State of israel

Israel's first Biennial Transparency Report and fourth National Communication Report

2025

המשרד להגנת הסביבה

الوزارة لحماية البيئة

Israel Ministry of Environmental Protection

ISRAEL'S FIRST BIENNIAL TRANSPARENCY REPORT To the United Nations Framework Convention on Climate Change

This report was prepared and edited by the Ministry of Environmental Protection – March 2025

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Introduction

This report represents Israel's first Biennial Transparency Report (BTR) and fourth National Communication (NC), submitted under the Enhanced Transparency Framework established by Article 13 of the Paris Agreement. The BTR and NC aim to provide a comprehensive overview of Israel's climate change actions in light of the objectives of the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. The purpose of this report is to ensure transparency and to track progress towards Israel's nationally determined contributions (NDCs), adaptation efforts, support provided or mobilized, and investments in education and research, while informing the global stocktake process process.

The report covers climate actions within the **recognized boundaries of the State** of Israel, providing insight into national circumstances, policies, measures, and achievements. It also highlights challenges and areas requiring further development to meet the goals set under the Paris Agreement.

The following provides an outline of the report:

- **National Inventory Report (submitted separately)** summarizes trends in national greenhouse gas (GHG) emissions and removals over the years 1996-2022, based on Israel's GHG inventory, and highlights key findings.
- **Chapter 1** describes Israel's national circumstances and institutional arrangements relevant to climate action. It also outlines the country's climate policy framework, including policies and measures implemented across various sectors, along with projections for GHG emissions and removals under existing policies.
- **Chapter 2** discusses adaptation to climate change, outlining governance structures, national priorities, and actions taken to enhance resilience in key sectors. It also identifies good practices, challenges, and gaps in adaptation efforts.
- **Chapter 3** provides an overview of Israel's support for climate action in developing countries, detailing financial contributions, technology transfer, and capacity-building efforts aligned with the goals of Articles 9, 10, and 11 of the Paris Agreement.
- **Chapter 4** focuses on education, training, and public awareness, emphasizing Israel's efforts to engage the public, enhance climate literacy, and build capacity through education and outreach initiatives.
- **Chapter 5** explores research and systematic observation, presenting key advancements and investments in climate science, monitoring, and data collection, as well as Israel's contribution to global climate research initiatives.
- **Chapter 6** focuses on the improvements made in monitoring and reporting in this submission compared to previous years, in order to enhance the accuracy, transparency, and comprehensiveness of the report.

This report reflects Israel's commitment to transparency and its active role in addressing the global climate challenge. It is intended to foster dialogue, promote cooperation, and contribute to the collective efforts under the Paris Agreement.

Executive Summary

National Inventory Report (submitted separately)

Israel submits its first National Inventory Report (NIR) for the period 1996-2022 to the UNFCCC as a standalone document, providing a detailed account of national GHG emissions and removals, and outlining the methodologies, assumptions, and data sources used to ensure transparency. The report includes the Common Reporting Tables (CRT) for standardized data presentation. The NIR reflects Israel's commitment to improving emissions reporting, offering insights into emission trends and supporting future climate policy and mitigation efforts.

Main trends in national greenhouse gas emissions and removals are summarized in this report under chapter 1.

Chapter 1: Information necessary to track progress made in implementing and achieving nationally determined contributions under Article 4 of the Paris Agreement

Israel's Nationally Determined Contribution (NDC) under Article 4 of the Paris Agreement commits to **a 27% absolute reduction in net greenhouse gas (GHG) emissions by 2030 compared to 2015**, capping emissions at 58 MtCO2e. **By 2050, the target is an 85% reduction**, limiting emissions to 12 MtCO2e. These commitments are anchored in Government Resolution No. 171, "Transition to a Low-Carbon Economy," and were officially submitted to the UN ahead of COP26 in Glasgow, 2021. During COP26 Israel **declared a Net-Zero GHG emissions target for 2050**.

Sectoral targets have also been established in Government Resolution No. 171 and in Israel's NDC for electricity generation, transportation, waste management, and industry. In this report, baseline emissions were updated to align with IPCC AR5 GWP values, this in turn affects target emissions. **Israel is actively tracking its progress toward achieving sectoral and economy-wide targets**. Significant milestones and challenges were observed across key sectors in 2022: Israel's **total GHG emissions were 81million tons CO2e**, representing an absolute increase of around 40% relative to 1996 GHG emissions, and 0.4% relative to 2015 emission levels. However, emission intensity has shown an overall declining trend since 1996 both in terms of GHG emissions per capita and in terms of GHG emissions per GDP. In 2021, per capita values reached their lowest levels since the inventory was first published in 1996, at 8.36 tCO2e/capita (down from 8.96 in 2019). In 2022 the GHG emissions per capita increased a bit to 8.48 tCO2e/capita.[1] Emissions per GDP were 0.23 tCO2e/$1000 GDP in 2021 (down from 0.25 tCO2e/$1000 GDP in 2020) and decreased to 0.22 tCO2e/$1000 GDP in 2022.[2]

Fuel combustion is the primary source of greenhouse gas emissions (77.5%), with 45.2% of emissions stemming from fuel combustion in the energy sectors (electricity generation and fuel refining). In **electricity generation**, emissions decreased by 9.5% by 2022 compared to 2015, with renewable energy contributing 10.4% of total electricity consumption. Delays in the planned closure of coal units present challenges, however, the accelerated installation of renewable energy capacity offers optimism.

[1] Israel GHG inventory 2022, CBS

[2] Calculated from Table 11.3 - GDP of Total Economy by Industry, CBS, and Israel GHG inventory, 2022, CBS

In the transportation sector, emissions rose by 9.4% compared to 2015. This can be partly explained by a rise of 3.1% in private vehicle travel per citizen. Despite this, progress was made in electrification, with electric buses comprising 17.7% of municipal bus purchases in 2022, compared to 1.1% in 2021. In Addition, average GHG emissions from new private vehicles decreased by 12.1% relative to 2015.

The industrial sector saw a 14.9% increase in emissions since 2015, with limited progress on reducing fuel oil use and HFC imports, underscoring the need for stronger measures.
In waste management, emissions increased by 9.3% compared to 2015, despite improvements in recycling rates, which reached 24% in 2022 compared to 19% in 2015. Efforts to reduce landfilled municipal waste have yet to yield significant results.
While progress varies across sectors, Israel remains committed to implementing measures to close the gap toward achieving its climate goals.

Israel has implemented comprehensive **policies and measures** across sectors to mitigate greenhouse gas emissions and promote sustainability in alignment with its climate targets. These efforts are outlined in various government resolutions and in the National Action Plan on Climate Change (2022–2026), which includes 100 economy-wide and sectoral measures addressing mitigation, adaptation, finance, and reporting. Key implemented measures include, inter alia, a carbon pricing mechanism, significant funding for public transportation related projects, renewable energy and energy efficiency projects, adaptation and mitigation plans in local authorities, climate innovation, and waste management; electric appliance import reform, opening the market for renewable energy power purchase agreements (PPA), electrification of passenger train network, and more.
The government has adopted resolutions to phase out coal-fired electricity generation by 2026, expand public transportation, and promote zero-emission vehicles, supported by substantial funding for infrastructure. In the waste sector, efforts focus on organic waste treatment, source separation, and reducing landfill reliance.

Planned measures include, inter alia, enacting climate legislation, further incentivizing renewable energy, and introducing net-zero frameworks for the energy and transportation sectors.

Projections of greenhouse gas emissions and removals: Israel's projections of GHG emissions and removals up to 2040 are modeled under two distinct scenarios: the "With Existing Measures" (WEM) scenario and the "With Additional Measures" (WAM) scenario. These scenarios reflect varying levels of policy implementation and ambition.
The WEM scenario considers the current rate of implementation for adopted measures that are not yet fully implemented. While it anticipates reductions in emissions, the 2030 economy wide target of a 27% decrease in emissions compared to 2015 levels is not projected to be fully achieved under this scenario. Notably, the electricity and transportation sectors are expected to meet their targets, while gaps remain in the waste and industrial sectors.
In contrast, the WAM scenario assumes a more ambitious trajectory, incorporating achieving higher levels of policy implementation. In the WAM scenario, the economy wide reduction goals are expected to be fully achieved. The targets for the electricity, transportation and waste sectors are expected to be fully met, with an overture of 9%, 0.6% and 28% respectively. However, the target for the industry sector is not expected to be met.

Chapter 2: Information related to climate change impacts and adaptation under Article 7 of the Paris Agreement

Israel is experiencing intensified impacts of climate change due to its location in a "hotspot" and being a "desert threshold" country. Observed and projected trends indicate increasing temperatures, decreasing precipitation, rising sea levels, and more extreme weather events.
Average temperatures have risen by 0.6°C per decade, a trend that is expected to continue, leading to a greater number of hot days and nights per year, a rise in sea temperature, increased rates of evaporation and a greater occurrence of hazy days.

Rainfall has declined both in volume and frequency, exacerbating desertification, droughts, and the drying of water sources. Sea levels have risen by 14.9 cm in the past 19 years, posing risks to coastal infrastructure, tourism, and groundwater extraction due to saltwater intrusion. Extreme weather events, including heatwaves, flash floods, and forest fires, are becoming more severe and frequent, with significant environmental, economic, and human consequences.

These impacts threaten multiple sectors, including security, energy, infrastructure, public health, and agriculture. The Ministry of Defense has acknowledged these risks as part of its National Security assessment.

Israel's National Adaptation Plan (NAP) outlines key domestic priorities to ensure national resilience while promoting social, economic, and environmental prosperity in the face of climate change. The plan emphasizes addressing vulnerable populations through inclusive policies, using nature-based solutions to preserve ecosystems and enhance climate resilience, and adopting model-based solutions for flexibility in decision-making under uncertainty. Multi-sectoral and international collaborations are recognized as essential for sharing knowledge and resources, while local authorities are viewed as critical partners for tailoring adaptation efforts to community needs. Despite progress, Israel faces several challenges: limited regional collaboration due to diplomatic barriers, difficulties in creating accurate economic forecasts to quantify climate risks, and the relatively recent recognition of adaptation as a national priority. The establishment of the Ministry of Environmental Protection's Department of Climate Resilience in 2022 marks a step forward, but the short timeframe for implementation highlights the urgency of advancing adaptation efforts amid increasing climate impacts.

Israel has developed comprehensive **adaptation strategies and policies** to address climate change impacts and strengthen national resilience, aligning with global goals under the Paris Agreement. In addition to the NAP mentioned above, Resolution 4079 established the National Adaptation Administration (The Secretariat) to oversee inter-ministerial coordination, research, and monitoring of adaptation efforts. Additionally, it promotes adaptation efforts in local authorities, with 55 local authorities currently engaged in tailored adaptation plans covering 55% of Israel's population.

Israel has made significant **progress in implementing its adaptation strategies** through various government resolutions and initiatives. For example, the urban shading initiatives under resolution 1022, is being implemented in 21 local authorities, benefiting 45% of the population. Additionally, forest fire prevention plans under resolution 1091, mitigate forest fires by focusing on developing buffer zones and managing risks. Lastly, the National Climate Computing Centre, under resolution 1791 was established to provide high-resolution risk maps and vulnerability analyses, to support data-driven adaptation planning for local and regional governments. These combined efforts reflect Israel's commitment to enhancing resilience, integrating science-based tools, and fostering coordinated action to address climate risks effectively.

It is important to note that Israel is currently in advanced stages of legislating a climate law, that will solidify many of these initiatives and resolutions into law, and thus ensuring that commitments are upheld.

Israel integrates best-available science, gender perspectives, and local knowledge into its policies, ensuring climate strategies are inclusive, equitable, and grounded in robust research. By fostering collaboration across stakeholders, from government ministries to local communities, Israel is enhancing its adaptive capacity while promoting co-benefits such as carbon sequestration, improved urban environments, and sustainable resource management.

Israel is engaged in cooperations, shares good practices, experience and lessons learned through MASHAV, IIsrael's agency for international development cooperation.

It operates under the Ministry of Foreign Affairs to promote sustainable development by sharing Israel's expertise and innovative technologies. Through capacity-building programs, on-the-spot training, and expert consultancies in over 140 partner countries, MASHAV focuses on areas where Israel holds a comparative advantage, including food security, public health, education, gender equality, and emergency response. By prioritizing human capacity development and a "training of trainers" approach, MASHAV empowers communities to drive their own transformation and resilience.

Chapter 3: Information on financial, technology development and transfer and capacity-building support provided and mobilized

During 2021-2022, Israel mobilized **financial support** through public interventions, bilateral, and multilateral channels to enhance climate change mitigation, adaptation, and environmental protection. Funding was directed to international environmental conventions, including the UNFCCC, Kyoto Protocol, and Vienna Convention, as well as environmental projects in the Palestinian Authority, such as waste fire extinguishing, waste removal, and river cleaning. These efforts addressed pollution control and waste management, with funds allocated directly to contractors for effective implementation. Detailed financial data can be found in the corresponding Common Tabular Format – Support tables.

Israel actively **supports technology development and transfer** to address global climate challenges, focusing on water, energy, and sustainable development, through initiatives like Israel-India Industrial R&D and Technological Innovation Fund (I4F), which fosters bilateral collaboration to co-develop and commercialize technologies in sectors such as water, agriculture, and healthcare, leveraging private sector expertise and funding. In addition, through the NGO Innovation: Africa, Israeli solar and water technologies have transformed rural communities in over 10 African countries, providing clean water, electricity, and capacity-building training to ensure long-term sustainability. Both programs provide support across the entire technology cycle, enhance local capacities, and encourage innovation through research and development or through deployment efforts.

Israel provides substantial **capacity-building support** through MASHAV, focusing on climate resilience, sustainable agriculture, water management, and education. Key initiatives include wastewater management training for Indian professionals and study visits for Uzbek and Kazakh water experts to adopt Israel’s innovative water solutions. The Golda Meir MASHAV Mount Carmel International Training Center (MCTC) promotes sustainable development and women’s empowerment globally, while the MASHAV International Agricultural Training Center (MATC) transfers advanced agricultural knowledge to address food security challenges. MASHAV’s Centers of Excellence in agriculture, particularly in India, improve yields and empower local farmers. Additionally, DeserTech fosters innovation to combat desertification in the Great Green Wall region, and humanitarian organization IsraAID builds long-term resilience in communities affected by climate crises.

Organizations like Tevel b'Tzedek focus on mobilizing youth, empowering women, and supporting smallholder farmers to strengthen community resilience in Africa and South Asia, while EcoPeace Middle East promotes regional cooperation on water, energy, and climate solutions through education and multi-stakeholder involvement. These initiatives reflect Israel's commitment to sharing expertise and fostering global partnerships to address climate change.

Chapter 4: Education, training and public awareness

Since the last National Communication, significant developments have occurred in climate education and public awareness in Israel. A climate education program was introduced for all students from kindergarten to high school starting in the 2022-2023 school year. The Green Schools and Green Kindergartens certification programs, which encourage schools to not only teach environmental subjects, but also to act in a sustainable manner, were expanded, certifying tens of schools and hundreds of kindergartens annually. Higher education opportunities in sustainability have increased, with new undergraduate and graduate programs launched across most universities. Government ministries and NGOs have expanded climate-related training opportunities for teachers and professionals, while public awareness campaigns have led to a notable decrease in water consumption and an increase in recycling rates. Informal education opportunities have also grown, supported by greater NGO involvement and new international climate education collaborations. These efforts are underpinned by government support, reinforcing climate education and the professional training needed to address environmental challenges.

Chapter 5: Research and systematic observation

Since the last National Communication, Israel has made significant advancements in research and systematic observation related to sustainability and climate technology. In July 2023, the Ministry of Education and Culture approved a flagship program to promote sustainability research. As of 2022, Israel is home to 784 climate tech startups, supported by significant government funding. The Israeli Innovation Authority allocated $71.4 million in 2022—16% of its annual budget—to support climate tech ventures across all stages, including academic research, pilot projects, and scale-up initiatives, with additional contributions from other ministries and agencies.

To enhance domestic cooperation, the Israel Research Core Facilities (IRCF) was established in December 2022, enabling stronger collaboration between research institutions. Additionally, three research consortiums were launched, focusing on cultured meat, circularity solutions with black soldier flies, and bioplastics. Climate change observation efforts are led by the Israel Meteorological Service, which provides essential meteorological and climate data.

On the international front, Israel actively participates in collaborative frameworks such as CORDEX, Horizon 2020, and ERA-NET. In 2022, Israeli organizations secured €22 million through Horizon Europe, benefiting 55 Israeli entities. Further strengthening global partnerships, Israel and the USA announced a research collaboration focusing on advanced technologies, including biotech and climate change solutions.

Chapter 6: Improvements in Reporting

Israel's first Biennial Transparency Report introduces key enhancements to its climate reporting. The GHG emissions projection timeline has been extended to 2040, and a new "With Additional Measures" (WAM) scenario has been added to assess the impact of current and planned policies. A GHG Emissions Projection Methodology Document was developed to improve transparency, and The Central Bureau of Statistics (CBS) has accelerated GHG data publication, enabling more timely decision-making and policy action. The preparation of Israel's first National Inventory Report (NIR) has led to a deeper analysis of greenhouse gas emissions, improving understanding of emission patterns and trends.

Chapter 1

Information necessary to track progress made in implementing and achieving nationally determined contributions under Article 4 of the Paris Agreement

1. National circumstances and institutional arrangements

Key developments since the last National Communication report

- Israel faces a temperature increase of approximately 0.6°C per decade in the last three decades, compared to a global average increase of about 0.22°C per decade for the period 1991–2020[3]. 2022 was a relatively cool year compared to recent trends, with a mean daily temperature of 20.4°C, compared to an average of 21.2°C in the last decade (2022 was the coolest year since 2011). When compared with greater overall trends, however, 2022 was still quite warm, measuring 0.9°C higher than the 1961-1990 average.
- The population of Israel has been rising steadily since 2000, reaching 9.66 million residents in 2022 (yearly average), representing a growth of 53% during that period. Accordingly, the population density has grown by 52% at the same time period- from 278 to 424 people per square kilometer.
- During 2000-2022, the average annual population growth rate was 1.97%, of which approximately 18% originated from net immigration. In 2022, approximately 39% of Israel's population growth originated from immigration. 74.7 thousand immigrants arrived in Israel this year - nearly three times higher than in 2021 (25.5 thousand) and the highest since 2000. This was mainly influenced by the Russia-Ukraine crisis, which began on February 24, 2022.[4]
- Israel's economic growth has continued to be strong, with an average annual growth of approximately 4% over 2010-2019. However, the COVID-19 pandemic has had profound effects, with a 1% decrease in the GDP between 2019 and 2020. Despite this decrease, during 2020-2022, the GDP grew a total of 15% with an annual average growth of 8%.[5]
- The share of natural gas in total primary energy consumption nearly doubled from 2010 to 2022: It rose from approximately 22% in 2010 to 35% in 2016, to 39% in 2019 and then to 43% in 2021 and 2022. In 2019, the Leviathan gas field began supplying large amounts of natural gas, enabling both exports to neighboring countries, as well as increased competition in the market.[6]
- The share of coal in the primary energy mix has decreased by approximately 50% from 2010 to 2022 - from approximately 32% in 2010 to 23% in 2016, and then to 21% in 2019, and 15% in 2022. The share of petroleum fuels in the primary energy mix fell from approximately 45% in 2010 to 39% in 2015, 35% in 2020, and then to 37% in 2022. The share of renewables in the primary energy mix has increased from 3% in 2016 - 2019 to 5% in 2022.
- Renewables accounted for 9.8% of power generation in 2022, while natural gas accounted for 68% and coal for 22%.

[3] Analysis of climatic trends and extreme events in Israel through the 21st century, IMS, 2024

[4] Statistical Abstract of Israel 2023 - No.74, CBS

[5] CBS 11.3 - GDP of Total Economy by Industry

[6] State of Energy Report, Ministry of Energy, 2024

- Electricity consumption nearly doubled from 2010 to 2022: It increased from approximately 54 TWh in 2010 to approximately 61 TWh in 2016 to 67.1 TWh in 2020 to 70.9 TWh in 2022.
- Water consumption per capita in 2022 was 243 m^3, an improvement of 21% relative to per capita consumption of 306 m^3 in 2000.[7]
- In 2022, 90% of domestic wastewater was recycled and used for agriculture as well as for urban irrigation and landscaping.[8]
- In 2000-2022, 9 major heat waves struck Israel. Many of them were extended in duration and some of them set new temperature records.[9]

In this report, recent data from 2021-2022 is compared to 2015-2019 data (reported in Israel's Third National Communication Report and Second Biennial Update Report) and/or to previous reference years (2010, 2000, etc). 2020 data is presented for specific parameters however due to COVID-19, 2010-2019 and 2021-2022 are more indicative of the long-term trends.

Geographic profile

The State of Israel is located on the southwest tip of the Asian continent, in the eastern basin of the Mediterranean Sea. The country lies at a latitude between 29° and 33° north of the Equator, with a total area of 22,072 km2 (including East Jerusalem as of 1967, and the Golan Heights as of 1982), 97.8% of which is land and 2.2% of which are bodies of water (Sea of Galilee and the Dead Sea).[10]

Land resources

Land resources in Israel include fertile plains and arid zones, coastline and desert, mountain ranges, and the lowest point on earth — the Dead Sea — all in close proximity. Arid zones comprise approximately 45% of the country. The remainder includes plains and valleys (25%), mountain ranges (16%), the Jordan Rift Valley (9%) and the coastal strip (5%). The most recent data regarding Israel's land resources is from 2013; for further detail please see the Third National Communication Report submitted in 2018.

[7] CBS 23.6 - Water Production and Consumption
[8] CBS 23.7 - Raw Sewage in Treatment Plants
[9] A review of extreme weather events in Israel over the past century, IMS, 2024
[10] CBS 1.1 - Area of Districts, Sub-Districts, Natural Regions and Lakes

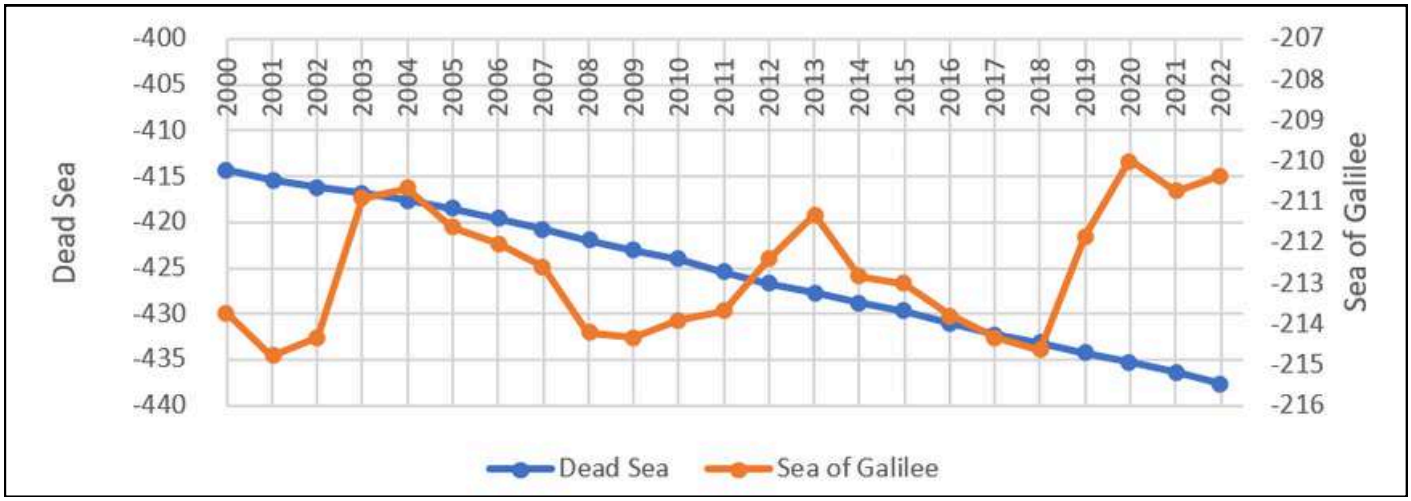
Water resources

Israel is located in an area characterized by scarcity of natural water resources, and faces various challenges regarding water resource management. Natural freshwater resources can be divided into aboveground reservoirs (the Sea of Galilee) and subterranean groundwater reservoirs (aquifers).

As can be seen in the following graph, the Dead Sea water level has continued to decline at a rate of approximately one meter per year. This decline is attributed to the diversion of incoming water from the Jordan River to the north and to industrial utilization of mineral resources from the Dead Sea.[11]

As seen in the graph below, between 2014 and 2018, the water level of the Sea of Galilee declined, this trend is explained primarily by low precipitation in this period. However, from 2019 to 2022, a significant rise in the water level was observed, attributed to increased precipitation and a reduction in the amount of water extracted from the lake. In 2021, the water level decreased by 75 meters as the amount of water extracted exceeded the volume added by precipitation. From 2021 to 2022, Sea of Galilee levels increased by 4 meters to 210.35 meters below sea level.[12]

Figure 1: Sea of Galilee and Dead Sea levels relative to mean sea level (meters)



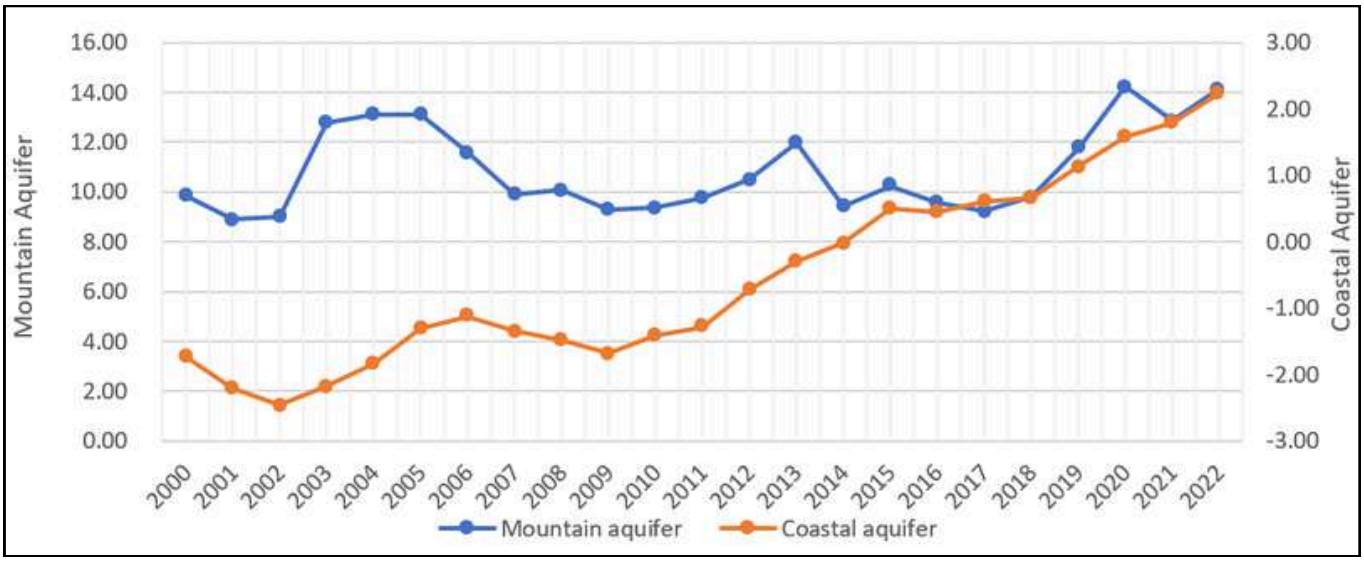
Groundwater (aquifers) serves as one of Israel's primary water sources. Water levels are directly affected by consumption activities and precipitation infiltration into aquifers. From 2002 to 2022, coastal aquifer levels increased, which can be attributed to decreased pressure on the water resources due to the growing use of desalinated seawater. Mountain aquifer levels remained relatively stable.[13]

[11] CBS 23.2 - Water Level of the Sea of Galilee and the Dead Sea and Salinity in the Sea of Galilee

[12] Statistical Abstract of Israel 2023 - No.74, CBS

[13] CBS 23.1 – Water Levels of Aquifers in Selected Drillings and Average Salinity

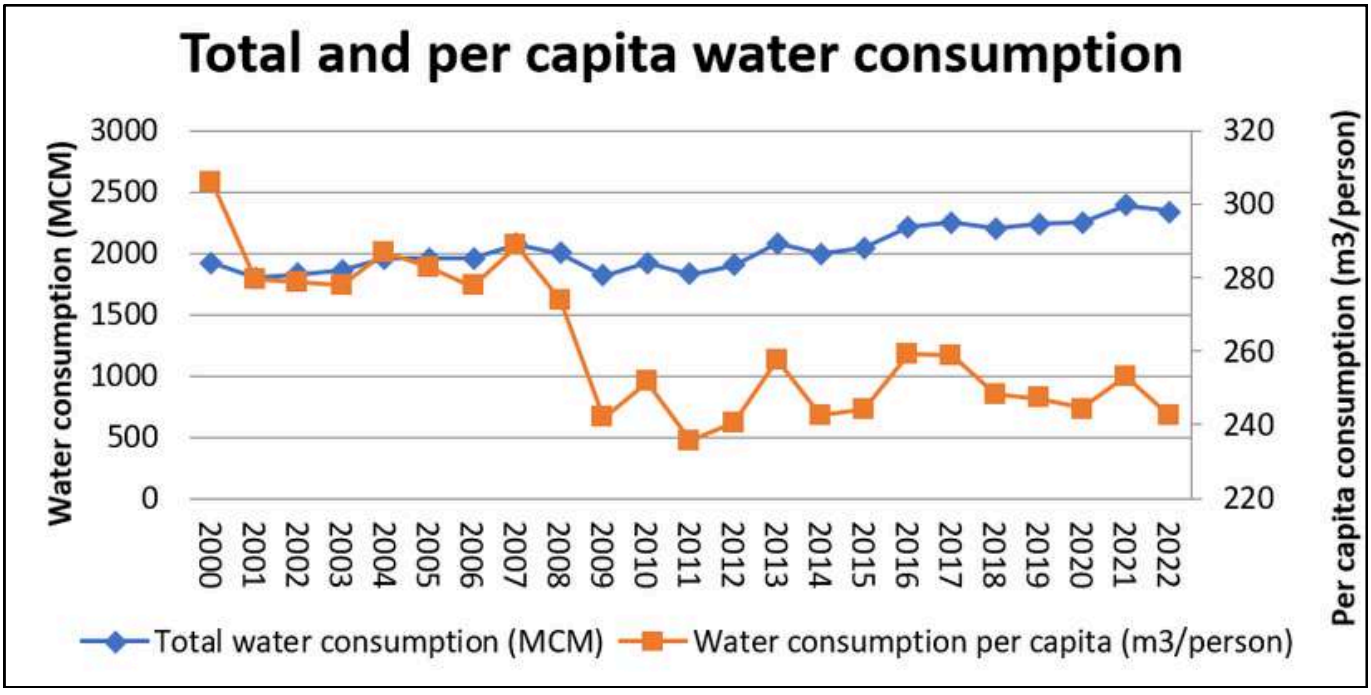
Figure 2: mountain aquifer and coastal aquifer water levels relative to mean sea level (meters)



Water consumption

Total water consumption in Israel has increased by 22% over the period 2000-2022. Most of the increase is attributed to recent years – 15% between 2015 and 2022 alone. In contrast, water consumption per capita has declined: in 2022, water consumption per capita was 243 m³, an improvement of 21% relative to per capita consumption of 306 m³ in 2000. Between 2019 and 2022, per capita water consumption did not change significantly (by only 2%).
The increase in total water consumption is therefore attributed to the high population growth rate. [14]

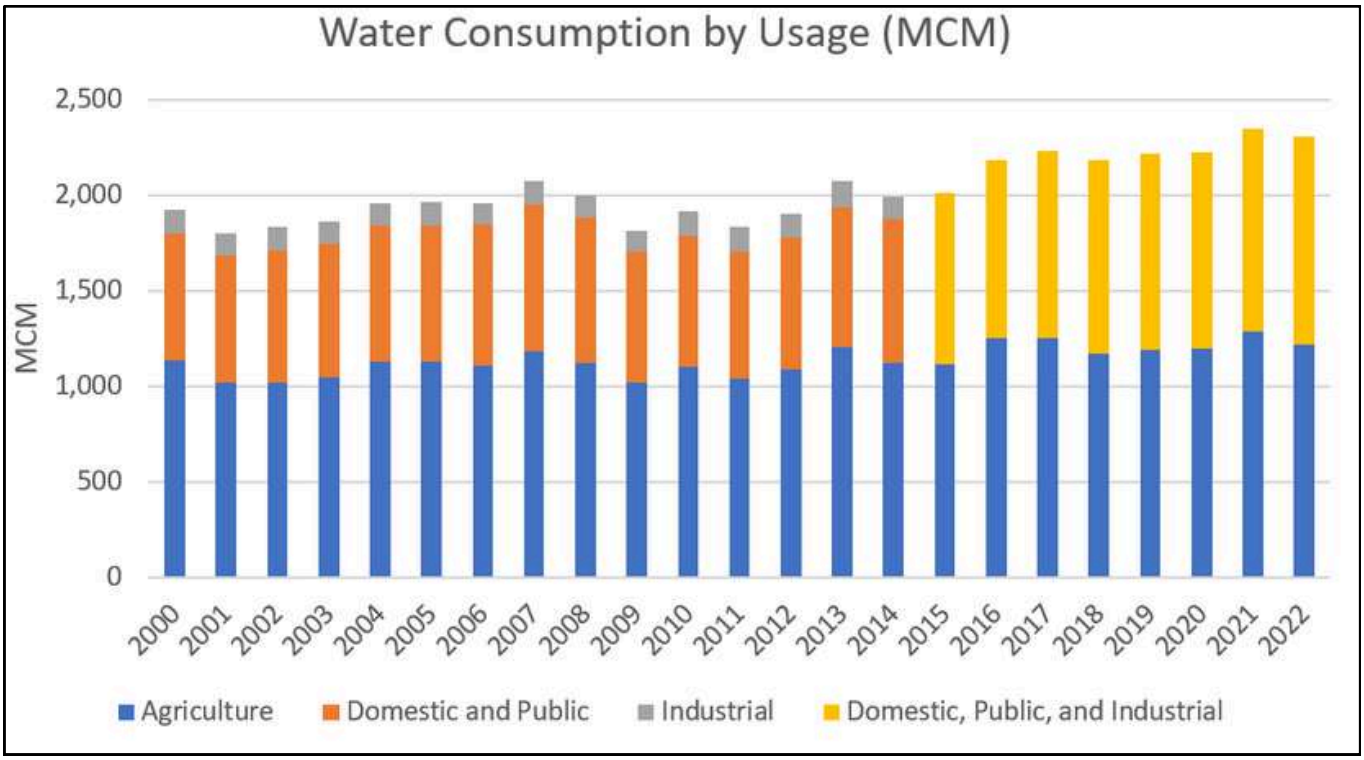
Figure 3: Total and per capita water consumption



[14] CBS 23.6 – Water Production and Consumption

In 2022, agriculture accounted for approximately 52% of the total water consumption; this proportion has remained relatively stable since 2000, as illustrated by the following graph. [15]

Figure 4: Total water consumption by usage (MCM)



* Since 2014, the classification method for the Public and Industrial sector has changed, and their consumption has since been combined with domestic consumption.

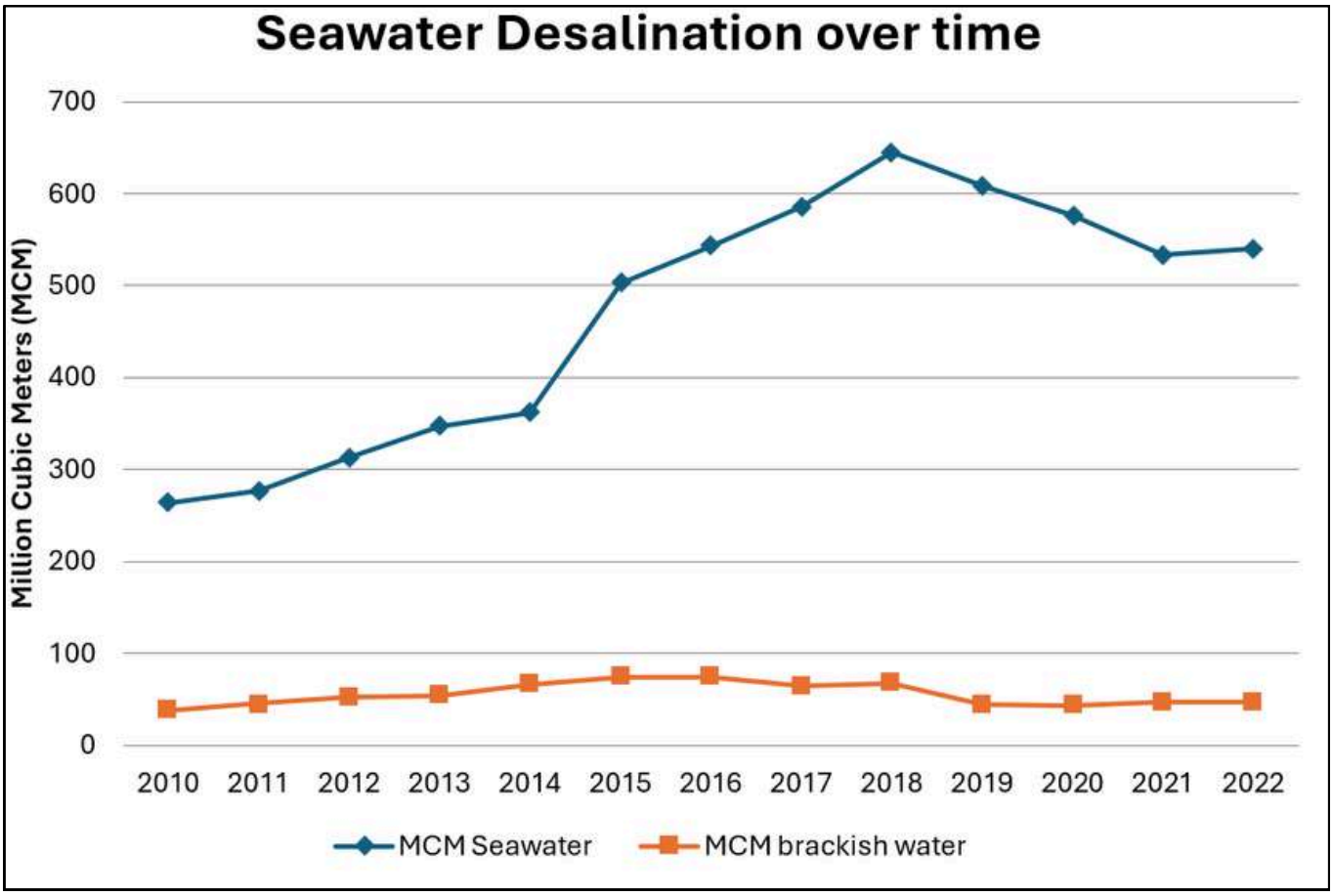
Water desalination [11]

Water scarcity in Israel has led to the development of advanced technologies for seawater and saline water desalination and wastewater treatment and recovery. Seawater desalination increased by 120% between 2010 and 2019, from 277 million cubic meters (MCM) to 609 MCM. From 2019-2022, water desalination has declined by 11% from 609 MCM in 2019 to 540 MCM in 2022. There was a spike in the amount desalinated between 2014 and 2015, from 351 to 503 MCM – a 43% increase. From 2015 to 2018, desalination increased by 28%, to 645 MCM, then decreased by 5.6%, to 609 MCM in 2019, and then continued to decrease from 2019-2021 before plateauing in 2022.[16]

As of 2022 there were five main seawater desalination facilities in Israel: Sorek (responsible for 28.6% of total desalination), Hadera (25.1%), Ashkelon (15.6%), Ashdod (15.4%) and Palmachim (15.4%). A few small facilities desalinate a combined total of less than 100 MCM of brackish water from the aquifer, for agricultural and industrial use.

[15] CBS 23.6 – Water Production and Consumption
[16] CBS 23.6 – Water Production and Consumption

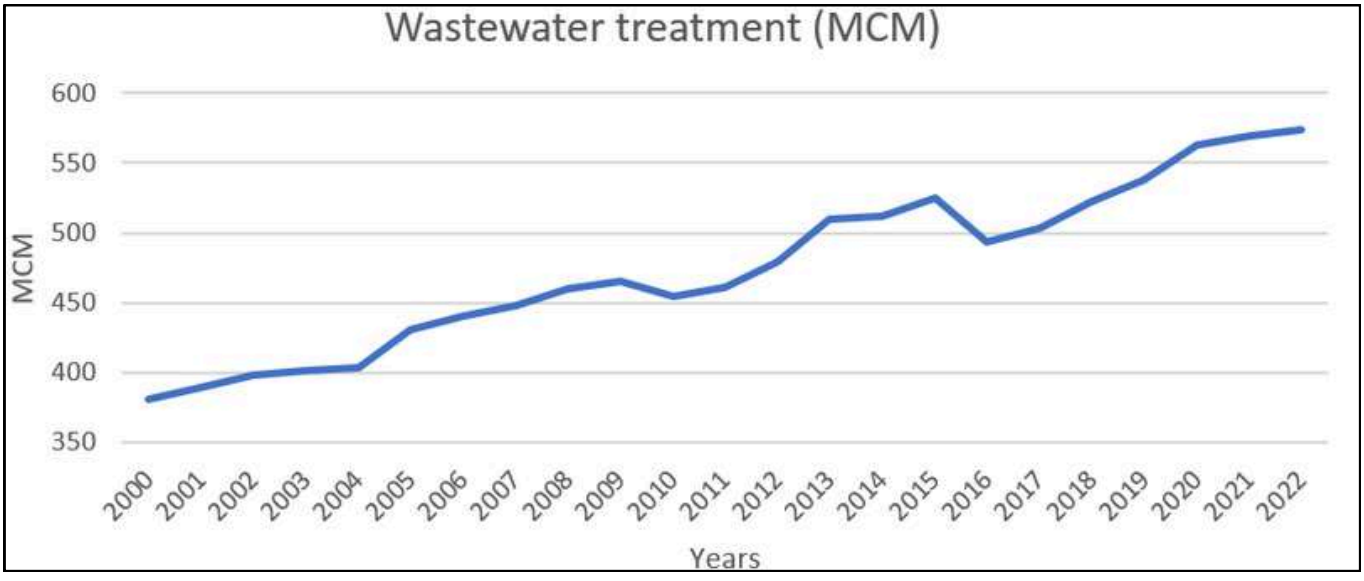
Figure 5: Water desalination in Israel



Wastewater recycling

Israel is a global leader in wastewater recycling. In 2022, approximately 90% of domestic wastewater was recycled and used for agriculture and urban irrigation and landscaping – a 2% increase from 2015 and a 3% increase since 2019. In the same year, 574 MCM of wastewater were treated, an increase of 51% from the 380 MCM treated in 2000.[17]

Figure 6: Wastewater Treatment (MCM)



[17] CBS 23.7 – Raw Sewage in Treatment Plants

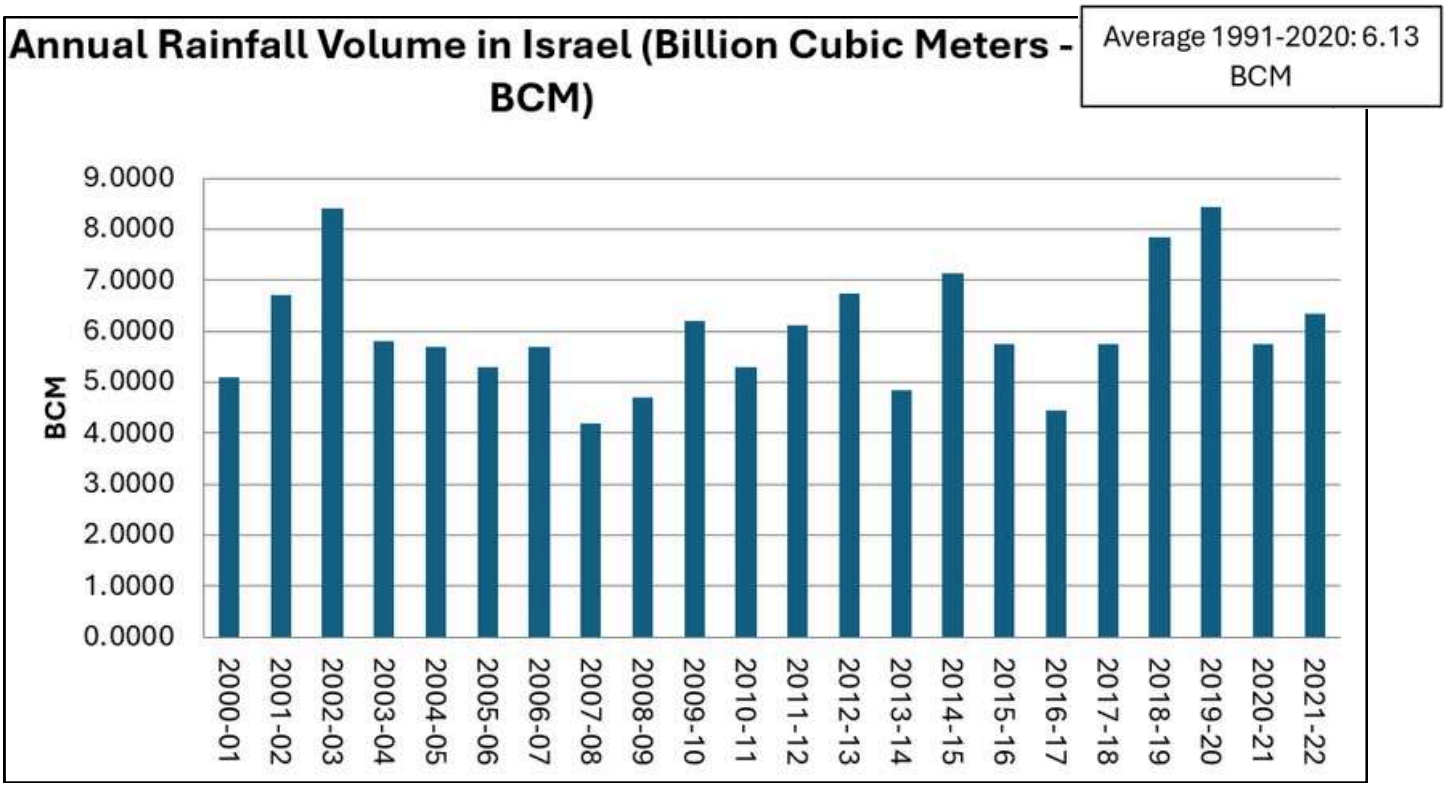
Climate profile

Israel lies in a transition zone between the hot and arid southern part of West Asia and the relatively cooler and wetter northern Mediterranean region. The northern part of Israel is characterized by a Mediterranean climate, while the southern part is arid, with a narrow, semi-arid strip in between. Israel's climate is characterized by hot summers and mild winters. Rainfall varies significantly across the country and from year to year.

Rainfall

The most crucial component of Israel's climate is the rainfall regime. Changes in the rainfall regime, including annual quantity, number of rain spells, seasonal distribution, intensity and timing, all have significant impacts on the country's water resources.16 Mean multi-annual rainfall is calculated for 30-year periods to adequately characterize the rainfall regime in accordance with the World Meteorological Organization (WMO) guidelines. In Israel, the most recent measurement period is 1991-2020. In this period the average annual rainfall volume was 6.13 BCM.[18] Average annual rainfall during 2021-2022 was not much higher, at 6.34 BCM. However, 2019-2020 and 2018-2019 were characterized by a large number of rainy days and frequent rain showers, with average annual rainfall volume of 8.44 BCM and 7.84 BCM respectively. The previous 3 years were characterized by a low average annual rainfall: 5.7 BCM in 2015-16, 4.5 BCM in 2016-17, and 5.7 BCM in 2017-18.[19]

Figure 7: Annual rainfall volume in Israel (BCM)



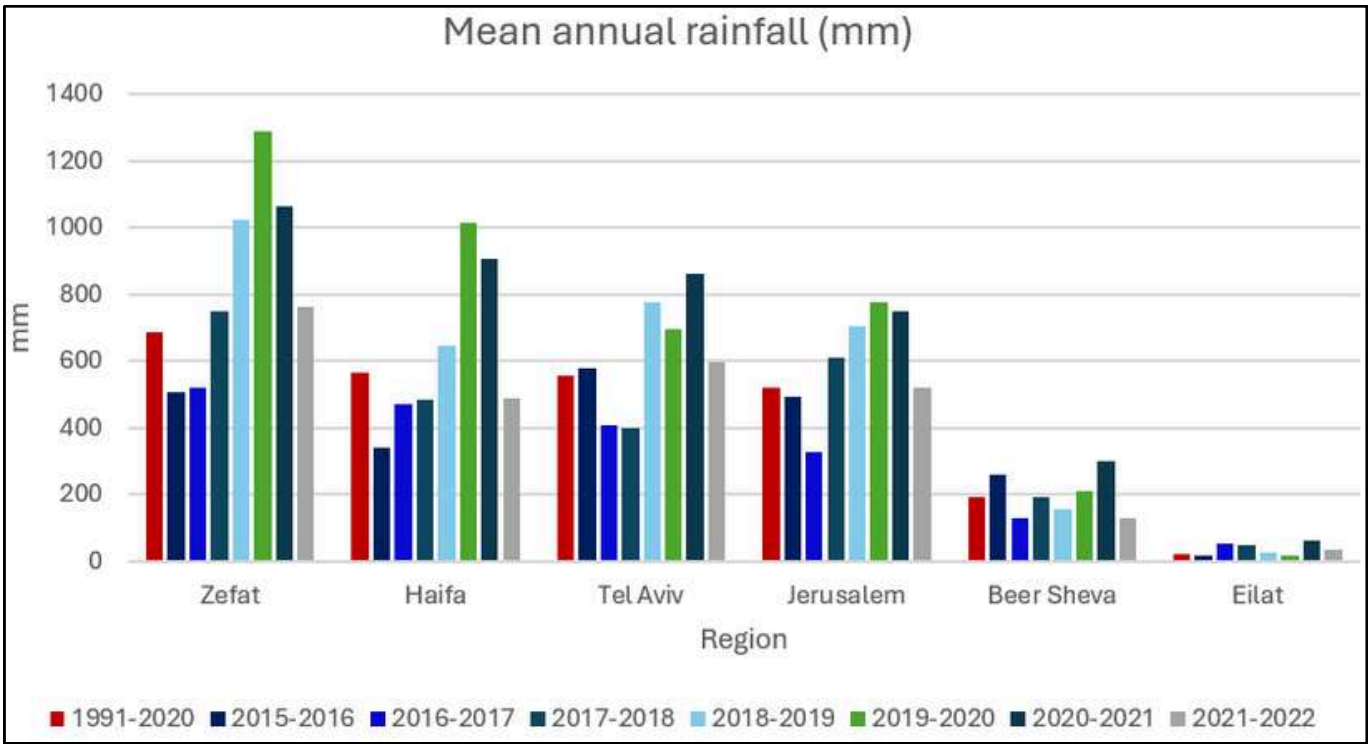
[18] Statistical Abstract of Israel 2023 - No.74, CBS

[19] IMS, 2024

According to the multi-year average for 1991–2020, the annual average precipitation in Safed is 688 mm, in Haifa 565 mm, in Tel Aviv 557 mm, in Jerusalem 522 mm, in Be'er Sheva 192 mm, and in Eilat only 23 mm.[20]

The graph below compares the mean annual rainfall by locality of 2021-2022 and previous years to the mean multi-annual rainfall by locality (1991-2020).
In 2021-2022, the distribution of rainfall relative to the average was uneven—central Israel and parts of the north experienced above-average rainfall, while the south received below-average rainfall.

Figure 8: Mean annual rainfall by region, compared to mean multi-annual rainfall (1981-2010)



Temperature
Although slightly lower than in the 1950s and 1960s (due to relatively high temperatures in those decades), the mean annual temperature has increased steadily since 1990.

Like precipitation, mean temperatures are also measured over long-term periods. The most up to date measurement period for mean local temperatures is 1995-2009, while the most up to date measurement period for mean national temperatures is 1961-1990. For elaboration see Israel's Third National Communication Report submitted to the UNFCCC in 2018.

The year 2022 was a relatively cool year compared to recent trends, with a mean daily temperature of 20.4°C, compared to an average of 21.2°C in the last decade (2022 was the coolest year since 2011). When compared with greater overall trends, however, 2022 was still quite warm, measuring 0.9°C higher than the 1961-1990 average.

[20] Statistical Abstract of Israel 2023 - No.74, CBS

Extreme weather events [21]

There have been several specific extreme weather events in Israel over the past few years.

For a week in May 2020 an extreme heat wave struck Israel. While it did not break any existing national records, at times temperatures reached over 40 degrees Celsius. This wave was notable because of its timing (in the spring), length (a whole week) and sequence of high temperatures measured. Climate scientists understand that heat waves have become more prevalent in Israel due to climate change – in the 21st century, periods of greater than three consecutive days when the temperature is at least six degrees above average have become much more frequent.

From the 29th of August 2020 until the 5th of September an unusually long heat wave struck Israel. Temperatures peaked at 45 degrees Celsius. The heat wave was largely felt in the Golan Heights, usually one of the cooler and wetter regions of Israel. During this heat wave, temperatures in the Southern and Northern Golan peaked at 44 and 40 degrees Celsius respectively.

For 2 weeks at the beginning of January 2021 there was an unusual and extended winter heat wave. Winter temperatures reached up to 23-26 degrees Celsius during this heat wave. There was a 9-10 day period during this heat wave with a temperature high of over 22 degrees in the lowlands and a high of over 24 degrees in the Negev desert.

For a week in August 2021 a wave of heat and dryness struck the lowlands and coastal plain of Israel. For the entirety of the week parts of the country measured 35 degrees with some areas measuring up to 40 degrees Celsius.

For 2 weeks in the middle of February 2022, there was an unusual cold spell in the country. In the warmer mountain and interior regions temperatures reached as low as 8-9 degrees Celsius. Temperatures in the coastal plain dropped even lower to 5-6 degrees Celsius. The coldest temperature during this period fell to -1 degrees Celsius.

[21] Review of extreme weather events in Israel in the last hundred years, IMS, 2023

Population profile

Population changes and growth

Population changes and growth patterns are fundamental drivers of trends in energy consumption, land use, housing density, and transportation, all of which have a significant impact on GHG emissions. In 2022, approximately 92% of the Israeli population lived in urban localities, which is consistent with the data from previous years. From 2000-2014, the percentage of the population in urban areas hovered between 92% and 93%; from 2015-19 the figure had remained constant at approximately 90%, before increasing to around 92% from 2020-2022.[22]

[21] Review of extreme weather events in Israel in the last hundred years, IMS, 2023
[22] CBS 2.15 – Population by District, Sub-District and Religion

Israel's population has risen steadily since 2000, reaching 9.66 million in 2022 (yearly average), as seen in the figure presented below.
The average annual growth rate during 2000-2022 was 1.97%, of which approximately 18% originated from net immigration. This annual growth rate is the highest among OECD countries, which averaged an annual population growth rate of 0.63% over the same period.[23]

Figure 9: Population of Israel (thousands) (2000-2022)

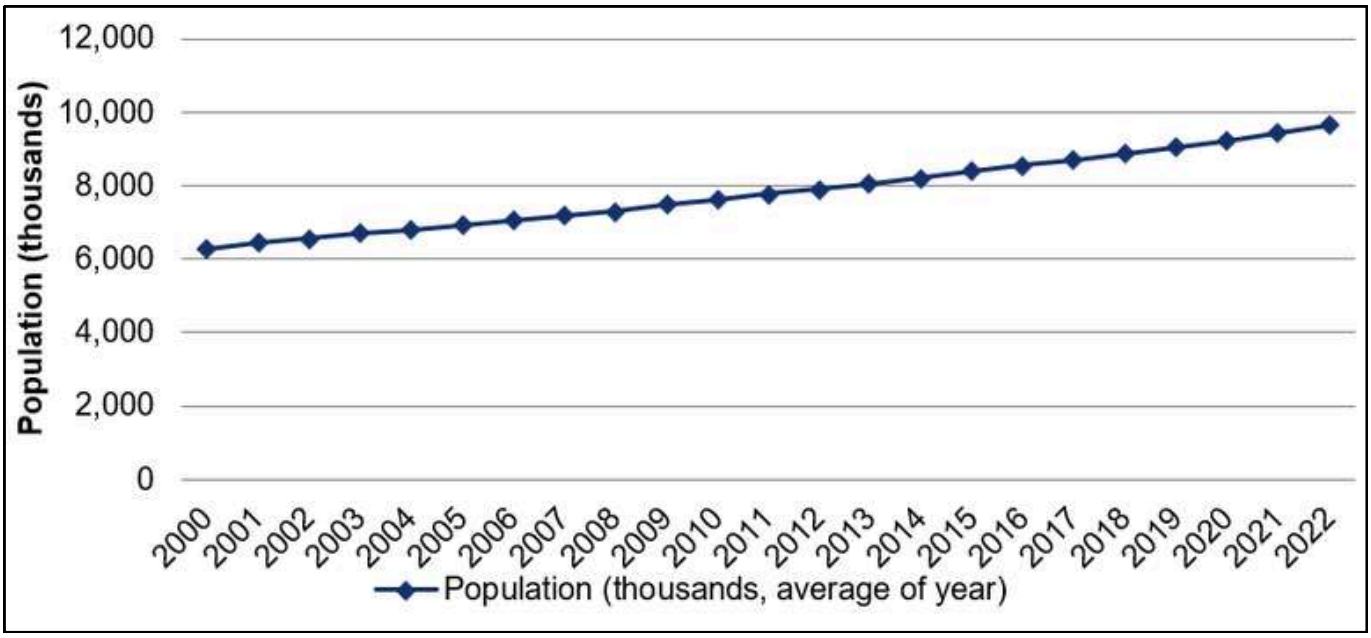
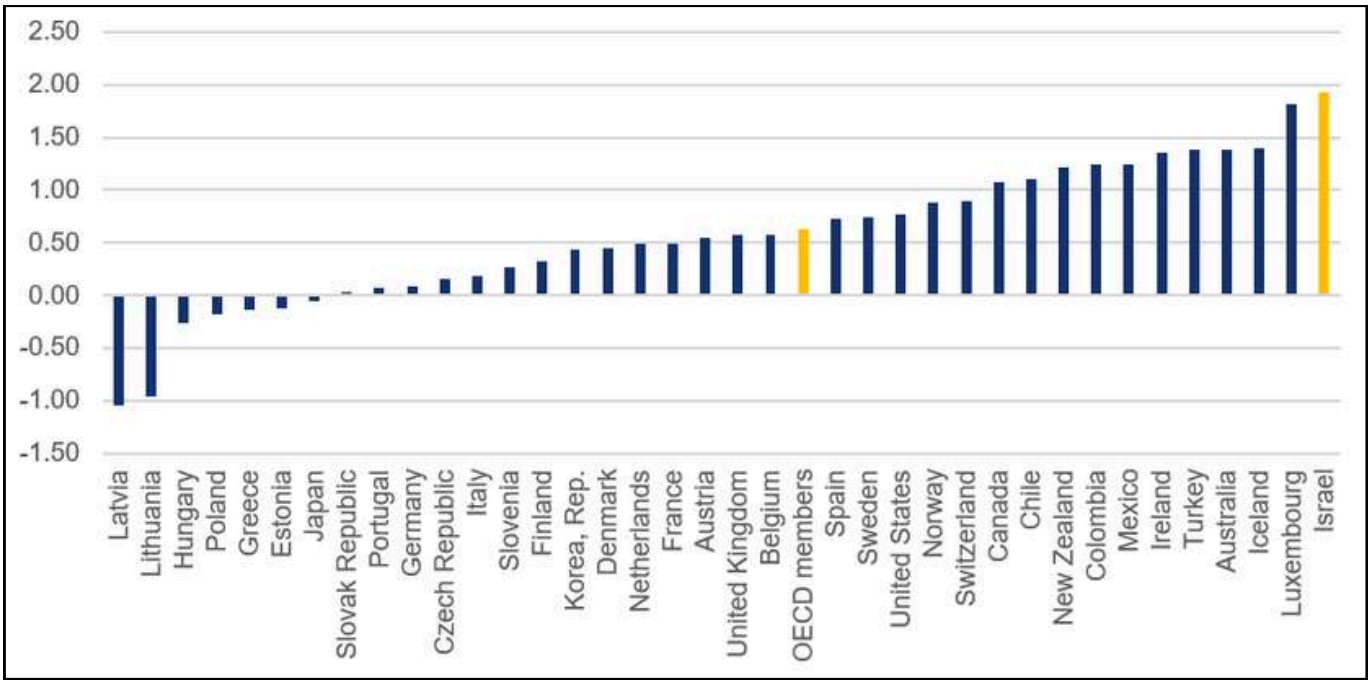


Figure 10: Annual growth rate- comparison to OECD countries (2000-2022), The World Bank World Development Indicators



[23] WDI – Population Growth (Annual %)

Density [24]

Israel's population density has increased steadily, from 278.7 people per km^2 in 2000 to 424.3 people per km^2 in 2022.

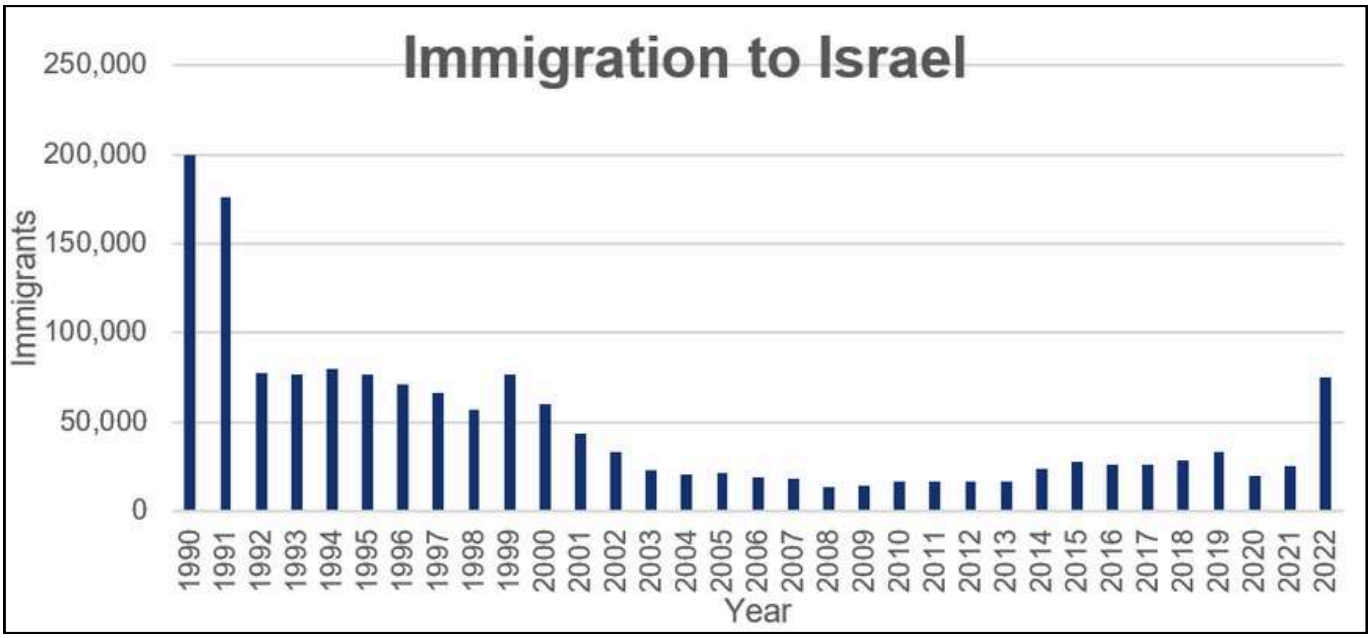
The population density varies greatly by region. The Southern and Northern districts are the least dense, with 100.3 and 344.8 people per km^2, respectively. The Tel Aviv district is by far the most dense, with 8,763.2 people per km^2. Together, the Tel Aviv and Central districts represent less than 7% of the country's land mass, but host 40% of its population.

Immigration [25]

Since its establishment, 3.3 million immigrants have arrived in Israel, approximately 48% of them arrived since 1990. In this year there was a peak in immigration (approximately 200,000 immigrants, mostly from the USSR) and since then immigration decreased to a minimum of only 13,701 immigrants in 2008. Immigration has since moderately increased, to 33,200 immigrants in 2019.There was then a decrease in immigration in 2020 with only 19,000 immigrants, likely as a result of the COVID-19 pandemic. However, by 2022, immigration highly increased to 74,000, the most in a year since 2000. The immigration rate was 7.8 per 1,000 residents. The significant increase in immigration to Israel in 2022 was mainly influenced by the Russia-Ukraine crisis, which began on February 24, 2022.

Since the last report, between 2019 and 2022, a total of 153 thousand immigrants have arrived in Israel. The average annual immigration in this period was 38 thousand people.

Figure 11 : Immigration to Israel (1990-2022)



[24] CBS 2.15 – Population by District, Sub-District and Religion

[25] CBS 2.54 – Immigrants by Type of Visa

Economic profile [32]

Until the end of 2022, thanks to cautious monetary, financial, and fiscal policies, economic growth exceeded that of most other OECD countries for more than a decade. Employment was rising, inflation was low, the external surplus was reasonable, and the public finances were in relatively good condition.

However, the COVID-19 pandemic which began in early 2020 has had profound effects. Lockdown measures and high uncertainty have led to a sharp contraction in output. More than a million workers were put on leave, reversing some of the employment gains of the past (see previous BUR and NC reports).

Israel's GDP declined by 1% in 2020 compared to 2019. [33] However, since 2020 and the end of the COVID pandemic, the GDP has continued on its upward path increasing by 15% over 2020-2022. [26]

As of the drafting of this document, since October 7th 2023, Israel is in a state of war. The long-term impacts of this situation on economic growth are not yet fully known and will be reflected in the next report.

Economic growth and changes in the overall GDP

Despite the economic crisis of 2008-2009, when GDP growth fell to just 1.3% in 2009, Israel's economic growth has continued to be strong. There was an average annual growth of approximately 4.1% over the 2010-2022 period. Israel's economic growth exceeded that of all OECD countries (with an average of 1.9%), except for Turkey and Ireland. Per capita GDP growth (2.2% in 2010-2022) was also above OECD average, 1.3%.[27]

Due to the COVID-19 pandemic, the GDP per capita decreased by 3.9% between 2019 and 2020. GDP then proceeded to continue to increase between 2020-2022.

[26] CBS 11.3 – GDP of Total Economy by Industry

[27] CBS 11.3 – GDP of Total Economy by Industry; WDI – GDP Per Capita Growth (Annual %); WDI – GDP Growth (Annual %)

Figure 12: Trends in per capita and real GDP (2015 prices)

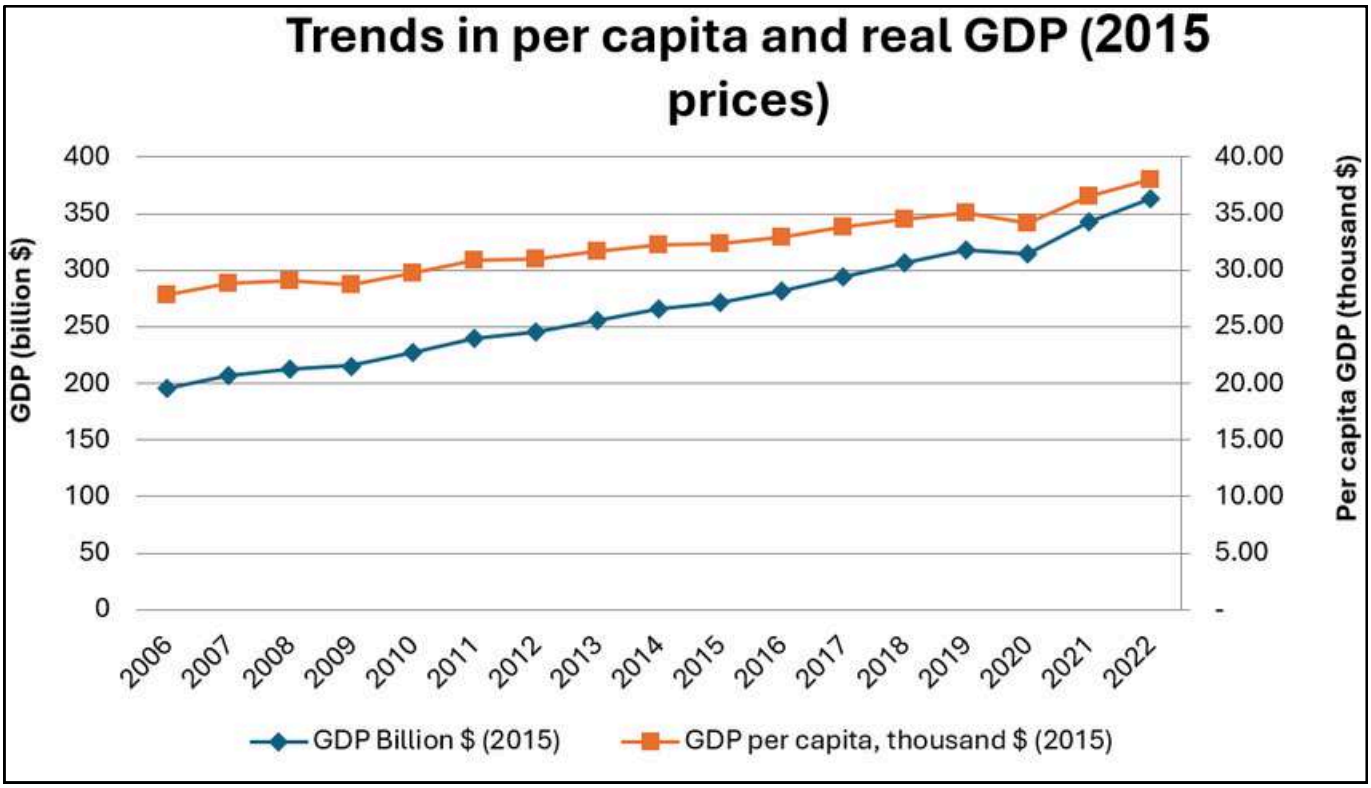


Figure 13: GDP average growth rate, OECD (2010-2022), The World Bank World Development Indicators, 2022

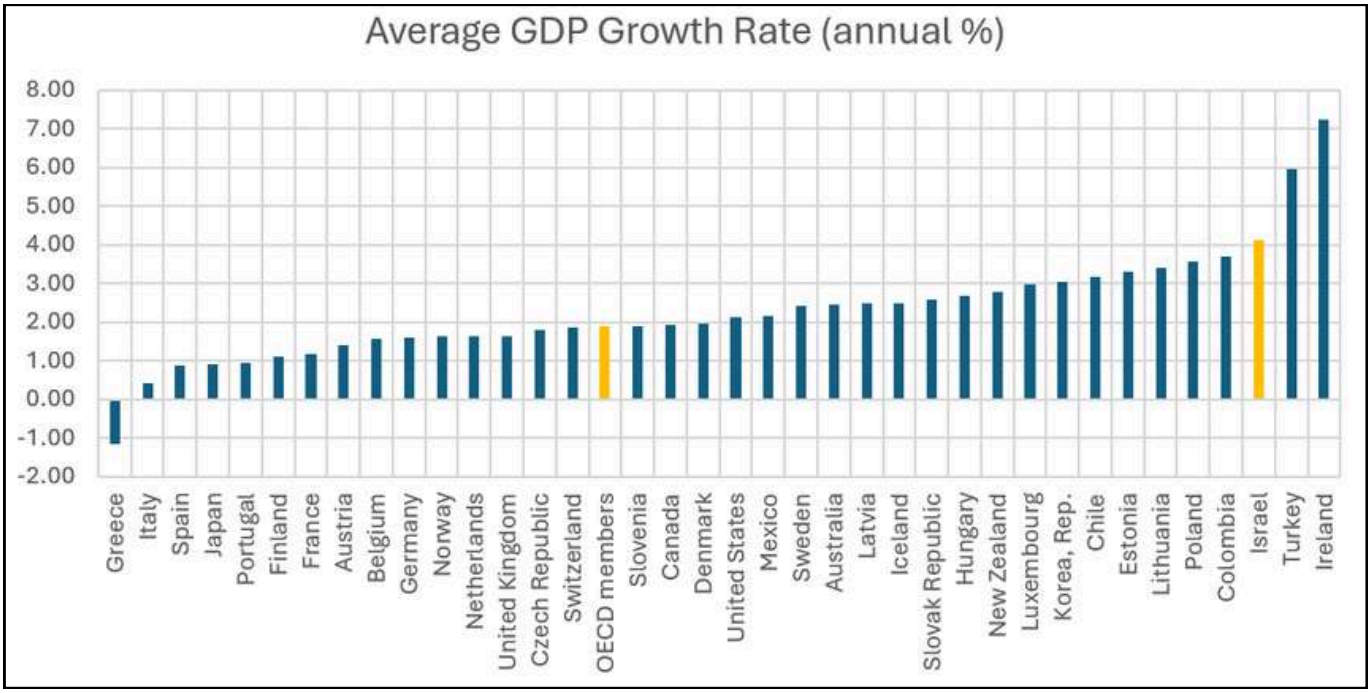
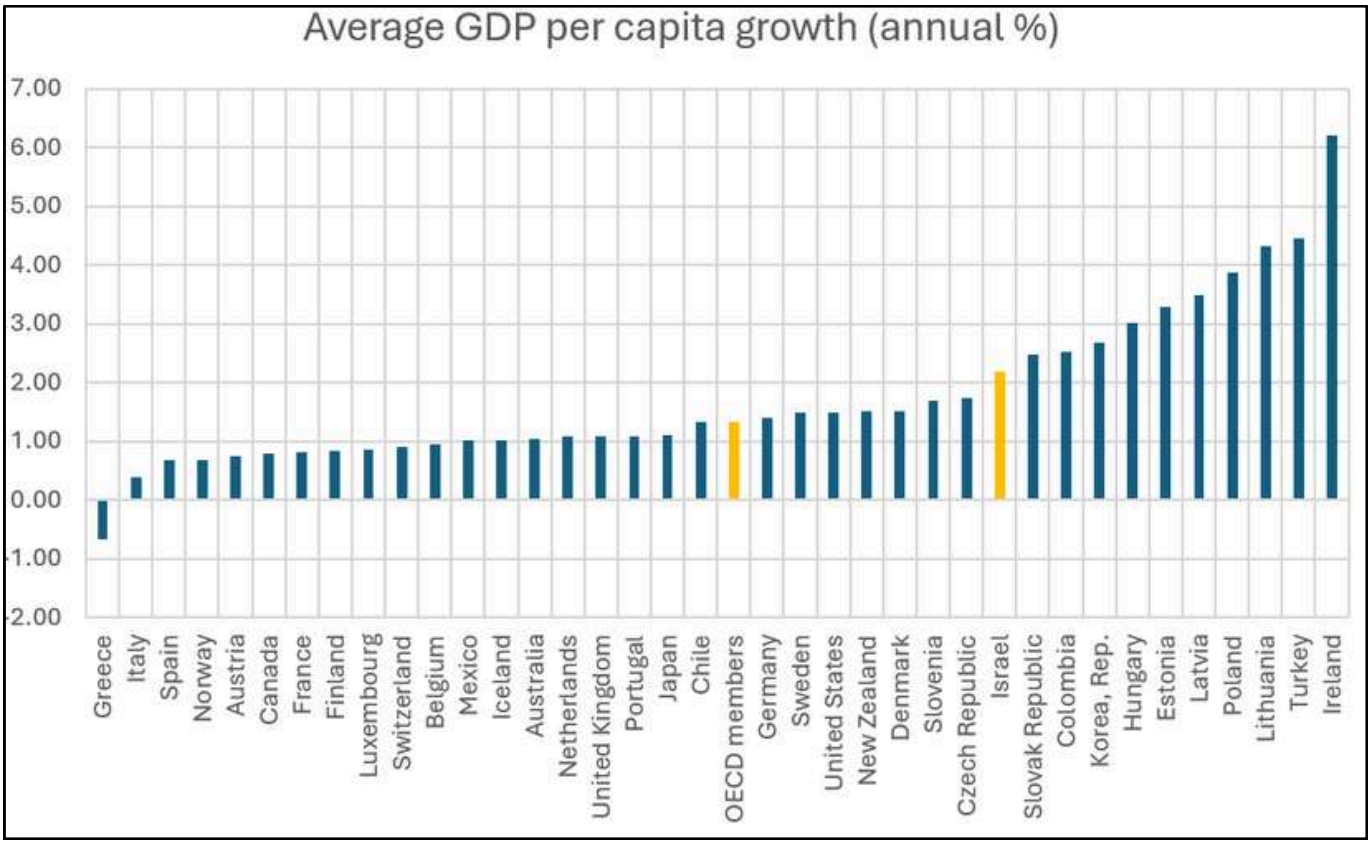


Figure 14: GDP per capita growth rate, 2010-2022, The World Bank World Development Indicators, 2022



Development of economic sectors [28]

The share of gross domestic product (GDP) of most sectors remained largely unchanged during 2015-2022. Changes to key sectors in terms of climate change included:

- Manufacturing, mining, quarrying and construction declined from 15% of the GDP in 2015 to 13.4% in 2019 to 12.6% in 2022.
- Electricity and water supply, sewage, and waste management remained steady at approximately 2% from 2015-2022.
- Transportation, storage, postal and courier activities remained steady at approximately 3.5% from 2015-2022.
- Agriculture, forestry and fishing remained steady at approximately 1% from 2015-2022.

Industry

During Israel's first decade (1948-1958), the country's industrial base consisted of textile manufacturing, diamonds and food processing. In subsequent decades, industrial production increased with the development of chemical, metallurgical, and electronics industries.

Israel has few raw natural resources; as such, the majority of its industries have concentrated on manufacturing products with a high added value. Major industries include pharmaceuticals, electronics, agro-technology, telecommunications, fine chemicals and computers. Other industries include cement manufacturing, nitric acid production, lime manufacturing, as well as those that consume soda ash, such as glass and paper production industries.

[28] CBS 11.3 – GDP of Total Economy by Industry

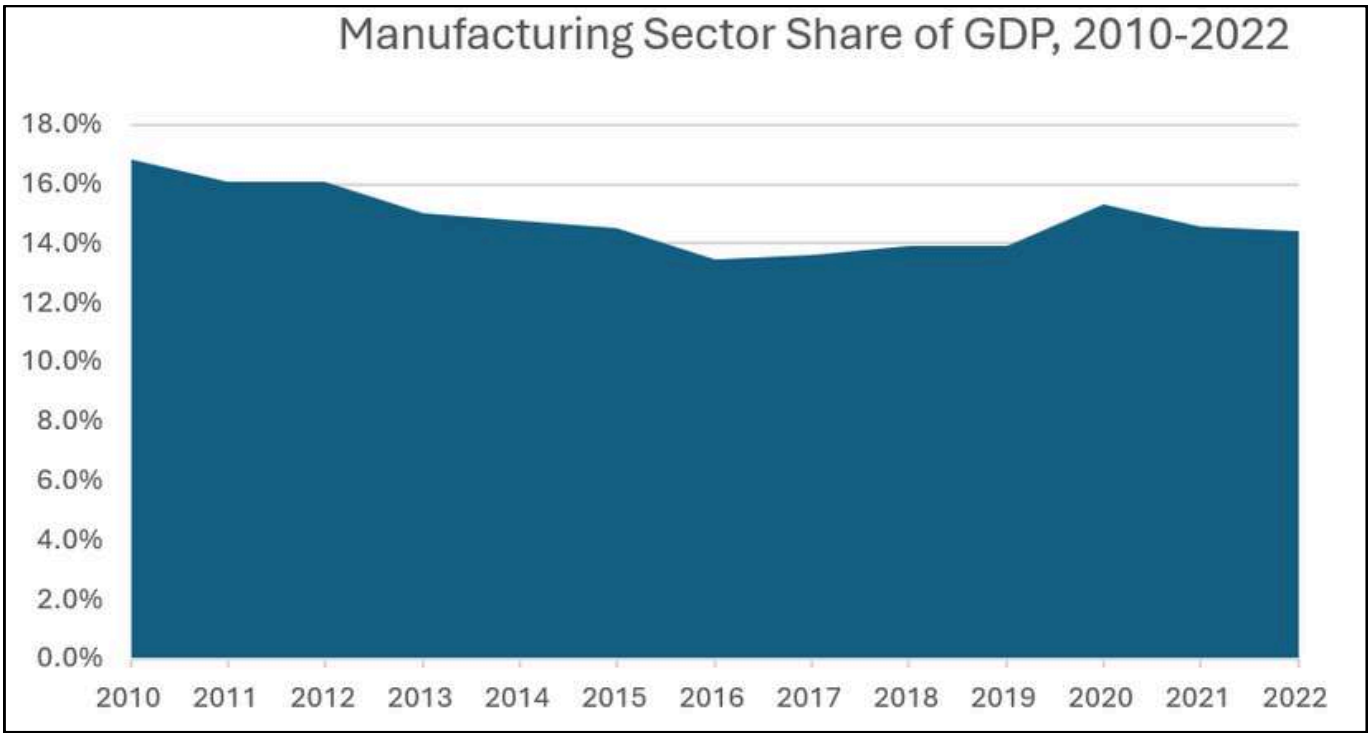
Manufacturing Industry [29]

The manufacturing industry (including high-tech industry) accounted for 14% of GDP (at 2015 prices), which represents a relatively steady state over the last decade, and 10% of the workforce in 2022, which represents a decline by 4% from 14% in 2010 and by 2% from 12% in 2015.

:The high-tech sector accounted for 28% of the manufacturing industry jobs in 2022, remaining relatively steady since 2010.

Nonetheless, the high-tech industry, which is skill and capital intensive and requires sophisticated production techniques, continues to attract considerable investment in research and development. In 2018, 30% of the business R&D expenditure was attributed to the industrial high-tech sector (9% increase from 2015). [30] [31]

Figure 15: : Manufacturing sector's share of GDP, 2010-2022 (2015 prices)

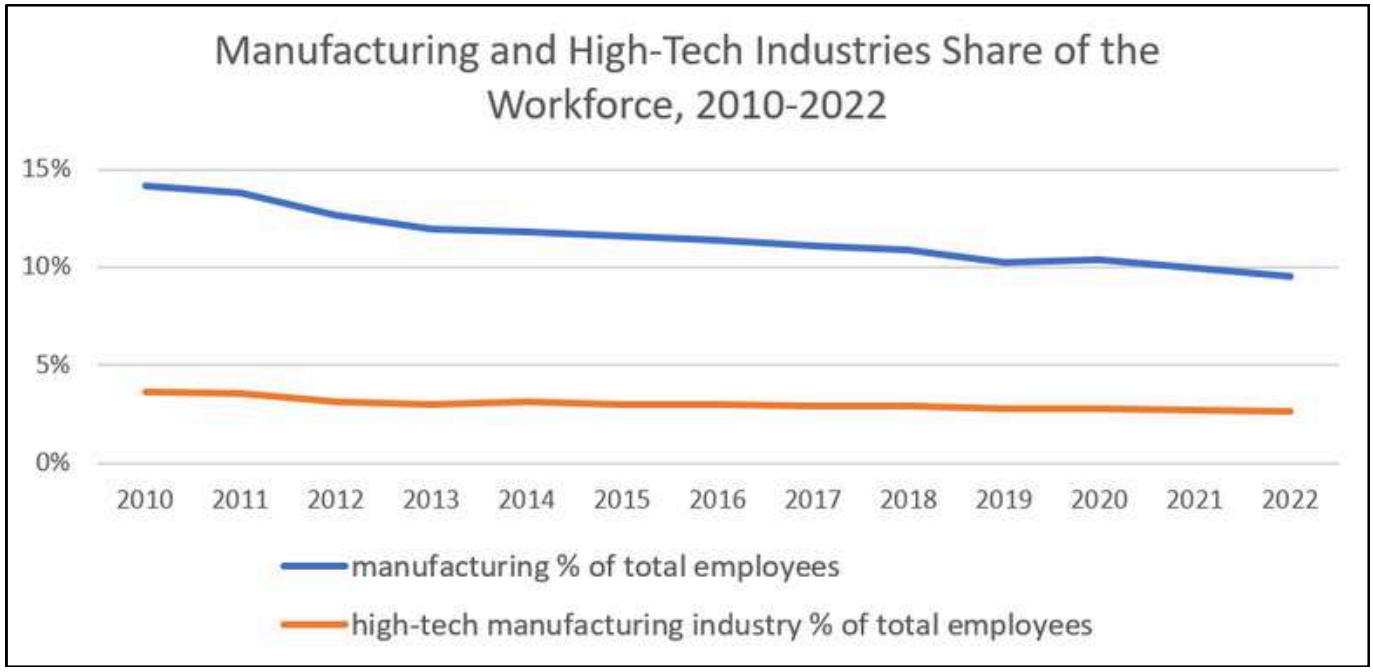


[29] CBS 11.3 – GDP of Total Economy by Industry

[30] CBS 16.3 – Establishments, Jobs, Revenue, Labor Costs and Wages in Manufacturing, Mining, and Quarrying

[31] CBS 17.13 – Employee Jobs and Average Wages per Employee Job in the High-Tech Sector by Industry

Figure 16: Manufacturing sector and high-tech industry's share of the workforce, 2010-2022



Building stock and urban construction

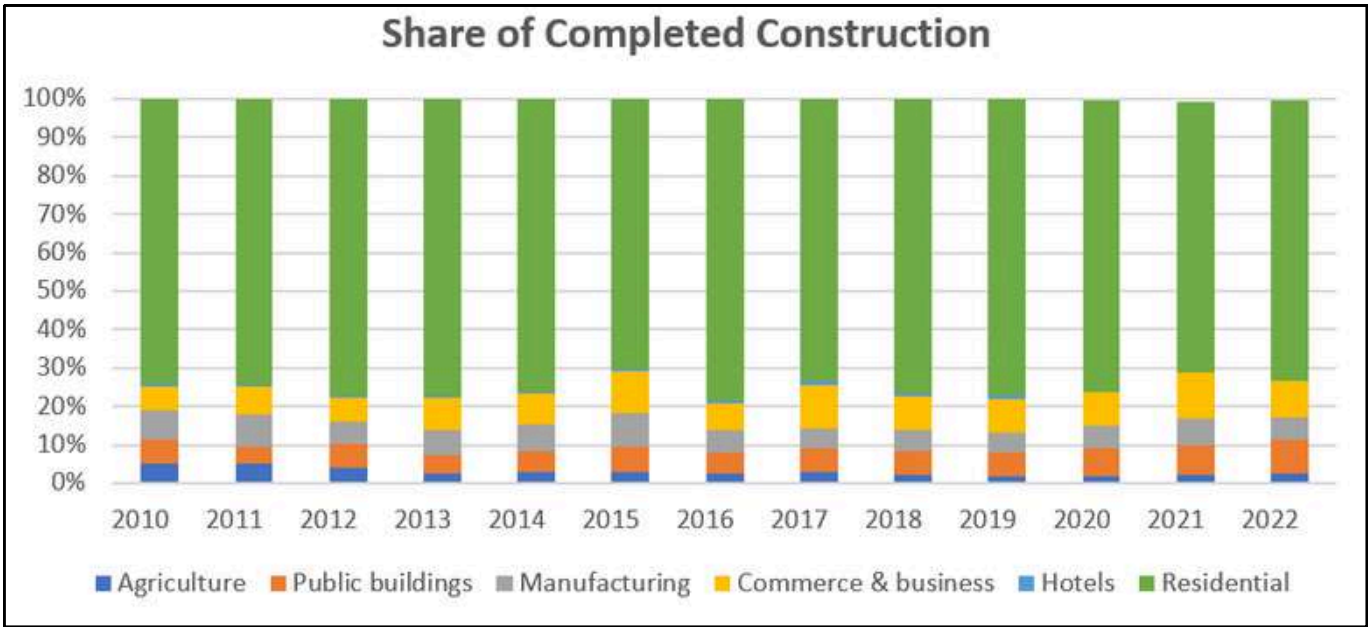
The contribution of construction to Israel's net GDP was 6.3% in 2022, compared to 6.5% in 2019, 5.9% in 2015 and 5.4% in 2010. In 2020, construction accounted for 7% of the workforce. Additionally, the average construction wage rose nearly 15% (in current prices) between 2011 and 2020. [32]

Residential construction accounts for the majority (73%) of construction completed in 2022. Manufacturing and storage (6%), offices (10%), and education (4%) are the sectors which represent the next largest shares of new construction. Agricultural construction (2%) and manufacturing and construction (6 %) have declined since 2010, when they represented 5% and 8% of new construction, respectively. [33]

Israel continues to experience increasing prices in the housing market: the apartment price index rose by 60% from 354.8 in 2015 to 568.7 in 2022. The rent index rose by 6% over the 2015-2019 period. This is due in part to a housing shortage, resulting from a combination of insufficient construction during the previous decades, and an increasing number of households due to population growth. To address the high prices and housing shortfall, residential construction has started to increase significantly in the last few years, with governmental encouragement, and is expected to increase further over the coming decades. [34]

[32] CBS 11.3 – GDP of Total Economy by Industry
[33] CBS 20.5 – Construction Area by Purpose and Construction Stage
[34] CBS 10_24_051t1 – Apartment Price Index

Figure 17: Share of Completed Construction, CBS 20.6, 2023



Agriculture

In 2022, agriculture accounted for approximately 0.9% of the workforce, remaining steady since 2016 and decreasing from 1.6% in 2010. Agriculture's share of the GDP was 1.3% in 2022, a decrease from 1.4% in 2016 and from 1.7% in 2010, but a slight increase from 1.2% in 2019. [35] [36]

Total land area under agricultural cultivation was 2,825 thousand dunams in 2022, a 2% decrease from 2,883 thousand dunams in 2019, a 8% decrease from 3,086 thousand dunams in 2016 and approximately the same as 2,832 thousand dunams in 2010. [37]

In 2022, agriculture consumed approximately 52% of Israel's total water consumption, using 1,215 MCM of water. This usage represents a 8.6% increase in water consumption from 2015, when 1,118 MCM of waterwas used for agriculture, and a 2% increase from 2019 when 1,191 MCM of water was used for agricultural purposes. [39]

Israel relies on imports for several key commodities. For example, 93% of the grain supply, 95% of the fish supply, 81% of legumes, oilseeds, peanuts, and nuts, and 63% of beef supply are imported. In contrast, Israel produces approximately 100% of its poultry and turkey meat, 93% of its dairy products, and around 81% of its fruits and vegetables. [39]

[35] CBS 21.7 – Employment in Agriculture
[36] CBS 11.3 – GDP of Total Economy by Industry
[37] CBS 21.1 – Agricultural Area, Planted Forest Area and Pasture Area, Selected Data
[38] CBS 23.6 – Water Production and Consumption
[39] CBS Website, 2024

Energy profile

Israel's total primary energy supply in 2022 was 23,868 thousand TOE, which represents an increase of 2.8% from 2019 (23,211 thousand TOE), 3.5% increase from 2016 (23,065 thousand TOE) and an increase of 5.4% from 2010 (22,636 thousand TOE). In 2020, total primary energy supply decreased by 2.9% relative to 2019, to 22,633 thousand TOE, primarily due to a 10% decrease in supply of petroleum - used almost exclusively in transport – due to COVID-19 lockdown measures; as such, 2010-2019 and 2021-2022 are more indicative of the long-term trends and Israel's overall energy profile. [40]

Energy intensity improved significantly during 2000-2022, both in terms of per capita consumption and in terms of energy consumption per unit of GDP:

1. Final total energy consumption per capita decreased by 13%, from 2.04 TOE per capita in 2000 to 1.75 TOE per capita in 2015, and decreased by an additional 9% to 1.74 TOE per capita in 2019, and then decreased by an addition 6% to 1.64 TOE in 2022. [41]
2. Energy consumption per economic output improved by 29%, from 27.2 TOE per million NIS GDP in 2000 to 19.2 TOE per million NIS GDP in 2015, and then improved by additional 8% to 17.6 TOE per million NIS GDP in 2017. Since then there was a decrease to 15.0 TOE per million NIS GDP in 2022.
3. The Israeli energy production sector continues to undergo two major changes:
    a. Independent Power Producers (IPPs) continue to enter the market. In 2022 49% of electricity was generated by IPPs, up from 34% in 2019s and 23 % in 2015. [42]
    b. The discovery of natural gas reserves has significantly changed the energy generation fuel mix. As of 2022, Israel has roughly 900 BCM of confirmed recoverable natural gas reserves. [43]

Energy supply (production and reserves)

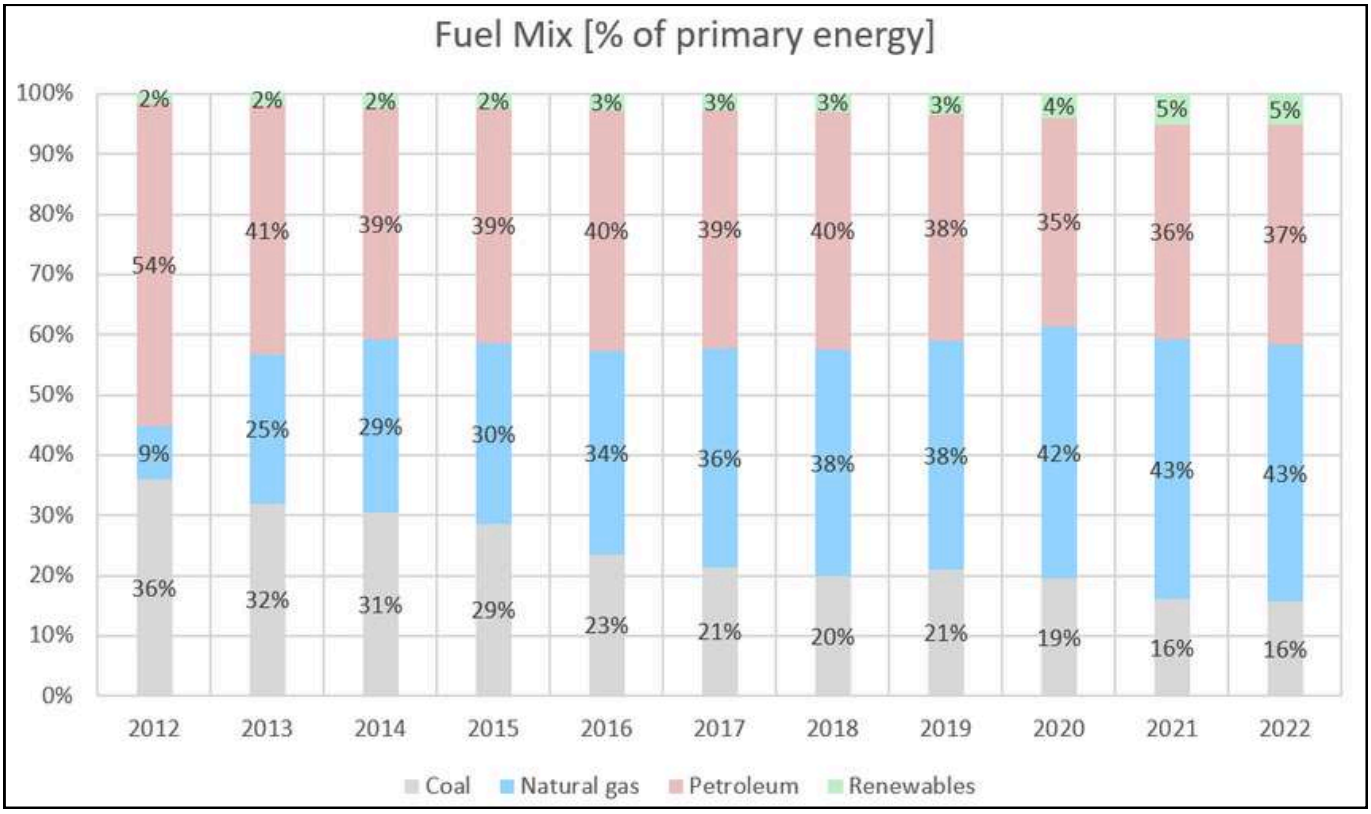
Fuel mix

An increased uptake of natural gas has been the main trend in the country's total fossil fuel mix (primary energy), both in the power generation and manufacturing/large-scale commercial sectors.

The share of natural gas in total primary energy supply rose from approximately 9% in 2012 to 34% in 2016, to 38% in 2019 and then to 43% in 2022. The share of coal has decreased from approximately 36% in 2012 to 23% in 2016, to 21% in 2019, and then to 16% in 2022. The share of petroleum fuels has decreased from approximately 54% in 2012 to 40% in 2016, to 38% in 2019, and to 37% in 2022. The share of renewables increased from 2% in 2012 to 3% in 2016-2019 to 5% in 2022. [44]

[40] CBS 24.2 – Primary Energy Supply, Energy Ratio and Final Consumption of Energy per Capita
[41] CBS 24.2 – Primary Energy Supply, Energy Ratio and Final Consumption of Energy per Capita
[42] "State of Electricity Sector", Electricity Authority, 2022
[43] Ministry of Energy and Infrastructure website
[44] "State of Energy Report", Ministry of Energy and Infrastructure, 2023

Figure 18: Fuel mix (% of primary energy) [45]



Coal

Coal was introduced during the early 1980s to diversify energy resources and became a major fuel in electricity production; it is used almost exclusively for electricity generation purposes by the state-owned Israel Electric Corporation (IEC). Israel has no domestic coal supply and relies on coal that is imported solely by the National Coal Supply Company.

Petroleum-based fuels

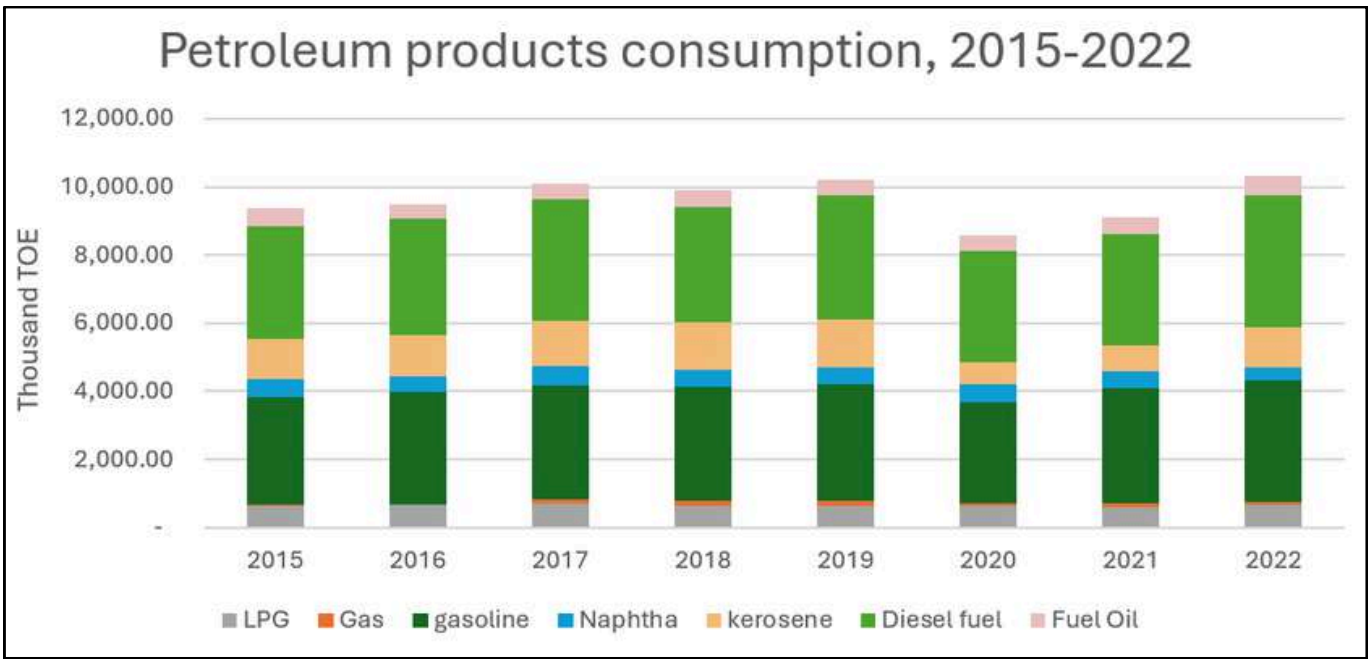
Israel has negligible domestic crude oil extraction (191 thousand TOE in 2022) and either imports raw petroleum to refine most of the fuel products it requires, or imports ready-made fuel products. [46]

Israel has two major oil refineries with a total refining capacity of about 15 million tons per year: Oil Refineries Ltd (ORL) in Haifa with a maximum crude oil refining capacity of approximately 9.8 million tons of crude oil per year, and the Paz Refinery in Ashdod.

Diesel fuel and gasoline constitute the bulk – approximately 72% - of total petroleum-based fuel consumption in 2022. This year gasoline accounted for 35%, up from 34% in 2019 and 2015. Diesel fuel accounted for 38% of total consumption in 2022, down from 35% in 2019 and 2015. The share of fuel oil decreased from 6% in 2015, to 5% in 2019 and 2022. [47]

[45] "State of Energy Report", Ministry of Energy and Infrastructure, 2023
[46] Energy Balance, CBS, 2022
[47] "State of Energy Report", Ministry of Energy and Infrastructure, 2023

Figure 19: Petroleum products consumption (TOE) 2010-2022



Natural gas

In recent years, offshore recoverable natural gas reserves totaling an estimated 900 BCM have been discovered. [48] These are expected to have major ramifications for the Israeli market.

These reserves, specifically the Tamar, Leviathan and Karish fields, are of very high quality (over 99% methane) and significantly large enough to supply the domestic market for the coming decades. In 2013, the Tamar field began producing gas for Israeli consumption and natural gas consumption increased. At the end of 2019 the Leviathan field began supplying large amounts of gas to the transmission system, so that Israel is currently experiencing a redundancy in natural gas supply enabling exports to neighboring countries, as well as increased competition in the market.[44] During 2022, the Karish field began operation contributing to the export of natural gas to Egypt and Jordan.

The first gas exports from Israel began at the end of 2016, with the start of the gas supply from the Tamar reserve, to the Arab Potash and Jordan Bromine plants on the Jordanian side of the Dead Sea. In addition, in September 2016, the Leviathan ownership group signed an agreement with the Jordanian Power Company (NEPCO) for the supply of natural gas in a total amount of approximately 45 BCM, for a period of 15 years. In early 2018, the Tamar ownership group signed an agreement for the supply of natural gas with the Egyptian company Dolphinus Holdings, based on the excess gas quantities that would be available to Tamar's partners over a period of 7 years from the date of commencement. The agreement set a minimum cumulative quantity for supply of 5 BCM, over the first three years. The implementation of this agreement depends on the existence of an infrastructural solution which will enable gas transport to Egypt. [45]

[48] Ministry of Energy website, accessed 2025.

In 2019, another two export agreements were signed with Egypt, allowing the export of a total of 83 BCM from Leviathan and Tamar reservoirs for a 15-year period. [46]

The Karish field, which began supplying the Israeli market in 2022, contains 1.4 TCF of gas 2P reserves, plus 54 mmbls of liquid 2P reserves. [49]

The Tanin field, which also began supplying the market in 2022, contains 921 BCF of gas 2p reserves, plus 4.5 mmbls of liquid gas reserves [50]

Natural gas supply to the Israeli market, as well as for export, totaled 21.9 BCM in 2022, an increase of 192% from 11.28 BCM in 2019, an increase of 224% relative to the 9.66 BCM supplied to the market in 2016, and an increase of 402% from approximately 5.32 BCM in 2010. Domestic extraction of natural gas accounted for nearly 100% of the total supply, an increase from 93% of the total supply in 2019, a dramatic increase from 60% in 2010, and a slight increase from 96% in 2016. [51]

Since 2020, Israel's natural gas exports have increased significantly. In 2022, Israel exported 9.2 BCM of natural gas to Egypt and Jordan. This figure represents a 29% increase from 7.14 BCM in 2021, a 116% increase from 4.25 BCM in 2020 and a dramatic 4000% increase from 0.22 BCM in 2019. [52]

The power sector accounted for 79% of natural gas consumption in 2022, and the industrial sector accounted for the remaining 21%.

[49] Energean website, 2024
[50] Energean website, 2024
[51] Ministry of Energy and Infrastructure website, 2024
[52] Ministry of Energy and Infrastructure - Review of Developments in the Natural Gas Market, 2022

Figure 20: Natural gas supply by source, Natural gas market review, Natural Gas Authority, 2023

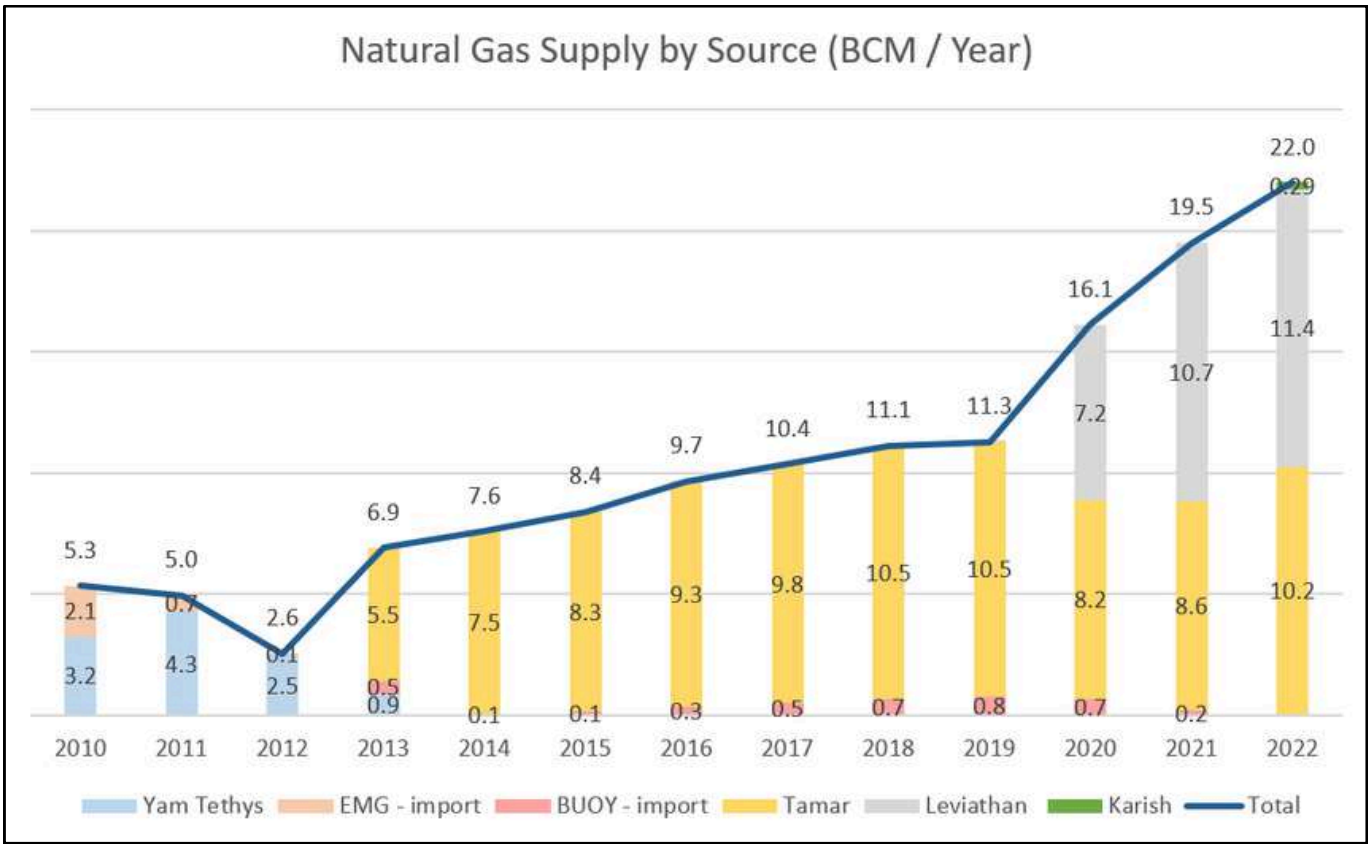
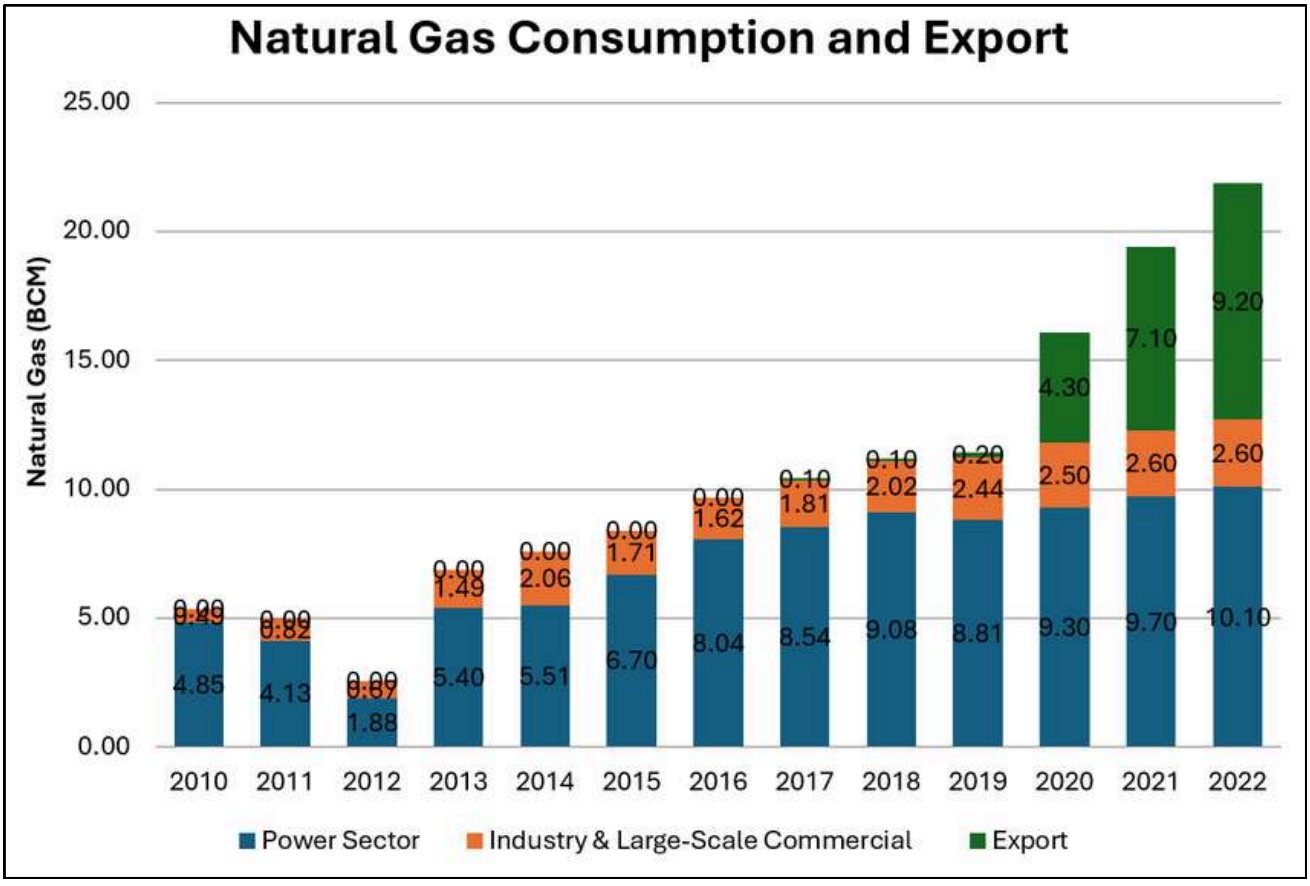


Figure 21: Natural gas consumption, Developments in the Natural gas market review, Natural gas authority, 2022



Renewable energy

In Israel, renewable energy policy is focused on increasing renewable electricity generation. In 2019, renewable generation accounted for 4.7% of electricity production, 5.9% in 2020, 7.7% in 2021, and 9.8% in 2022. [53] For more information, see power sector below.

Furthermore, solar energy is a major source of power for residential water heating, as per a long-standing regulation that mandates installation of solar water heaters on all new constructed residential buildings up to nine stories. In 2022, 428.5 thousand TOE of solar energy was utilized for water heating purposes. This accounted for 37% of the total renewable energy production in Israel. [54]

Power sector

Market structure

Historically, the state-owned Israel Electric Corporation (IEC) had a full monopoly on the power sector, including generation, transmission and distribution, and grid management.

In recent years, however, the Israeli electricity market has undergone extensive reform, including measures to increase competition in the electricity sector, resulting in a privatized generation component. [51]

By the end of 2022, the established electricity generation capacity owned by private producers and connected to the national electricity grid accounted for about 48% of total electricity generation in the country, and for 52% of the installed capacity. The Israel Electricity Authority (EA) estimates that by 2025 around 60% of the electricity generation and approximately 56% of the installed capacity will be private.

In addition, grid management is handled by a new governmental company, while the supply component is expected to be opened for competition in the future.
The transmission and distribution segments, however, continue to be managed mainly by the IEC and are expected to remain so in the future.

Power Generation capacity

At the end of 2022, installed generating capacity totaled 22 GW, representing a 11% increase from 19 GW in 2019 and a 30% increase from the 17 GW generation capacity in 2016. [55]

[53] CBS, 2022
[54] Energy Balance, CBS, 2022
[55] State of the Energy Market, Ministry of Energy, 2023

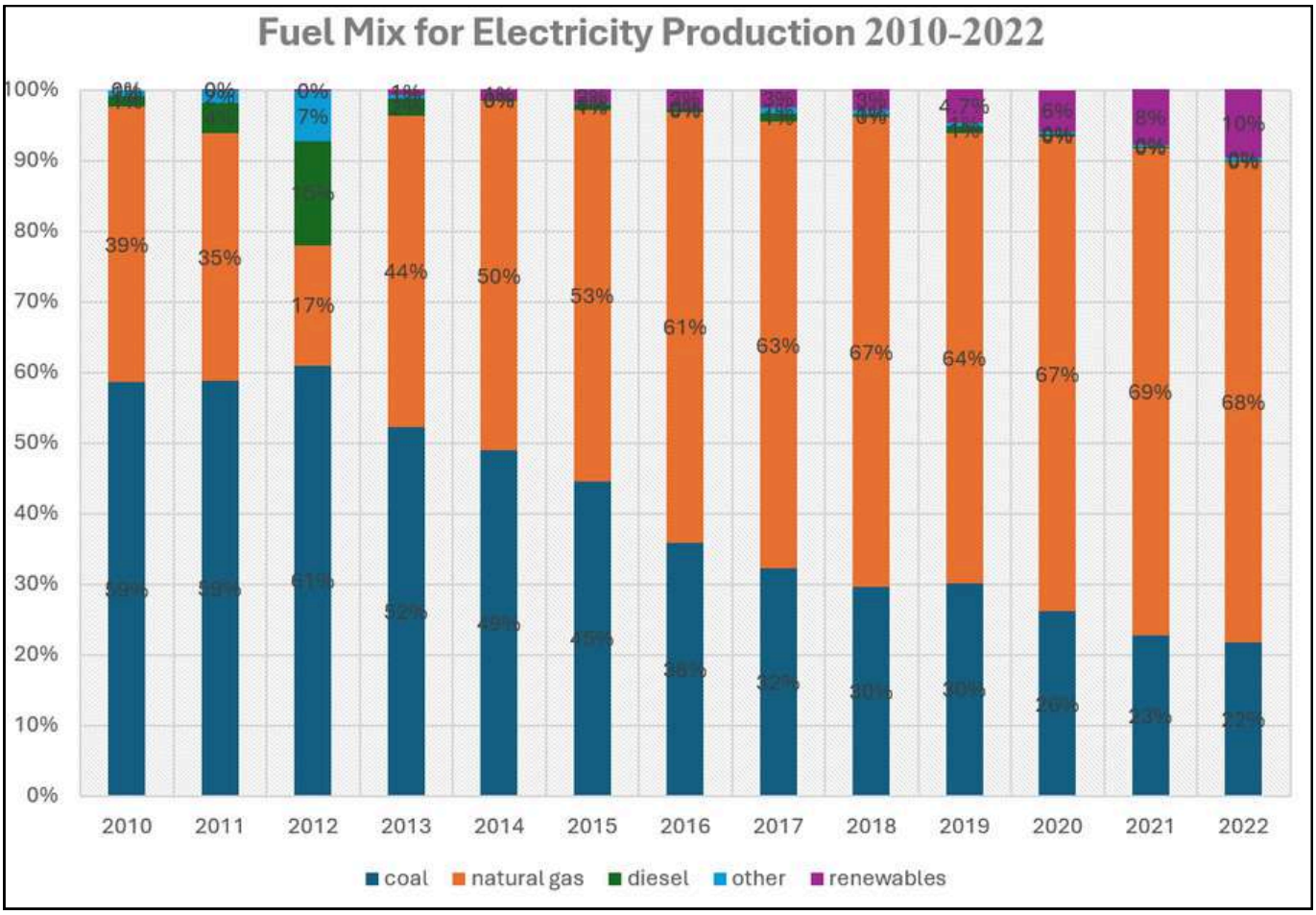
Power Generation fuel mix

In 2022, approximately 22% of total power generated was from coal, down from 26% in 2020, 30% in 2019, 36% in 2016 and 59% in 2010. Natural gas provided 68% percent, up from 64% in 2019, 61% in 2016 and 39% in 2010. In 2022, 9.8% of electricity was generated from renewables, up from 7.7% in 2021, 5.9% in 2020, 4.7% in 2019, 2.6% in 2016 and from nearly zero in 2010. [56]

Electricity consumption increased from approximately 53.8 TWh in 2010 to approximately 62 TWh in 2016 and to 67.1 TWh in 2020, to 70.9 TWh in 2022, representing an average annual growth rate of approximately 2%; Peak demand increased from 11 GWh in 2010 to 12.6 GWh in 2016 to 13.6 GWh in 2019 and to 14.6 GWh in 2022, amounting to an average annual growth of approximately 3%.

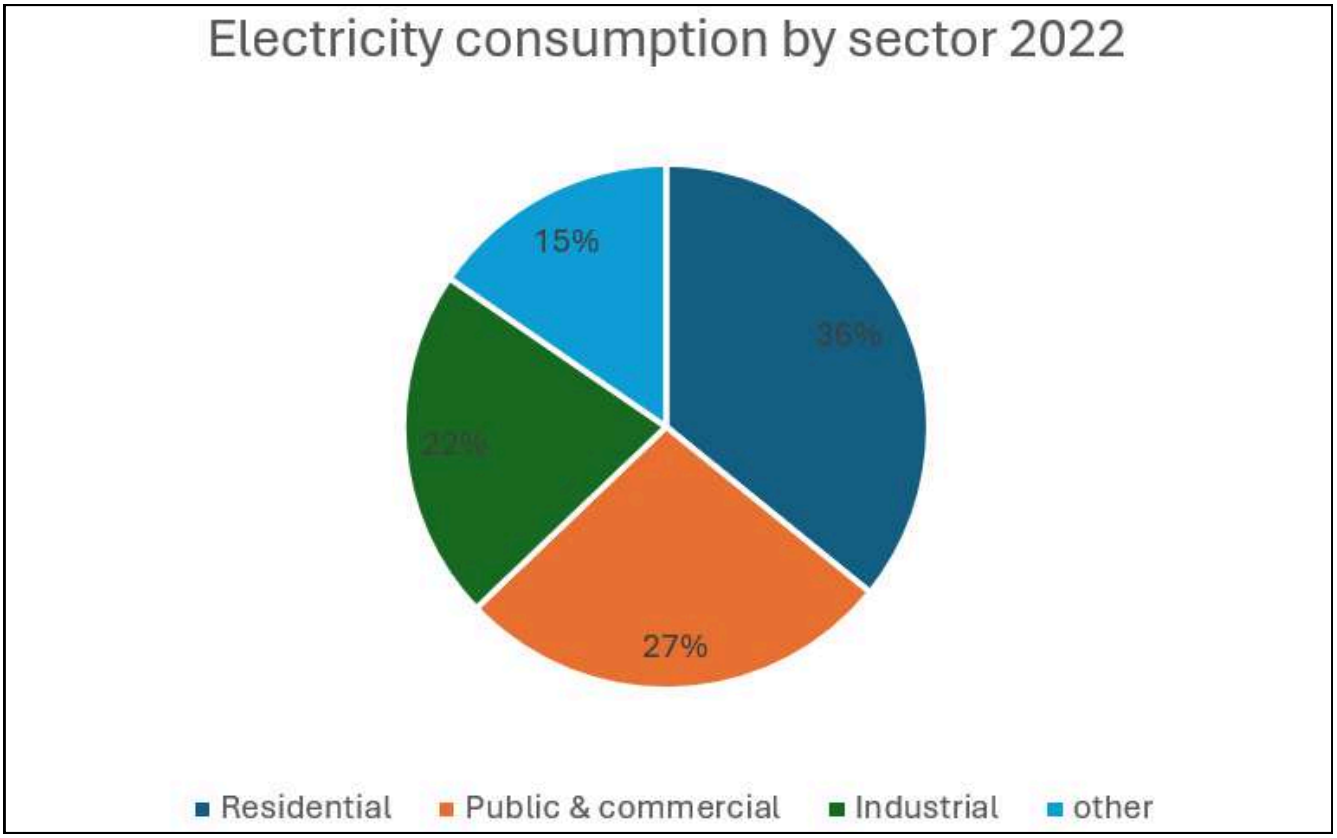
The residential and the public and commercial sectors are the highest consuming sectors in Israel, accounting for 36% and 27% respectively from total consumption in 2022. [57]

Figure 22: Fuel Mix for Electricity Generation 2010-2022



[56] Electricity Authority, Annual Report, 2023
[57] Electricity Authority, Annual Report, 2023

Figure 23: Electricity consumption by sector, 2022 [58]



Transportation

The dominant fuel for private vehicles remains petrol, with approximately 82% of private vehicles powered by petrol in 2022, down from 87% in 2020, 96% in 2015 and 97% in 2010. For other vehicles (taxis, buses and trucks), the share of vehicles powered by diesel fuel is 92%, remaining constant since 2017, up from 89% in 2015 and from 83% in 2010, replacing petrol.

In 2022, the share of vehicles powered by alternative fuels (gas and electric) remained very low with approximately 2% of total vehicles, but has increased from the consistent rateof 0.7% observed from 2010 to 2020.

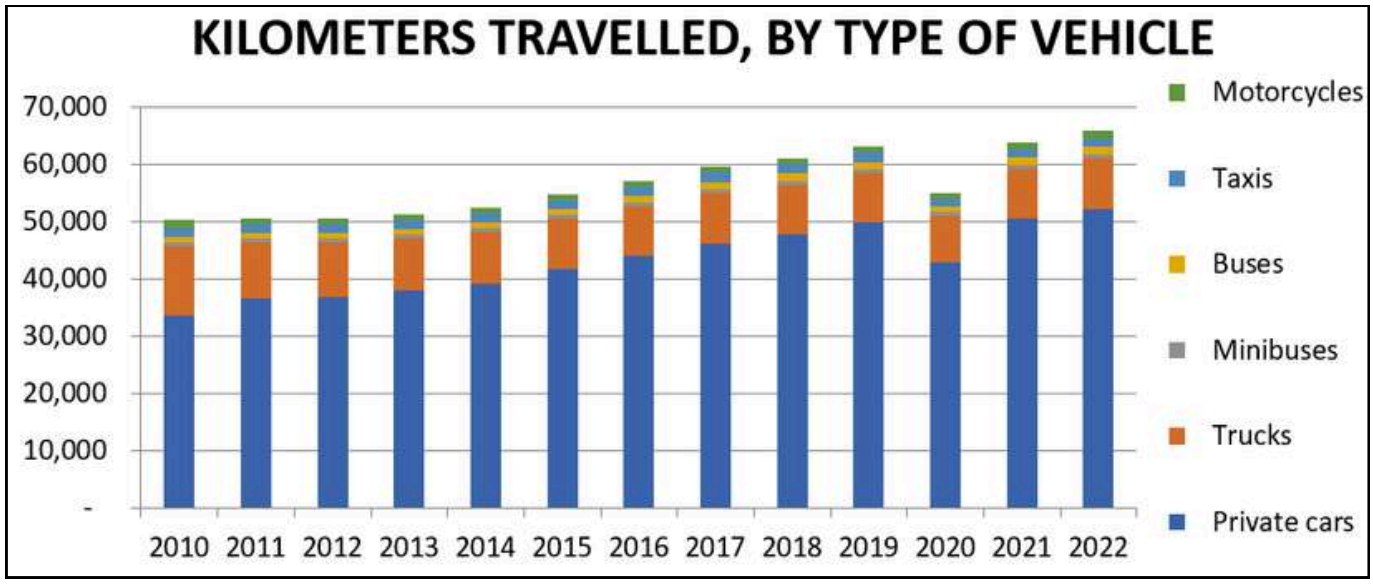
The total number of vehicles in Israel grew from 1,832,000 in 2000 to 2,566,191 by 2010, and then to 3,600,649 by 2019 and 3,973,311 by 2022. Of this number, 86% are private cars. [59]

In 2022, the rate of motorization was 411 cars per 1,000 residents, an increase from 394 in 2019 and 375 in 2016 and from 334 in 2010. [60] In 2022, total travel by road transport in Israel amounted to 65,900 million vehicle kilometers, an increase of 4% relative to 2019 (63,200 million km), 15% relative to 2016 (57,220 million km) and 32% relative to 2010 (49,870 million km). The vast majority of vehicle kilometers traveled - 79% (52,205 million km) - were by private cars, an increase from 77% in 2016 and 67% in 2010. [61]

[58] Electricity Authority, 2022
[59] CBS table 12. motor vehicles, by type of fuel and vehicle type, selected years
[60] CBS table 5. rate of motorization, by type of vehicle
[61] CBS 19.12 – Kilometers Traveled by Type of Vehicle

The increase in private car ownership and usage has not resulted in a proportionate increase in road surface; total road length increased only by 25% over the 2000– 2022 period, from 16,450 km to 20,546 km. The disproportionate increase in vehicular traffic compared to the road surface area has increased traffic and congestion. [62]

Figure 24: Kilometers traveled, by type of vehicle, 2010-2022



Public transportation

Use of public transport increased during 2010-2019 and declined slightly from 2019-2022 likely as a result of the COVID-19 pandemic in 2020:

- An increase of 30% in bus service – travel by buses rose from 458 million km in 2010 to 597 million km in 2016 to 703 million km in 2019 but declined to 679 million km in 2022; the number of buses rose from 6,479 in 2010 to 9,024 in 2016 and to 10,467 in 2019 and then to 10,833 in 2022. [63]
- An increase of 92% in rail ridership, from approximately 36 million passengers in 2010 to approximately 69 million passengers in 2019. Ridership then fell to 24 million passengers in 2020 before increasing to 55 million passengers in 2022 [64]

To manage the congestion problems, Israel is expanding and adapting public transportation:

Public transport in metropolitan areas: All four main metropolitan areas (Tel Aviv, Jerusalem, Haifa, Be'er Sheva), home to 43.5% of Israel's population, are pursuing public transportation development plans, including dedicated public transport "fast lanes", light rail trains, and metro.

[63] CBS 19.04 – Bus Services on Scheduled Routes

[64] CBS 19.03 – Rail Services

- In 2015 construction of the light rail network infrastructure began in the Tel Aviv Metropolitan Area. It is expected to be fully operational by 2028 and connect 13 cities.[65] Additionally, in 2018 the primary planning stage for the Be'er Sheva Metropolitan Area light rail network began.[66] These two projects join the already existing light rail network in Jerusalem (since 2011[67]), which is going through an expansion process, which began in 2021.[68]
- In 2021, a "Fast Lanes" project began in the Tel Aviv Metropolitan Area. This project is a public-private partnership for the construction of separate public transportation lanes along the highway to the metropolitan area, as well as Park & Ride parking lots combined with shuttle services into the metropolitan area [69]. Thus far, 120km of new Fast Lanes have been built. These lanes are restricted to designated shuttles, public transport vehicles including taxis and buses, as well as vehicles containing 3 or more passengers.[70]
- A planned subway system for the Tel Aviv Metropolitan Area is currently (2024) in the statutory planning phase and construction is expected to begin in 2025. This mass transit system will link 24 cities and towns in the Metropolitan Area. This new rail system will have 3 lines, stopping at 109 different stations and spanning around 150 km. This new system will connect the existing Israeli Railways as well as the Tel Aviv light rail. It is Intended to extend from Rehovot in the South to Kfar Saba in the North [71]
- In August of 2023 Tel Aviv saw the introduction of the Red Line of the Light Rail. This new line spans from Petah Tikva in the North of the Tel Aviv metro area, all the way south to Holon.
- Between 2021 and 2022, several projects were completed in Jerusalem including:
  - New public transportation lanes along the length of Yirmiyahu Street.
  - The Golda Meir Expressway public transportation route along Golda Meir Avenue
  - It is also expected that in early 2025 the extension of the red line of the Jerusalem light rail will be completed. [72]

- Intercity public transport: During 2019-2022, Israel began to establish new rail lines, including the Eastern Railway which connects the North of the country to the South without entering Tel Aviv, which is expected to be completed by 2026 . In addition, Israel has expanded intercity highway lanes dedicated to public transport. [73]

[65] Tel Aviv municipality
[66] Be'er Sheva municipality
[67] Transport Master Plan Team, Jerusalem
[68] Jerusalem municipality
[69] Ministry of Finance
[70] Ayalon Highways website, 2024
[71] NTA Metropolitan Mass Transit System website, 2024
[72] Transport Master Plan, Jerusalem
[73] Israel Rail Website

Other sectors

Waste

Waste and recycling trends

Israel's waste generation increased by 35% from 2010 to 2022%. Israel generated approximately 6.2 million tonnes of MSW in 2022 compared to 5.8 million tonnes in 2019, 5.3 million tons in 2016 and 4.6 million tons in 2010. The average Israeli generates 1.8 kg of waste per day and total waste produced is growing at an average rate of 2.3% per year since 2019, mainly due to population growth.[74]

Approximately 80% of municipal solid waste is landfilled; in 2015, 4 million tons of municipal solid waste were sent to landfills. This increased to 4.4 million tons in 2019 and 4.9 million tons in 2022.

In 2021 the Ministry of Environmental Protection published its new National Strategy for a Circular Economy in 2050 and a Sustainable Waste Sector in 2030, which sets ambitious targets for waste recycling and landfill reduction. The ultimate aim is a transition by 2050 from a linear economy into a circular economy, which will enable Israel to reach its goals for the three indexes listed in the table below. Another important goal of the new strategy is zero landfilling untreated organic waste by 2030 as well as improvement of methane collection in landfills.[75]

Table 1: Waste Management Strategy Major Goals

Index	Definition	2030 Goal	2050 Goal
Landfilling*	Percentage MSW landfilling	20%	0%
Waste Sector GHG Emissions	Waste sector GHG emissions [MtCO2]	3.9	0.6
GHG Emissions Reduction	Percentage of waste sector GHG emissions reduction	47%	92%

*In the government's work plan for 2024, new targets for 2030 were outlined, including a target of 65% landfilling.

[74] CBS 22.12 – Solid Waste Collected in the Local Authorities and Transferred to Recycling and Recovery by District and Sub-District

[75] Waste strategy, Ministry of Environmental Protection, 2021

Government structure [76]

Israel is a parliamentary democracy. As such, there is a joint responsibility for the nation's economic development, energy, natural resources, and many other issues affecting the welfare of Israelis. The government consists of three distinct branches: executive, legislative, and judicial. Each branch possesses distinct powers, but is not independent of the others. This creates a system of checks and balances and separates the powers to create, implement and adjudicate laws.

Executive branch

The executive branch in Israel is its government (cabinet of ministers). The executive branch is charged with implementing and enforcing the laws of Israel. The Prime Minister is the head of the executive branch, and the ministers are responsible for implementing policies in their respective fields. The ministries are as follows:

- Prime Minister's Office
- Agriculture and Rural Development
- Immigration and Integration
- Communications
- Construction and Housing
- Culture and Sports
- Defense
- The Negev, Galilee and National Resilience
- Diaspora and the fight against antisemitism
- Economy and Industry
- Education
- Energy and Infrastructure
- Environmental Protection
- Finance
- Foreign Affairs
- Health
- Intelligence
- Interior
- Heritage
- Department of Justice
- National Security
- Regional Cooperation
- Religious Services
- Innovation, Science and Technology
- Settlement and National Missions
- Social Equality and the Promotion of the Status of Women
- Welfare and Social Security
- Tourism
- Transport and Road Safety
- Labor
- Jerusalem and Israel Heritage

Legislative branch

The legislative branch in Israel is its parliament, the 'Knesset'. The Knesset passes all laws, elects the President and Prime Minister (although the President formally appoints the latter), approves the cabinet, and supervises the work of the government. In addition, the Knesset elects the State Comptroller.

[76] Gov.il – Government Bodies - https://www.gov.il/he/departments

Judicial branch

The judicial branch of Israel consists of both secular courts and religious courts. The courts constitute a separate and independent unit of the Ministry of Justice. The President of the Supreme Court and the Minister of Justice head the judicial branch. In its capacity as the High Court of Justice, the Supreme Court also acts as a court of first instance in matters concerning the legality of state decisions and actions.

National circumstances' effect on GHG emissions and removals over time

In 25 years, Israel has increased its GHG emissions by 40%, from 1996 to 2022. In 2022, Israel's total GHG emissions were 81.1 million tons (Mt) CO2 equivalent (CO2e), representing an absolute increase of around 40% relative to 1996 GHG emissions, 14% relative to emissions in 2005, 6% relative to 2010 emissions, and 0.4% relative to 2015 emission levels.

The emissions this year are similar to the emissions in 2019, before the Covid-19 epidemic, and this may reflect the rebound in emissions from the transportation sector which decreased during the Covid-19 period.

The power sector, which peaked in 2012, due to a natural gas shortage that resulted in the increased use of more GHG-intensive fossil fuels, has experienced a reduction of GHG emissions in recent years. Once natural gas supply resumed in 2013, emissions from energy industries declined from 47.5 MtCO2e in 2012 to 40.3 MtCO2e in 2015 to 37.4 MtCO2e in 2020 and further to 36.6 in 2022; this decline also coincides with increased uptake of renewable energy generation and policy limitations imposed on generation from existing coal-fired power plants (see "Mitigation policies and measures, actions and plans" under this chapter).

Emission intensity has shown an overall declining trend since 1996 both in terms of GHG emissions per capita and in terms of GHG emissions per GDP. In 2021, per capita values reached their lowest levels since the inventory was first published in 1996, at 8.36 tCO2e/capita (down from 8.96 in 2019). In 2022 the GHG emissions per capita increased a bit to 8.48 tCO2e/capita. Emissions per GDP were 0.23 tCO2e/$1000 GDP in 2021 (down from 0.25 tCO2e/$1000 GDP in 2020), and decreased to 0.22 tCO2e/$1000 GDP in 2022. [77]

[77] Table 11.3 - GDP of Total Economy by Industry, CBS; Israel GHG inventory, 2022, CBS

Figure 25: Total emissions (MtCO2e) and GHG per capita (tCO2e/capita)

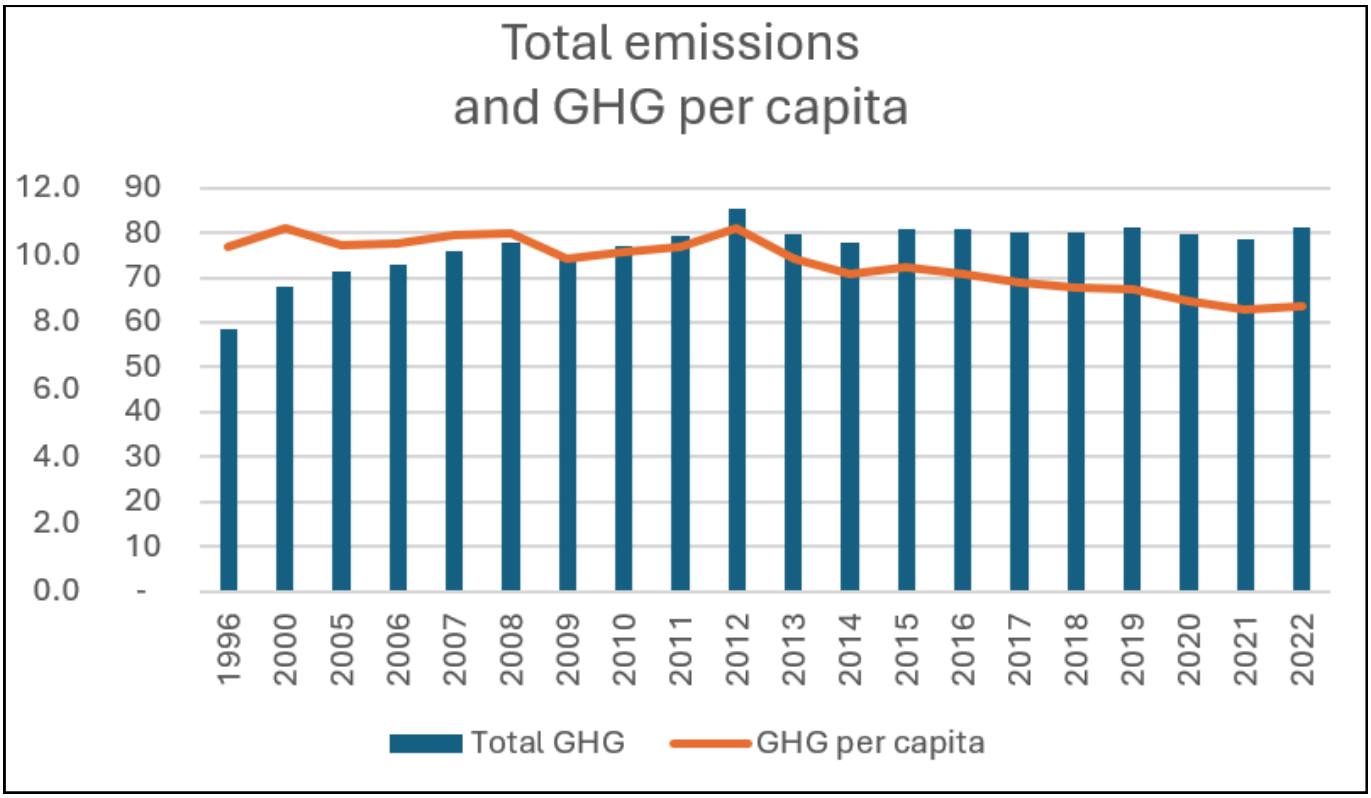
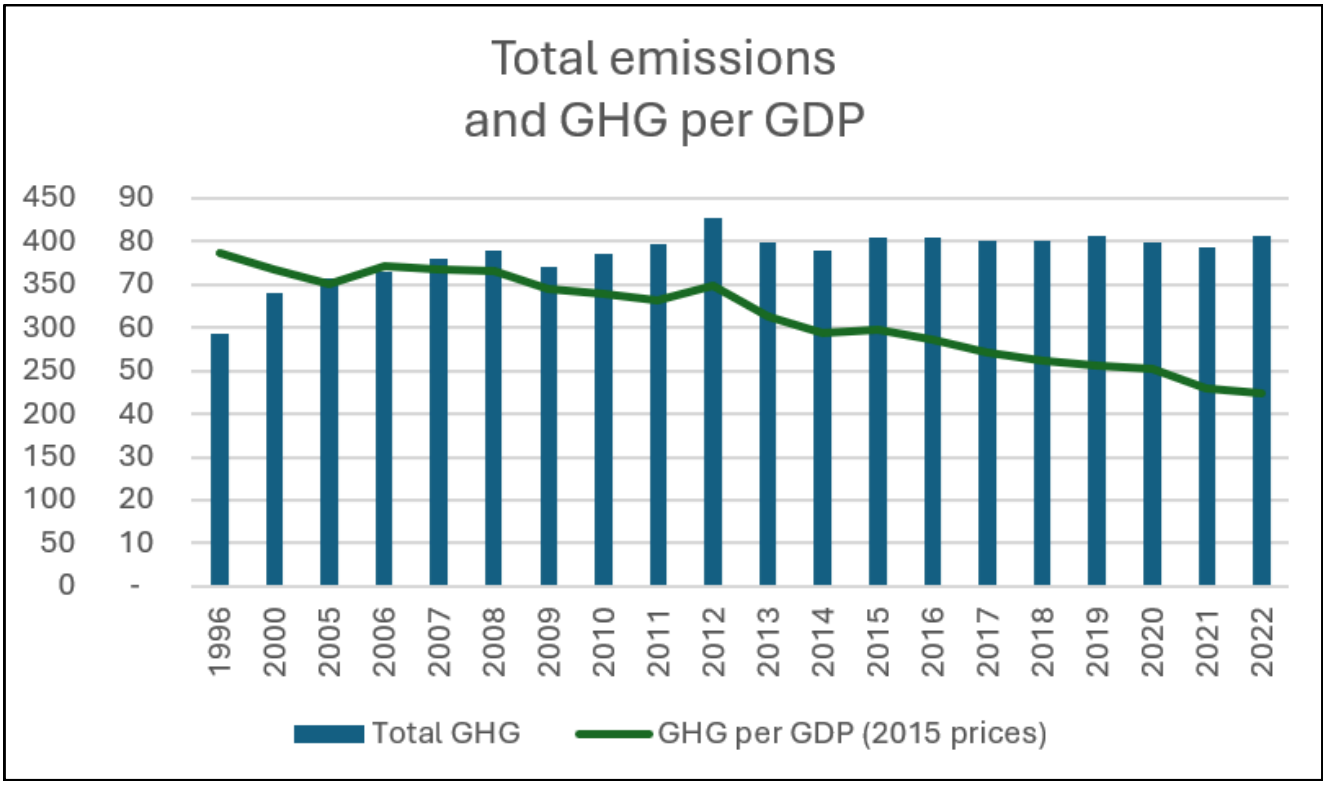


Figure 26: Total emissions (MtCO2e) and GHG per GDP (tCO2e/$1000)



Institutional arrangements

- The Ministry of Environmntal Protection (MoEP) is responsible for the preparation of UNFCCC National Communications and Biennial Reports, which detail climate actions, emissions, and progress towards international climate commitments.
- The Israel Central Bureau of Statistics (CBS) is responsible for preparing the National Inventory Report annually, to track Israel's greenhouse gas emissions.
- An interministerial steering committee provides oversight for the process.
- These arrangements are formalized in government resolution 1403.

The Ministry of Environmental Protection is responsible for the formulation of a nationwide, integrated, and inclusive policy for the protection of the environment, and is Israel's key institution for climate change issues. The Ministry operates on three levels: national, regional, and local, and is responsible for preparing the ETF (Enhanced Transparency Framework) reports submitted to the UNFCCC, including National Communications reports and Biennial Transparency Reports, and was responsible for preparing the Biennial Update Reports.

An Inter-ministerial Steering Committee for GHG Reductions includes representatives from the Ministry of Energy, the Electricity Authority, the National Economic Council in the Prime 'Minister's Office, the Ministry of Finance, the Ministry of Economy, the Ministry of Transport, the Ministry of Interior, the Ministry of Construction and Housing, the Ministry of Foreign Affairs, the Ministry of Health, and the Ministry of Agriculture and Food Security.

The primary role of the Steering Committee is to assess the effectiveness of government measures to reduce emissions, including preparing cost-benefit analyses, evaluating the progress made towards meeting GHG emission reduction targets (and supporting targets), and recommending additional measures as needed. The Steering Committee reports annually to the Government.

The Ministry of Environmental Protection is responsible for the preparation of UNFCCC national communications and biennial update reports, including compiling the requisite data from various government ministries and agencies, as well as other relevant stakeholders, and submitting these to the Steering Committee for approval.

The Israel Central Bureau of Statistics prepares the National GHG Inventory and the National Inventory Report annually and has a legal mandate to collect data from all stakeholders in the country.

To facilitate both the work of the Steering Committee and reporting process in accordance with its international obligations, Israel established a national Monitoring, Reporting and Verification (MRV) system, in line with the GHG Protocol Policy and Action Standard and the Mitigation Goal Standard. The MRV system has been operational since 2016. The Ministry of Environmental Protection, as head of the Steering Committee, oversees the process, and a MRV national report is issued by the Ministry, publicly, on a yearly basis.

The institutional arrangements require the ministries on the Steering Committee to provide the Ministry of Environmental Protection with the requisite data in order to prepare an annual report to the Government, as well as national reports in accordance with the country's international obligations. These arrangements are formalized within the context of government resolution 1403 - National Plan for Implementation of the Greenhouse Gas Emissions Reduction Targets and for Energy Efficiency, 2016.

2. Description of a Party's nationally determined contribution (NDC) under Article 4 of the Paris Agreement, including updates

Israel aims to achieve an economy-wide 27% absolute reduction in net GHG emissions by 2030, relative to 2015, aiming to cap emissions at no more than 58 MtCO2e. Additionally, Israel aims for an 85% reduction in net GHG emissions by 2050, also relative to 2015, with a target of no more than 12 MtCO2e. These are the official targets of the State of Israel, to which it committed under Government Resolution No. 171, "transition to a low-carbon economy". These targets were anchored in Israel's official NDC commitments under the Paris Agreement, ahead of the COP26 in Glasgow, 2021. At the conference itself, the Prime Minister declared Israel's commitment to achieving net zero greenhouse gas emissions by 2050.

To support these economy-wide targets, Israel has approved sectorial absolute emissions reduction targets for 2030, under Government Resolution No. 171. The base year for all targets is 2015. The sectors include Electricity generation, Transportation, Waste Management, and the Industrial sector.

Table 2: Official and declared GHG emissions reduction targets of Israel

		official targets				Declared targets
GHG Emissions Source	**Baseline - 2015 (MtCO2e)**	**2030 Target (% reduction)**	**2030 Target (emissions, MtCO2e)**	**2050 Target (% reduction)**	**2050 Target (emissions, MtCO2e)**	**2050 Target**
Economy Wide	80.7	27%	58	85%	12	Net-Zero GHG Emissions
Electricity Generation	37.6	30%	26.3	85%	5.6	-
Transport	17.6	3.3% increase	18.2	96%	0.7	-
Industry	11.4	30%	8.0	56%	5.0	-
Waste	7.4	47%	3.9	92%	0.6	-

Net emission reductions from the sectors mentioned above are the selected indicators to track progress towards achieving the NDC targets.

In addition to the main, sectorial targets, supporting targets have been established, as detailed in the table below. While these supporting targets are not used as indicators to track progress toward achieving the NDC targets, they are recognized as important enabling conditions.

Table 3: 2030 Supporting Targets

Sector	Supporting Targets
Power Generation	• Phase-out coal-fired power generation by 2026 • 30% renewable generation by 2030
Waste	• Reduction from 80% landfilling of MSW in 2020 to only 20% by 2030, with zero landfilling of untreated organic waste, paper and cardboard
Transportation	• 95% reduction in GHG emission intensity of new cars and light commercial vehicles, relative to 2020 • As of 2026, 100% of new municipal buses purchased will be clean vehicles
Industry	• Reduction of industrial gas emissions in line with the Kigali Amendment to the Montreal Protocol
Other	• Final Energy Intensity of 122 MWh per NIS 1 million GDP by 2030

Time frame(s) and/or periods for implementation:
NDC time frame: January 2021 - 31 December 2030
Long-term low-emission development strategy timeframe: January 2021 – 31 December 2050

Scope and coverage – economy-wide target:
Sectors covered:

- Energy (Fuel combustion) in: energy industries (electricity generation), manufacturing industries, construction, transport, other sectors (residential, commercial, institutional, agriculture)
- Industrial Processes
- Agriculture
- Waste and Wastewater
- Land-use Change and Forestry

Greenhouse gases covered:
Carbon Dioxide (CO2), Methane (CH4), Nitrous Oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur Hexafluoride (SF6).

Categories covered:
Category 1.B. "Fugitive emissions from fuels" is currently not covered by Israel's NDC. However, this category is to be included in Israel's National GHG Inventory in the future (see below, section 3(c).
Initial estimates are that fugitive emissions constitute between 0.1% to 0.8% of Israel's total GHG emissions.

LULUCF pools are negligible in Israel.

The sectors, gases, categories and pools covered by Israel's NDC are based on the revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, the 2006 IPCC Guidelines for National GHG Inventories and the Global Warming Potential (GWP) values from the IPCC Second Assessment Report (1995).

Scope and coverage – sectoral targets:
Electricity Generation emissions include fuel related emissions produced by that sector. This sector is not equivalent to any of the categories of the national inventory.
Transport sector emissions are equivalent to the Transportation category of the national inventory.

The emissions for the industrial sector include emissions from Manufacturing Industries And Construction as well as Industrial Processes categories from the national inventory.
Emissions from waste sector include emissions from the national inventory categories of "Solid waste disposal on land" and "Biological treatment of solid waste".

Updates or clarifications of previously reported information
Compared to previously reported information, the baseline calculations were updated to align with the AR5 GWP values. This updated the economy-wide baseline of the total GHG emissions from 78.6 to 80.71 MtCO2e, and increased the baseline for emissions from waste from 5.5 to 7.42 MtCO2e.

Intention to use cooperative approaches that involve the use of internationally transferred mitigation outcomes under Article 6
While Israel plans to achieve its Nationally Determined Contribution (NDC) mitigation objectives through domestic means, it continues to follow Article 6 negotiations regarding the use of internationally transferred mitigation outcomes, to keep the option open for future relevance.

3. Information necessary to track progress made in implementing and achieving nationally determined contributions under Article 4 of the Paris Agreement

Economy wide
In accordance with national commitments, Israel has set targets to reduce economy wide greenhouse gas emissions by at least 27% by 2030 and by 85% by 2050, compared to 2015 levels. In addition, Israel declared a Net-Zero target for 2050. As of 2022, economy wide emissions were approximately 81 million tCO2e, reflecting a 0.4% increase relative to 2015.

Electricity Production

In accordance with national commitments, Israel has set targets to reduce greenhouse gas emissions from the electricity generation sector by at least 30% by 2030 and by 85% by 2050, compared to 2015 levels. As of 2022, emissions from this sector were approximately 34 million tCO2e, reflecting a 9.5% reduction relative to 2015.

This abatement is related to two main policy measures:

Reduction of coal-based electricity generation: The planned closure of units 1-4 at the Orot Rabin coal fired power plant, originally scheduled for July 2022, has been delayed, with closure of two units now anticipated by the end of 2024, and of the other two by 2025. Despite this delay, Israel has made progress in reducing coal-based electricity generation, which declined from 29.2 TWh in 2015 to 16.7 TWh in 2022. This reduction has contributed to 80% of the overall decrease in emissions from the sector, with the remaining 20% resulting from an increase in renewable energy generation.

Increase of electricity consumption from renewable energy sources: In 2022, 10.4% of Israel's electricity consumption was generated from renewable energy sources. Over the years 2020-2022, an average of 865 MW of renewable energy capacity was installed annually, compared to 750 MW in the previous year. This pace accelerated further in 2022-2023, with an average of 1004 MW (DC) installed per year.

Achieving the 2030 goal of reducing emissions by 30% compared to 2015 will depend on accelerating the installation of renewable energy and the planned coal plant closures proceeding as scheduled.

Transportation

A target has been established to limit the growth of greenhouse gas emissions from the transportation sector by 2030, aiming to restrict the total increase to 3.3% relative to 2015 emission levels. Furthermore, a long-term target has been set to achieve a minimum reduction of 96% in emissions by 2050 compared to 2015. As of 2022, greenhouse gas emissions from the transportation sector amounted to 19.3 MtCO2e, representing a 9.4% increase compared to 2015 levels.

Industrial sector
Targets have been set to reduce greenhouse gas emissions from the industrial sector by 30% by 2030 and by at least 56% by 2050, compared to 2015 levels. In 2022, greenhouse gas emissions from the industrial sector were approximately 12.8 million tCO2e, representing a 14.9% increase compared to 2015 levels.

Waste Management Sector
Targets have been set to reduce greenhouse gas emissions from the solid waste sector by at least 47% by 2030 and by 92% by 2050, relative to emissions measured in 2015. In 2022, greenhouse gas (GHG) emissions from the waste sector were 9.11 million tCO2e, a 9.3% increase compared to 2015 levels.

Definitions and description of methodologies
Israel is currently developing a comprehensive modelling document that is expected to be published by the Ministry of Environmental Protection during the course of 2025. This document will include definitions and description of methodologies required under paragraphs 73-76 of the MPGs.

4. Mitigation policies and measures, actions and plans, including those with mitigation co- benefits resulting from adaptation actions and economic diversification plans, related to implementing and achieving a nationally determined contribution under Article 4 of the Paris Agreement

As part of Israel's commitment to meeting its targets and international obligations, government ministries jointly formulated a **National Action Plan on Climate Change** for the years 2022-2026 (hereinafter: "The National Plan").

The plan, published in October 2021, as an update to the previously established GHG Emissions Reduction Plan (2016-2021). The National Action Plan on Climate Change includes 100 economy-wide and sectoral measures regarding mitigation, adaptation, finance and investment, and reporting.

The plan, published in October 2021, as an update to the previously established GHG Emissions Reduction Plan (2016-2021). The National Action Plan on Climate Change includes 100 economy-wide and sectoral measures regarding mitigation, adaptation, finance and investment, and reporting.

The plan is designed to bridge the gap between emission reductions already achieved and the reduction required to meet Israel's updated NDC GHG reduction target for 2030, as well as to facilitate the required reductions to meet Israel's target for 2050.
Additionally, several key government resolutions aimed at promoting the abatement of greenhouse gas emissions and combating climate change were approved in recent years.
Israel monitors the implementation of the national plan and government resolutions through the Monitoring, Reporting and Verification (MRV) system, which was created in 2016. In the table below is an overview of the climate related plans and resolutions that are being monitored.

Table 4: Climate related resolutions that are being monitored in the MRV system

Scope	Year	Resolution name	Resolution number
A resolution outlining a series of measures to promote renewable energy in the electricity sector, advancing Israel towards its target of 30% renewable energy by 2030, as set in previous resolutions.	**2020**	Promoting Renewable Energy in the Electricity Sector and Amending a Government resolution	**465**
Establishes Long term goals to reduce greenhouse gas emissions by 30% by 2030 and at least 85% by 2050, relative to 2015 levels. The plan includes adopting clean technologies across various sectors to support a low-carbon economy.	**2021**	Transition to a Low-Carbon Economy	**171**
Introduces a pricing mechanism for greenhouse gas emissions to incentivize reductions across sectors. This framework was later updated and replaced by Resolution 1261 in 2024, reflecting changes to the carbon pricing strategy.	**2021**	Greenhouse Gas Emissions Pricing (replaced by resolution 1261 in the year 2024)	**286**

Scope	Year	Resolution name	Resolution number
Accelerates Israel's transition to renewable energy by amending previous policies. It focuses on expanding green energy sources and reducing the use of fossil fuels in the electricity sector.	**2021**	Transition to Green Energy and Amendment of Government resolution	**208**
Updates Israel's national plan for energy efficiency and greenhouse gas emission reductions, introducing new targets and measures to decrease energy consumption and enhance efficiency across sectors.	**2021**	Approval of Update to the National Energy Efficiency and Greenhouse Gas Emission Reduction Plan	**541**
Focuses on reducing emissions in the transportation sector by promoting electric vehicles, improving public transportation, and adopting low-carbon fuels as part of a shift toward sustainable transportation solutions.	**2021**	Promoting Clean and Low-Carbon Transportation	**542**
Fast-tracks the development of infrastructure necessary to support Israel's climate goals. It prioritizes upgrading energy, transportation, and industrial infrastructure to facilitate the transition to clean energy and enhance climate resilience.	**2021**	Accelerating Infrastructure in the Fight Against Climate Change	**543**
Promotes technological innovation to combat climate change by encouraging investment in the development of climate technologies. The initiative aims to position Israel as a leader in global climate innovation efforts.	**2021**	Promoting Technological Innovation to Combat Climate Change	**544**
Sets a national strategy to reduce air pollution and greenhouse gas emissions through specific targets for various sectors, contributing to Israel's overall climate and environmental objectives.	**2022**	National Plan for the Prevention and Reduction of Air Pollution and Greenhouse Gas Emissions in Israel - Implementation Plan	**1282**

Scope	Year	Resolution name	Resolution number
Accelerates Israel's transition to renewable energy by amending previous policies. It focuses on expanding green energy sources and reducing the use of fossil fuels in the electricity sector.	**2021**	Transition to Green Energy and Amendment of Government resolution	**208**
Engages the high-tech industry in developing solutions to fight climate change. It promotes collaboration between the government and private sector to drive technological advancements that align with national climate goals.	**2022**	Promoting Israeli Technological Innovation and Engaging the High-Tech Industry in the Fight Against Climate Change and Meeting National Goals	**1685**
Enhances the government's ability to meet renewable energy targets by streamlining regulatory processes and supporting the expansion of renewable energy projects to achieve the 2030 renewable energy goal.	**2022**	Measures to Strengthen the Government's Ability to Meet Renewable Energy Target	**1855**
Introduces an emergency plan to reduce reliance on private vehicles by promoting alternative forms of transportation and acceleration of transport infrastructure projects, aiming to reduce road congestion and emissions from the transportation sector.	**2022**	Emergency Plan - Alternative Solutions to Private Vehicles and Amendment of a Government resolution	**1684**
Integrates climate-related measures into Israel's 2023-2024 national budget, streamlining government policies to support climate and energy goals through fiscal and regulatory adjustments.	**2023**	Arrangements Law 2023-2024	**-**
Promoting policies and investments that support the development of cutting-edge technologies to address climate change and enhance Israel's global technological presence.	**2023**	Strengthening Israel's Technological Leadership	**173**
Focuses on improving the efficiency of electricity production while ensuring sufficient supply capacity. It supports the modernization of energy infrastructure and the integration of more renewable energy into the national grid.	**2023**	Streamlining Electricity Production and Ensuring Electricity Supply Capacity	**587**

The monitored government resolutions and plans include more than 300 abatement measures. Below is a detailed sectorial breakdown of the main abatement measures, divided into 3 categories:

- **Implemented**: Policies and measures that are currently in force and operational.
- **Adopted**: Policies and measures that have been formally approved but are not yet operational.
- **Planned**: Policies and measures that are under consideration or development but have not yet been formally adopted or approved.

Economy-wide measures

Implemented measures:

Israel has implemented a range of economy-wide measures aimed at reducing greenhouse gas emissions and promoting climate resilience.

- Carbon Pricing: In line with its carbon pricing strategy, Israel has adopted measures to implement carbon pricing on fossil fuels through the existing fuel excise tax mechanism. The carbon price will gradually increase, beginning in 2025, until full implementation by 2030, aiming to drive the transition toward a low-carbon economy.
- Israeli Taxonomy: In 2024, the Ministry of Environmental Protection launched the mitigation chapter of its financial taxonomy system, modeled after the European Union's taxonomy. This system is designed to enhance transparency concerning the environmental impacts of economic activities, with a particular focus on their effect on climate change.
- "Zero Hour": In 2022, the Ministry of Environmental Protection introduced the "Zero Hour" Net Zero Platform, which provides a professional framework for organizations to set and monitor their greenhouse gas emission reduction targets with the aim of achieving net-zero emissions by 2050. The platform also includes comprehensive guidelines for reporting and tracking progress towards these goals, ensuring that entities have a structured approach to meet their climate commitments.
- Significant investments in climate innovation:
  - The government allocates 20 million NIS (approximately 5.3 million USD) annually to encourage applied research in climate-related fields through calls for proposals.
  - An additional 12 million NIS (approximately 3.2 million USD) has been directed towards research and the development of innovative climate technologies.
  - A Research center focused on mitigation strategies in the agricultural sector has been established, funded by the Ministry of Agriculture and Food Security.
  - Seven innovation centers have been set up to create a geographically and thematically diverse ecosystem focused on climate issues such as ag-tech, desert technologies, and sustainable construction.

Planned measures:

- **Climate Legislation**: Israel intends to enact climate legislation that will establish mechanisms to ensure the state's capacity to reduce greenhouse gas emissions and prepare for climate change.

Energy

Implemented measures

- Updated Development Plan for the Electricity Grid - Transmission Network: This plan involves an investment of approximately 20 billion shekels (5.3 billion USD) and is designed to enable the grid to accommodate 30% renewable energy by 2030, ensuring reliable integration of renewable energy sources into the electricity system.
- Opening the Market for Renewable Energy Power Purchase Agreements (PPA): As of January 2024, Israel enabled the purchase of electricity from renewable energy facilities through bilateral agreements. This regulatory change allows consumers to directly procure electricity generated by renewable sources, fostering greater integration of clean energy into the national grid.
- Updated Feed-in Tariffs for Small Dual-Use Photovoltaic Installations: In January 2024, Israel's Electricity Authority approved new feed-in tariffs for small dual-use photovoltaic installations (up to 630 kW) and solar systems with integrated storage. This update aims to encourage further deployment of distributed solar energy solutions.
- Electric Appliance Import Reform: Amendment 3 to the Energy Sources Law (1989) mandates compliance with European Union energy efficiency and labeling standards for electrical products. The reform, fully implemented in June 2023, replaced outdated regulations, aligning Israel's energy efficiency standards with international best practices.
- Support for Energy Efficiency Projects in Industry and Commerce: Government resolution 541 instructed the allocation of 350 million NIS to support energy efficiency initiatives aimed at reducing greenhouse gas emissions, over the years 2022–2026. By 2023, approximately 100 million NIS (27 million USD) had been allocated, of which 72 million NIS were disbursed (19 million USD).
- Support for Climate Action and Sustainable Energy in Local Authorities: Israel has supported the development of 17 adaptation and sustainable energy plans in local authorities, with an additional 63 adaptation plans and 20 sustainable energy plans are currently being developed. A call for proposals for 20 additional local authorities will be issued in 2024. More than 14.5 million NIS (3.8 million USD) were allocated towards this effort to date.
- Support for Sustainable Energy in Local Authorities: Between 2022 and 2024, A total of 253 million NIS (65.9 million USD) was approved to support sustainable energy projects in local authorities.
- Urban Heat Island Mitigation Efforts: To address the issue of urban heat islands, Israel invested 46 million NIS (11 million USD) for solar shading projects in urban environments.
- National Plan for Dual-Use Renewable Energy Generation: Israel has launched a national plan aimed at promoting dual-use renewable energy systems, allowing for the generation of renewable energy while maintaining other land uses, such as rooftop solar installations and solar farms on agricultural land.

Adopted measures

- Complete phase-out of coal-fired power generation by 2026: This includes retrofitting the 4 existing "Rothenberg" coal fired units to use natural gas. Two units were converted in 2024. A conversion plan has been submitted for the other two units which are expected to be converted during 2025. In addition, the phase out includes closing the 4 existing "Orot Rabin" 1-4 coal fired units during 2025 and retrofitting two more units to natural gas during 2026. By 2030, 70% of Israel's electricity generation is planned to be fueled by natural gas, with the remaining share produced by renewable energy sources.
- Support for Energy Efficiency Projects in Industry and Commerce: An additional budget allocation of 290 million NIS (77.7 USD) has been designated to promote energy efficiency and reduce greenhouse gas emissions, contingent on the approval of carbon pricing mechanism (the latter was approved in October 2024).

Planned measures

- Photovoltaic system installation Mandate for New Buildings: new regulations in final stages of approval, requiring photovoltaic systems to be installed in all new non-residential buildings with roof areas over 250 square meters, and residential detached houses with a roof area of over 100 square meters. These regulations are expected to result in the installation of tens of thousands of additional renewable energy systems, with a total capacity of up to 3,500 megawatts by 2040.
- Publication of a dedicated plan for the promotion of renewable energy: A national energy and infrastructure plan has been prepared, which includes a dedicated plan for the promotion of renewable energies. Its final approval and publication are delayed due to the outbreak of the Israel-Hamas war.
- Net-zero greenhouse gas emissions plan for the energy sector: In 2024, the Ministry of Energy and Infrastructure published a framework for achieving net-zero greenhouse gas emissions in the energy sector by 2050, currently open for public consultation. The framework includes three decarbonization scenarios, economic assessments of key technologies, and recommended actions to support a diverse, reliable, and sustainable energy system. Key steps proposed include investment in advanced technologies, such as hydrogen and nuclear energy, and strengthening regional and international energy connectivity to position Israel as an energy hub.

Transportation

Implemented measures

- Public Transit Infrastructure Development in Metropolitan Areas: To date, a budget of 230 million NIS (62 million USD) has been allocated and partially invested in projects such as light railway line constructions and cable car projects.
- Public Bus Electrification and Service Expansion: A budget of 307 million NIS (82.9 million USD) was approved for service expansion. Additionally, 1,389 electric buses have been subsidized as part of the goal to electrify the entire urban bus fleet by 2026.
- Electrification of passenger train network: By 2022, Israel electrified its entire passenger train network.
- Transition to zero emissions vehicles: Israel is promoting the distribution of charging infrastructure in new buildings, apartment buildings and public spaces, with 39 million NIS (10.8 million USD) invested in charging infrastructure for electrified transport.
- Dedicated Cycling Infrastructure Development: 5 million NIS (1.3 million USD) has been invested in developing dedicated cycling infrastructure.

Adopted measures

- Public Transport Lanes Development: 150 million NIS (42 million USD) has been allocated (not yet invested) to expanding public transportation lanes across the country to enhance service efficiency.
- Transition to zero emissions vehicles: Israel allocated additional 27 million NIS (7.5 million USD) in charging infrastructure for electrified transport.
- Dedicated Cycling Infrastructure Development: Additional 230 million NIS (64 million USD) has been allocated towards developing dedicated cycling infrastructure.
- Mass Transit Systems Infrastructure Development: A budget of 250 billion NIS (67.5 billion USD) has been allocated for mass transit systems infrastructure development in metropolises for the next decade (up to 2035).
- Public Bus Service Expansion: An additional 2.2 billion NIS (~594 million USD) allocated until 2026.

Planned measures

- Reduction of Emissions from Heavy-Duty Vehicles: By 2035, 50% of imported vehicles over 3.5 tons are expected to have zero tailpipe emissions. This target is currently under regulatory impact assessment as part of updates to the Clean Air Act.
- Emission Targets for New Light Vehicles: Emission targets for new imported light vehicles are under review and expected to be published during 2024.

Industry

Implemented measures:

- Reduction in the Use of Fossil Fuels: Israel has invested 72 million NIS (20 million USD) for promoting energy efficiency, reducing greenhouse gas emissions, and transitioning industrial facilities to cleaner energy sources. These measures are intended to support the broader objective of reducing reliance on fossil fuels and accelerating the shift towards sustainable energy within the industrial sector.
- Transition to green refrigerants: Legislation for Refrigeration Technicians and Service Providers: Regulations for defining the standards and qualifications of professionals providing refrigeration were passed in November 2024.
- Voluntary Climate Impact Reporting Mechanism: A voluntary mechanism for reporting and publishing information on the climate impact and GHG emissions of products and services produced in, or imported into, Israel is currently under development was released in 2024.

Adopted Measures:

- Industrial Symbiosis Projects: 25 million NIS (6.75 million USD) has been allocated to projects that facilitate the use of one organization's waste as raw material for another, promoting circular economy practices.

Planned measures:

- Transition to green refrigerants: Regulations on the Import of Products with Freon-Based Refrigerants: a regulatory impact assessment is underway for approving regulations to restrict the import of products containing Freon-based refrigerants.
- Adoption of Standards for Recycled Raw Materials: A budget has been approved for developing relevant standards to facilitate the use of recycled materials in products.

Waste

Implemented measures:

1. Management of agricultural waste: regional plans have been developed to reduce emissions resulting from the burning of agricultural waste, and municipal bylaws have been promoted to allow the collection of fees for such management.
2. Source separation of organic waste: Budget allocations for this matter have been integrated into various calls for proposals by the Ministry of Environmental Protection. A total of 40 million NIS (10.7 million USD) has been approved to date.
3. Organic Waste Treatment Facilities: A budget of 5.3 billion NIS (1.44 billion USD) has been approved. This includes 2.4 billion NIS (700 million USD) allocated for organic waste treatment facilities under the Maintenance of Cleanliness Fund, in addition to 2.9 billion NIS (837 million USD) for calls for proposals.

Planned measures:

- Mandatory Treatment of Organic Waste and Ban on Landfilling Unsorted and Untreated Organic Waste: Regulations have been drafted to establish mandatory treatment standards for organic and agricultural waste. These standards include guidelines for utilizing treated materials and prohibit landfill disposal. The regulation also supports the development of infrastructure for energy recovery from residual waste. This initiative aims to enhance resource efficiency and contribute to the national emission reduction goals by minimizing waste sent to landfills.
- Implementation of Electronic Waste Treatment Standards and Waste Deposit Law Amendment: The integration of the CENELEC standard for electronic waste treatment is underway, alongside amendments to the Waste Deposit Law.

5. Summary of GHG emissions and removals

In 2022, Israel's total GHG emissions were 81 million tons (Mt) CO2 equivalent (CO2e), representing an absolute increase of around 40% relative to 1996 GHG emissions, and 0.4% relative to 2015 emission levels.

Fuel combustion is the primary source of greenhouse gas emissions (77.5%), with 45.2% of emissions stemming from fuel combustion in the energy sectors (electricity generation and fuel refining). Overall emissions increased by 3.4% between 2021 and 2022, driven mainly by a corresponding 3.4% rise in emissions from fuel combustion.

Other significant sources of emissions include waste treatment and fluorinated greenhouse gases, which accounted for 10.2% and 6.2% of total emissions in 2022, respectively. Emissions from waste and wastewater treatment rose by 2.9%, and emissions from fluorinated gases increased by 4.6% between 2021 and 2022. Over the years, a rising trend in emissions from waste landfilling has been observed, along with an increase in emissions from imported fluorinated gases.

For more information see "National circumstances' effect on GHG emissions and removals over time" in this report and the separately submitted NIR report.

Table 5: Summary of GHG emissions and removals ($MtCO_2e$)

GHG EMISSIONS & REMOVALS	Reference year for NDC - 2015	Base year - 1996*	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change from base year to latest reported year
CO_2 emissions without net CO_2 from LULUCF	66.2	52.2	61.1	62.5	62.5	62.7	63.8	66.6	66.1	63.2	65.1	67.2	72.4	66.4	64.4	66.2	65.3	65.0	64.6	65.9	62.8	62.3	64.5	24%
CO_2 emissions with net CO_2 from LULUCF	66.1	52.0	60.9	62.2	62.2	62.4	63.4	66.2	65.7	62.9	64.7	66.8	72.1	66.1	64.3	66.1	65.1	64.8	64.4	65.6	62.5	62.0	64.2	23%
CH_4 emissions without CH_4 from LULUCF	9.5	4.7	5.2	6.6	6.9	7.4	7.7	8.0	8.3	8.5	9.0	9.0	9.3	9.3	9.5	9.5	9.7	9.8	9.9	9.8	9.8	10.1	10.4	122%
CH_4 emissions with CH_4 from LULUCF	9.5	4.7	5.2	6.6	6.9	7.4	7.7	8.0	8.3	8.5	9.0	9.0	9.3	9.3	9.5	9.5	9.7	9.8	9.9	9.8	9.8	10.1	10.4	122%
N_2O emissions without N_2O from LULUCF	1.5	1.6	1.9	1.6	1.7	1.7	1.7	1.8	1.7	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	-14%
N_2O emissions with N_2O from LULUCF	1.5	1.6	1.9	1.6	1.7	1.7	1.7	1.8	1.7	1.6	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	-14%
HFCs	3.3	0.8	NE	NE	NE	NE	NE	NE	0.8	0.8	1.4	1.9	2.1	2.6	2.1	3.3	4.0	3.6	4.0	3.9	5.3	4.3	4.6	465%
PFCs	0.1	0.1	NE	NE	NE	NE	NE	NE	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	350%
Unspecified mix of HFCs and PFCs	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SF_6	0.1	1.1	NE	NE	NE	NE	NE	NE	1.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	-89%
NF_3	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Total (without LULUCF)	80.9	58.6	68.1	70.7	71.0	71.7	73.2	76.4	78.1	74.4	77.3	79.8	85.6	80.0	77.8	80.9	80.8	80.1	80.3	81.4	79.7	78.7	81.3	39%
Total (with LULUCF)	80.7	58.4	67.9	70.4	70.8	71.4	72.8	76.1	77.7	74.0	76.9	79.4	85.2	79.7	77.6	80.7	80.6	79.9	80.1	81.1	79.5	78.4	81.1	39%
Total (without LULUCF, with indirect)	-	-																						
Total (with LULUCF, with indirect)	-	-																						

*For HFCs, PFCs and SF6 the base year is 2008

GHG SOURCE AND SINK CATEGORIES	Reference year for NDC - 2015	Base year - 1996*	2000	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Change from base year to latest reported year
1. Energy	64.1	50.6	59.0	60.7	60.6	60.7	61.6	64.4	64.0	61.5	63.2	65.0	70.3	64.3	62.2	64.1	63.4	63.1	63.0	64.2	61.2	60.8	62.9	24%
2. Industrial processes and product use	6.1	2.4	2.7	2.3	2.4	2.6	2.6	2.7	4.5	3.2	4.0	4.8	4.9	5.3	4.9	6.1	6.6	6.1	6.4	6.3	7.6	6.6	7.0	196%
3. Agriculture	2.3	2.2	2.3	2.3	2.3	2.4	2.5	2.6	2.6	2.5	2.5	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.4	2.4	2.3	2.4	2.4	10%
4. Land use, land-use change and forestry [B]	-0.1	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.4	-0.3	-0.4	-0.4	-0.4	-0.3	-0.3	-0.2	-0.1	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3	-0.3	51%
5. Waste	8.3	3.4	4.0	5.4	5.7	6.1	6.5	6.7	7.0	7.2	7.6	7.9	8.2	8.2	8.3	8.3	8.6	8.6	8.6	8.5	8.6	8.8	9.1	167%
6. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF) [B]	80.7	58.4	67.9	70.4	70.8	71.4	72.8	76.1	77.7	74.0	76.9	79.4	85.2	79.7	77.6	80.7	80.6	79.9	80.1	81.1	79.5	78.4	81.1	39%

6. Projections of greenhouse gas emissions and removals

Presented here are projections for greenhouse gas (GHG) emissions for two scenarios until the year 2040 – projected emissions with the implementation of current mitigation policies (WEM - With existing measures scenario) and projected emissions with the adoption of additional mitigation measures (WAM- With additional measures scenario).

The scenarios modeled for these projections are based on varying levels of implementation of policy measures, policy measures packages, leverages or mechanisms, rather than strictly on the inclusion of policy measures defined as implemented, adopted, or planned. The difference between the scenarios lies in the expected level of adoption of technical abatement measures: the WEM scenario refers to the expected level of adoption if Israel continues on its existing course, whereas the WAM scenario includes a higher degree of adoption consistent with full implementation of planned policy measures in a manner that meets key sectoral targets (such as share of renewables in electricity generation).

Expected implementation levels of key policy measures included in the two scenarios are detailed in the table below, demonstrating the differences between the two scenarios:

Table 6: Expected implementation levels of key policy measures

Measures	Target	Status		Projections- WEM				Projections- WAM			
	2030	2015	2022	2025	2030	2035	2040	2025	2030	2035	2040
Electricity Production											
Electricity production from renewable energy sources (% from total consumption)	30%	2.8% (2017)	9.8%	16.3%	25.3%	30.8%	34.3%	20%	30%	40%	50%
Routinely operated coal capacity (MW)	0	4,840	4,840	2,970	0	0	0	2,970	0	0	0
Transportation Sector											
Private vehicle travel per citizen (Average annual Km Traveled)	5000	4,975	5462	5,099	4,982	4,893	4,785	5,099	4,982	4,893	4,785
Average GHG emissions from new private vehicles (% reduction in average gCO2/km)	95%	145.9	128.30	93.7	38.3	20.3	5.3	93.7	0	0	0
Electric buses purchased (% out of the total purchases of Municipal public buses)	100% by 2026	0%	17.7%	50%	100%	100%	100%	50%	100%	100%	100%
Reduction of private car mileage (% of the reference scenario)	15%	0%	3%	10%	15%	18%	20%	10%	15%	18%	20%
Industrial Sector											
Import of HFC gases (MtCO2e per year)	1.96 (Annually from 2029-2033)			2.8	1.2	0.82	0.48	2.8	1.2	0.82	0.48
Waste											
Municipal Waste Recycled (%)	54%	19.1%	22.6%	43%	44.9%	48.8%	53.5%	44.5%	52.6%	53.8%	55.1%
Reduction in landfilled municipal waste (% compared to baseline)[78]	71%	0%	-4%	-16%	18%	28%	33%	-13%	70%	75%	78%
Percentage of collected methane in active landfills.	50%	4.94% (2017)	5.06%	5.1%	26%	26%	26%	5.1%	69%	69%	69%

[78] There is an increase in landfilled municipal waste in 2025 in both scenarios. After that year there is a reduction according to government policy.

WEM (with existing measures) Scenario

The WEM scenario was modelled accounting for the actual implementation of measures in the reporting year, and what is foreseen in the targets years (achievement or not of the targets and measures) given the current rate of implementation of measures that have been adopted but not yet fully implemented. For further detail, see Table 6 above.

In the WEM scenario, the overall reduction goal is not expected to be fully achieved. However the electricity sector and transportation sector targets are predicted to be fully met.

Table 7: Targets achievement prediction in the WEM scenario

Sector	Reduction Target for 2030 (relative to 2015)	WEM Scenario	
		Predicted Reduction	Distance from 2030 Target (absolute)
Waste	- 47%	-18%	**29%**
Industry	- 30%	-19%	**11%**
Electricity	- 30%	-32%	**-2%**
Transportation	+3.3%	+0.8%	**-2.5%**
Economy Wide	-27%	-19%	**8%**

To achieve the GHG reduction targets under the 'With Existing Measures' (WEM) scenario, there are several policy measures that have been approved but must be fully implemented. The sectors where significant gaps exist are the industrial sector and the waste management sector.

Therefore, to ensure compliance with the national targets, several measures to mitigate emissions from the waste sector must be implemented. This may include setting a carbon pricing mechanism for waste landfilling and incineration, alongside regulations for capture and destruction of methane from landfills, and bans on the disposal of untreated organic and unsorted waste. These measures must be supported by investments in advanced waste treatment facilities to enable separation, sorting, and treatment of organic waste, reducing overall methane emissions.

In the industrial sector, dedicated funding must be allocated to support emission reductions and sustainable energy use. Furthermore, a certification program for HVAC installers must be introduced, and the Kigali Amendment to phase down HFCs must be ratified.

In the energy sector, key measures that are necessary to ensure the WEM scenario include the planned conversion of coal-fired units 1-4 at the Orot Rabin power station to natural gas, the expansion of the national electricity distribution network to accommodate more renewables, and a grant program to promote dual-use solar energy installations, particularly on rooftops.

Additionally, the National Plan for meeting renewable energy targets that is awaiting final approval must be passed.
Additionally, in the transport sector new emission standards for light vehicles must be set and financial support for expanding the electric vehicle charging infrastructure must be provided, promoting the shift to low-emission transportation.

WAM (with additional measures) scenario
The WAM scenario was modelled assuming a full policy implementation of adopted measures beyond the current rate of implementation, as well as implementation of additional planned measures. This scenario reflects compliance with adopted and planned government policy during the target years and enables forecasting the emissions and emissions reduction that will be achieved by each of the measures in the target years. For further detail, see Table 6 above.

In the WAM scenario, based on the measures that were modelled, the overall reduction goal is expected to be nearly achieved. It is important to note that some measures were not modelled due to modelling limitations but are expected to considerably impact the national emission reduction. An estimation for the total additional potential emission reduction is presented in the figure below [79].

Targets for the electricity, transportation and waste sectors are expected to be fully met, with an overture of 7%, 2.1% and 23% respectively. However, the target for the industry sector is not expected to be met.

[79] The estimation includes the potential emission reduction from the reduction of animal enteric fermentation, a reduction in nitrogen emissions from fertilizers, and oil refineries closure. However, there are more measures not modelled, see the detailed list below.

Table 8: Targets achievement prediction in the WAM scenario

Sector	Reduction Target for 2030 (relative to 2015)	WAM Scenario	
		Predicted Reduction	Distance from 2030 Target (absolute)
Waste	- 47%	-70%	**-23%**
Industry	- 30%	-19%	**11%**
Electricity	- 30%	-37%	**-7%**
Transportation	+3.3%	+0.2%	**-3.1%**
Economy Wide	-27%	-26%	**1%**

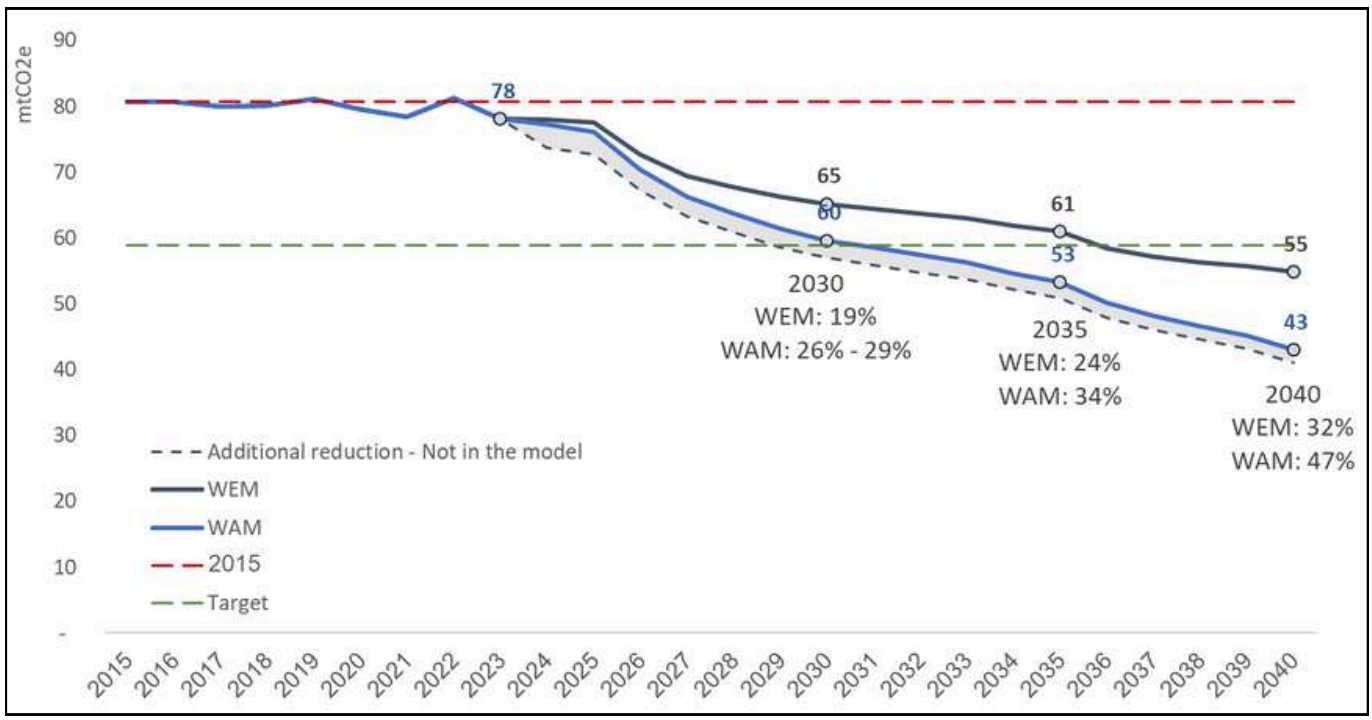
Key policy measures that were not accounted for in any of the scenarios:

- Implementation of carbon tax (implemented, yet were not accounted for due to modelling work not yet completed)
- Closure of the Haifa refinery by 2030 (adopted) [80]
- Formulation and implementation of a comprehensive action plan to reduce greenhouse gas emissions in the agriculture sector (planned)
- Carbon capture and storage/utilization (planned)
- Reduction in GHG emissions from wastewater treatment plants (planned)

[80] Government resolution 1231 "Strategy for the Development and Advancement of Haifa Bay and Amendment of a Government Resolution", 2022, and The Prime Minister's Office "Strategic Work Plan for the Development of Haifa Bay", 2023.

Projections for WEM and WAM scenario up to 2040
Overall projections of the WAM and WEM scenarios – Economy Wide:

Figure 27: Economy wide emissions projections of the WAM and WEM scenarios [81]



As illustrated in the graph above, Israel's GHG emissions are projected to decline steadily in the coming years, reaching approximately 57 million tons CO2e by 2040 under the WEM scenario and 43 million tons CO2e under the WAM scenario. The disparity between these scenarios is primarily attributed to enhanced efforts in methane capture from operational landfills, the accelerated adoption of renewable energy sources, and the electrification of the transportation sector.

[81] The number in parentheses represents the additional emission reduction from measures that were not modelled.

Projections of key indicators

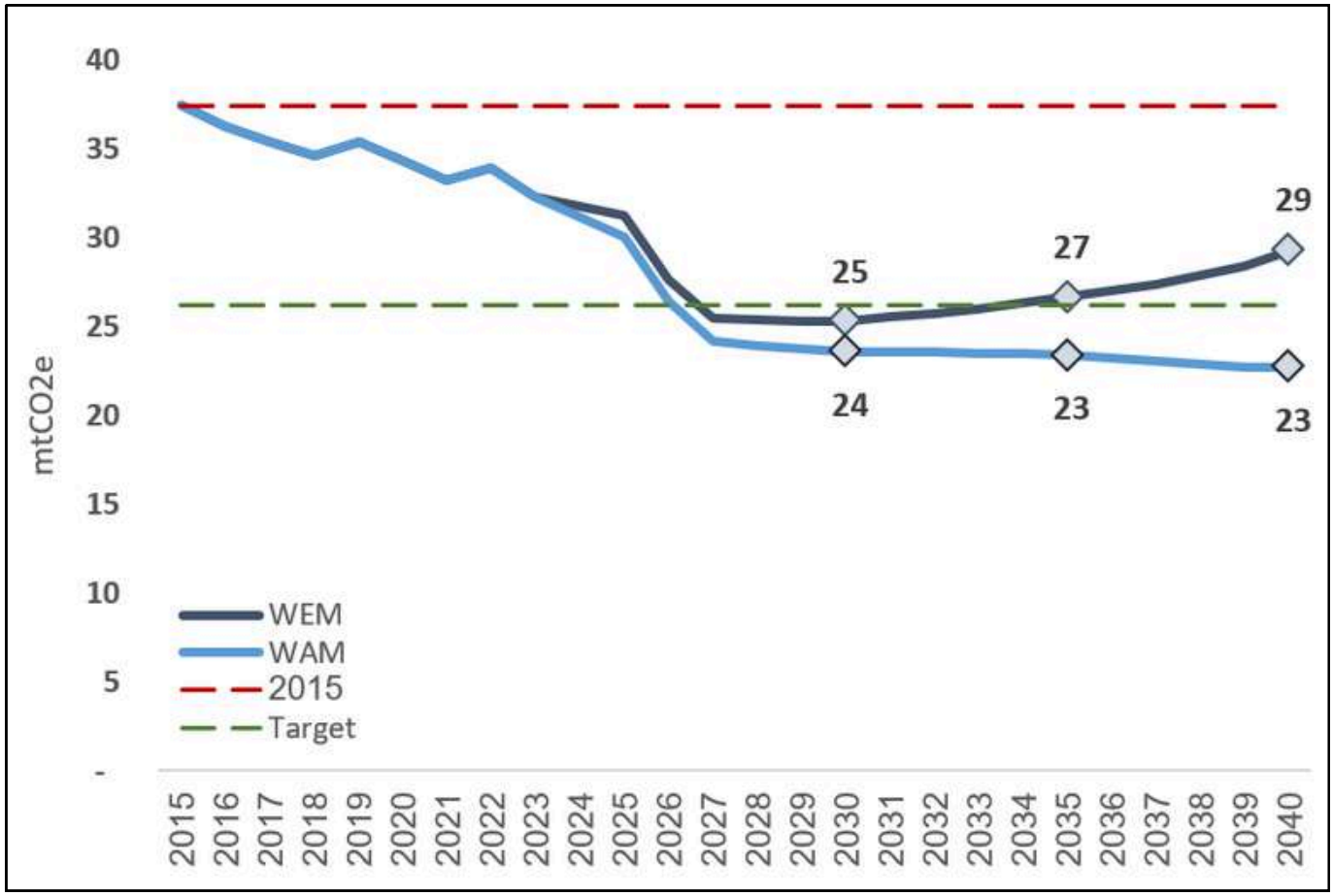
Projections for the economy wide indicators are presented in the previous section. This section includes projections for the sectorial indicators included in Israel's NDC.

Table 9: Projected emission reduction of key indicators by sector

Key indicator(s)	Units	2022	2025	2030	2035	2040
WEM						
Electricity Generation	mtCO2e	33.9	31.2	25.3	26.6	29.3
Transport	mtCO2e	19.3	19.8	17.8	14.0	8.8
Waste	mtCO2e	8.1	8.4	6.0	5.3	4.9
Industry	mtCO2e	13.0	11.3	9.2	8.2	7.4
Other	mtCO2e	6.7	6.8	6.9	6.9	4.5
Economy Wide	mtCO2e	81.1	77.5	65.2	61.0	54.8
WAM						
Electricity Generation	mtCO2e	33.9	30.0	23.6	23.4	22.7
Transport	mtCO2e	19.3	19.8	17.8	13.2	7.2
Waste	mtCO2e	8.1	8.3	2.4	2.1	1.8
Industry	mtCO2e	13.0	11.3	9.2	8.2	7.4
Other	mtCO2e	6.7	6.7	6.5	6.5	3.9
Economy Wide	mtCO2e	81.1	76.1	59.6	53.3	43.0

Electricity Generation

Figure 28: Electricity generation emissions projections of the WAM and WEM scenarios



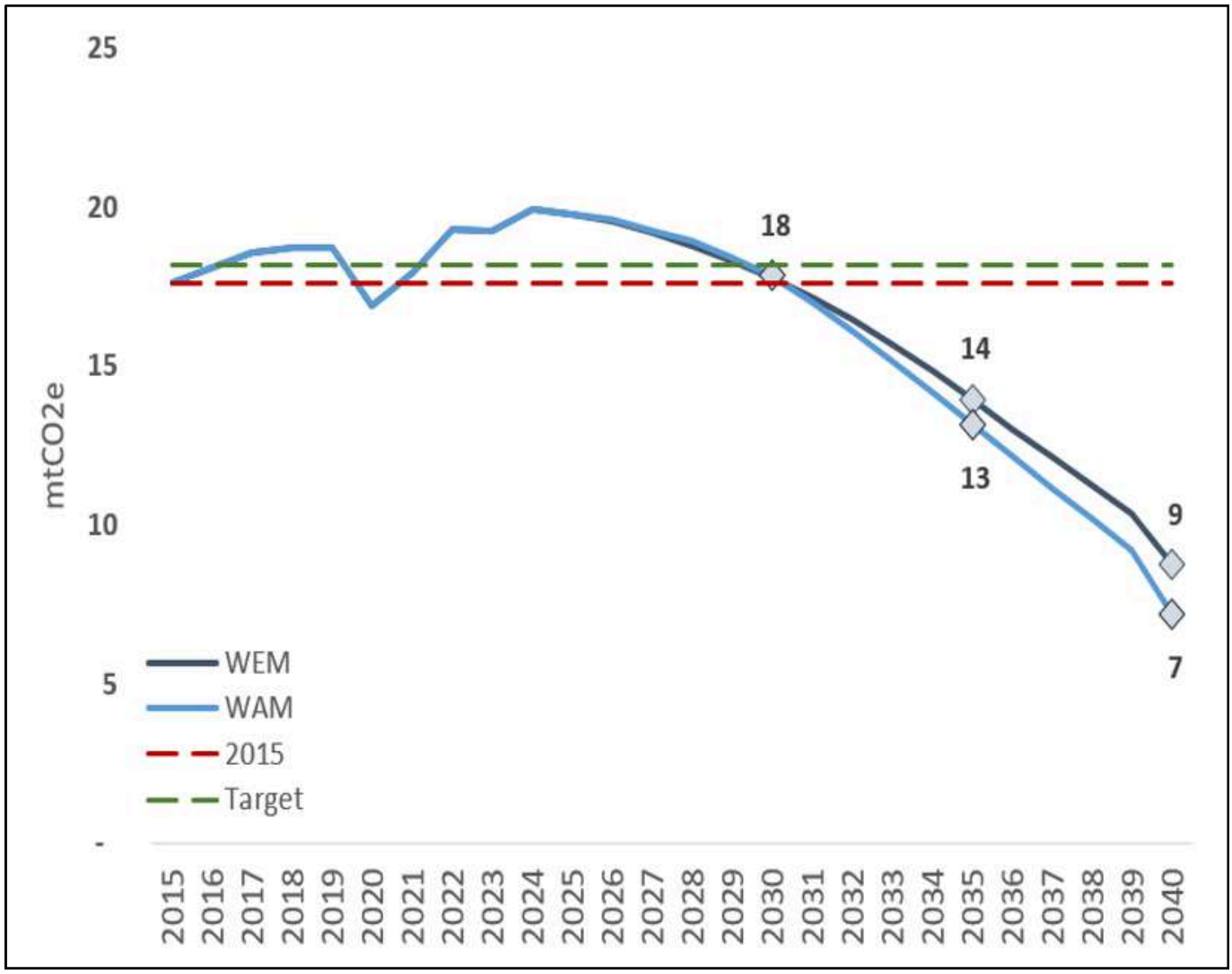
Both scenarios demonstrate achievement of the national sectorial target in 2030, yet the WEM scenario demonstrates a rise in emissions which causes a deviation from the target from 2030 onward, while in the WAM scenario, abatement continues.

The primary distinction between the two scenarios lies in the penetration rate of renewable energy. In the WEM scenario, the penetration rate is based on the average increase observed over the past three years. However, the assumed growth in renewable energy is insufficient to offset the rising electricity demand expected in the coming years due to population increase and accelerated electrification of transportation. In contrast, the WAM scenario assumes renewable energy will constitute 30% of consumption by 2030, 40% by 2035, and 50% by 2040. This trajectory supports a steady reduction in absolute emissions from the electricity sector, despite increasing demand.

One of the key challenges facing the Israeli electricity sector is the potential slow adoption of energy storage systems. This could hinder the ability of renewable energy sources to replace conventional power plants, particularly during peak demand hours.

Transportation

Figure 29: Transportation emissions projections of the WAM and WEM scenarios

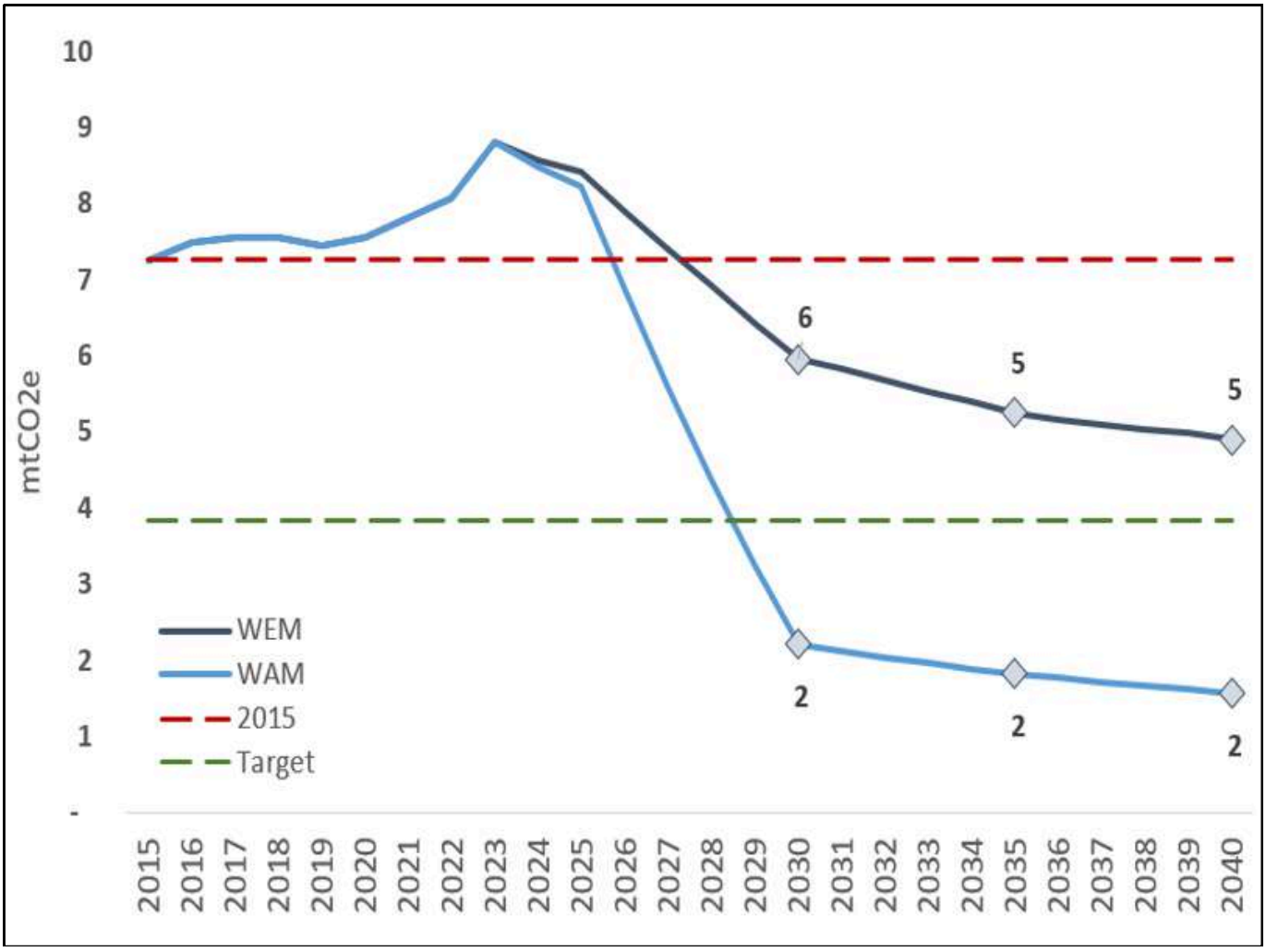


Both scenarios demonstrate an achievement of the sectorial national target, with continuance of abatement onward, more significantly in the WAM scenario. A key difference between the two scenarios is the rate of vehicle electrification. The WEM scenario assumes a business-as-usual rate of electrification, reflecting current trends and policies. Conversely, the WAM scenario envisions more ambitious targets, including all new purchases of private vehicles under 3.5 tons being electric by 2030 and 50% of commercial vehicle purchases above 3.5 tons being electric by 2035. These targets aim to significantly reduce emissions in the transport sector, a major contributor to national greenhouse gas emissions.

Despite the potential benefits, the transport sector faces several challenges, such as reducing vehicle kilometers traveled and expanding charging infrastructure. Addressing these challenges is crucial for achieving absolute emission reductions beyond 2030.

Waste Management

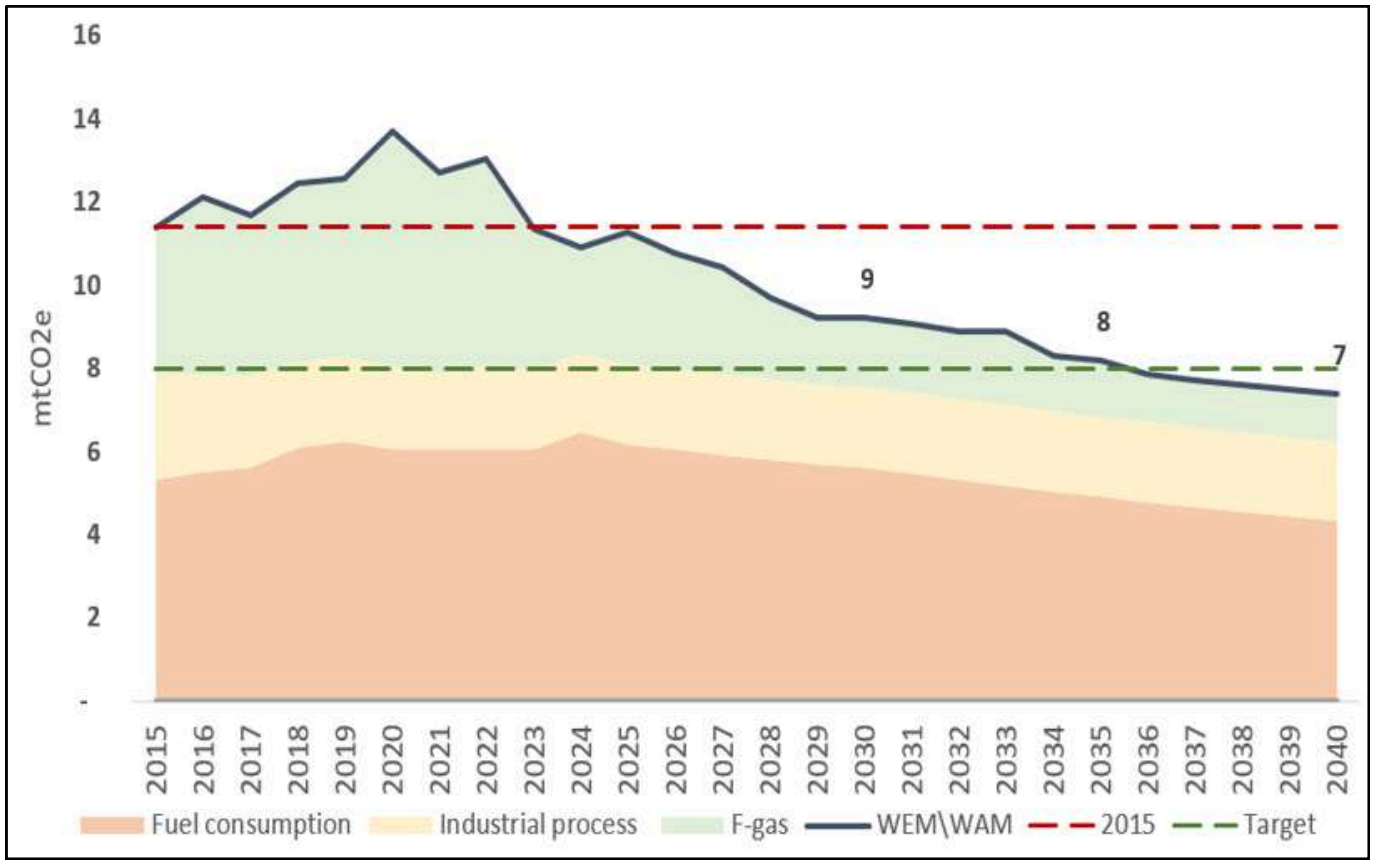
Figure 30: Waste management emissions projections of the WAM and WEM scenarios



Both scenarios demonstrate abatement in the coming years, yet acheivement of the sectorial target is demonstrated only in the WAM scenario. A key difference between the two scenarios lies in the rate of methane collection and destruction in operating landfills. The implementation of the methane collection guidelines, expected to be published by the Ministry of Environmental Protection in the coming year, will be critical for reducing emissions in the waste sector and for enabling Israel to achieve its overall emission reduction targets.

Industry

Figure 31: Industrial emissions projections of the WAM and WEM scenarios



In the industry sector the WEM and WAM are identical and demonstrate a pattern of abatement. The adoption of the Kigali Amendment is a key driver in reducing the industry sector emissions, as illustrated in the graph above (green). Emissions stemming from F-gas show a significant decrease over the years, highlighting the amendment's impact on phasing down HFCs. Despite the decrease in F-gas consumption, it appears that the industry sector may not achieve its target. This shortfall could be attributed to limitations in the modeling process and the absence of additional measures and policy initiatives necessary to bridge the gap. A summary of the projections of sectorial GHG emissions and removals in the WEM and WAM Scenarios are presented in the tables below. It is important to note that there are minor inconsistencies between these projections and the projections by gas, due to modeling limitations.

Projections by gas [82]
WEM Scenario

Figure 32: Projections of GHG emissions and removals by gas with LULUCF– WEM scenario

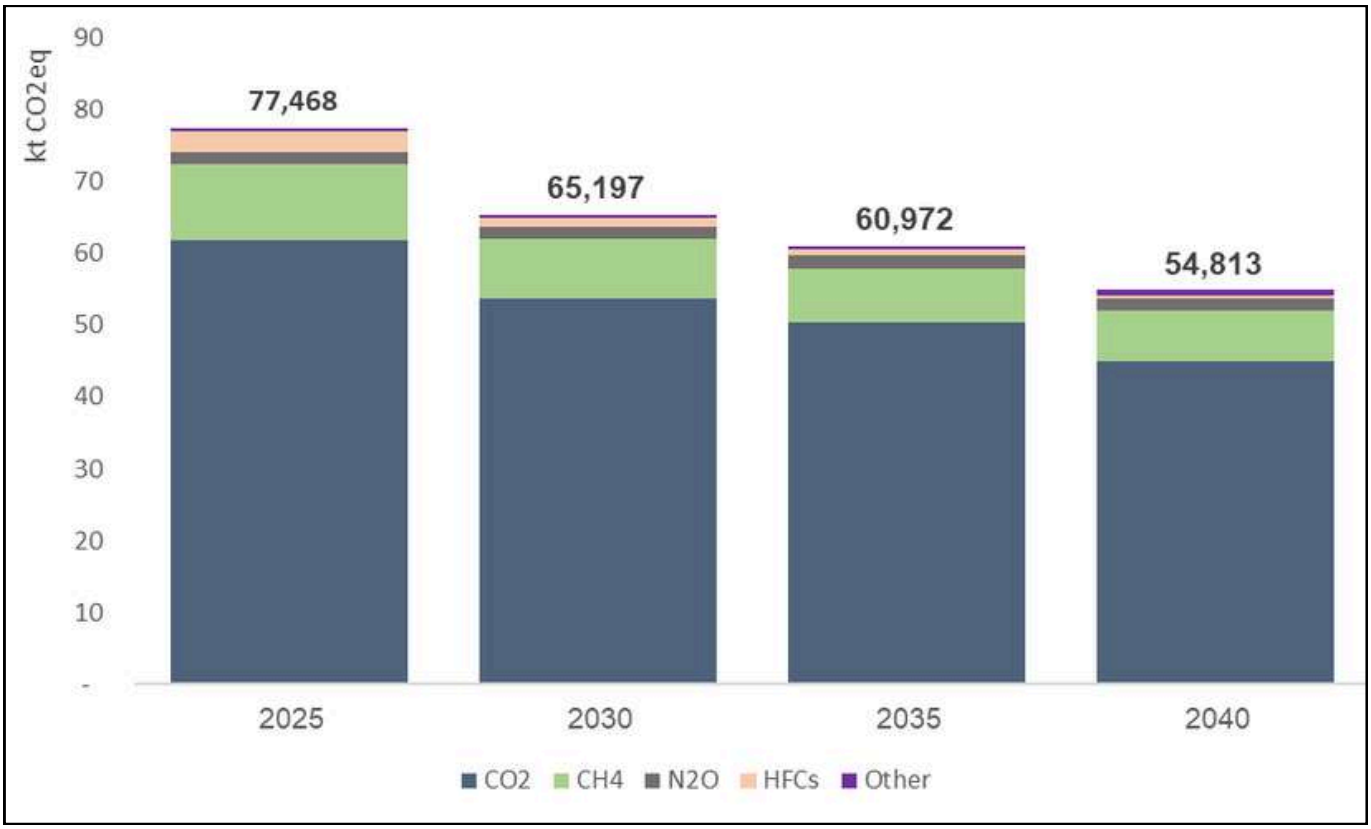


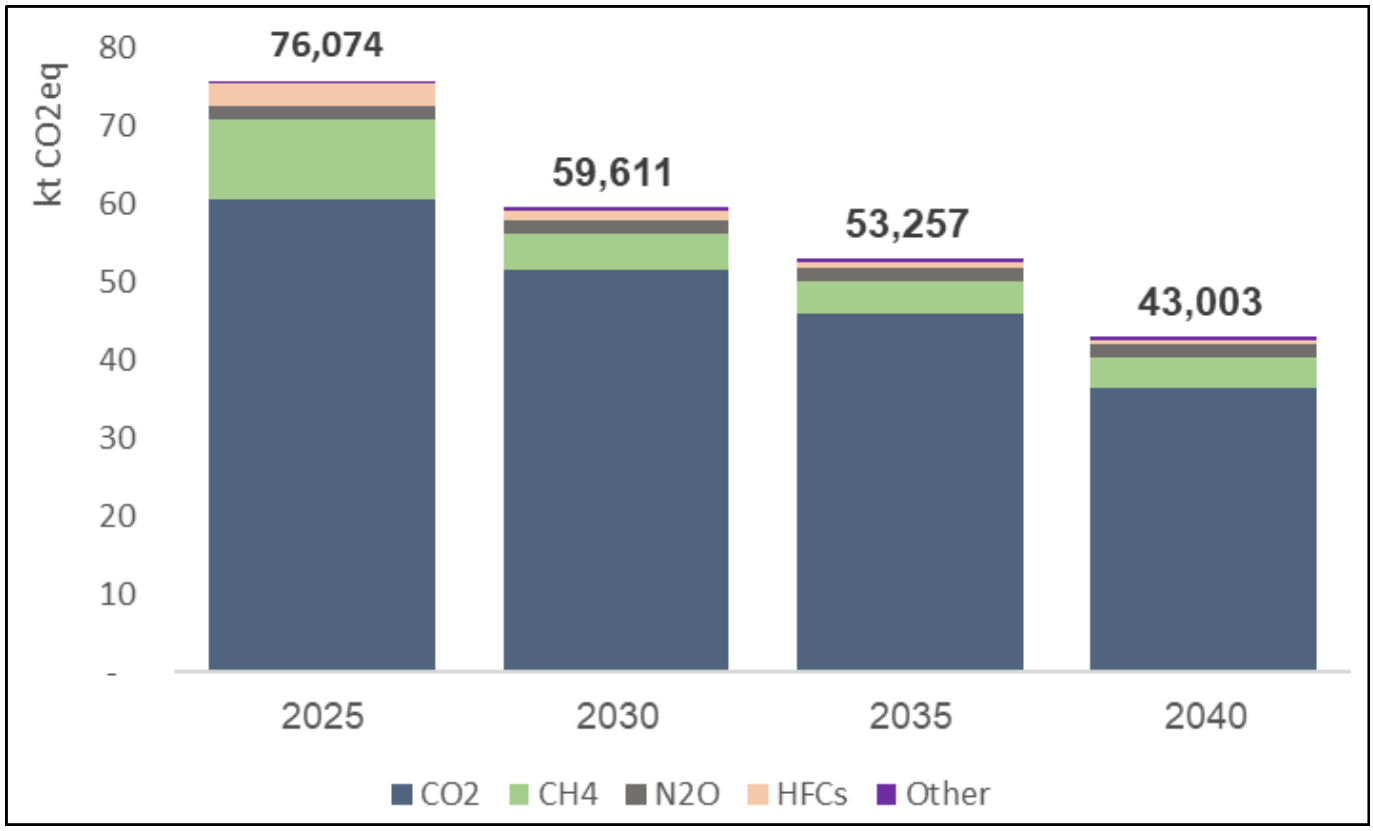
Table 10: Projections of GHG emissions and removals by gas– WEM scenario (kt CO2 eq)

Gas	2022	2025	2030	2035	2040
CO_2 emissions including net CO_2 from LULUCF	64,220	61,907	53,639	50,448	44,864
CO_2 emissions excluding net CO_2 from LULUCF	64,506	62,192	53,925	50,734	45,150
CH_4 emissions including CH_4 from LULUCF	10,448	10,451	8,275	7,480	7,126
CH_4 emissions excluding CH_4 from LULUCF	10,448	10,451	8,275	7,480	7,126
N_2O emissions including N_2O from LULUCF	1,395	1,764	1,738	1,739	1,741
N_2O emissions excluding N_2O from LULUCF	1,395	1,764	1,738	1,739	1,741
HFCs	4,618	2,797	1,205	824	486
Other F-Gas (PFCs, SF6) Inhalers and medical sprays emissions, vehicle scrapping)	383	390	460	543	642
Total with LULUCF	**81,063**	**77,468**	**65,197**	**60,972**	**54,813**
Total without LULUCF	**81,349**	**77,754**	**65,483**	**61,258**	**55,098**

[82] The total emissions by gas have a slight deviation from the total emissions by sector. This is due to modelling limitations.

WAM Scenario

Figure 33 : Projections of GHG emissions and removals by gas with LULUCF – WAM scenarioTable



scenarioTable 11: Projections of GHG emissions and removals by gas – WAM scenario

Gas	2022	2025	2030	2035	2040
CO_2 emissions including net CO_2 from LULUCF	64,220	60,678	51,644	46,025	36,451
CO_2 emissions excluding net CO_2 from LULUCF	64,506	60,964	51,930	46,311	36,737
CH_4 emissions including CH_4 from LULUCF	10,448	10,255	4,530	4,050	3,795
CH_4 emissions excluding CH_4 from LULUCF	10,448	10,255	4,530	4,050	3,795
N_2O emissions including N_2O from LULUCF	1,395	1,763	1,737	1,736	1,733
N_2O emissions excluding N_2O from LULUCF	1,395	1,763	1,737	1,736	1,733
HFCs	4,618	2,797	1,205	824	486
Other F-Gas (PFCs, SF6) Inhalers and medical sprays emissions, vehicle scrapping)	383	390	460	543	642
Total with LULUCF	**81,063**	**76,074**	**59,611**	**53,257**	**43,003**
Total without LULUCF	**81,349**	**76,360**	**59,897**	**53,543**	**43,289**

Projections by sector
WAM Scenario

Table 12: Projections of sectorial GHG emissions and removals – WEM Scenario (mtCO2 eq)

Sector	2022	2025	2030	2035	2040
Energy	36.6	33.7	27.8	29.2	29.3
Transport	19.3	19.8	17.8	14.0	8.8
Industrial processes and product use	1.9	2.0	2.0	2.0	2.0
Agriculture	2.42	2.42	2.42	2.42	2.42
LULUCF	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)
Waste	9.1	8.5	6.2	5.5	5.1
Other[83]	12.0	11.4	9.3	8.3	7.5
Total with LULUCF	**81.1**	**77.5**	**65.2**	**61.0**	**54.8**
Total without LULUCF	**81.3**	**77.8**	**65.5**	**61.3**	**55.1**

For a detailed textual description and explanation of the projections of sectorial GHG emissions and removals, please refer to the "Forecast by Indicator" section, as the indicators are largely similar to the sectors mentioned in the tables above.

WAM Scenario

Table 13 :Projections of sectorial GHG emissions and removals – WAM Scenario (mtCO2 eq)

Sector	2022	2025	2030	2035	2040
Energy	36.6	32.5	26.1	25.9	22.6
Transport	19.3	19.8	17.7	13.0	7.0
Industrial processes and product use	1.9	2.0	2.0	2.0	2.0
Agriculture	2.42	2.42	2.42	2.42	2.42
LULUCF	(0.29)	(0.29)	(0.29)	(0.29)	(0.29)
Waste	9.1	8.3	2.4	2.1	1.8
Other[84]	12.0	11.4	9.3	8.3	7.5
Total with LULUCF	**81.1**	**76.1**	**59.6**	**53.3**	**43.0**
Total without LULUCF	**81.3**	**76.4**	**59.9**	**53.5**	**43.3**

[83] Household, commercial, Industry, wastewater treatment, Fgas, fuel processes not including NG fugitive emissions
[84] See footnote 83.

Methodology and assumptions:
Israel is currently compiling a full modelling document, expected to be published during the course of 2025, which will include comprehensive information on the methodologies and assumptions used for the projections. Key assumptions are also reported in the relevant tables of the Common Tabular Format - NDC.

Chapter 2

Information related to climate change impacts and adaptation under Article 7 of the Paris Agreement

1. National circumstances, institutional arrangements, and legal frameworks

A. National Circumstances

Adaptive capacity refers to the ability to adjust or cope with the impacts, risks, and challenges posed by climate change. This is achieved through initiative-taking measures that build resilience, minimize vulnerabilities, and encourage adaptability. Increasing Israel's adaptive capacity is essential for ensuring the safety of communities, ecosystems, and the economy in the face of climate change. For an overview of Israel's national circumstances, refer to "National Circumstances" in Chapter 1 of this report.

Additional key elements in Israel's National Circumstances, related to adaptation:

Bio-geophysical: Israel is situated in a region prone to arid conditions and facing increasing water scarcity due to climate change. This impacts soil conditions and affects the agricultural landscape.

Economy: Israel has a thriving hi-tech sector, which totaled 18.1% of total GDP in 2022 [85]. Israel's economy is innovative and dynamic by nature enabling technological advancements and the development of adaptation solutions, as well as creating green jobs.
Infrastructure: As a young country, Israel has made impressive strides in infrastructure, especially in water management and renewable energy. However, rapid population growth and underinvestment in sectors like transportation and urban planning create challenges. While its modern infrastructure is advanced in some areas, Israel still faces gaps that need to be addressed to meet future demands and adapt to climate change.

B. Institutional arrangements and governance

The Ministry of Environmental Protection is responsible for the formulation of a nationwide, integrated, and inclusive policy for the protection of the environment, and is Israel's key institution for climate change issues. The Ministry operates onthree levels: national, regional, and local, and in terms of adaptation, is responsible for preparing the National Adaptation Communication reports, Biennial Transparency Reports, and the Biennial Updates to these Reports, all of which are submitted to the UNFCCC. This includes compiling the necessary data from various government ministries and agencies, local authorities, and relevant stakeholders in order to ensure transparency in the submission of these reports.

[85] High-Tech's Contribution to the Economy - English Innovation Site (innovationisrael.org.il)

In addition, under the guidance of the Ministry of Environmental Protection, the National Adaptation Administration ("The Secretariat") was established - an inter-ministerial coordination and monitoring body that advances the implementation of the national strategy for adaptation. The Secretariat is also responsible for drafting a national adaptation plan (NAP) that focuses on preparation and adapting to climate change.

The Secretariat includes representatives from government ministries, local authorities, and NGOs, as follows: Prime Minister's Office, Ministry of Health, Ministry of Agriculture and Food Security, Ministry of Energy and infrastructure, Ministry of Transport and Road Safety, Ministry of Interior, Ministry of Innovation, Science and Technology, Ministry of Tourism, Ministry of Finance, Ministry of Construction and Housing, Ministry of Foreign Affairs, Water Authority, Ministry of Defense, Ministry of Social Equality, Ministry of Economy and Industry, Ministry of Education, Ministry of the Negev, Galilee and National Resilience, Central Bureau of Statistics, Israel Nature and Parks Authority, Forum 15 (The Israeli forum of self-government cities), Ministry of National Security, Ministry of Welfare and Social Affairs, National Emergency Management Authority, Manufacturers' Association of Israel (Organization for industrialists in Israel) and the Federation of Local Authorities in Israel (Umbrella organization representing all municipalities and local councils in Israel).

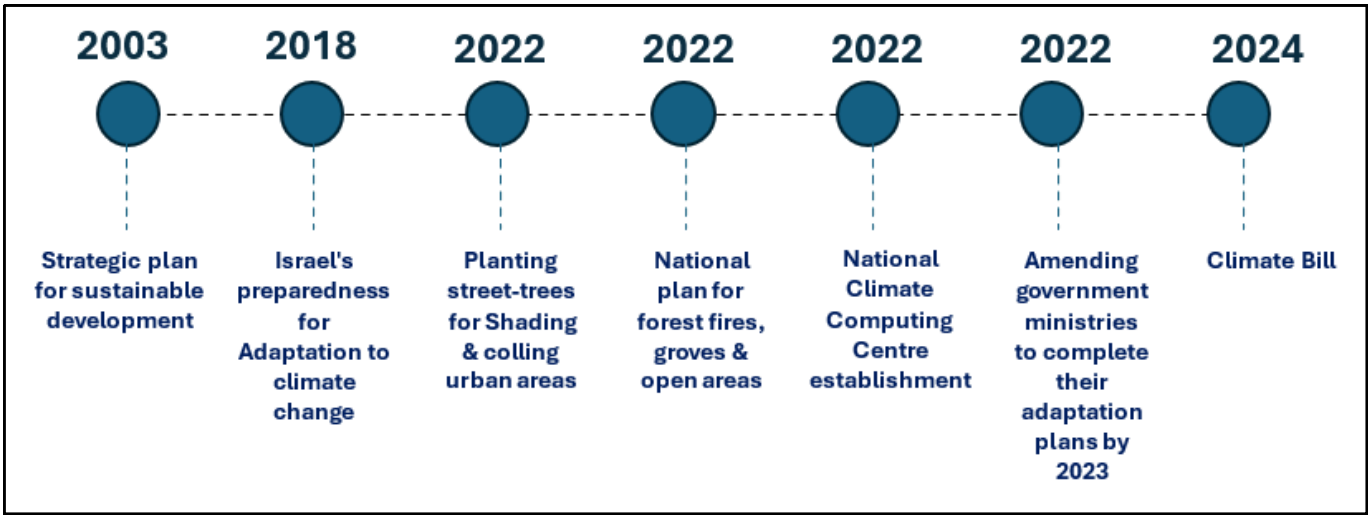
Beyond being representatives in the Secretariat, many of these bodies are advancing adaptation goals in their own departments. For example, the National Emergency Management Authority, established under the Ministry of Defense, is responsible for coordinating and integrating all organizations responsible for home-front defense during emergency scenarios. This includes climate change disasters such as floodings and storms.

In addition to the Secretariat, there are other governmental bodies that play an important role in ensuring that Israel is resilient in the face of climate change. For example, the National Security Council – which is responsible for drafting and recommending alternative policies for the prime minister and government. The Council works to increase the integration between ministries and organizations that deal with national security to optimize and effectively realize their capabilities and strengths. This aims to reduce gaps in the planning and execution of policies. In relation to advancing climate resilience, the council is currently focusing on the management of wildfires and food security.

A. Legal and policy frameworks and regulations

Below, outlined are the legal and policy frameworks and regulations. For further expansion refer to section D and E.

Figure 34: Timeline of legal and policy frameworks and regulations



1.Government resolution 246: "Strategic plan for sustainable development in Israel", May 2003. This resolution provides various ministries with the framework for advancing policy on principles of sustainable development. In terms of adaptation, the important aspect of this resolution is the focus on the Ministry of Education, and its responsibility for implementing curricula that encourages sustainability, and awareness for the need to adapt in the necessary manner to the changing climate.

2. Government resolution 4079: "Israel's Preparedness for Adaptation to Climate Change", July 2018. In accordance with the Government resolution 4079, the MoEP is responsible for the establishment of the National Adaptation Administration ("The Secretariat") – an inter-ministerial coordination and monitoring body that advances the implementation of the national strategy for adaptation. In addition, the Secretariat is responsible for drafting a national adaptation plan (NAP) that focuses on preparation and adapting to climate change.

3. Government resolution 1022: "Shading and cooling urban areas by planting street-trees as a part of the preparations for climate change", January 2022. Aimed at supporting the local authorities in formulating a strategy plan for the shading and cooling of urban spaces.

4. Government resolution 1091: "National plan to deal with forest fires, groves and open areas", February 2022 [86]. This resolution aims to reduce the damage caused by forest fires to woodlands, groves, and open areas.

5. Government resolution 1791: "The establishment of the National Climate Computing Centre and the updating of the database of scientific knowledge for decision making in regard to Climate Change", July 2022. This resolution enables the establishment of more detailed projections about the impact of global warming on our region.

[86] https://www.gov.il/he/pages/dec1091_2022

6. Government resolution 1902: "Preparing Israel to Adapt to Climate Change - Amending Government resolution 4079", October 2022. This is an amendment to the Government resolution 4079 that sets a final date for the completion of the preparation plans by each of the government ministries. According to the amendment, all government ministries are required to complete their adaptation plan by the end of 2023.

7. Climate law. The Israeli Climate Bill will be the most important environmental law to be enacted in Israel. Currently it is waiting to be finalized as law, having passed its first and second reading. It focuses on the following: Reducing GHG emissions, adequately adapting for climate change and establishing a ministerial committee that will be assisted by an advisory committee, and an academic committee of experts and the public. The transition to a low-carbon and net-zero emissions economy allows for an adaptation to climate change without harming the economy. Additionally, as part of the law a reporting and control mechanism will be established, requiring the government to report to the Knesset (The Israeli Parliament) on compliance with the law's goals and the implementation of its provisions. This report will be made public to encourage transparency in both relevant information and long-term policy decisions.

2 .Impacts, Risks and Vulnerabilities, as appropriate

Current and Projected Climate Trends:

When understanding how climate change is impacting Israel, its geographical location must be considered. Israel is situated in a "Hotspot" and is considered a "desert threshold" country[87]. The implications and effects of climate change are felt in an intensified manner. According to Israel's Meteorological Service, and models by Israel's Oceanographic and Limnological Research Center which have relied on the SSP5-8.5 scenario, the following is expected: an increase in the average temperature by approximately 3.5 degrees Celsius (relative to the past two decades), a reduction in the amount of precipitation, and the amount of rainy days, by an average rate of 20% - 25% and lastly an increase in extreme weather events such as heatwaves, floods and torrential rains[88]. Therefore, when understanding patterns in Israel there are four main trends to consider: Hotter temperatures, decrease in the amount of precipitation (drier), rising sea levels and more extreme weather conditions. These trends are interconnected and have impacts that have the potential to cause serious damage.

[87] Challenges and Tools of Israel's Agricultural Sector in Response to Climate Change Ministry of Agriculture and Food Security (www.gov.il)
[88] IMS Website, 2024

Table 14: Current and Projected Climate Trends

Hotter – Increase in Temperature	Drier – Reduction in Precipitation	Higher – Rise in Sea Levels	More Extreme – Increase in Extreme Weather Events
• Increase in the number of warm days and nights throughout the year • Ocean temperatures rising • Higher rates of evaporation • More frequent and severe dust storms	• Contamination of water sources • Reduced replenishment of natural water supplies • Expansion of desert areas • Drying of rivers and wetland habitats • Increased occurrence of droughts • Lower atmospheric humidity • Persistent decline in rainfall	• Salinization of coastal aquifers • Rising sea levels • Flooding of estuaries and river deltas • Accelerated erosion of coastal regions	• More frequent occurrences of extreme weather (high winds, hail, and snow) • More flooding • Increased surface runoff • Higher frequency of heavy rainfall events • Intensified and more frequent heatwaves • Rise in the occurrence of wildfires

Hotter - an increase in temperature: The past 30 years have seen an average rise in temperature at a rate of approximately 0.6 degrees Celsius per decade - a trend that is expected to continue [89]. This has the following impacts: A greater number of hot days and nights per year, a rise in sea temperature, increased rates of evaporation and a greater occurrence of hazy days.

Case Study – Heatwave:
According to the Israel Meteorological Service, July-August of 2023 was considerably warmer than average. The second part of August, temperatures were significantly warmer than average, and Israel experienced a severe heatwave. Devastating effects were felt, for example, in the northern part of the country, many farmers experienced a loss of livestock - in total over 10,000 chickens died.

[89] IMS Website, 2024

Drier - decrease in the amount of precipitation: The climate model predictions of the Mediterranean basin show a general decreasing trend in the amount of annual precipitation until the end of the 21st century. In the years 1988-2017, the precipitation nationwide decreased compared to the years 1961-1990. Throughout the latter period there was also a reduced number of rainy days. According to the Israeli Meteorological Service, this trend is expected to continue. Rainfall in the years 2017-2100 is expected to decrease by 10-20 percent on average, in comparison to the years 1988-2017. Additionally, Israel is experiencing changes in the distribution of precipitation. For example, in the years 2012-2018 the north of the country has experienced a decrease in the amount of precipitation.

This has the following impacts: Desertification, drying-up of streams and moist habitats, droughts, reduction in atmospheric humidity and contamination of water sources.

Case Study - Forest Fire:
Across the world there has been a rise in extreme weather events, a phenomenon also experienced in Israel. 2021 saw a forest fire just outside of Jerusalem. The wildfire consumed around 25,000 dunams (6,200 acres) of forest. This had both a human and environmental impact. There was severe damage caused to the ecosystem in the surrounding area, as well as damage to property. At the height of the blaze, it was feared that Hadassah hospital, the biggest hospital in Jerusalem, would need to be evacuated, highlighting the severity of the incident.

Higher-rising Sea level: In recent decades changes have been observed in the level of the Mediterranean Sea. It has risen by 14.9 cm over the past 19 years. Observations from the last 40 years indicate that the temperature of the upper water mass has risen by approximately 0.13°C per year. In addition, salinity levels of the upper water mass are increasing by approximately 0.007 per year. This phenomenon is primarily caused by rising temperatures, which lead to the expansion of water, and thus an increase in the volume of sea, as well as the melting of continental glaciers.

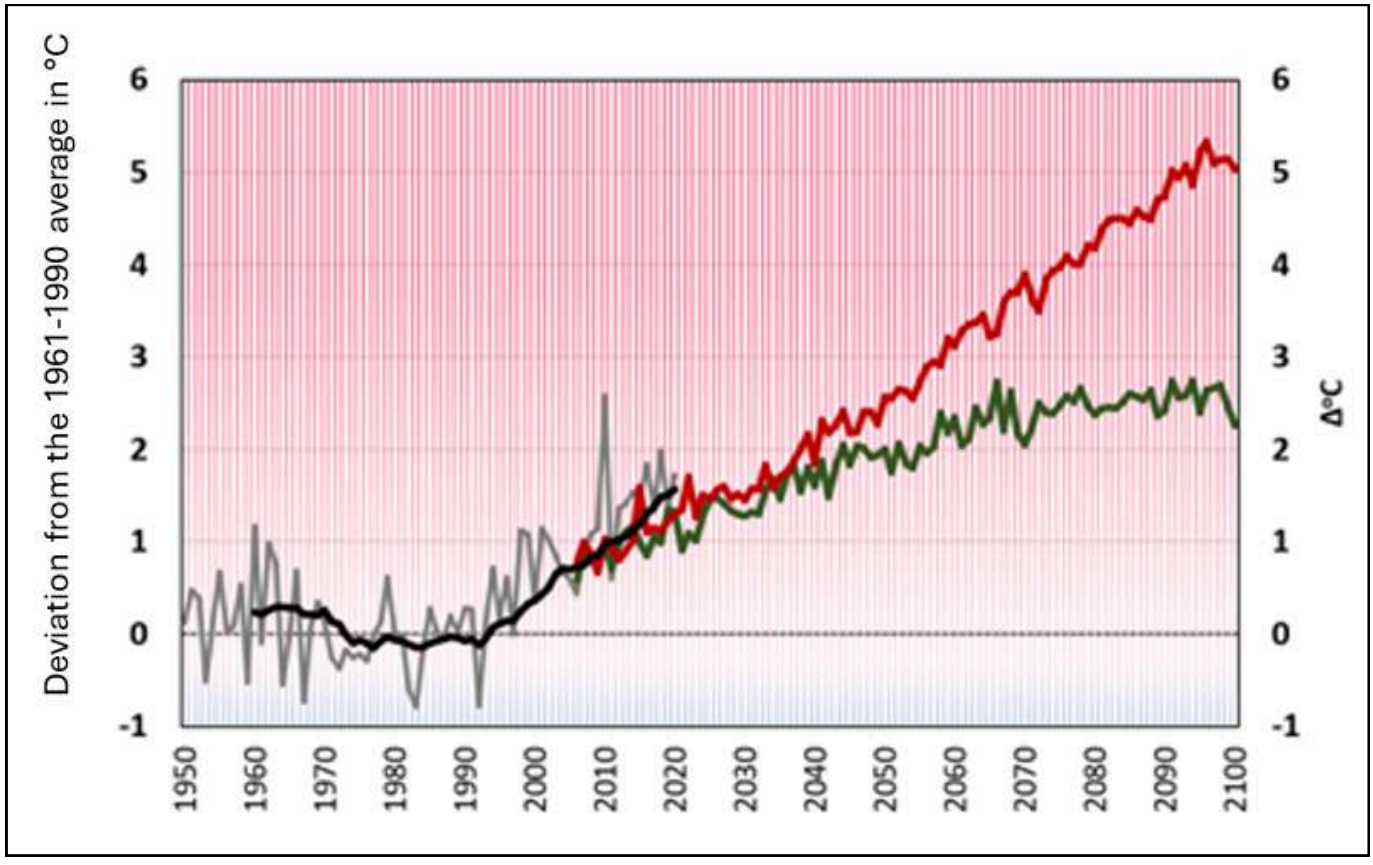
The sea level in Israel is rising. In order to implement the necessary adaptation measures, Israel has adopted a temporary scenario, that accounts for a rise in sea level by 1.06 meters above the national baseline by the year 2100. This is in accordance with the IPCC forecasts and analyses from various academic and governmental bodies. This estimate will guide the next two years of further risk assessments, which aim to refine the sea level rise projection and provide a foundation for necessary preparations and adaptation efforts. The rising sea level will change the coastline, reduce the seafront, damage infrastructure, contribute to the destruction of the coastal cliff and negatively impact tourism. Additionally, it increases the likelihood of flooding, specifically in shallow coastal areas, as well as shifts the saltwater-freshwater interface inland. This enables the penetration of seawater into the estuaries (mouth of the river) disrupting the ability to extract groundwater.

Case Study - Collapse of Cliffs:
In April 2023 there was a cliff retreat in Netanya, one of the coastal cities in Israel, that occurred by the seaside promenade. Despite there being no injuries, several areas were blocked off over fears that remaining loose stone could cause additional landslides.

More Extreme - increase in extreme weather events:
Extreme weather phenomena will become more frequent and more severe. It is manifested in prolonged heat waves, extensive forest fires and record events of precipitation and storms. Upon examination of the extreme events that occurred in Israel over the past two decades, there has been a significant increase in the frequency and intensity of heat waves.

Case Study – Flooding:
In April 2018, a pre-military preparatory school, consisting of youth between the ages of 17-18, lost 10 participants. This disaster was a result of an intense flash flood that occurred where they were hiking, in the Tzafit stream, in the south of Israel.
The consequences of the four trends mentioned above will be felt in all areas of life: security, energy, infrastructure, economy, public health, welfare, agriculture, biological diversity, open spaces and the like.

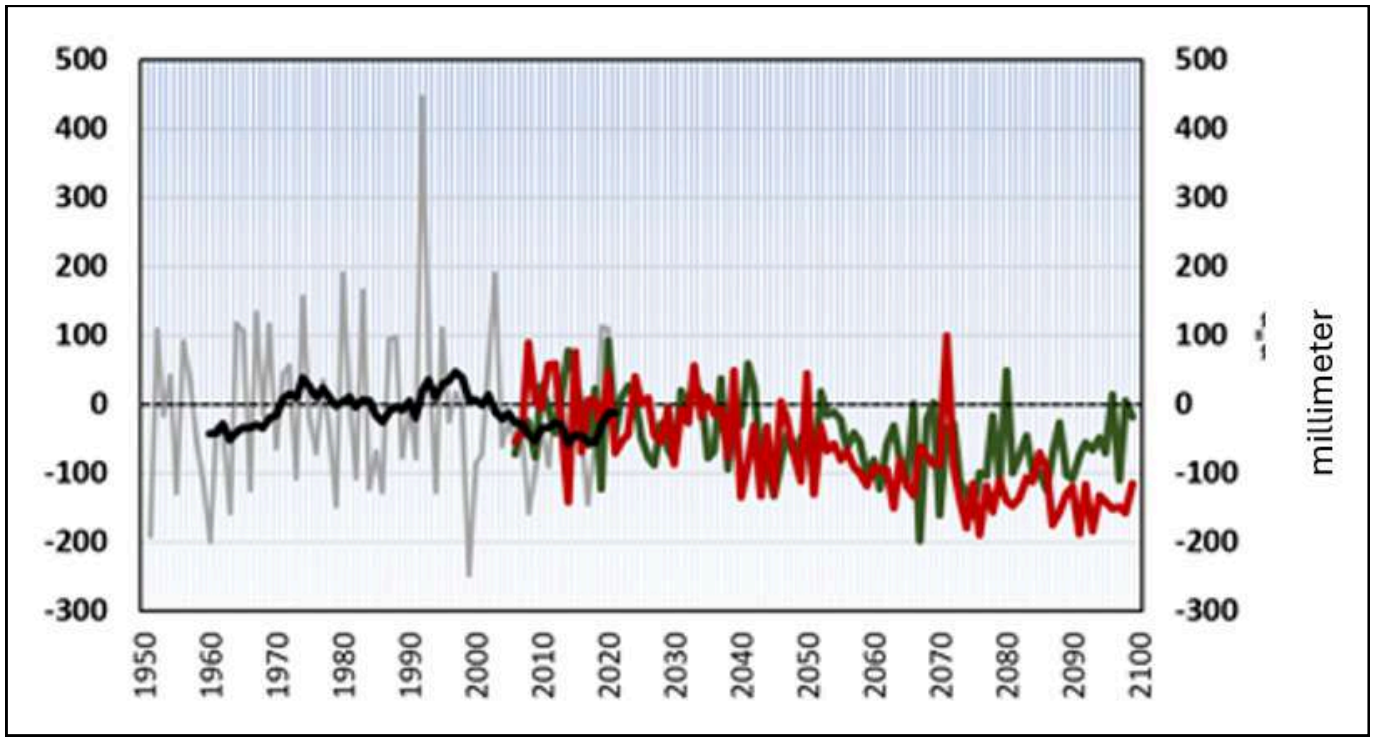
Figure 35: The change in the average temperature anomaly in Israel from 1950 to 2100 compared to the average from 1961 to 1990 [90]



[90] IMS website

The change in temperature from observations (in gray) with an 11-year moving average (in black). The forecasted temperature until 2100 under two climate scenarios: moderate - RCP4.5 (in green) and severe - RCP8.5 (in red).

Figure 36: The change in the average annual precipitation anomaly in Israel from 1950 to 2100 compared to the average from 1961 to 1990.[91]



The change in precipitation from observations (in gray) and its 11-year moving average (in black). The forecasted precipitation until 2100 under a moderate climate scenario - RCP4.5 (in green), and severe, RCP8.5 (in red)

It is important to note that the impacts, risks and vulnerabilities mentioned above, are of great significance, and are being considered by the Ministry of Defense, in their National Security assessment.

Observed and Potential Impacts

Extreme weather events have become more evident over the past few years. For example, December 2018 was characterized by large volumes of rainfall in the northern and central areas – 1.5 to 3 times higher than the historic average for the same month. In one instance, there was more than 200 mm of rainfall measured, causing extensive flooding. In January 2020 three similar events occurred, resulting in several deaths.

[91] IMS website

Additionally, there was a heat wave on July 17th, 2019 where temperatures measured in Sodom, in the Judean Desert, reached 49.9°C, the highest temperature measured in Israel since 1942. For a week in May 2020 an extreme heat wave struck Israel. While it did not break any existing national records, at times temperatures reached over 40 degrees Celsius. This wave was notable because of its timing (in the spring), length (a whole week) and sequence of high temperatures measured.

Climate scientists understand that heat waves have become more prevalent in Israel due to climate change. In the 21st century, periods of greater than three consecutive days whereby the temperature is at least six degrees above average have become significantly more frequent [92].

Approaches, Methodologies and Tools

Our approach to writing this Biennial Transparency Report involved reviewing existing literature on adaptation and consolidating information through dialogue with relevant government bodies. This process provided us with an overview of the current state of adaptation efforts in Israel and the anticipated impacts of climate change.

3 .Adaptation priorities and barriers:

Domestic Priorities

The National Adaptation Plan lays out Israel's domestic priorities. First and foremost is the understanding that it is essential to ensure national resilience and adaptation in the face of climate change. This has to be done in a manner that simultaneously ensures social, economic and environmental prosperity, whilst reducing the adverse effects of climate change. All policies and strategies related to adaptation and mitigation have to be flexible, comprehensive, integrative and multi-sectoral to be successful.

The following principles outline Israel's domestic priorities:

First, in the implementation of the National Adaptation Plan, vulnerable populations are to be addressed by ensuring adaptability for all sectors of society.

This principle emphasizes the importance of equality, inclusion and distributive justice through explicit reference to vulnerable populations when formulating national and ministerial actions. This stems from the recognition of the disproportionate effects of climate change on disadvantaged communities such as: low-income groups, senior citizens, people with disabilities and chronically ill patients.

This priority also promotes targeted intervention to increase resilience and reduce vulnerability.

[92] Cite Israel's Second Biennial Update Report

Second, reducing risks through the use of nature-based solutions. This is the introduction of policy, planning and regulation that support solutions based on natural means. This can help both in preserving open space and in improving its absorption capacity.

This principle emphasizes the importance of using the inherent resilience of ecosystems to deal with the effects of climate change. This advocates the restoration and preservation of natural habitats, which not only improves biodiversity, but also provides essential services such as flood regulation, carbon sequestration, etc.

Third, model-based solutions. This allows for greater flexibility when making decisions and enables the necessary adaptability to respond to a variety of scenarios.

This principle emphasizes the importance of a dynamic and versatile approach to dealing with the evolving challenges of climate change. Israel recognizes the uncertainty that exists in this field, and therefore model-based solutions enables the flexibility to make choices based on real-time data.

Fourth, forming multi-sector and international collaborations.
This principle emphasizes the importance of joint efforts spanning diverse sectors and borders to address the multifaceted effects of climate change. The formation of international partnerships, as well as domestic partnerships between different sectors promotes the sharing of expertise, resources and ideas.

Lastly, viewing local authorities as key partners in preparing for climate change. They understand community needs and can establish tailor made processes accordingly. By integrating them with local communities, their knowledge and resources can maximize climate resilience. The involvement of local authorities in planning ensures the efficient allocation of resources.

Domestic Progress
In reference to domestic progress, and remaining true to the core principles outlined above, vast advancements have been made, as outlined below, in section E.

Adaptation Challenges, Gaps and Barriers to Adaptation:
The article by Moser et al (2010)[93], provided a framework for assessing the adaptation challenges, gaps and barriers that Israel is facing. The correct identification of challenges improves our understanding of the necessary strategic responses.

[93] A framework to diagnose barriers to climate change adaptation | PNAS

1. International Collaborations
Climate change is not an isolated issue, and thus cannot be dealt with as such. It has wide-reaching consequences which require international collaboration to ensure resilience, and protection in the face of threats - the problem of one country affects all surrounding countries. Thus, there is great importance in mapping and formulating opportunities for cooperation, both globally and regionally.

This is a crucial challenge to Israel, which does not have diplomatic relationships with some of its neighboring countries. This is especially problematic, as Israel is in a hotspot, as mentioned in Section B, and thus the implications of climate change pose a more urgent threat, and the need for collaboration is ever more important.

2. Challenges in Creating Forecasts
When implementing adaptation plans, a significant challenge that arises is mapping the economic factors. It is essential to be able to form accurate economic forecasts that quantify the potential damage from climate change. Without economic forecasting governments are unable to make informed decisions about allocation of resources.

3. Developing Field in Israel
Adaptation is a relatively new field in Israel. It gained recognition in 2018, and in late 2022, the Department of Climate Resilience was established at the Ministry of Environmental Protection. The fact that this department is fairly new brings to light several challenges, as there is a short time frame for which there has been the opportunity to implement adaptation measures. This is especially challenging considering the ever-growing negative outcomes of climate change, and the need to adapt quickly in order to address these consequences.

4. Adaptation Strategies, Policies, planned goals and actions to integrate adaptation into national policies and strategies.

Implementation of adaptation actions in accordance with the global goal, as well as adaptation goals, actions, objectives, undertakings, efforts, plans, strategies, policies, priorities, programs and efforts to build resilience
COP 28 concluded with the first 'global stocktake' of climate efforts under the Paris Agreement, revealing slow progress across all areas. To accelerate action, nations agreed, by 2030, to hasten the transition to renewable energy, such as wind and solar power.

Additionally, states have agreed to the Global Goal on Adaptation, outlined in Article 7.1, which aims to enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate change globally. Israel has responded to the urgency of addressing climate change by implementing policies that align with the global goals mentioned, paving the way for transformative actions across various sectors. They include the following:

1. Government resolution 246: "Strategic plan for sustainable development in Israel", May 2003.

This resolution ensures that each government ministry prepares a strategic plan for sustainable development. Each ministry plan will include: a plan of action, methods of implementation, funding sources from the ministry's budget, measurable goals and deadlines for achieving them. In reference to education, this resolution aims to integrate principles of sustainable development into the curriculum of natural sciences, social sciences, and educational institutions' activities.

2. Government resolution 4079: "Israel's Preparedness for Adaptation to Climate Change", July 2018 [94].

The goal is to reach a high level of preparedness for the effects of a changing climate, reduce the health, environmental and economic risks, whilst maximizing benefits from opportunities that arise.

Overarching goals:

1. Building economic resilience
2. Reducing the vulnerability of people and their belongings to damage.
3. Increasing the durability of natural systems.
4. Building and updating the scientific resources for decision making.
5. Raising awareness and making knowledge more accessible to decision makers and the public.
6. Integration into the global effort in accordance with its commitments, and the promotion of regional and international cooperation.

The resolution oversees the following:

a. The establishment of the National Adaptation Administration ("The Secretariat"), an entity overseen by the MoEP. The Secretariat is in charge of inter-ministerial coordination and monitoring the implementation of the national strategy for adaptation.

b. Every government ministry will examine how to implement the adaptation plan. Each ministry will submit, through the Secretariat, a report to the government on their progress in implementing their adaptation plan.

c. Mandates the National Emergency Authority, to formulate national emergency plans in light of extreme weather events. It is responsible for leading the Emergency Subcommittee, who in collaboration with meteorological services evaluates reference scenarios for fires, floods, and other extreme events.

[94] https://www.gov.il/he/pages/dec4079_2018

The functions of the Secretariat:

- Encouraging new initiatives regarding adaptation, and reviewing existing policies, and updating them as necessary.
- Publishing an annual report disclosing national adaptation efforts to the public and government.
- Establishing ad-hoc committees to coordinate between various government offices that are dealing with initiatives on the same subject. This is an attempt to aid in resolving inter-ministerial issues efficiently for the benefit of the public and future generations. Subcommittees include representatives from relevant ministries and bodies related to the committee's dealings.
- Developing a methodology for making decisions based on risk-management.
- Conducting and coordinating research on the impacts of climate change on different sectors and populations. This is to ensure that climate research in Israel includes comprehensive and practical adaptation aspects, for example, economic application.
- Encourage the integration of science and policy to create practical strategies for decision-makers.
- Acting as a source to connect the public and the government to experts as well as providing independent sources of information.

The Secretariat clearly serves as a pivotal entity, orchestrating collaborative efforts across various government bodies, with the aim of overseeing and executing the NAP.

3. Government resolution 1022: "Shading and cooling urban areas by planting street-trees as a part of the preparations for climate change", January 2022.

Overarching goals:

- Conservation of existing trees.
- Increase the shading provided by trees in urban areas.
- Increase the number of trees and widen tree canopies.
- Increase resilience of urban forests.
- Raise awareness for the importance of urban shading.

As part of implementing the Urban Shading Plan, the MoEP provides guidance and encouragement to local authorities in formulating an urban vision and setting measurable goals for the promotion of additional shading.

Shading provided by mature trees is an important element in ensuring a high-quality urban environment. They lower the temperature, capture carbon, manage surface runoff and encourage outdoor activity. This improves the quality of life and health of residents. A budget has been allocated for the formulation of an urban shading plan, and for the execution of pilot programs.

4. Government resolution 1091: "National plan to deal with forest fires, groves and open areas", February 2022 [95].

This resolution focuses on mitigating the risks of forest fires, an essential goal considering the increased frequency of extreme weather conditions and prolonged fire seasons. This includes improving the preparedness of communities that are located near forests and woodlands - an important goal for ensuring public safety and the protection of nature and property. The resolution also includes the establishment of a dedicated team, responsible for formulating and implementing a national plan, as well as a buffer zone that protects residents, and public institutions that are at increased risk of fires.

5. Government resolution 1791: "The establishment of the National Climate Computing Centre and the updating of the database of scientific knowledge for decision making in regard to Climate Change."

Following resolution 4079, this resolution focuses on advancing climate research in Israel and creating a National Climate Computing Center – with the aim of promoting climate research in Israel and ensuring a sufficient foundation for making decisions that relate to adaptation. This is partially achieved by running high resolution simulations for a range of climate change scenarios and analyzing the results. For example, atmospheric simulations, which then enables the Water Authority to better forecast the impacts of climate change on water sources.

6. Government resolution 1902: "Preparing Israel to Adapt to Climate Change - Amending Government resolution 4079", October 2022.

In order for ministries to submit their Ministerial Adaptation Plans by the given deadline, the MoEP published a government guide in March 2023 for creating an adaptation plan, helping the ministries to create a standardized and uniform format.

How best available science, gender perspectives and indigenous, traditional and local knowledge are integrated into adaptation

Israel relies on cutting-edge research and data from local and international sources to inform its climate adaptation strategies. This includes climate modeling, impact assessments, and the development of technologies and practices tailored to the country's unique environmental conditions. The scientific community collaborates closely with government bodies to ensure that policies and measures are grounded in the latest scientific findings.

[95] https://www.gov.il/he/pages/dec1091_2022

In addition, recognizing that climate change affects different demographics in varied ways, Israel incorporates gender perspectives into its adaptation strategies. This involves ensuring that women's voices and experiences are considered in policy-making, providing equal opportunities for women in climate-related fields, and addressing specific vulnerabilities faced by women and marginalized groups in the context of climate impacts.

Furthermore, in adapting to climate change, Israel values the insights and practices of local communities, as they offer valuable strategies for sustainable resource management and resilience-building. Efforts are made to engage these communities in dialogue and incorporate their practices into broader adaptation plans.
Integrating best available science, gender perspectives local knowledge are integrated into adaptation aligns with the domestic priorities laid out in Section C.

Adaptation actions and/or economic diversification plans leading to mitigation co-benefits

Refer to Section 5, Part 3; Government resolution 1022: "Shading and cooling urban areas by planting street-trees as a part of the preparations for climate change", January 2022.

Efforts to integrate climate change into development efforts, plans, policies and programming, including related capacity-building activities

Refer to Section 1, Part C; Legal and Policy Frameworks and regulations.

Nature-based solutions to climate change adaptation

Refer to Section 5, Part 3; Government resolution 1022: "Shading and cooling urban areas by planting street-trees as a part of the preparations for climate change", January 2022.

Stakeholder involvement, including subnational, community-level and private sector plans, priorities, actions and programmes.

Refer to Section E, Part 3; Government resolution 4079: "Israel's Preparedness for Adaptation to Climate Change", July 2018.

5 .Progress on Implementation of adaptation

1 .Government resolution 246: "Strategic plan for sustainable development in Israel", May 2003.

This resolution encompasses several topics, in terms of adaptation and its implementation, the important part of the resolution refers to education.

As of May 2022, the Ministry of Education and the MoEP began a new initiative relating to climate education for students from kindergarten to 12th grade. This includes a comprehensive curriculum that discusses the climate crisis. This is being taught in classrooms, kindergartens and in open areas of nature and aligns with the following subjects: Science and Technology, Geography, Environmental Sciences, Biology, Agriculture, Chemistry, Philosophy, Social Studies, etc. This initiative also includes field trips, learning tours, and days focused on learning about climate change. This program involves visiting streams, beaches, deserts and forests.

Both ministries have set aside a budget for the training of teachers and for the creation of climate-related materials. So far, over 160 training courses equipping teachers with the necessary tools have been carried out, and over 1,500,000 students have participated in this initiative.

Additionally, a youth leadership program has been launched in Israeli youth movements and organizations. This involves goals that focus on changing habits and lifestyles to become greener, training objectives that focus on climate awareness, appointing climate and sustainability coordinators to lead the program, and participating in climate week activities.

2. Government resolution 4079: "Israel's Preparedness for Adaptation to Climate Change", July 2018.

In order to implement the resolution, the Secretariat was established in December 2018. It includes representatives from 35 entities including government ministries, government agencies, local government organizations and non-governmental organizations (as noted in section A, part B).

In 2021, the Secretariat published its first report, the "Report on Israel's Adaptation for Climate Change". This report includes empirical data forming the basis of the Secretariats' work, and its plan for advancing adaptation to climate change.

The Secretariat is responsible for ensuring that all government ministries submit their ministry's adaptation plan. To date, all ministries are in the process of writing their plan. These plans, along with a review of global literature on this topic, and in cooperation with representatives from the Secretariat are the basis for formulating Israel's National Adaptation Plan which has been written.

As for local authorities [96], currently, 65 local authorities in Israel are either actively engaged in or are in the process of writing a climate adaptation plan that is tailored to their needs. This encompasses more than 55% of the Israeli population. The goal is to expand the number of local authorities that are writing a climate adaptation plan – so that all of the population of Israel will be covered. Beyond writing the plans, the goal is to also implement them.

The following timeline shows the reports, and the timeframe for when the Secretariat is responsible for publishing them.

Figure 37: Adaptation reports timeline

[96] Government support for climate change adaptation programs in local authorities, Knesset research and information center, 2023

3. Government resolution 1022: "Shading and cooling urban areas by planting street-trees as a part of the preparations for climate change", January 2022.
Since 2022, the MoEP, in collaboration with the Israeli Green Building Council, has been advancing strategic national shading and cooling plan, through the use of trees. This initiative involves writing and preparing an urban shading and cooling plan by 18 local authorities. 11 of which, plus an additional 3 authorities, are already piloting the implementation of these plans. These projects are to be completed by June 2025 benefiting 4.22 million residents, which accounts for roughly 45% of the total population. These initiatives are the first stages in a commitment to shade and cool urban areas, and in the future are expected to be expanded to cover more local authorities.

4. Government resolution 1091: "National plan to deal with forest fires, groves and open areas", February 2022 [97].
As of 2021, Israel has about 1,237,000 dunams of planted forest and nearly 735,460 dunams of groves. Between 2015 and 2021, approximately 15% of these areas experienced at least one fire. Meteorological data indicates that the risk of fire spread has tripled in recent years. In response, the Israeli government made two key resolutions in 2022 (Resolution 1091 and its amendment, Resolution 1884) to address this issue. These resolutions focus on creating buffer zones in local authorities and securing funding by allocating a dedicated budget for forest fire management.

To carry out these resolutions and develop a multi-year plan for establishing and maintaining firebreaks, a specialized team was formed under the Ministry of National Security. This team includes representatives from the Prime Minister's Office, the National Security Council, the Ministry of Environmental Protection, the Ministry of Agriculture, the Fire and Rescue Authority, the National Emergency Authority, the Budget Department of the Ministry of Finance, and other relevant bodies. The team has met three times so far as a steering committee and will report biannually to the Minister of National Security on the progress of the national program.

Additionally, at the start of 2022, the Ministry of National Security signed an agreement with the Haifa Municipality to pilot the establishment of buffer zones in areas with the highest risk of fire. The planning phase is expected to be completed by the end of 2022, with implementation to begin immediately afterwards, and be completed by 2024. The results of this pilot will help guide the broader establishment of buffer zones across the country.

[97] https://www.gov.il/he/pages/dec1091_2022

5. Government resolution 1791: "The establishment of the National Climate Computing Centre and the update of the database of scientific knowledge for decision making in regard to Climate Change", July 2022.

This resolution instructs that the Center will be managed by the Israel Meteorological Service, and is to be established by August 1, 2023 (accomplished), with operations running by the end of 2027. The center will be responsible for helping both government bodies and academics, in their accessibility to knowledge on adapting to climate change.

In addition to the center, the update of the database of scientific knowledge for decision making in regard to Climate Change is being carried out by the MoEP through the creation of national risk maps -

A prototype of the risk map is to be published for use and acts as a reliable source for understanding which areas are more vulnerable to climate change. This is important for local and regional governments as it allows them to plan and implement effective adaptation plans in accordance with areas that are most vulnerable.

Several factors affect the vulnerability to climate risks, such as, the area sensitivity to risk, the adaptive capacity and the severity and frequency of the risks.

The database includes high resolution maps of street-level modelling for climate risk exposure – including floods, urban heat islands, wildfires, sea level rise etc. It will also include sensitivity maps that consider the vulnerability of the population's socio-economic status, and general health.

Integrating all this information produces reliable, readily available high-resolution vulnerability maps, including IPCC scenario-based vulnerability forecasts. This enables knowledge-based action, planning and prioritization. As well as optimization of public and private adaptation investments.

Database passes the prototype stage, it will include added information to help users be active participants in adapting to climate change. For example, it will include information sources, templates, funding opportunities, action plan kits, success stories, stakeholder engagement tips, indices, methodology and more. The portal is open to academia, the private and public sector and will be regularly improved and updated.

6. Monitoring and evaluation of adaptation actions and processes

As noted, adaptation is a new field, and thus we still do not have methods for monitoring and evaluating adaptation actions and processes. This will be the focus of the Secretariat going forward.

7. Information related to averting, minimizing and addressing loss and damage associated with climate change impacts

This section is currently not relevant to Israel - we are focused on adaptation measures and have not yet addressed issues related to loss and damages.

8. Cooperation, good practices, experience and lessons learned

MASHAV is Israel’s agency for international development cooperation at Israel’s Ministry of Foreign Affairs. Its mission is to lead Israel's efforts in empowering individuals and communities in need by sharing tools and expertise to achieve sustainable development and transformation within their own societies.

MASHAV is responsible for the design, coordination and implementation of the State of Israel’s development cooperation programs and humanitarian assistance efforts. By placing people at the heart of development, MASHAV focus its development activities on human capacity building and on the ‘training of trainers’ approach, sharing with other countries Israel’s own development experience and expertise as well as innovative technologies and tested methodologies.

MASHAV’s professional activities take place both in Israel and in over 140 partner countries. MASHAV conducts its extensive capacity building program in Israel through professional affiliated leading institutes, through its core specialized training and consultancy centers. In partner countries MASHAV has on-the-spot training programs, short and long-term expert consultancies, and centers dealing with agriculture.

MASHAV focuses its human capacity building activities on areas in which Israel has a comparative advantage and expertise: Food security and agriculture, education for all, medicine and public health, community development, innovation and entrepreneurship, gender equality and women's empowerment, rural-urban development, research and development, emergency planning and response, and humanitarian aid.

Chapter 3

Information on financial, technology development and transfer and capacity-building support provided and mobilized

A. National Circumstances and institutional arrangements

Israel is committed to transparent and accurate reporting on the provision and mobilization of support for climate actions. This year marks an important milestone as Israel reports for the first time as a developed country. Consequently, this is the inaugural year for the State of Israel to include this chapter in its reporting, reflecting its enhanced role and responsibilities in global climate efforts.

In 2018, Government Resolution No. 4021 was adopted on the topic "Promoting Israeli Activity in the Field of International Development." The purpose of this resolution is to enhance Israel's role in international development, and in doing so, harness the full potential in the field of international development to strengthen the Israeli economy. In accordance with this resolution, an inter-ministerial committee was constituted, presided over by the Director General of the Prime Minister's Office. This committee incorporates representatives from a broad spectrum of governmental departments, encompassing the Ministries of Foreign Affairs, Economy and Industry, Finance, Energy, Health, Environmental Protection, and Agriculture. Furthermore, the committee includes representatives from the National Innovation Authority, as well as other relevant governmental entities.

The committee was assigned responsibilities such as formulating a strategy for international development, determining priorities regarding the countries that Israel will assist, and identifying the areas on which international development activities will be focused. This includes determining Israel's areas of relative advantage in international development and emphasizing Israel's potential contribution to achieving sustainable development goals. The committee was also tasked with setting measurable government goals for promoting Israeli activity in international development and monitoring compliance with these goals [98].

a. Description of the systems and processes used to identify, track and report on support provided and mobilized through public interventions

Currently, Israel does not have a centralized system to identify, track and report the support provided and mobilized through public interventions to developing countries. Each government ministry or private entity that offers support independently monitors their contributions. The Central Bureau of Statistics of Israel collects data on Official Development Assistance (ODA) from Israel. It is important to note that the tracking of this information is not specifically focused on climate-related support alone but encompasses a broad range of assistance provided by Israel to developing countries. There are various institutions entrusted with supporting developing countries, each playing a unique role in Israel's efforts to provide international assistance. Below is an explanation of main institutions that are part of the Israeli government and whose activities are related to climate change:

[98] The promotion of Israeli activity in the field of international development, Resolution number 4021 of the government of July 23, 2018 website, 2024

1. MASHAV – Israel's Agency for International Development Cooperation - MASHAV, under the Ministry of Foreign Affairs, plays a critical role in providing capacity-building support, especially under Article 11 of the Paris Agreement. MASHAV is responsible for the design, coordination, and implementation of Israel's development cooperation and assistance programs [99].

2. Ministry of Environmental Protection -

The Ministry promotes climate-related support to developing countries, primarily through the International Relations and Multilateral Environmental Agreements Divisions. Their work includes participation in international environmental forums, fostering bilateral cooperation and collaborations with international organizations, and promoting regional collaboration on cross-border environmental issues [100].

3. Inter-Ministerial Committee for International Development Coordination -

An inter-ministerial committee, established following Government Resolution 4021, examined the promotion and coordination of Israeli activities in the field of international development. Led by the Director General of the Prime Minister's Office, the committee included representatives from various ministries, such as the Ministry of Foreign Affairs, Ministry of Economy and Industry, Ministry of Finance, and other relevant governmental bodies [101].

In addition to government institutions, portion of Israel's support to developing countries is channeled through private sector efforts and civil organizations. These non-governmental entities often operate independently, initiating and implementing their own support programs without direct government oversight or guidance.

b. Description of challenges and limitations

Israel faces several challenges in its efforts to collect information from all entities that provide support to developing countries. These challenges encompass gathering data on financial support, capacity building, and the transfer and development of technologies. Each government office or private entity that offers support independently monitors their contributions, and this decentralized approach poses challenges in standardizing and consolidating data for comprehensive reporting. As this is the first year Israel is reporting its support to developing countries, there is still room for improvement in the reporting methods. The government is working to strengthen these processes, inter alia through the process done under the Inter-Ministerial Committee for International Development Coordination mentioned above.

[99] MASHAV website, 2024

[100] International Relations Department, Ministry of Environmental Protection website, 2024

[101] The promotion of Israeli activity in the field of international development, Resolution number 4021 of the government of July 23, 2018 website, 2024

c. Information on experience and good practices in relation to public policy and regulatory frameworks to incentivize further private climate financing and investment

The government resolution described above serves as an initial regulatory framework aimed at understanding and encouraging Israeli activity in the field of international development. As part of this resolution, an inter-ministerial committee was appointed to promote and coordinate Israeli activity in this area. The committee was tasked with examining several key issues, including tools to encourage the Israeli private sector to integrate into international development. Additionally, the committee examined financing tools to expand the involvement of the Israeli private sector and achieve the government's goals in international development. This includes options for combining private financing, public financing, and financing from international bodies, as well as tools to encourage private financing of international development projects. The committee also examined the possibility of establishing an Israeli Development Finance Institution. Furthermore, the committee examined tools for strengthening Israeli aid and connecting it with the private sector and the third sector. The implementation and assimilation of the goals outlined in the government resolution was not completed, yet the process reflects an initial attempt to foster a more coordinated and strategic approach to international development [102].

d. Efforts taken to enhance comparability and accuracy of reported information on financial support provided and mobilized through public interventions, such as through the use of international standards or harmonization with other countries, institutions and international systems

Israel is not currently using international standards or harmonizing its reporting with other countries or international systems. However, efforts to enhance the comparability and accuracy of reported information are ongoing, in order to ensure that financial support provided and mobilized through public interventions is transparently reported.

The information provided in response to section 119 applies to section 120 as well.
The national circumstances and institutional arrangements described are also relevant to Israel's efforts in technology development and transfer, and capacity-building support.

[102] The promotion of Israeli activity in the field of international development, Resolution number 4021 of the government of July 23, 2018 website, 2024

B. Underlying assumptions, definitions and methodologies

In order to enhance the transparency of reporting, this section provides a description of the underlying assumptions, methodologies, and definitions used to identify and/or report various aspects of financial, technology development, and capacity-building support. This includes the following components:

(a) Reporting Year

The chosen reporting years for this report are the years: 2021-2022.

(b) Conversion Between Domestic Currency and United States Dollars

The conversion rate used is 1 Israeli Shekel (ILS) = 0.265 United States Dollar (USD), (Current exchange rate for 17.04.24).

(c) Status of Funding

The funding status in this report is categorized as committed and disbursed. Committed funds are those that have been pledged or allocated for specific projects, programs, or initiatives, indicating future availability. **Disbursed** funds are those that have been transferred to the recipient and are available for immediate use in the intended activities [103].

(d) Channel of Funding

The channels of funding were classified using the following definitions:

1. Multilateral Channels - Support provided through multilateral channels includes climate-specific contributions and core/general contributions provided to multilateral institutions and/or for uses that Parties do not consider to be climate-specific. Multilateral channels include financing through:

a. Multilateral financial institutions
b. Entities of the Technology Mechanism
c. Operating entities of the Financial Mechanism
d. International organizations

2. **Bilateral, Regional, and Other Channels** - A Party reports funding for climate change activities through bilateral, regional, and other channels such as bilateral development cooperation agencies or bilateral development finance institutions where the Party typically allocates the financing directly. [104]

[103] These definitions were established during our work process and are specific to this context, rather than being based on external definitions.
[104] BTR Review Training course, 2024, Lesson 2 - introduction

(e) Funding Source

The funding sources were classified using the following definitions:

1. Official development assistance (ODA) - Official development assistance (ODA) is government aid that promotes and specifically targets the economic development and welfare of developing countries [105].

2. Other official flows (OOF) - Other official flows (OOF) are official sector transactions that do not meet official development assistance (ODA) criteria [106].

(f) Financial Instrument

Some financial Instruments were classified using the grant definition: [107]

Grant - Transfers with no repayment required from recipients. Grants include technical assistance, for example carrying out policy studies, providing advice, supporting project preparation and implementation, and assisting in technology transfer, which is normally delivered as a cost-free service.

Other support funds transferred did not align with the areas defined in the classification according to UN definitions (sourced from the BTR Review Training course). These funds are membership fees, as defined below, and were categorized as "other".

Membership fees - A significant portion of Israel's contribution to developing countries was in the form of membership fees. These fees refer to payments made by the State of Israel to various conventions and protocols that address different aspects of climate issues.

(g) Information on instruments and funding sources reported, including how a Party has determined finance to be concessional and/or ODA, including by using information such as grant equivalency, institution and/or instrument-based approaches;

Israel's financial support to developing countries is categorized into "membership fees" and "grant", both provided e.g. by the Ministry of Environmental Protection. The Ministry dedicated those funds to promote and specifically target the economic development and welfare of the receiving entities, and therefore the funds are defined as Official Development Assistance (ODA). Membership fees involve contributions to international conventions and protocols addressing climate issues and international organizations, reflecting Israel's commitment to global climate efforts. Funds for projects in the Palestinian Authority, categorized as grants, are allocated through contractors to ensure effective use and oversight, rather than being provided directly. This approach allows for targeted support and ensures that financial resources are used for their intended purposes.

[105] Official development assistance (ODA), OECD website, 2024
[106] Other official flows (OOF), OECD website, 2024
[107] BTR Review Training course, 2024

(h) Type of Support

The types of support were classified using the following definitions:

- **Adaptation** - Support defined as adaptation refers to assistance provided to help ecological, social, or economic systems adjust to actual or expected climate change impacts. This support can include aid for modifying processes, practices, and structures to reduce potential damages or capitalize on opportunities associated with climate change [108].
- **Mitigation** - Support defined as mitigation refers to assistance provided to reduce greenhouse gas emissions and enhance carbon sinks. This support can include aid for implementing cleaner technologies, developing renewable energy sources, improving energy efficiency, changing land use practices, and promoting behavioral changes. It encompasses a broad spectrum of interventions across sectors such as energy, transport, buildings, industry, agriculture, forestry, and waste management, all aimed at decreasing atmospheric greenhouse gas concentrations and combating climate change [109].
- Cross-cutting (both adaptation and mitigation) - Support defined as cross-cutting refers to assistance that addresses both adaptation and mitigation aspects of climate change response.

(i) Sector of Support

The sector definitions align with the IPCC guidelines for preparing the national inventory.

(j) Subsector of Support

Israel did not utilize sub-sectors in this report, as they were not applicable.

(k) Whether it supported capacity-building and/or technology development and transfer objectives.

Projects were classified as capacity-building or technology development and technology transfer projects, based on the following:

1. Capacity-building - Capacity-building focuses on developing national expertise and institutional strength to address climate change issues and integrate them into long-term planning and policies. It occurs at three levels:

a. Individual: Enhancing individual expertise through education, training, and awareness-raising.

b. Institutional: Promoting cooperation and development of organizations at the national level.

c. Systemic: Creating enabling environments through policies, regulations, and accountability frameworks [110].

[108] Introduction, Adaptation and resilience, UNFCCC website, 2024

[109] Introduction to Mitigation, UNFCCC website, 2024

[110] BTR Review Training course, 2024, Lesson 4 - introduction

2. Technology Transfer - Technology transfer involves sharing knowledge, experience, and equipment to mitigate and adapt to climate change. It includes learning to understand, use, and replicate technology, adapting it to local conditions, and integrating it with indigenous technologies. [111]

(l) The support as being climate-specific;

Israel defined support as being climate-specific when it directly addressed climate change challenges and promoted GHG emissions reduction and/or climate resilience. This definition encompassed initiatives that focused on efficient water and energy resource management, renewable energy solutions, sustainable agriculture practices, and efforts to combat desertification. Climate-specific support was characterized by leveraging Israel's expertise in adapting to challenging environmental conditions, promoting international collaboration in climate-related research and development, and building national and institutional capabilities to address climate issues. This approach prioritized practical solutions tailored to local needs while addressing global climate challenges, aiming to create sustainable impact and foster climate resilience in partner countries and communities. By concentrating on these areas, Israel ensured that its support directly contributed to climate change mitigation and adaptation efforts.

(m) Information on the efforts taken to avoid double counting

The financial support projects reported by Israel were conducted independently, without the involvement of multiple Parties or collaborations with other external bodies. Consequently, the potential for double counting among multiple Parties or in the mobilization of private finance through public interventions is inherently eliminated. Given the independent nature of these projects, there has been no requirement to develop or implement specific methodologies to avoid double counting, nor is there a need for attribution methodologies concerning multiple recipient countries.

In addition, Israel did not utilize resources under Article 6 of the Paris Agreement towards the achievement of its NDC; therefore, methodologies related to this matter are not applicable.

(n) Definition of Public and Private Finance in particular where entities or funds are mixed;

All financial support provided by Israel is classified as public finance. This support is administered by the Ministry of Environmental Protection. There are no instances of mixed entities or funds involving private finance in the reported contributions, ensuring that all financial support is sourced and categorized as public.

[111] BTR Review Training course, 2024, Lesson 3 - introduction

(o) How private finance was assessed as mobilized through public interventions
No financial support was provided by private finance that was mobilized through public interventions, making this section not applicable to Israel's current reporting. As such, there are no instances where a causal link between public intervention and mobilized private finance needs to be identified, nor is there information to report on points of measurement or boundaries used to identify finance as mobilized by public intervention. Therefore, defining this section is not relevant to our context.

(p) How Israel seeks to ensure that support provided and mobilized through public interventions effectively addresses the needs and priorities of developing country Parties for the implementation of the Paris Agreement, as identified in country-driven strategies and instruments, such as biennial transparency reports, NDCs and national adaptation plans;

Israel is currently making efforts to regulate its support for developing countries, as outlined in Government Resolution No. 4021. As part of this initiative, the inter-ministerial steering committee established under the resolution addressed the identification of the needs of the developing world, specifically through focusing on innovation that meets the specific needs of developing countries. This way, Israel seeks to align its assistance with their priorities. This targeted approach allows Israel to contribute its technological expertise and innovative solutions in ways that directly address the climate-related challenges faced by developing nations.

Through this process, Israel aimed to provide support that is not only aligned with its own strengths and capabilities but also closely matches the expressed needs and priorities of developing country Parties in their efforts to combat climate change and adapt to its effects.

(q) How it seeks to ensure that support provided and mobilized through public interventions is in line with the long-term goals of the Paris Agreement;
Israel ensures that the support provided and mobilized through public interventions aligns with the long-term goals of the Paris Agreement by focusing on initiatives that promote climate resilience, reduce greenhouse gas emissions, and support sustainable development in partner countries. By prioritizing projects that contribute to adaptation and mitigation, Israel seeks to align its support efforts with the overarching targets of limiting global warming and enhancing climate resilience.

(r) An indication of what new and additional financial resources have been provided, and how it has been determined that such resources are new and additional;

Israel's financial support is provided annually through membership fees for International Conventions and support to the Palestinian Authority. This aid is allocated specifically for each year (2021, 2022) and does not extend over multiple years, making each contribution new for the respective year. Consequently, all reported aid is considered new financial support, as it is distinct and newly allocated for each period.

(s) How the information provided reflects a progression from previous levels in the provision and mobilization of finance under the Paris Agreement;

The financial support provided by Israel shows a slight progression in recent years. Total payments to protocols and conventions were 4,545,603 NIS (approximately USD 1,206,000) in 2019 and increased to 4,781,766NIS (approximately USD 1,269,000) in 2020. However, there was a slight decrease in 2021 to 4,121,979NIS (approximately USD 1,092,000), followed by an increase in 2022 to 4,434,072NIS (approximately USD 1,176,000).

Regarding grants, there was a noticeable increase in total payments from 2021 to 2022. In 2021, grants amounted to 5,733,000NIS (approximately USD 1,520,000), and in 2022, they increased to 6,580,623NIS (approximately USD 1,745,000). Data on total payments in grants for the years 2019-2020 is missing, making it difficult to fully compare these figures with previous levels. [112]

This data indicates some progression in the provision and mobilization of finance under the Paris Agreement, particularly in the area of grants, reflecting an increased commitment to climate-related initiatives. However, the relatively stable payments to protocols and conventions suggest a consistent rather than a significantly escalating level of overall financial support.

(t) Information on reporting on multilateral finance

Israel's reporting on multilateral finance is based on inflow [113] contributions to multilateral institutions in the form of membership fees for climate conventions, protocols, etc. These contributions are specifically intended to support climate-related activities. However, Israel does not have detailed information about how the support is used by the institutions.
Therefore, these contributions are reported as inflows, reflecting a commitment to climate goals without specific attribution to particular projects or outcomes within the multilateral institutions.

[112] Ministry of Environmental Protection, 2024
[113] International Relations Department, Ministry of Environmental Protection, 2024

A description of the underlying assumptions, definitions and methodologies used to provide information on technology development and transfer and capacity-building support.

Israel's approach to reporting on technology development and transfer and capacity-building support is underpinned by key assumptions, definitions, and methodologies. The underlying assumptions include the critical importance of local empowerment for sustainable climate action, the effectiveness of tailored solutions over generic approaches, and the interconnected nature of technology transfer and capacity building.

The methodology for project selection and reporting involves a comprehensive evaluation process that assesses alignment with climate goals, potential for sustainable impact, and ability to address specific local climate challenges.
Reporting criteria prioritize projects with clear climate-specific objectives, and alignment with the Paris Agreement's long-term goals. This robust methodology ensures that Israel's reported information accurately reflects its approach to climate action and its commitment to fostering global climate resilience.

All of the definitions and assumptions used for providing information on technology development and transfer and capacity-building support are identical to the assumptions and definitions used to report on the financial support and are detailed in full under section B (121).

C. Information on financial support provided and mobilized under Article 9 of the Paris Agreement

During the reporting period of 2021-2022, financial support was mobilized through public interventions, bilateral and multilateral channels aimed at enhancing environmental protection, climate change mitigation, and adaptation efforts. Key funding recipients included major international environmental conventions and protocols such as the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Vienna Convention for the Protection of the Ozone Layer.

Environmental protection projects in the Palestinian Authority also received substantial funding, supporting initiatives like extinguishing waste fires, waste removal, and river cleaning. These projects addressed waste management and pollution control, with funds allocated directly to contractors for effective implementation.

For detailed information on the financial amounts, types of interventions, and specific projects funded during this period, please refer to the tables in Common Tabular Format - support that compiles all the comprehensive data on financial support mobilized through public interventions, bilateral and multilateral channels.

D. Information on support for technology development and transfer provided under Article 10 of the Paris Agreement

Technology development and transfer are crucial in supporting developing countries to address global climate change challenges. This process involves sharing knowledge, experience, and equipment to mitigate and adapt to climate change impacts. It encompasses learning to understand, use, and replicate technology, adapting it to local conditions, and integrating it with indigenous solutions. This chapter highlights various initiatives and programs that exemplify support for technology development and transfer, showcasing strategic collaborations, comprehensive support mechanisms, and the generation of valuable knowledge. Key examples include the Israel-India Industrial R&D and Technological Innovation Fund (I4F) and the impactful projects of Innovation: Africa. These initiatives demonstrate how technology development and transfer can drive sustainable development and enhance the resilience of communities in developing countries.

Much of Israel's support in technology transfer focuses on water and energy, leveraging its extensive expertise. Despite being in a semi-desert area, Israel has maximized its water resources through innovative desalination programs, high-quality regular water supply, and efficient reuse of sewage effluents.

Israel's structural and infrastructural transformations in the water sector, such as establishing water and sewage corporations, large desalination facilities, and wastewater treatment for agriculture, have spurred innovative solutions [114]. These achievements, highlight Israel's leadership in water and agriculture technology transfer, emphasizing its commitment to aiding developing countries in tackling the climate crisis.

Innovation: Africa

Innovation: Africa, a non-profit organization, utilizes Israeli solar and water technologies to assist rural African villages. Since 2008, the organization has impacted over 5.3 million people across 10 African countries by providing essential resources such as clean water and electricity. Their work has transformed numerous communities, addressing critical needs and improving overall quality of life.

For instance, in Malata Village, Zambia, Innovation: Africa completed the installation of a solar water-pumping system on January 4, 2021. This project, which included a water tower with a 10,000-liter tank and eight distribution taps, provided clean and safe water to 2,261 people. The intervention significantly improved health and hygiene, reduced waterborne diseases, and supported economic activities like gardening and brick-making.

[114] The Water Sector in Israel, Ministry of Energy and Infrastructure website, 2024

Similarly, in Bitoni Village, Malawi, the organization installed a solar water pumping system on December 23, 2021. This project transformed the community by providing clean water, improving school attendance, and enabling economic activities such as gardening. The initiative fostered better health and sanitation, reducing waterborne illnesses and impacting 1,602 people.

Another example of Innovation: Africa's work is in Matangari Tshiumoni Village, South Africa. On December 8, 2022, they completed the installation of a solar water pumping system, significantly enhancing the community's quality of life. The availability of clean water improved health, supported education, and encouraged economic development through gardening and other activities, benefiting 3,600 people.

These examples illustrate the impactful strategies employed by Innovation: Africa to address the critical needs of rural communities in African countries, showcasing the transformative power of clean water and solar energy. The organization's work demonstrates how Israeli technology and expertise can be effectively applied to support developing nations and improve lives on a large scale.

Strategies Employed to Support Technology Development and Transfer

Innovation: Africa employs a multifaceted approach to support technology development and transfer in rural African communities, utilizing advanced Israeli solar and water technologies adapted to local needs. The organization installs solar water-pumping systems to provide clean water access in areas previously dependent on contaminated sources. Each project is tailored to the specific needs of the village, considering factors such as population size and local geography. Furthermore, Innovation: Africa focuses on capacity building by training local communities in the maintenance and operation of these systems to ensure their long-term sustainability. Their projects aim to improve multiple aspects of community life including health, education, and economic development. The organization's scalable model has been successfully replicated across multiple countries, demonstrating the transferability of their technological solutions. Partnerships with local governments and communities are also crucial, ensuring support for the technology transfer process. Through these strategies, Innovation: Africa has significantly impacted over 5.3 million people across 10 African countries, effectively transferring and implementing sustainable technologies in these regions.

Support Provided at Different Stages of the Technology Cycle

Innovation: Africa provides comprehensive support across various stages of the technology cycle, from initial implementation to maintenance and sustainability. The organization ensures that communities receive not only the technology but also the necessary training and support to maintain and utilize these systems effectively. For instance, the solar water-pumping systems installed in various villages include ongoing training for local community members to handle minor issues and maintain the systems, ensuring their long-term success and sustainability.

Support for the Development and Enhancement of Endogenous Capacities and Technologies of Developing Country Parties

Innovation: Africa's projects are meticulously designed to enhance the endogenous capacities and technologies of developing countries. By providing access to clean water and electricity, the organization significantly improves health, education, and economic conditions in rural communities. The involvement of local community members in the construction and maintenance processes fosters local expertise and ensures the sustainability of the projects. Additionally, the organization's training programs enhance future job opportunities for community members.

Efforts to Encourage Private Sector Activities Related to Technology Development and Transfer and How Such Efforts Support Developing Country Parties

Innovation: Africa actively involves the private sector in its projects, ensuring substantial engagement and financial commitment. The organization collaborates with various donors, including foundations like the Kirsh Foundation and UNICEF, to secure the necessary financial resources for their projects. This support is crucial for the successful implementation and long-term maintenance of capacity-building initiatives. The private sector's involvement brings in additional funding and expertise, driving commercial interest in the developed technologies.

Efforts to Accelerate, Encourage, and Enable Innovation, Including Research, Development and Deployment Efforts, and Collaborative Approaches to Research and Development

Innovation: Africa accelerates innovation through its structured support for technology deployment in rural communities. The program's focus on key sectors such as water and energy addresses pressing global challenges and promotes the development of impactful technologies. By facilitating partnerships between local communities and international donors, Innovation: Africa fosters the exchange of ideas and expertise, thereby accelerating the innovation process and ensuring that new technologies can be rapidly developed and deployed.

Knowledge Generated

The collaborative projects under Innovation: Africa generate significant knowledge that benefits both the local communities and the global knowledge base. The joint efforts lead to the creation of innovative technologies and solutions, contributing to overall development. Additionally, the involvement of academic and research institutions ensures that the findings and advancements from these projects are documented and shared, further enhancing the knowledge base and providing valuable insights for future research and development initiatives. The Remote Monitoring system used by Innovation: Africa provides valuable data and insights that can be used to refine and improve future projects, ensuring continuous improvement and sustainability.

The Israel-India Industrial R&D and Technological Innovation Fund (I4F)

The Israel-India Industrial R&D and Technological Innovation Fund (I4F) exemplifies the strategic collaboration between countries to foster technology development and transfer. This program is a cooperative initiative between the Department of Science and Technology of India and the Israel Innovation Authority. Both governments have committed to creating a joint fund of $40 million USD over five years to support joint industrial R&D projects. The goal of I4F is to promote, facilitate, and support the co-development and commercialization of innovative technologies in sectors such as water, healthcare, agriculture, energy, and information & communication technology (ICT).

Strategies Employed to Support Technology Development and Transfer

A noteworthy strategy employed by I4F is the equal financial contribution from both countries, ensuring a balanced and collaborative approach to innovation. The program also mandates significant participation from the private sector, with project leads from industry contributing a minimum of 50% to the project costs. This not only ensures financial commitment but also leverages private sector expertise and resources.

Support Provided at Different Stages of the Technology Cycle

I4F provides comprehensive support across various stages of the technology cycle, from initial research and development to commercialization. The fund co-finances joint R&D projects with a minimum of $0.25 million USD and a maximum of $1.25 million USD per project, or up to 50% of the project cost, whichever is lower. This funding mechanism is designed to cover the full spectrum of the technology development process, encouraging continuous innovation and ensuring that projects have the necessary resources to progress through each stage.

Support for the Development and Enhancement of Endogenous Capacities and Technologies of Developing Country Parties

The I4F program is tailored to enhance the endogenous capacities and technologies of both India and Israel. By focusing on collaborative R&D, the program enables both countries to benefit from shared knowledge and technological advancements. The involvement of academic institutions, research entities, and other R&D institutes as intellectual contractors or partners further strengthens the local capabilities and promotes the development of indigenous technologies.

Efforts to Encourage Private Sector Activities Related to Technology Development and Transfer and How Such Efforts Support Developing Country Parties

One of the key components of I4F is the active involvement of the private sector. By requiring project leads from industry to contribute at least 50% of the project costs, the program ensures substantial private sector engagement. This approach not only provides additional funding but also brings in private sector expertise and drives commercial interest in the developed technologies. The conditional grants provided by the governments of Israel and India, repayable in the form of royalties depending on project success, further incentivize private sector participation and align commercial objectives with national innovation goals.

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Efforts to Accelerate, Encourage and Enable Innovation, Including Research, Development and Deployment Efforts, and Collaborative Approaches to Research and Development

I4F accelerates innovation through its structured support for joint R&D projects, fostering an environment of collaborative research and development. The program's focus on key sectors such as water, healthcare, agriculture, energy, and ICT addresses pressing global challenges and promotes the development of impactful technologies. By facilitating partnerships between companies and research institutions in both countries, I4F encourages the exchange of ideas and expertise, thereby accelerating the innovation process and ensuring that new technologies can be rapidly developed and deployed.

Knowledge Generated

The collaborative projects under I4F generate significant knowledge that benefits both countries. The joint R&D efforts lead to the creation of innovative technologies and solutions, contributing to the global knowledge. Additionally, the involvement of academic and research institutions ensures that the findings and advancements from these projects are documented and shared, further enhancing the knowledge base and providing valuable insights for future research and development initiatives [115].

E. Information on capacity-building support provided under Article 11 of the Paris Agreement

Capacity-building focuses on developing national expertise and institutional strength to address climate change issues and integrate them into long-term planning and policies. As a developed country, Israel provides significant capacity-building assistance to developing nations. The central body responsible for most of these projects is MASHAV, Israel's Agency for International Development Cooperation at the Ministry of Foreign Affairs. MASHAV designs, coordinates, and implements Israel's development cooperation programs and humanitarian assistance efforts, playing a crucial role in enhancing the climate resilience of partner countries.

MASHAV

MASHAV, Israel's Agency for International Development Cooperation, mentioned earlier in this report, concentrates its efforts in areas where Israel has a comparative advantage, including food security, agriculture, Climate Change, education, public health, community development, innovation, gender equality, and rural/urban development. MASHAV shares innovative technologies and tested methodologies, emphasizing climate change adaptation, inclusive education, emergency preparedness, and women's empowerment. Additionally, MASHAV coordinates Israel's humanitarian assistance, providing rapid response to international crises [116]. Below is a overview of several projects by MASHAV:

[115] Israel – India Industrial R&D and Technological Innovation Fund, Israel Innovation Authority website, 2024
[116] MASHAV website, 2024

1. The "Management of Wastewater and Sustainable Reuse for Irrigation" project
Organized by MASHAV's Agricultural Training Center in Israel, the project provided capacity-building support to senior professionals from India's water sector.

Strategies Employed to Provide Capacity-Building Support
The program included visits to Israeli water recycling centers. Participants learned how treated water can be reused in agriculture, gaining practical insights into sustainable water management practices.

Response to Existing and Emerging Capacity-Building Needs
This project specifically addressed India's critical issue of water management. It focused on sustainable practices, efficient use, and conservation of water resources. By providing targeted training to senior professionals, the project aimed to enhance their capacity to implement effective water management strategies in India.

Policies Promoting Capacity-Building Support
The support for this project was aligned with policies that prioritize sustainable water management and capacity-building. MASHAV's initiative to organize the training reflects a commitment to international cooperation in addressing global water challenges.

Involvement of Stakeholders in Capacity-Building Support
The project involved key stakeholders from India's water sector, including senior professionals responsible for water management. Their participation ensured that the training was relevant and could directly impact water management practices in India.

Promotion of Lessons Learned and Best Practices
The project facilitated the sharing of lessons learned and best practices through its structured visits to Israeli water recycling centers. Participants were able to observe successful models of wastewater management and reuse, providing them with valuable knowledge to apply back in India [117].

2. The "UNEP Study Visit for Water Management Professionals from Uzbekistan" project
MASHAV, partnering with the UN Environment Program and Israel's Ministry of Environmental Protection, hosted water management professionals from Uzbekistan and Kazakhstan for a study visit. The program showcased Israel's water management approaches and explored shared challenges in wastewater treatment, desalination, river rehabilitation, water conservation, and agricultural R&D.

[117] MASHAV Activity Report 2022

Strategies Employed to Provide Capacity-Building Support
The project provided comprehensive capacity-building support. In collaboration with UNEP and Israel's Ministry of Environmental Protection, Water professionals from Uzbekistan and Kazakhstan explored Israeli practices in wastewater treatment, desalination, river rehabilitation, water conservation, and agricultural R&D. This hands-on approach allowed participants to learn and apply best practices.

Response to Existing and Emerging Capacity-Building Needs
The project addressed Uzbekistan's and Kazakhstan's water management needs by focusing on sustainable practices and efficient resource use. By exposing professionals to Israel's advanced techniques, it aimed to enhance their ability to manage water resources effectively.

Policies Promoting Capacity-Building Support
Supported by UNEP and Israel's Ministry of Environmental Protection, the project aligned with policies promoting international collaboration and sustainable water management.

Involvement of Stakeholders in Capacity-Building Support
Key stakeholders involved in the project included Water professionals from Uzbekistan and Kazakhstan and Israeli experts.

Promotion of Lessons Learned and Best Practices
The project promoted the exchange of lessons learned and best practices through structured visits and discussions. Following the training in Israel, a team of Israeli water experts visited Uzbekistan and met with relevant stakeholders, formulated recommendations for further development of the Water professionals from Uzbekistan and Kazakhstan and suggested relevant projects for international funding. Participants gained valuable insights into Israel's successful water management strategies, which they could adapt and implement in Uzbekistan [118].

3. The Golda Meir MASHAV Mount Carmel International Training Center (MCTC)
The Golda Meir MASHAV Mount Carmel International Training Center (MCTC) is a prominent institution in international development and women's empowerment. Founded in 1961 by Golda Meir and Mina Ben-Zvi, MCTC's founding director, through MASHAV, Israel's Agency for International Development Cooperation, its initial purpose was to train women in community work from emerging states in Africa and Asia. Over the years, MCTC has expanded its focus to three main areas: Sustainable Community Development, Entrepreneurship and Innovation, and Early Childhood Education, with gender as a cross-cutting issue. The center has trained approximately 30,000 professionals from developing countries and conducts on-site courses and long-term projects globally.

[118] MASHAV Activity Report 2022

Strategies Employed to Provide Capacity-Building Support
The centers hands-on methodology includes observation visits, case studies, and simulation exercises. MCTC conducts global on-site courses and long-term projects, collaborating with regional NGOs on women leadership, economic empowerment, and healthcare management. Emphasizing bottom-up development and women's roles in global development, the center partners with donor bodies and international organizations to achieve common goals. Aligned with the UN's MDGs and SDGs, MCTC focuses on poverty eradication and improving women's socio-economic status, ensuring robust capacity-building support worldwide.

Response to Existing and Emerging Capacity-Building Needs
MCTC's programs are tailored to address the needs and gaps identified in sustainable development and environmental management. For instance, the "Sustainable Development, Leadership, Gender, and the Environment" course in 2021, conducted in cooperation with UNEP and UN-HABITAT, aimed to enhance leadership capacity, analyze gender equality in environmental management, and provide skills in community mobilization and project planning.

Policies Promoting Capacity-Building Support
MCTC's activities align with global sustainable development policies, including the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs). Israel's commitment to these goals supports MCTC's efforts to advance socio-economic status and environmental stewardship.

Involvement of Stakeholders in Capacity-Building Support
The center engages various stakeholders, including government agencies, non-governmental organizations, and international bodies such as UNEP and UN-HABITAT. Collaboration with Palestinian, Jordanian, and other regional NGOs and civil society organizations further enriches the training programs, ensuring they are comprehensive and impactful.

Promotion of Lessons Learned and Best Practices
MCTC fosters the sharing of lessons learned and best practices through structured courses, workshops, and online sessions. For example, the 2022 "Smart Cities" delegation from Kazakhstan involved lectures, study visits, and workshops, where participants worked on needs assessments and challenges related to smart city models. These interactions promoted the exchange of innovative ideas and experiences [119].

[119] The Golda Meir MASHAV Mount Carmel International Training Center (MCTC) website, 2024

4. MASHAV International Agricultural Training Center (MATC)

MASHAV's International Agricultural Training Center (MATC) has been a leader in global agricultural development since 1963. It focuses on capacity building and knowledge transfer in agriculture, water management, and rural development. MATC offers diverse programs including international courses and tailored training, both in Israel and abroad. Drawing from Israeli expertise and innovation, these multilingual activities align with UN Sustainable Development Goals. MATC collaborates with international organizations to enhance global partnerships, aiming to improve agricultural practices and food security worldwide.

Strategies Employed to Provide Capacity-Building Support

The MASHAV International Agricultural Training Center (MATC) plays a crucial role in global agricultural cooperation. It focuses on enhancing human capacity through professional training in agriculture, water management, environmental stewardship, and rural development. MATC organizes and leads international, regional, and tailored training programs, drawing upon Israel's expertise in these fields. Training sessions are conducted in English, Spanish, French, Russian, and Arabic, catering to professionals from various countries.

Response to Existing and Emerging Capacity-Building Needs

MATC’s programs aim to contribute to sustainable food security and better livelihoods through improved agricultural practices. For example, MATC has deployed long-term experts in countries like Brazil, Kenya, Guatemala, and India, with plans to expand to Senegal. These experts, specializing in agriculture and water management, provide training and support to local farmers and authorities, enhancing their capabilities and addressing local needs and gaps.

Involvement of Stakeholders in Capacity-Building Support

The project involves various stakeholders, including local farmers and governmental bodies such as the Ministry of Agriculture. Experts stationed in countries like Brazil, Kenya, and India work closely with local communities and authorities to provide hands-on training and advisory support. This collaborative approach, combined with the center's partnerships with international organizations like UNESCO, FAO, IRENA, WHO, and USAID, ensures that training is relevant, directly applicable to local contexts, and promotes sustainable development through extensive knowledge sharing and cooperation.

Promotion of Lessons Learned and Best Practices

MATC promotes the sharing of lessons learned and best practices through its diverse training programs and advisory missions. For instance, experts provide on-the-ground support in their stationed countries and extend their assistance to neighboring nations. Local farmers, after receiving advanced training, return to their communities to apply and disseminate the acquired knowledge, fostering a cycle of continuous improvement and sustainable development [120].

5. MASHAV Centers of Excellence

MASHAV's Centers of Excellence in Agriculture focus on rapidly transferring modern agro-technologies to farmers. These centers demonstrate technologies such as protected cultivation, drip irrigation, and fertigation, adapted to local conditions. They aim to increase yields, productivity, and produce quality. Catering to both small and large farm holders, the centers serve as regional hubs for capacity building, enhancing agricultural practices and value chains, boosting smallholder farmers' income, and generating employment.

Strategies Employed to Provide Capacity-Building Support

The aim is for farmers to adopt these innovations to increase their yields, productivity, and improve the quality of their produce, even under extreme climate conditions such as heat and water scarcity. For instance, in India, around 30 Centers of Excellence (CoEs) have been established, offering farmers access to advanced agricultural practices and resilient seeds.

The purpose of the centers is to empower local farmers by presenting a value chain for key crops, including commercial nurseries and irrigation and fertilization demonstration plots, while exposing them to technologies and presenting various solutions to streamline their work, increase profitability, and improve crop yield and quality. These methods are tailored to the location, ensuring efficient use of water, energy, and other resources, which is crucial for adapting to and mitigating the impacts of climate change.

The focus is on six clusters/growing areas: vegetables, mangoes, pomegranates, citrus fruits, flowers, and bees. As part of the program's implementation agreement, the activity was expanded to include additional topics such as irrigation and fertilization, post-harvest care, integration of new varieties, plant protection, water management in agriculture, and pollination. This comprehensive approach helps ensure food security and sustainable agricultural practices in the face of climate challenges.

[120] MASHAV International Agricultural Training Center (MATC) website, 2024

Response to Existing and Emerging Capacity-Building Needs

The Centers of Excellence address the specific agricultural needs of host countries by offering a range of practices that cater to both small and large farm holders. These centers act as regional demonstration hubs, boosting vegetable and fruit yields and improving quality. This approach increases the income of smallholder farmers and generates employment opportunities by enhancing value chains. For example, the CoEs in India have significantly contributed to the local agricultural sector by providing training and resources tailored to local conditions.

Policies Promoting Capacity-Building Support

The CoEs align with the broader goals of sustainable development and economic viability. They focus on the entire agricultural value chain, from production to marketing, storage, and transport. The Indo-Israeli Agriculture Project (IIAP) exemplifies this, involving collaborative three-year work plans between the agricultural ministries of India and Israel. The project's expansion to "Villages of Excellence" (IIVOE) further illustrates the commitment to strengthening agricultural ties and improving practices.

Involvement of Stakeholders in Capacity-Building Support

The establishment and operation of CoEs involve various stakeholders, including local farmers, agricultural ministries, and international partners. Experts from MASHAV work closely with local communities and authorities to provide hands-on training and advisory support. This collaborative effort ensures that the training is relevant and directly applicable to the local context, enhancing the overall effectiveness of the centers.

Promotion of Lessons Learned and Best Practices

CoEs facilitate the sharing of lessons learned and best practices by serving as hubs for demonstration and capacity building. Farmers receive practical training and access to new technologies, which they can implement in their communities. The success of these centers in India, where the project operates in 12 states with 32 active centers, has led to further interest and expansion plans, demonstrating the scalability and effectiveness of this model [121].

[121] Centers of Excellence in Agriculture website, 2024

Desert Tech

The DeserTech Innovation Leaders for the Great Green Wall is a training scheme launched to tackle desertification challenges through innovative solutions. Announced at COP27 in Sharm el-Sheikh in 2022, this initiative engages innovators from the Great Green Wall countries in developing and implementing new technologies and business models. The program's objectives include restoring degraded lands, fostering business opportunities, and creating jobs in the region. It involves a collaborative effort among entrepreneurs, investors, policymakers, and NGOs from the 11 Great Green Wall countries and the DeserTech community in the Negev region of Israel, under the guidance of the Israel Innovation Institute. The DeserTech community is a joint initiative of the Merage Israel Foundation, the Israeli Innovation Institute, the Ministry of Environmental Protection, and Ben-Gurion University.

Strategies Employed to Provide Capacity-Building Support

Project objectives include:

1. Foster innovative solutions for combating desert-related challenges.
2. Enable participants to utilize cutting-edge technologies and creative business models for land restoration and economic development.
3. Facilitate collaboration among innovators, entrepreneurs, corporate entities, investors, policymakers, and NGOs.
4. Provide participants with essential skills and knowledge through workshops, training sessions, and field trips, enabling them to craft ready-to-implement project proposals.
5. Support the Great Green Wall initiative's goal of restoring 100 million hectares of land, sequestering 250 million tons of carbon, and creating 10 million green jobs by 2030.

The DeserTech community, based in Be'er Sheva, Israel, focuses on developing and commercializing sustainable technologies suitable for arid climates, positioning the Negev region as a global hub for desert innovation. This project is backed by significant international collaboration, including support from the Merage Foundation Israel, the United Nations Convention to Combat Desertification (UNCCD), the Global Mechanism of the UNCCD, and the Federal Ministry for Economic Cooperation and Development of Germany. The initiative highlights the importance of international cooperation in addressing global environmental challenges, showcasing a unique partnership between African countries and Israel, supported by global organizations and foundations.

Response to Existing and Emerging Capacity-Building Needs

The DeserTech Innovation Leaders for the Great Green Wall initiative directly addresses the capacity-building needs identified by developing countries in the Great Green Wall region. This project aims to combat desertification through innovative solutions, thus meeting critical needs in mitigation, adaptation, and technology development and transfer. By fostering innovative solutions for land restoration, the initiative addresses the urgent need to combat desertification in the Great Green Wall countries. Additionally, the program supports economic development by enabling participants to utilize cutting-edge technologies and creative business models, creating new business opportunities and green jobs. Through workshops, training sessions, and field trips, participants gain essential skills and knowledge, empowering them to develop and implement effective project proposals.

Policies Promoting Capacity-Building Support

DeserTech promotes capacity-building support through several key policies. The initiative involves a collaborative effort among various stakeholders, including entrepreneurs, investors, policymakers, and NGOs, ensuring a comprehensive approach to addressing desertification challenges. The project is supported by significant international collaboration, highlighting the importance of global partnerships in addressing environmental challenges. The DeserTech community focuses on developing and commercializing sustainable technologies suitable for arid climates, ensuring long-term solutions for the Great Green Wall countries.

Involvement of Stakeholders in Capacity-Building Support

Stakeholder involvement is a cornerstone of the DeserTech Innovation Leaders for the Great Green Wall initiative. The project ensures active participation and collaboration among various stakeholders. Innovators from the Great Green Wall countries actively participate in developing and implementing new technologies and business models. Entrepreneurs, corporate entities, investors, policymakers, and NGOs from the involved regions work together to achieve the project's objectives. The initiative is backed by international organizations and foundations, including the UNCCD and the Federal Ministry for Economic Cooperation and Development of Germany, providing essential support and resources.

Promotion of Lessons Learned and Best Practices

The DeserTech Innovation Leaders for the Great Green Wall initiative emphasizes the promotion of lessons learned and best practices through its capacity-building actions. This approach ensures that successful strategies can be replicated and adapted in other regions. Participants receive essential skills and knowledge through workshops and training sessions, enabling them to develop and implement effective project proposals. Practical field trips provide participants with hands-on experience, enhancing their understanding of innovative solutions for land restoration and economic development.

The initiative showcases the importance of international cooperation in addressing global environmental challenges, promoting the sharing of knowledge and best practices among different regions [122].

IsraAID

IsraAID, established in 2001, is Israel's largest humanitarian aid organization. Amongst its activities, it responds to climate-related emergencies overseas, such as floods and sea level rise. Operating in over 60 countries globally, IsraAID adheres to a 'Communities First' philosophy. By partnering with local communities, the organization delivers immediate relief, supports recovery efforts, and enhances resilience against future catastrophes, leveraging both local insights and Israeli proficiency in areas such as trauma, water management, and emergency response.

Strategies Employed to Provide Capacity-Building Support

IsraAID responds to climate-related emergencies and other disasters, and helps plan for long-term recovery. The organization provides sustainable water, sanitation, and hygiene (WASH) solutions to help communities recover and build resilience. These programs range from hygiene promotion and education to repairing wells and constructing large-scale community water systems. Access to safe water and adequate sanitation is crucial for community health and resilience, addressing issues like illness, time spent fetching water, and secondary health emergencies from contaminated water.

Response to Existing and Emerging Capacity-Building Needs

IsraAID ensures that capacity-building needs are met by following the principles of ‘communities first.’ This means that disaster responses are implemented in collaboration with local partners and affected communities so that their voices are heard and prioritized. As their work shifts from immediate emergency relief, IsraAID focuses on building long-term resilience through sustainable and practical solutions tailored to local needs.

Policies Promoting Capacity-Building Support

IsraAID approaches climate-related emergency response strategically, viewing crises as opportunities to develop deeper infrastructure for resilience. This framework aligns with IsraAID's mission of the 3 R's: providing immediate relief, recovery, and long-term resilience. IsraAID also utilizes evidence-based work by partnering with academic institutions to assess and improve their climate-related programming and test new technologies, sharing findings with international forums to enhance global humanitarian aid.

Involvement of Stakeholders in Capacity-Building Support

Involvement of various stakeholders is essential to IsraAID’s approach. The organization works with specialists from their own response teams as well as with communities within the affected area to create long-term partnerships and trust.

IsraAID also employs ambassadors to speak at events on behalf of the organization in order to raise awareness of their work and about global humanitarian issues. Lastly, IsraAID partners with academic institutions and international partners to assess their humanitarian aid strategies and test new ones.

Promotion of Lessons Learned and Best Practices
IsraAID prioritizes sharing lessons learned through their capacity-building actions. A key part of their mission is building long-term resilience in communities which they do in part by focusing on two-way knowledge sharing between international and local communities. By handing over program resources to local communities, they ensure that knowledge gained by the organization over years of assisting in humanitarian crises is passed onto those in need [123].

Tevel b'Tzedek
Tevel b'Tzedek is an organization founded in 2007 to address extreme poverty in subsistence farming villages in Africa and South Asia. It aims to help communities transition from unsustainable farming to viable livelihoods, particularly through small-scale commercial agriculture. Since its inception, Tevel b'Tzedek has impacted over 50,000 people in Nepal, Haiti, Burundi, and Zambia, and hosted about 1,500 young adults in service-learning programs. The organization focuses on mobilizing youth, empowering women, and supporting smallholder farmers to strengthen community resilience.

Strategies Employed to Provide Capacity-Building Support
To combat poverty at its roots, Tevel b'Tzedek employs various techniques such as agricultural teaching, community outreach, and farming initiatives. The organization prioritizes empowering youth through the Youth Service Program (YSP), training young people in sustainable farming practices and community leadership. Participants of the YSP utilize Tevel B'tzedek's training farm to learn agricultural techniques

Response to Existing and Emerging Capacity-Building Need
Before entering a new community, Tevel B'tzedek conducts a baseline survey to determine the socioeconomic conditions, farming practices, and health concerns of villagers. The organization conducts interviews and focus groups to deeply understand the needs of the community and build an effective plan that targets their specific needs. Additionally, Tevel B'tzedek conducts semi-annual midterm surveys to evaluate the influence of their work on the community and look for areas to improve.

Policies Promoting Capacity-Building Support
Tevel B'tzedek utilizes a comprehensive approach that contains eight components to support rural villages in crisis. Their approach prioritizes youth education, as in Zambia, as well as many parts of the Global South, the majority of the population consists of young people.

[123] ISRAAID website, 2024

Tevel B'tzedek's Youth Service Program (YSP) ensures that youth are educated in sustainable agriculture practices to foster community-wide education. Each pair of YSP members work with 50 to 70 households, ultimately educating the entire community.

Involvement of Stakeholders in Capacity-Building Support
Tevel B'tzedek engages with various academic institutions including the Hebrew University, University of Zambia, Tel Aviv University, University of Haifa, and University of Arizona. These partnerships allow the organization to monitor and evaluate their work as well as research new strategies and programs.

Promotion of Lessons Learned and Best Practices
Tevel b'Tzedek emphasizes the promotion of lessons learned and best practices through rigorous academic research and continuous evaluation. Strategic partnerships with academic institutions play a crucial role in this process. These collaborations support monitoring, evaluation, and research of new strategies and programs, providing highly trained interns to supervise ongoing activities. Comprehensive baseline surveys are conducted, involving interviews with households and focus group discussions. These surveys provide critical insights into socioeconomic conditions, water use, nutrition, farming practices, and health concerns, informing tailored interventions for communities. To ensure effectiveness, Tevel B'tzedek conducts semi-annual midline surveys to evaluate the impact of agricultural training and other initiatives on food security, health, and livelihoods. These surveys provide essential data for continuous evaluation and improvement, ensuring that initiatives remain effective and aligned with their objectives. This rigorous process contributes valuable insights to the broader field of international development [124].

EcoPeace Middle East
EcoPeace Middle East is a unique organization that unites Jordanian, Palestinian, and Israeli environmentalists to foster regional collaboration and develop shared solutions to combat climate change. Their work is primarily focused on climate, water, and education. EcoPeace's initiatives emphasize capacity-building, aiming to empower local communities and foster sustainable development across the region.

Strategies Employed to Provide Capacity-Building Support
EcoPeace employs a multi-faceted strategy to build capacity in the Middle East, particularly in the domains of climate, energy, and water. Their efforts bring together diverse groups to promote sustainable solutions and enhance adaptive capacities to the growing climate crisis. Recognizing the Middle East as a climate hotspot, EcoPeace emphasizes the importance of regional cooperation to address extreme climate impacts, such as rising temperatures and decreasing rainfall, which threaten water security.

[124] Tevel b'Tzedek website, 2024

Education Initiatives:

- High School Program: EcoPeace trains high school teachers to become for water pollution through interdisciplinary, project-based learning. This initiative empowers teachers to educate and engage students on environmental issues.
- Green Social Entrepreneurs (GSE) program: The Green Social Entrepreneurs (GSE) program equips Israeli, Jordanian, and Palestinian young adults (ages 21-35) with skills, coaching, and mentoring to address regional environmental challenges through innovative solutions. This initiative supports green enterprises that create substantial social and economic value, working both regionally and nationally.

Response to Existing and Emerging Capacity-Building Need

EcoPeace offers training and workshops to build the capacity of local community members, government officials, and NGOs in areas such as water management, renewable energy, and environmental education. They also partner with academic institutions and research centers to conduct studies that inform sustainable development practices, ensuring that their work is grounded in scientific research.

Workshops and Training:

- **Water Management:** Training local communities and officials in sustainable water management techniques.
- **Renewable Energy:** Workshops on the adoption and implementation of renewable energy solutions.
- **Environmental Education:** Building knowledge and skills for effective environmental stewardship.

Policies Promoting Capacity-Building Support

EcoPeace utilizes several policies to support capacity-building. EcoPeace collaborates with other countries to share knowledge, resources, and best practices in environmental management and sustainable development. The organization also aligns their projects with the United Nations Sustainable Development Goals (SDG), especially those related to clean water, affordable clean energy, and climate action.

Involvement of Stakeholders in Capacity-Building Support

EcoPeace involves a range of stakeholders in their work, including local community members and government agencies. By engaging local residents in project planning, EcoPeace ensures that they are meeting the specific needs of the community. Additionally, collaborating with government agencies allows EcoPeace to develop and implement policies that support environmental protection.

Promotion of Lessons Learned and Best Practices

To promote lessons learned and best practices, EcoPeace produces reports that include case studies and share insights gained from their initiatives. The organization also participate in conferences, workshops, and other events to share experiences and collaborate with stakeholders [125].

[125] EcoPeace Middle East, 2024

Chapter 4

Education, training and public awareness

Key developments since the last National Communication

- Mandatory climate education program from kindergarten to high school, since the school year of 2022-2023.
- Development and expansion of the Green Schools and Green Kindergartens certification programs to reach thousands of educational institutions across the country:
  - Tens of Green Schools were certified each year
  - Hundreds of Green Kindergartens were certified each year
- Increase in higher education opportunities related to sustainability, in both undergraduate and graduate degrees, with new programs at most universities.
- Expansion of teachers and other professionals' climate related training opportunities by government ministries and NGOs.
- New public awareness campaigns resulted in a significant decrease in water consumption and increase in recycling.
- Expansion of informal education opportunities and NGO involvement for public education.
- New international climate education programs and cooperations.
- Extensive government support in the field of climate education and training of professionals in the field.

1. Formal Education

Primary and secondary school education

In Israel, environmental education is a mandatory part of the curriculum from kindergarten to high school. With very few-pre-existing examples of climate change education in other countries to follow, Israel's curriculum follows UNESCO & UNICEF (2014) and UNICEF (2019) guidelines and is built on three main ideas:

First, climate change education should be based in evidence-based educational theories, not ones in which results are not yet known. Second, because education for sustainable development (ESD) covers major global problems and lacks clear contents, it should be kept separate from the climate change curriculum. Instead, the curriculum should be built in accordance with IPCC principles. In addition, the curriculum is built on the basis of eight themes: measurements, causes, models and forecasts, hazards and effects, coping methods (adaptation and mitigation), economic and social driving factors (media influences), politics and government, and ethics. Lastly, climate change should be taught not only in its own right, but also through an interdisciplinary lens, recognizing its complexities. This allows students to explore climate change in new contexts and create new connections.

In most age groups, the study of climate change will be integrated into broader curriculum and other subjects; however, students in grades 8 and 10 will have independently structured units on the field of climate change. Teacher professional development will also take place to support the development of the climate change curriculum. [126]

[126] Israel Ministry of Education's Role in Leading the Development and Implementation of Climate Change Curriculum, Gilmor Keshet-Maor and Efrat Eilam, 2022

Green School Certification Expansion

In 2007, the Ministry of Environmental Protection and the Ministry of Education partnered to create a certification process to encourage schools to not only teach environmental subjects, but also to act in a sustainable manner by conserving resources, and promoting eco-efficiency. While the certification requirements vary by type of institution (kindergarten, school, campus), all three have successfully expanded in the last few years.

- Green kindergartens: Eligibility for Green Kindergarten accreditation includes preparation of an annual work plan on environmental subjects, carrying out community-oriented environmental projects, and behavioral expression of environmental literacy through activities intended to conserve natural resources and reduce environmental pollution.
  - From 2007 until 2021, approximately 3300 kindergartens have been certified. In 2020 alone, 358 kindergartens received accreditation.
  - In 2021, 305 kindergartens were certified, 41 of which were permanently recertified.
- Green schools: Guidelines for accreditation as a Green School include 30 annual hours of formal teaching of environmental subjects within the framework of subjects such as geography, science, and social studies. The schools are required to reduce consumption and collect waste for recycling, in addition to implementing community projects that increase environmental awareness. Green schools are also required to have an action plan for a sustainable lifestyle in the school. This includes wise use of resources, and raising awareness for the importance of a sustainable lifestyle. Teachers at green schools are required to attend a course consisting of 4 sessions delivered by environmental professionals. The following table demonstrates the growing number of educational institutions that received Green School certification and the number of those that reapplied annually. [127]
- In 2022, the Ministry of Environmental Protection published a call for proposals to give grants to local authorities to encourage implementation of activities that promote climate change education. These activities fall under three categories: the certification of Green Schools, promoting educational activities in kindergartens and schools on adaptation to climate change, and promoting education on the conservation of the environment. as part of this project, 35 million NIS (approximately 9 million USD). were awarded to 200 local authorities

[127] Ministry of Environmental Protection website, 2024

Table 15: Green Kindergarten Certification [128]

Year	Green Kindergartens Certified (new)	Green Kindergartens (renewals)
2012	158	17
2013	330	29
2014	292	46
2015	317	54
2016	346	43
2017	371	53
2018	435	86
2019	403	48
2020	358	32
2021	305	41
2022	232	37

Table 16: Green Schools Certification [129]

Year	Green Schools Certified (new)	Green Schools (renewals)
2012	127	17
2013	156	23
2014	110	28
2015	154	35
2016	127	17
2017	56	17
2018	53	24
2019	87	25
2020	18	8
2021	30	9
2022	30	23

[128] Ministry of Environmental Protection website, 2024
[129] Ministry of Environmental Protection website, 2024

Integrated plan for Sustainability Education

In 2013, guidelines to implement the Integrated Plan for Sustainability Education in the school system were published by the Ministry of Environmental Protection. The goal is to give Israeli students the knowledge and tools to make more environmentally conscious decisions. The plan was prepared in cooperation with the Ministry of Education and focuses on critical subjects as:

- Sustainable development
- Climate change
- Air pollution and GHG emissions
- Waste management
- Renewable energies
- Water sector and the water crisis
- Biodiversity and open areas

The plan also includes professional development for the teaching staff. It aims to have 80% of teaching staff participate in a 30-hour learning module: 6 hours on a professional tour and 24 hours dedicated to expanding the curriculum. Kindergarten teachers follow the same requirements. New kindergartens will receive professional guidance of 11 hours a year for each kindergarten, and the renewing kindergartens will receive professional guidance of 6 hours a year.[130]

Educational Programs by the Ministry of Energy

Ministry of Energy policy regarding education programs

Government Resolution 541 "Update to the National Plan for Energy Efficiency and Abatement of Greenhouse Gas Emissions" tasked the Ministry of Energy with working to raise awareness and change consumption habits in the field of sustainable energy (energy efficiency, renewable energy production and energy storage) through education and training. For this purpose, the Ministry of Energy will allocate a budget of NIS 10 million over the years 2022-2026. [130]

Elementary school and middle school programs

In the years 2018-23, the following activity was carried out in elementary schools and middle schools to raise awareness in the field of sustainable energy and change consumption habits with a budget of about 2 million NIS (approximately 530,000 USD):

[130] Ministry of Energy, 2024

- Development of an educational website "Energy in a different way". The site includes electronic activities, learning support apps, online quizzes, teacher guides and lesson plans. [131]
- Competitions in the field of clean transportation and energy efficiency in collaboration with the Ministry of Education and the national teacher centers.
- Space and Energy Olympics in collaboration with the Ministry of Education and the Space Agency.
- Zero Energy Schools Competition in collaboration with the Green Building Council and the Ministry of Education.
- An exhibition on sustainable energy at the Science Museum in Jerusalem (under construction) [132]

High school programs

The Chief Scientist of the Ministry of Energy finances 3 curricula and activities for high schools:

1. An escape room on energy issues for high school students, by the Davidson Institute in the Weizmann Institute.
2. High school physics curriculum with a holistic energy vision including a set of energy experiments, by the Davidson Institute in the Weizmann Institute.
3. Energy curriculum in Arabic for high school students. [133]

Encouraging innovation and entrepreneurship

The Ministry of Energy and infrastructure, in collaboration with the Ministry of Education and the National Science and Technology Teacher Centers, joined together to create a project whose goal is to encourage innovation and entrepreneurship among students, and to increase awareness and exposure to renewable energies, energy efficiency, and clean transportation needs and solutions.

As part of the project, an entrepreneurship competition was held for 5th-9th grade students from around the country under the name: "The vehicles of the future - clean transportation".

The task was engineering a design of a vehicle that will work according to the principles of clean transportation - through energy efficiency and renewable energy.
The peak event of the competition was a hackathon where the winners of the competition were announced. [134]

[131] Energy in a different way website, 2024
[132] Ministry of Energy, 2024
[133] Ministry of Energy, 2024
[134] Ministry of Energy Facebook page, accessed: June 2024

Higher education programs

Higher education opportunities in environmental and sustainability fields continue to grow in Israel. All major universities and colleges in Israel offer graduate or undergraduate programs on environmental studies, environmental management and related fields.

According to the Council for Higher Education's Department of Strategy and International Relations, in 2023, there were 124 higher education programs, out of which 116 are in the research universities. 37 of these for bachelor's degrees, 67 for master's degrees and 12 for third degrees. The areas in which research universities operate study programs are diverse: 37% of the programs are in the life sciences, 15% in the natural sciences and agricultural and food engineering, 22% in urban planning, technology, and engineering, and the remaining programs (about 26%) are in other fields or classified as interdisciplinary programs.

During the current school year (2024), 13 new study programs were approved in the following fields: sustainability and environmental sciences, society, economy and sustainability, sustainability and environmental protection, sustainability and innovation, social and environmental sustainability, blue biotechnologies and sustainable marine agriculture, economic and social sustainability, sustainable design, spatial landscape and sustainability, agriculture, nutrition and sustainability, sustainability and the environment, and environment and climate change. Six of these programs are for bachelor's degrees, and the other seven are for master's degrees. The 13 new programs have been implemented in 11 different institutions, universities and colleges. [135]

The significant environmental programs established since the last National Communication Report:

Reichman University (formerly IDC Herzliya)

The Arison Center for Environment, Society and Governance

In October of 2023, the Arison Center for Environment, Society and Governance (ESG) was established at Reichman University. This research center has been the first of its kind in Israel, a sustainability center that deals within the core of business. The center focuses on the implementation of sustainable and environmental business activity. The main goal of the center is to promote and accelerate the transition of businesses and society to a sustainable economy.. The center aims to guide current and future business leaders and managers in integrating sustainable practices within businesses [136].

This activity complements the ongoing initiatives of the School of Sustainability, established in 2012 by Israel Corp., this 3-year interdisciplinary Bachelor of Arts degree has graduated 60 to 80 students a year since its inception. The program combines courses in environmental and earth sciences with economic and government classes, with the addition of local aspects unique to Israel.

[135] Council for Higher Education, 2024

[136] Arison ESG Center website, 2024

Arava Institute

The Arava Institute was founded in 1996 as an academic and research center for environmental leadership in the Middle East. By partnering with Ben Gurion University, the Institute began offering an M.A. in 2002 and a minor in Environmental Studies in 2012, in addition to a host of research programs and international cooperation initiatives. With a student body comprised of Jordanians, Palestinians, Israelis, and students from all over the world, the Institute provides the opportunity to learn from leading professionals to solve today's most pressing environmental challenges. The Arava Institute has more than 900 alumni from its educational programs. Here, the idea that nature knows no political borders is the curriculum and way of life.

Among many programs of the Arava Institute is the "Climate Changemakers: Innovation and Environmental Justice in a Climate Emergency," a program for 25 students including Israeli Jews, Israeli and Palestinian Arabs, and American Jews Over the course of six months, students explore issues related to cross-border cooperation on climate change as well as climate justice in the Middle East. [137]

Another initiative focused on collaboration in the Red Sea Region, including participants from Jordan, Israel, the United Arab Emirates, Morocco, and Egypt is the Arava Sustainability Hackathon. The event focused on entrepreneurship and environmental themes, challenging participants to utilize aquaculture and desert technology in the south of Israel and Jordan to create a more sustainable future. [138]

The Hebrew University of Jerusalem

The Ring Center

The Ring Center was established at the Hebrew University of Jerusalem as a center for combatting Israel's unique environmental challenges including climate conditions, high population density and high rate of urbanization. The Ring Center promotes environmental academics by organizing conferences, advanced courses, and providing financial support to environmental related studies. [139]

The Advanced School for Environmental Studies in the Hebrew University of Jerusalem continues to focus on training top-level researchers and professionals to be able to combat current and future environmental issues both within Israel and globally.

The University of Haifa

The University of Haifa is leading research facility in a variety of environment sciences and related fields. This includes academic programs, and special laboratories (such as the GIS laboratory, and the climate laboratory with a meteorological station).

[137] Arava website, 2024
[138] Arava website, 2024
[139] Hebrew University website, 2024

The University of Haifa offers many environmental related courses, such as:

1. Renewable Energies
2. Water resource conservation
3. Environmental sustainability [140]

In March 2022, the University announced its new vision and goals, committing to social and environmental sustainability. This vision is based on the 17 Sustainable Development Goals established by the United Nations. The objective is to create an environment where various university activities are interconnected: basic research will be integrated with community-focused initiatives; community activities will be aligned with student engagement; and all operations will be grounded in scientific knowledge. [141]
This activity complements the existing activity under the Faculty of Management, the Department of Natural Resources and Environmental Management which offers three M.A.

programs and an M.B.A. program:

1. Natural Resources and Environmental Management – General track
2. Energy Policy and Management- The objective of the program is to broaden and deepen the knowledge of professionals who engage in the field of energy resources in Israel and around the world. The program emphasize social and managerial studies, the development of renewable energy and promotion of energy efficiency.
3. Management of Sustainable Built Environment - M.A. program in Management of Sustainable Built Environment offers a broad survey of sustainability and urban resilience to link research to policy and practice.
4. An International M.B.A. Program Specializing in Sustainability - Focus on issues of environmental and social sustainability that are increasingly at the heart of the responsibilities of business managers. This new M.B.A. program seeks to promote sustainability-oriented leadership by providing the students with the essential tools for business management and incorporating cutting-edge sustainability principles throughout the curriculum.

Tel Aviv University
The Porter School of Environmental Studies
The Porter School at Tel Aviv University is dedicated to the research, teaching and sharing of environmental knowledge in Israel. The school offers a number of new undergraduate programs in geophysics, law, and mechanical engineering, all with an environmental emphasis. Students graduate from these 4-year programs with the tools for a multi-disciplinary approach to some of Israel's biggest climate challenges. The Porter School offers M.A. and PhD degrees in renewable energy, climate change, air pollution, environmental justice and more.

[140] University of Haifa website, 2024
[141] Hayadan website, 2024

The school also offers an internship program designed to give Porter School students a significant advantage in securing jobs in environmental fields after graduation. This program provides students with practical experience in areas where they are likely to build their careers. Porter School students intern with environmental organizations and local authorities, where they play significant roles and gain valuable hands-on experience.
In addition, the school enables student involvement in practical projects via partnerships and collaborations in the fields of environmental innovation and policy. [142]

The Kibbutzim College of Education
Master of Environmental Education
This 2-year program provides training for environmental educators in primary and secondary schools. It offers courses on the philosophical, epistemological and ethical aspects of environmental education, in addition to practical components of lesson planning, shaping attitudes, raising awareness of environmental, and instruction. The Education Program offers professional advancement through internships in different environmental NGOs.

New areas of specialization in the master's degree in environmental education:

Forest Education:
The program enables educators to specialize in forest education, including theoretical and applied aspects for examining forest education in Israel and around the world and understanding the principles that guide it. In addition, the program includes outdoor learning that characterizes forest education in the various courses such as biological diversity, ecological-social systems and natural resources. This learning combines experiential and sensory experience for the students, which can also be applied in kindergartens, schools and other educational settings.

Art and Sustainability
The combination between art and sustainability aims to bridge art and life - by protecting the environment through creative, less polluting and less wasteful use of art supplies. The program is aimed at art teachers and educators interested in sustainability and art.
The program is the result of a collaboration between the Faculty of Sciences and the Faculty of Arts and enables students to explore environmental studies alongside specialization in art. [143]

[142] Tel Aviv University website, 2024
[143] The Kibbutzim College of Education website, 2024

Bar Ilan University

Multidisciplinary School for Sustainability and the Environment

The Multidisciplinary School for Sustainability and the Environment will unite all of the university's programs for environmental studies under one roof, initiate and support the development of new programs and majors, and develop innovative teaching methods. In addition, it will run courses taught in a hybrid or online manner open to students from all academic disciplines on campus.

Environmental management and innovation major in companies in the geography and environmental studies program

The major educates students on tools used to solve challenges in environmental sustainability within companies. These challenges persist through all operation stages of a company, including R&D, the product planning stage and how emissions are managed during operation. Students will graduate with an understanding of how to integrate themselves into businesses with their added value of understanding environmental management. [144]

Master's program in environmental regulation and policy

This program utilizes an interdisciplinary approach that allows students to study both theories of regulation and their applications to the environmental field. The program also gives students the tools to conduct research, for practical work in in the public and private sectors. [145]

This new program complements the existing programs under The Department of Geography and Environment, which was established in 1969.

The faculty of the department includes 19 researchers, and it includes historical geographers and oceanographers, society, culture and heritage researchers as well as climate, water, soil and geology experts. Researchers trained in the humanities and social sciences work in unison with researchers in the exact sciences and natural sciences.

In the curriculum of the department, there are courses in political geography, site conservation and urban planning, as well as synoptic climatology, hydrology and natural disasters. [147]

The Ben-Gurion University

Goldman Sonnenfeld School of Sustainability and Climate Change

The Goldman Sonnenfeld School of Sustainability and Climate Change at the Ben-Gurion University is committed to teaching about the field of environmental research and making environmental information readily available to the public. This institution aims to be a leading center for promoting important environmental solutions developed through research. The university is committed to tending to the incredibly complex ecosystems of the world by way of collaboration between different academic fields ranging from nature to engineering to societal behaviors. [147]

[144] Bar Ilan University website, 2024
[145] Bar Ilan University website, 2024
[146] Bar Ilan University website, 2024
[147] Ben Gurion University Website, 2024

Green Campuses Certification

The Green Campus is an initiative of the Ministry of Environmental Protection in institutions of higher education that defines criteria for certifying academic institutions – universities and colleges – as green campuses.

There are 4 criteria that a campus must meet before being approved for green status. These criteria are:

-A "green council" comprised of both staff and students

-Environmental courses

-Intelligent and environmentally conscious use of resources

-Promotion of environmental projects in which both students and staff must participate.

This green campus process has led to increased awareness of environmental issues and the concept of sustainability.

As of mid-2020, 31 higher education institutions in Israel have been certified as Green Campuses. [148]

2. Scholarships

Scholarships by the Ministry of Energy

The Ministry of Energy Chief Scientist office provides scholarships to students which excel in the fields of energy, geology, and geophysics. These scholarships help fulfill the goal of maximizing the potential of higher education institutions.

Scholarships are given in the amount of 10,000 NIS (approx. 3,000 USD) to 60,000 NIS (approx. 16,000 USD) per student per academic year to students pursuing their bachelor's degree, master's degree, or third degree which includes a thesis or significant coursework in the following fields:

- Electrical engineering – preferably specializing in high voltage and strong current;
- Mechanical engineering – specialization in energy;
- Nuclear engineering and nuclear physics;
- Energy engineering - energy systems, renewable energy, energy efficiency;
- Engineering of hydrocarbon and alternative fuel facilities;
- Materials engineering, chemical engineering and chemistry in the fields of energy;
- Geology and geophysics of the subsoil;
- Seismic and geological risks with reference to energy infrastructure;
- Minerals;
- Hydrology, water and sewage engineering, water infrastructures, chemical engineering, and chemistry in the fields of water and the effluents [149]

[148] Ministry of Environmental Protection website, 2024

[149] Ministry of Energy website, 2024

Scholarships by the Ministry of Environmental Protection

In 2022, the ministry published a call for awarding research scholarships in environmental fields at a scope of approximately 1 million NIS.

The amount of each scholarship will be between NIS 25,000 and NIS 32,000 for the duration of the degree years. The Ministry will support students in selected research fields including waste treatment, cleanliness of public space, climate crisis, and nature-based solutions. [150]

3. Informal education

Across Israel, informal education settings help solidify existing environmental knowledge and transfer new sustainable practices to the public. Teenagers in youth movements, “at risk” adolescents, and anyone interested in the environmental movement can become involved in these centers to create sustainable lifestyles. These programs and centers are also conduits of important knowledge exchange for vulnerable groups such as the elderly and poor about climate change impacts and mitigation.

Youth movement activities

"Green Branches"

The Ministry of Environmental Protection, the Ministry of Education and the Youth Movement Council in Israel joined forces for over a decade to enhance youth movements activities for a more sustainable society. The Ministry of Environment Protection allocates between 800,000 NIS and 1 million NIS (approximately 200,000-250,000$) annually for the program. Branches of youth movements can now be accredited as ‘Green’ if the branch has an environmental committee and acts for environmental awareness in the community. As of 2019, over 400 branches of youth movements were certified as "green". Training on environmental and sustainability issues is available to youth movement counselors through educational seminars. [151]

The Environmental Leadership Program for Youth Movements

Ministry of Education has developed environmental and climatic leadership programs in youth movements. A large-scale program has been launched with the goal of reaching all 550,000 youth who are within the frameworks of these youth movements. The goal of the program is to provide these youth with knowledge about the climate crisis and to encourage them to be active on the issue. Another goal of this project is to get all of the youth movements and organizations to reduce their ecological footprint in their daily conduct by changing habits and developing climate-friendly infrastructures. Another major goal of this project is to strengthen community resilience in dealing with prevalent environmental challenges.

2022 was the third year in which 13 youth movements and 18 children and youth organizations all over the country and in all sectors took part in the program. The Ministry of Environmental Protection supports the program to the extent of 15 million NIS (approximately 4 million USD) per year. [152]

[150] Ministry of Environmental Protection website, 2024

[151] Ministry of Environmental Protection website, 2024; Youth movement council website, 2024

[152] Ministry of Environmental Protection website, 2024

Urban Sustainability Centers

A number of urban sustainability centers are operated by local authorities around the country (for example in Tel Aviv-Yafo, Jerusalem and Kfar Saba). Open to residents, with the goal of promoting a more sustainable lifestyle, the centers offers many resources including:

- Community connection around environmental issues
- Environmental activities for children
- Confrences and Events
- Professional trainings
- Environmental activites for schools
- Spaces for rent for events such as conferences, birthday parties or office activities. All with the goal of supporting sustainable and environmental initiatives. [153]

International Programs

Penpal Program [154]

The Penpal program is a collaboration between the Taiwanese government and the Israeli government (Ministry of Education, Ministry of Foreign Affairs, Ministry of Environmental Protection, and the Nature Museum). It is an educational program active since 2019, aimed at establishing an international community of educators to promote familiarity between Taiwan and Israel, and to establish sister school partnerships between the two countries. The program fosters student interactions with peers from Taiwan and promotes collaboration of Taiwanese and Israeli teachers on climate change and wildlife conservation issues. The program addresses human impact on biodiversity and ecosystems globally. It is designed for grades 5 to 10. Over the four years, more than 200 schools and hundreds of students have participated in the program.

Young Environmental Reporters

The 'Young Environmental Reporters' program is an international network created by the FEE organization, in which youth is engaged in journalism and environmental education for sustainable development. The aim is to provide youth with tools for article writing, practical experience in critical thinking, and conveying messages to raise awareness and influence the local and global community through significant environmental and social action. Targeted at grades 6 to 12, the program has been active since 2015, involving 400 schools and many students to date. [155]

[153] Center park website, 2024
[154] Ministry of Environmental Protection, 2024
[155] Ministry of Environmental Protection, 2024

ISDG Israel Sustainable Development Goals

The unique program is operated by the Ministry of Education, Ministry of Foreign Affairs, and the Israel Sustainable Development Foundation, and has been active for 4 years. The program was established with the goal of engaging Israeli students in the international framework to achieve the United Nations Sustainable Development Goals (SDGs) by 2030. It aims to assist the world in addressing the challenges ahead of us. Participation in the ISDG program provides students with a unique opportunity to propose an initiative addressing one or more of the 17 SDGs. The initiative must be planned for a developing country that should be chosen in advance. Chosen students visit the headquarters of the international food and agriculture organizations of the UN in Italy, where they present their initiative and meet key figures in the field. Thus far, hundreds of students have participated in the program. [156]

GLOBE (Global Learning and Observations to Benefit the Environment)

The GLOBE Program, active for 27 years, is an international science and education program that focuses on promoting scientific literacy and building connections between people passionate about the environment. GLOBE has three primary goals: increasing environmental awareness, contributing to increased scientific understanding of the Earth and supporting improved student achievement in science and mathematics. By participating in GLOBE, students, teachers, researchers and lifelong learners can connect with the program's global community.

GLOBE learners also investigate and study Earth System Science through their own research projects and those led by NASA. These projects can center around one of GLOBE's various protocols, campaigns or other data initiatives. By participating in these initiatives, GLOBE community members are inspired to collect, submit and analyze GLOBE data from other members around the world.

With the support of NASA and the federal science agencies that sponsor GLOBE, namely the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF) and the U.S. Department of State (DoS), GLOBE engages learners in the scientific process and advances scientific literacy and diplomacy. Through GLOBE's community engagement, the program serves as a bridge between the researchers of today and those of tomorrow. [157]

[156] Ministry of Environmental Protection, 2024
[157] Ministry of Environmental Protection, 2024

COP27 Climate Conference Panel
The Ministry of Education, in collaboration with the Ministry of Environmental Protection, **led a panel** on education in the field of climate change with the participation of stakeholders from Israel and around the world. Additionally, lesson plans were developed, and various educational activities were conducted as part of the conference events. Discussions and summaries of activities were broadcasted live to students in collaboration with the Director of the School for Sustainability at Ben-Gurion University. Students were also invited to participate in the Climate March. [158]

4. Public awareness
NGO involvement in public awareness

The number of environmental NGOs in Israel continues to increase. Life and Environment – The Israeli Union of Environmental NGOs is a non-profit, non-governmental organization that represents and serves over 120 organizations. Many of these organizations each conduct their own education and public awareness initiatives, contributing to the scope of the environmental movement. The following are examples of NGOs raising awareness on climate change related issues.

The Society for the Protection of Nature in Israel (SPNI)
Founded in 1953, SPNI is the largest and one of the oldest nature conservation organizations in Israel. Established shortly after the founding of the state, SPNI began with a successful campaign to save the Hula Wetlands and has since been at the forefront of efforts to protect Israel's natural resources, biodiversity, and unique landscapes for future generations.

SPNI's education programs aim to foster a deep emotional connection to Israel's nature and heritage while promoting interdisciplinary learning, environmental responsibility, and a commitment to preserving the country's natural and cultural legacy. By nurturing environmental leadership within civil society, SPNI engages communities and stakeholders to work collectively toward the conservation of nature.

Over the years, SPNI has achieved significant milestones, including halting phosphate mining in the Negev, preventing urban development in the Jerusalem hills, protecting natural areas in Modi'in, preserving Haifa's coastline, establishing a nature reserve in Nitzanim Sands, developing hiking trails around the Sea of Galilee, and more. These accomplishments highlight SPNI's ongoing dedication to safeguarding Israel's environment for current and future generations.

[158] Ministry of Environmental Protection, 2024

Green Course
Green Course is an activist field organization that works with the goal of promoting a just and sustainable environmental climate policy. Green Course works to prevent harming natural resources, society and the natural environment, with a focus on the climate crisis and environmental justice.

Green Course include hundreds of volunteers, mostly students and youth, who believe in active and participatory civic involvement, in taking personal responsibility for shaping the face of society and the environment. The organization’s activities take place on campuses and in communities across the country.

Over the years, Green Course has achieved significant milestones, including promoting the closure of the Haifa refinery, the promotion of renewable energy solutions, and advancing policies to reduce the use of single-use plastics. Green Course has also played a key role in raising public awareness about climate change and advocating for sustainable urban planning to protect Israel's natural landscapes and biodiversity.

Adam Teva V'Din
Adam Teva V'Din, established in 1990, is a leading organization involved in shaping Israel's environmental laws, policies, and practices. The organization plays a key role in protecting the rights of all Israelis to a safe, clean, and healthy environment through legal advocacy, public engagement, and environmental justice initiatives.

Adam Teva V'Din collaborates with communities across the country to address environmental injustices, such as noise and air pollution and the loss of green public spaces. The organization has provided pro bono legal support to marginalized groups, including Arab communities in the Galilee and central Israel, Bedouin communities in the Negev, and Jewish communities across socio-economic groups.

Through strategic litigation, Adam Teva V'Din has secured significant environmental victories, such as improving air quality, safeguarding drinking water, and protecting public beaches from commercial development. Landmark rulings from their Supreme Court appeals have set precedents in critical environmental cases.

The organization has also been instrumental in promoting environmental legislation in Israel, including the Coastline Protection Law (2004) and the Clean Air Law (2011). Currently, Adam Teva V'Din is advocating for the enactment of a Climate Law for Israel to address the pressing challenges of the climate crisis. These efforts reflect their commitment to integrating environmental priorities into national policies and achieving sustainable development goals.

Homeland Guards
Homeland Guards is a volunteer-based organization focused on environmental protection, environmental justice and public health, particularly in the context of the natural gas and energy sectors.

Homeland Guards Aims:
1. Preventing processing of crude gas in environmentally sensitive locations.
2. Preventing transportation, storage or treatment of dangerous by-products of natural gas processing on Israel's land.
3. Relocating petrochemical industry from Israel's population centers.
4. Meeting Israel's greenhouse gas emissions reduction targets, in order to fight global climate change.

The organization has played a pivotal role in advocating for offshore processing of natural gas to minimize air pollution and health risks to coastal communities. Through public campaigns and legal actions, it has successfully promoted more sustainable practices in the energy sector. Their efforts have contributed to increased awareness to environmental and public health concerns in Israel.

Greenpeace Israel
Founded in 1995, Greenpeace Israel is the local branch of the international environmental organization Greenpeace, dedicated to promoting environmental awareness and advocating for sustainable practices in Israel. Greenpeace Israel achieves its mission through grassroots activism, public campaigns, education, and collaboration with communities and organizations. The group strives to address key environmental challenges, including climate change, plastic pollution, and the protection of natural ecosystems, while empowering the public to take action for a sustainable future.

Over the years, Greenpeace Israel has been instrumental in numerous environmental campaigns. Notable achievements include raising public awareness about the dangers of plastic waste, campaigning against coal-based power plants to promote renewable energy alternatives, and advocating against oil transportation and offshore drilling in Israel's waters.

Today, Greenpeace Israel continues to focus on protecting marine ecosystems in the Mediterranean, reducing Israel's dependence on fossil fuels, promoting the use of renewable energy, and addressing the challenges posed by climate change through public education, policy influence, and grassroots activism.

Zalul
Founded in 1999, Zalul is one of Israel's leading environmental NGOs, dedicated to protecting the seas and rivers of Israel. Zalul accomplishes its mission through conservation, activism, raising awareness for research, and education. It strives through education to bring the issues of water preservation and environmental protection to front of the Israeli conscience. The group continues to wage strategic campaigns that confront municipalities and corporations who neglect water resources.

Over the years of its activity, the association has had many successes: it has led to the cessation of the discharge of the sludge from the Shafdan wastewater treatment facility into the sea, the establishment of wastewater treatment institutes, the approval of fishing regulations, the closing of the ammonia tank in the Haifa Bay and the enactment of environmental laws.
Today, the group works to protect the Mediterranean Sea from pollution by sewage, oil and drilling, to protect the streams and the water system, to reduce the use of single-use plastic and to protect the corals of the Gulf of Eilat from the transfer of oil from the Gulf countries to the Mediterranean Sea. [159]

EcoPeace Middle East
EcoPeace is an advocacy organization that seeks to build transboundary efforts to protect shared environmental resources of Israelis Jordanians and Palestinians. As climate change continues, water availability will decrease and conservation practices will become more important. The group addresses lack of sewage treatment, aquifer overuse, and diversion of water that threatens already scarce water resources. In 2010, EcoPeace began projects to protect and manage biodiversity and raise awareness among high school students regarding climate change related water issues.

EcoPeace has many educational programs. Most notably, their Youth Leadership training program. Launched in 2019, this program fosters dialogue between Israeli, Palestinian and Jordanian young education professionals. This program aims to provide these educators with skills and networks to encourage cooperation and joint solutions particularly on water-related issues. [160]

Green Step
Green Step is an organization whose goal is to promote environmental and sustainable education at the national level. They specialize in planning and operating multi-year educational programs on a variety of topics for broad audiences. Courses are available for kindergarten students to teaching staff to public representatives and everything in between. They have written and implemented over 130 programs that have been used in 50 local authorities and over 1,000 education institutions. [161]

[159] Zalul website, 2024
[160] Ecopeace website, 2024
[161] Greenstep website, 2024

Citizens for the Environment

Citizens for the Environment (CFE) is a non-profit organization dedicated to representing the environmental needs and challenges of the Arab community in Israel. Established in 1990 by a group of Galileans in northern Israel CFE has emerged as the leading advocate for environmental sustainability and climate change action within Arab community.

The organization's mission is to promote climate justice, protect the right to a clean and healthy environment, and address the impacts of climate change and environmental hazards on the Arab community in Israel. CFE strives to achieve this mission through advocacy, empowering professional leadership, and civil enforcement, in collaboration with community members and partners. The organization's activities in recent year include:

Journalism for the Environment:

This project, which took place in 2022, is a cooperation between the CFE, the Alam Center, and the Society for the Protection of Nature in Israel, which aim to train Arab journalists on climate challenges in order to raise awareness on environmental issues in Arab society.

Influencing for the Environment

The project aims to increase involvement of the Arab society in environmental policy platforms. It provides lectures, workshops, and seminars on three area: the environment, mechanisms for influencing policy, and leadership and social change. [162]

Governmental support for NGOs on climate and environmental issues

Israeli Climate Forum

Announced by President Isaac Herzog in October of 2021, the Israeli Climate Forum aims to lead deliberations about the climate crisis and Israel's role in the fight against it. The forum includes not just government representatives but also other Knesset members, and representatives from Israeli academia, local authorities, the business and industrial sectors, and NGOs - the forum operates along with 'Life and Environment', Israel's umbrella organization for environmental and sustainability NGOs. The forum's first convention was held in May of 2022. [163]

[162] Citizens for the Environment website, 2024

[163] Gov.il website, 2024

Financial support for the activities of environmental NGOs:
The Ministry of Environmental Protection publishes an annual call for submissions to support environmental organizations as of 2019 (and excluding 2020). The call enables the existence of a variety of activities that contribute to creating a strong civil infrastructure that promotes an environmental-social agenda in Israel. Additionally, the call strengthens the relationships and cooperation between the Ministry and the environmental movement in Israel.

Types of supported activities include events and conferences aimed to raise awareness of environmental issues, courses on environmental issues for employees, preparation of research and policy documents, development of environmental curricula and updating websites about environmental topics.

Environmental issues included in the call include, among others: climate change, mitigation and adaptation, reduction of air pollution from transportation, industry and energy production sources, prevention of fires in open areas, preservation of open areas and biodiversity ,reducing the use of natural resources, promoting urbanism, green building, environmental innovation, and circular economy.

In 2019, the Ministry approved support for 20 organizations for 57 activities, for a total budget of more than 3 million NIS (0.8 million USD).

In 2021, the Ministry approved support for 24 organizations for 69 activities, for a total budget of more than 4.7 million NIS (1.2 million USD).

In 2022, the Ministry approved support for 29 organizations for 115 activities, for a total budget of more than 7.3 million NIS (1.9 million USD).

In 2023, the Ministry approved support for 35 organizations for 148 activities, for a total budget of more than 10.7 million NIS (2.8 million USD).

Examples of supported activities:

- In 2021, the Society for the Protection of Nature in Israel prepared a policy document on 'the two-way relationship between climate systems and ecosystems' - nature-based policies and solutions to climate adaptation.
- In 2022, the 2 B-Friendly organization held a training session for government employees and volunteers on the subject of 'turning the climate crisis into an opportunity'.
- In 2022, the Israeli Green Building Council prepared a study on the topic of 'dealing with climate change in the construction sector';
- In 2022, Transportation Today and Tomorrow organization held a training event on the topic 'The climate crisis is already here' which dealt with urbanism, transport and emissions reduction.

Joint ventures:
In addition to supporting environmental organizations, the ministry has joint ventures with NGOs to promote various environmental issues, including climate change.

Examples of projects:
In 2021, the Ministry approved a joint venture with the Israel Institute for Innovation for the purpose of establishing the DeserTech innovation community - A community dealing with the climate change in the desert environment. This 3 year project is supported by a budget of one million NIS per year (approximately 260,000 USD).

In 2022 and 2023, the Ministry collaborated with the Green Building Council on professional guidance and monitoring for urban shading and cooling pilot projects, with a budget of approximately one million NIS (approximately 260,000 USD).

National public awareness campaigns
In Israel, public campaigns have successfully impacted on human behavior in areas such as water conservation, recycling, and smart consumption. The following are examples of successful recent national awareness projects.

Ministry of Environmental Protection Climate Change Campaigns
In recent years the Ministry of Environmental Protection has produced a very large number of videos and various publications in all digital media: Including Facebook, Instagram, YouTube, Twitter, LinkedIn, Telegram, TikTok, and the Ministry's websites. The activity has a very high exposure of millions of viewers and is carried out on a daily basis. Recent examples of campaigns are detailed in the table below, elaboration on significant campaigns can be seen further below.

Table 17: MOEP Campaigns [164]

Budget (thousand USD)	Topic
2018	**2018**
1,919	Treatment of old diesel. This campaign calls diesel vehicle owners to install a filter or to scrap the vehicle.
220	Clean beach campaign – Raising awareness of beach cleanliness with an emphasis on plastic
2019	**2019**
126	National Cleanup Day
275	Clean beach campaign
184	Guidelines for dealing with mosquito hazards
181	Instructions for proper and sustainable extermination
2020	**2020**
658	A clean air zone in Jerusalem - Ban on entry of polluting vehicles to the city, in cooperation with the local municipality
55	Raising awareness to the hazards caused by using fireplaces
275	Clean beach campaign
110	Guidelines for dealing with mosquito hazards
2021	**2021**
275	Clean beach campaign
96	Guidelines for dealing with mosquito hazards
82	Removal of brittle asbestos from public buildings
55	Preventing the use of glue traps for mice
2022	**2022**
1,782	The deposit law for large beverage bottles
1,900	Reducing the use of disposable dishware and encouraging the use of dishwashers
275	Green building campaign – Entry into the force of the green building regulations
658	Clean beach campaign
55	Raising awareness to the hazards caused by using fireplaces
96	Instructions for proper extermination
96	Guidelines for dealing with mosquito hazards
329	East Jerusalem cleaning campaign in collaboration with the Jerusalem municipality

[164] Ministry of Environmental Protection, 2024

Campaign to reduce the use of disposable dishware

In 2022 the Ministry of Environmental Protection set out on a mission to explain the extent to which disposable dishware is harming the environment and to encourage the public to switch to reusable items. This campaign was done in tandem with legislation which increased taxation on disposable dishware [165]. The ministry spent approximately 1.8 million USD on the campaign and made it a mission to publicise to all audiences including the Ultra-Orthodox, Arab, and Russian and Amharic speaking societies. While the effects of this campaign did initially burden the public financially, it has proven to be effective. The increase in taxes in addition to the advertising and information activity has led to a decrease in the consumption of disposable dishware. When comparing July 2021 to July 2022, there was a 37.5% decrease in sales. When comparing September 2021 to September 2022, a 36.2% decrease was shown. [166]

The deposit law for beverage bottles

This law imposes on beverage manufacturers and importers the obligation to collect and recycle empty plastic bottles as part of an extended producer responsibility mechanism. The goals of this campaign include: Improving levels of cleanliness in the public domain, reducing the amount of waste produced and landfilled, introducing a system that will incentivize the production and use of recyclable beverage bottles. With the extension of the Deposit Law to include large beverage bottles of 1.5 liters and above starting from December 2021, the Ministry of Environmental Protection initiated a three-phase public awareness campaign: before the law took effect and upon the law's entry into force – raising awareness of the law; providing the public with information on the deposit fees and the collection mechanism; and after the law took effect – encouraging the public to recycle and return their empty beverage bottles.

The Ministry of Environmental Protection spent 6.5 million NIS (approximately 1.8 million USD) on the campaign and including wide publication including to Ultra-Orthodox, Arab, Russian and Amharic speaking societies.

This campaign initially saw some criticism from the public due to Initial difficulties in setting up the infrastructure; however, the campaign eventually went on to be generally perceived as important and effective. [167]

[165] This legislation was later repealed temporarily during 2023 and 2024
[166] Ministry of Environmental Protection, 2024
[167] Ministry of Environmental Protection, 2024

Clean Beaches Campaign

The Clean Beaches Program is a national campaign to address the problem of marine waste. The program includes a comprehensive vision to address the problem of marine waste with a particular emphasis on informing the public about the importance of prevention of marine waste. [168] In 2022, the budget for the Clean Beach Program was 2.7 million NIS (~740,000 USD), a major increase compared to previous years. The campaign led to an increased rate of using reusable dishware at the beach. Although the campaign is repeated annually, it continues to be perceived as a very relevant and pressing issue. A significant portion of the public expresses concern regarding the use and improper disposal, of disposable utensils and dishware. [169]

Mosquito Removal Campaign

Mosquito carried diseases, particularly the West Nile fever which is typically found in the Middle-East, are most prominent near still water sources where temperatures are high. As the climate crisis worsens and temperatures continue to increase, the frequency and intensity of such events will increase as well. The Ministry of Environmental Protection conducts an annual outreach program to raise awareness of the dangers of mosquitos and simple actions that can be taken to prevent these hazards. [170]

The "Trash Transformers" Campaign

Led by the Ministry of Education and the Ministry of Environmental Protection, this campaign is an educational program that values behavioral changes on waste management. This program encourages reducing waste production by reducing consumption as well as not leaving waste in public spaces with a large emphasis on the connection between consumerism, waste, and climate change. This program aims to raise awareness for the issue of waste and for personal responsibility for a clean environment. To this date, hundreds of students have participated in the program. [171]

Ministry of Energy Climate Change Campaigns

In its commitment to raising awareness of sustainable energy related issues, the Ministry of Energy has conducted several campaigns on the topic in recent years. Recent examples of campaigns are detailed in the table below.

[168] Ministry of Environmental Protection website, 2024
[169] Ministry of Environmental Protection, 2024
[170] Ministry of Environmental Protection, 2024
[171] Ministry of Environmental Protection, 2024

Table 18: Ministry of Energy Campaigns [172]

Budget (thousand USD)	Topic
2018	2018
268	Energy efficiency (during the World Cup) - the campaign included three television broadcasts that aired on commercial and sports channels, and encouraged energy efficiency in the domestic sector.
2019	2019
93	Campaign of the Fund for Loans for Energy Efficiency - a joint campaign with the Ministry of Environmental Protection, designed to raise awareness among energy consumers in the industrial-commercial-public sector of their possibility to receive a government loan at attractive interest rates for the implementation of energy efficiency projects.
1,000	Solar Roofs Campaign - a joint campaign with the Electricity Authority, with the aim of encouraging the public to install PV panels on their roofs.
2022	2022
883	A campaign on the Ministry's reform in electrical products import regulations. The campaign encourages the public to purchase energy-efficient electrical products.

5. Training Programs

As the environmental education sector is expanding, the demand for environmental educators has also increased. Training programs have provided a knowledge base for how to educate students about environmental issues, and how to incorporate sustainability practices across the disciplines.

Government Training Projects

MASHAV

MASHAV – Israel's Agency for International Development Cooperation at Israel's Ministry of Foreign Affairs is responsible for the design, coordination and implementation of the State of Israel's development cooperation programs and humanitarian assistance efforts. By placing people at the heart of development, MASHAV focuses development activities on human capacity building and on the 'training of trainers' approach, sharing with other countries Israel's own development experience and expertise as well as innovative technologies and tested methodologies.

[172] Ministry of Environmental Protection, 2024

In alignment with the 2030 Sustainable Development Agenda, and as a member of the family of nations, the State of Israel through MASHAV, shares the global responsibility of striving to overcome development challenges and contributing to the fight against poverty, while leaving no one behind. In 2022, MASHAV taught 976 participants in 47 different courses in 5 different languages including English, Spanish, Russian, French, and Arabic. [173]

Ministry of Energy and Infrastructure [174]
Training Programs and Information Accessibility
The Ministry builds and supervises the training of energy accountants. In the years 2013-2018, about 700 energy accountants were trained in various courses across the country. In addition, the ministry funded dedicated courses for energy accountants in government ministries and local authorities. In 2023 an online system will be built to supervise the courses.

In addition, The Ministry enhances access to energy information through materials on the ministry's website and guides designed to assist local authorities in transitioning to sustainable energy, for example:

- A guide for preparing local action plans for adapting to climate change and transitioning to sustainable energy [Link].
- A guide for setting up renewable energy systems in local authorities, created in collaboration with the Ministry of the Interior and the Ministry of Environmental Protection [Link].
- A guide for energy efficiency in local authorities, developed in cooperation with the Ministry of the Interior [Link].
- A guide for preparing local authorities for private electric transport [Link].
- A guide for local authorities to encourage solar energy production in the household sector is in the final stages of writing and will be published in the coming months.

All research reports supported by the Mnistry of Energy and Infrastructure are published on the ministry's website and are accessible to the public.
The ministry also manages a library with journals, books, and professional materials in the fields of energy, which are open to the public.

[173] Annual Report, MASHAV, 2022
[174] Ministry of Energy, 2024

Energy efficiency training for people with disabilities

In 2012, the Ministry of Energy in conjunction with the American Jewish Joint Distribution Committee, launched a special energy efficiency training course for people with disabilities. According to the Ministry, the average electricity consumption in homes of people with disabilities is 75% higher than the average consumption in all Israeli homes. The courses were designed for the needs of people with disabilities, helping them acquire tools to save energy in their home and surroundings. [150]

Teachers' Center at "Beyadenu", Faculty of Education, Technion:

"Beyadenu" - The National Teachers' Center for Environmental Education and Sustainability serves all middle school and high school teachers, with a focus on science teachers and those interested in environmental issues, climate change, environmental education, and sustainability:

- The Center assists the Ministry of Education in professional development and the creation of updated content for teachers based on academic knowledge and in collaboration with stakeholders in the field. It promotes innovative pedagogies for addressing environmental topics.
- The Center provides dynamic support for professional development and the development of relevant materials for science teachers, according to the goals and policies of the Ministry of Education, and in response to teachers' needs and developments in environmental issues.
- The Center promotes strategic planning and policy recommendations with the Ministry of Education to advance environmental education and education for sustainability.
- The Center collaborates extensively with a variety of organizations to promote environmental education and education for sustainability. It fosters a dynamic and evolving community of teachers, sharing and supporting one another.
- The Center is a source of current scientific knowledge in various environmental and sustainability issues, in the field of environmental science education, environmental education, and education for sustainability.

The TEVEL Project

The TEVEL project assists key stakeholders in the education system in examining the role of the education system in the era of climate change, taking responsibility for creating effective changes, and acting to implement these roles. The project includes a senior leaders program, a participatory development lab, and a professional community.

The Tevel program for senior educators establishes a group of change agents to promote education in the era of climate change through learning, inspiration, motivation cultivation, and implementation in influential circles.

The program is active since 2022, and is a collaboration between the Heschel Center, the Ministry of Education, the Ministry of Environmental Protection, the Beracha Foundation, the Green Network, the Azrieli Foundation, and the Israeli Climate Forum.

Thus far, 50 senior officials from the education system had participated in the program. [175]

[175] Ministry of Environmental Protection, 2024

NGO Involvement in Training Programs

The Heschel Sustainability Center

The Heschel Sustainability Center offers a unique one-year program designed to train entrepreneurial leaders in a variety of fields. Each cohort may include a wide range of professionals, e.g., the manager of a chemical firm, a product designer, an environmental activist, an academic researcher, an architect, and a marketing director. The program trains its fellows to understand that sustainability requires synergy. They work together to craft environmental community projects such as campaigns to save open natural areas and endangered species. Today, the program sees approximately 35 graduates per year. Heschel aims to be the premier institution promoting a broad- based social, environmental, and economic vision for Israel.

The Heschel Sustainability Center offers additional programs including:

- Special trainings for senior educators
- An online course focusing on health promotion in urban planning, including climate adaptation methods. There have been 4 cycles of this course and about 200 urban planners were trained.
- Environmental leadership trainings for non-environmental specific NGOs. In 2022 there were 2 cycles of this training.
- Training for climate consultants for preparation programs for Arab society. One cycle of this training was conducted with 30 graduates.
- The NZO (Net ZerO Emissions) project aims to accelerate the transition to renewable energy in Israel. Members of the project conduct research, field work, and are involved in government discourse and policy to formulate recommendations for the development of the renewable energy industry. [176]
- Trainings for sustainability managers in local authorities to promote sustainable conduct [177]

Israeli Green Building Council

Founded in 2007, this non-profit organization aims to bring green building education to architects and builders in Israel, and to create a rating tool for real change in Israeli construction. The Israeli Green Building Council operates a Green Building School leading training programs and courses, such as attaining green building certification, urban agriculture, and green building toolbox for architects and construction workers.

[176] Heschel Sustainability Center, 2024
[177] Heschel Sustainability Center, 2024

Chapter 5

Research and systematic observation

Key developments since the last National Communication

- In July 2023, the Ministry of Education and Culture approved a flagship program for research in the field of sustainability. [178]
- As of 2022, Israel has 784 tech startups in the field of climate. [179]
- Government support from the Israeli Innovation Authority for climate tech ventures across all stages, from academic research to pilots and scale-up, totaled $71.4 million in 2022, comprising 16% of its annual budget. Other governmental ministries and agencies support climate tech in academic research, pilots, and technological developments. [180]
- 3 research consortiums were formed by The Israeli Innovation Authority, focusing on cultured meat, the black soldier fly (circularity), and bioplastics. [181]
- Through Horizon Europe, an international research collaboration, 55 Israeli organizations secured a total of €22 million in funding in 2022. [182]
- On December 19, 2022, the Israel Research Core Facilities (ICRF) was established for ease of cooperation between Israeli research institutions [183]
- Israel and the USA announced a research collaboration focused on advanced technology including in the field of bio-tech and climate change solutions. [184]

Known as one of the world's start-up capitals, Israel has a strong focus on research and development as well as innovation. Within Israel, many government programs are incentivizing research projects in the climate-tech field, the goal being for Israel to become an international center of expertise in mitigation and adaptation solutions. From 2017-2022, government-funded climate research supported by the Office of the Chief Scientist in the various ministries focused on the following fields: [185]

- Climate change impact, mitigation and adaptation technologies
- Climate change and health related issues
- Clean energy
- Energy conservation and efficient use of resources
- Greenhouse gas emissions
- Agriculture and agricultural threats from climate change
- Water conservation
- Pest management and reduced usage of pesticides
- Environmental policy
- Marine protection
- Waste and recycling

[178] Council for Higher Education
[179] Israel's State of Climate Tech, Dr. Tamar Moise & Dr. Hagit Schwimmer, 2023
[180] Israel's State of Climate Tech Dr. Tamar Moise & Dr. Hagit Schwimmer 2023
[181] Israel's State of Climate Tech Dr. Tamar Moise & Dr. Hagit Schwimmer2023
[182] Israel's State of Climate Tech Dr. Tamar Moise & Dr. Hagit Schwimmer 2023
[183] IRCF website, 2024
[184] Ministry of Innovation, Science and Technology website, 2024
[185] Ministry of Environmental Protection website, 2024

Private institutions and academia, focusing on different issues of climate change impacts, adaptation and mitigation technologies and policy, conduct other domestic research activities. Israeli organizations participate in several international cooperative frameworks for research, such as CORDEX, Horizon 2020, and ERA-NET. Several institutions provide climate change observations. The most important is the Israel Meteorological Service, which provides meteorological and climate data and forecasts.

1. Systemic Climate Change Observation

To identify areas that require further research regarding climate change mitigation and adaptation, Israel has established a number of weather and air pollution monitoring institutions. These observation centers provide critical data for scientists and policy makers to determine the scope of possible climate impacts, critical areas of interest, and produce timelines for advancements.

The Israel Meteorological Service (IMS)

The Israel Meteorological Service is a unit within the Israeli Ministry of Transportation and is responsible for forecasting weather, supplying meteorological data and conducting climate research. The organization's primary functions and activities are as follows:

- Issuing public weather, climate change, and extreme weather events forecasts and warnings through all available media for different sectors of the economy, e.g., transportation, agriculture, water management, energy economy, environment, etc.
- Supervising meteorological services for civil aviation and supplying basic flight weather information.
- Establishing, operating and maintaining a nationwide network of meteorological stations - synoptic, climatic, agro-meteorological, and solar radiation stations - including a national database of basic meteorological and climatic data.
- Pursuing relevant applied meteorological research to advance and develop a better scientific understanding of weather and climate in Israel.
- Responsibility for Israel's international activities in the field of meteorology as part of its membership in the World Meteorological Organization, including providing raw meteorological data and analyses for different consumers in Israel and abroad. [186]

[186] The Israel Meteorological Service (IMS) website, 2024

Israel Institute for Biological Research
IIBR's multi-faceted air pollution research includes numerous aspects of meteorological modeling and measurement, pollutant sampling, and risk assessment. The Institute employs and develops calculation tools for the prediction of pollution concentrations on various scales, from the indoor environment, through urban areas, to large, complex terrains. Activities include:

- Flow and concentration modeling at diverse scale
- Air pollution modeling
- Meteorological measurements
- Environmental survey
- Granulometric, aerodynamic and image analyses

IIBR researchers also perform assessments of environmental risk in various scenarios, such as those resulting from possible malfunctions in industrial processes involving hazardous materials. The Institute uses a wide array of hightech modeling to assess potential environmental consequences for an area, for either point source problems or climate change. [187]

Israel Oceanographic & Limnological Research - IOLR
The IOLR is a governmental aquatic research institute located in three sites:

1. The National Institute of Oceanography (NIO) in Haifa, Mediterranean coast
2. The Yigal Allon Kinneret Limnological Laboratory (KLL) near Tiberias, Sea of Galilee and
3. The National Center for Mariculture (NCM) in Eilat, Red Sea

The IOLR conducts a multi-faceted research program in oceanography and marine biotechnology and provides information and advice to government agencies and public and private sectors how to best use and conserve Israel marine and coastal resources. Oceanographic research at the IOLR focuses on Israel's three highly diverse seas: the eastern Mediterranean, the Gulf of Aqaba /Eilat (northeastern branch of the Red Sea) and the land-locked Dead Sea. Research activities involve field studies, theoretical and modeling work and laboratory experiments. The broad range of questions considered includes such diverse topics as ocean circulation and mixing; air-sea interaction; coastal erosion; biogeochemical cycles; physiology, developmental biology and ecology of marine organisms and their population dynamics and the impact of human activities on coastal and marine ecosystems and resources.

[187] Israel Institute for Biological Research website, 2024

The Israel Marine Data Center at the IOLR serves as the national repository for oceanographic data, acquires archives and distributes data and information on Israel's marine environment. The IOLR provides a wide range of professional services including hydrographic, oceanographic and water quality surveys, analyses and modeling, climate change-related indices such as measurements of sea level, water temperature and water acidity; environmental monitoring and assessment; professional consulting; and technology transfer and licensing. [188]

The Geological Survey of Israel

The Geological Survey of Israel (GSI) is a public sector organization responsible for advising the Israeli government on all aspects of geoscience, including conducting research on paleoclimate and global climate change. Activities include consolidation national policy regarding the development of infrastructure and its interaction with the natural environment; creating and maintaining databases for geoscience information; estimation of natural and human-caused geohazards; long-term planning of sustainable development of natural resources. [189]

Israel Research Core Facilities

Launched on December 19, 2022, the ICRF was established as a band of research institutions and universities.

IRCF establishes a national database and creates professional networks that connect experts in cores.

The IRCF website acts as a knowledge center of the core facilities in Israel: experts, equipment, services, educational activities, and contact details – aiming to make them accessible to everyone in order to promote collaborations and maximize their potential for the benefit of the entire Israeli scientific ecosystem (academia, hospitals, and industry).

The IRCF networks are multiple expertise communities of core facilities staff at the national level meant to develop the proficiency of core personnel by sharing knowledge, and expertise and developing training curricula for their own staff and for external personnel.

The searchable platform will enable potential users to acquaint themselves with technologies available in Israel that they may need for their research. The core facilities in IRCF are generally open to users with a service charge and accessibility that is determined by each Institution's guidelines.

IRCF's mission is to serve as a force multiplier for all core facility centers in Israel and to promote collaborations that maximize the potential of these centers for the benefit of the Israeli scientific ecosystem.

[188] The Geological Survey of Israel website, 2024

[189] Israel Oceanographic & Limnological Research website, 2024

IRCF Goals

1. To foster, develop and encourage the proficiency of core personnel.
2. To establish a website with a national database that reflects up-to-date data.
3. To employ the equipment and services of existing core facilities to the fullest extent.

The institutions part of the ICRF include universities, medical centers, governmental research institutions and more. [190]

2. International research cooperation

Israel continues to access global tools to enhance its research capacity. Greater access to data and funds has allowed Israel to be involved in many research projects and expand the countries working knowledge on climate change impacts.

Research and Development Cooperation with the European Union

Global Biodiversity Information Facility

Since 2013, Israel has been an associate member of the Global Biodiversity Information Facility, a global database of information on the composition, vibrancy, and biodiversity of different regions. GBIF offers free access and unlimited downloads for all records published via their network for use in research. It is the largest biodiversity database on the Internet, and is a critical tool for Israeli scientists to both publicize their findings, and conduct their own research. This international cooperation has enhanced understanding of the spread of pests and diseases, biodiversity loss, and priority areas for conservation. [191]

Horizon Europe

Horizon Europe is the primary program of the EU to promote international cooperation in research and development with a focus on increasing innovation in a wide variety of fields, including environment. The program will operate for seven years, from 2020-2027, with a budget of €95.5 billion in grants.[192] By the end of 2016, Israeli organizations had participated in two projects receiving NIS 1.6 million (approximately €416,000). By 2022, 55 Israeli organizations have secured a total of €22 million in funding. [193]

[190] The Israel Research Core Facilities (IRCF) website, 2024
[191] Global Biodiversity Information Facility website, 2024
[192] Horizon Europe website, 2024
25 Global Biodiversity Information Facility website, 2024
[193] Israel's State of Climate Tech, Dr. Tamar Moise & Dr. Hagit Schwimmer, 2023

ERA-NET

ERA-Net (European Research Areas) is a program for European cooperation in research and development that is supported, among others, by the FP7 and Horizon 2020. ERA-NET operates by establishing a cooperation network in the chosen field, and the member states fund research and development for joint projects, with participants from both academy and industry. ERA-NET publishes calls for proposal and chooses among the offered development projects. Each state funds its participants, and sometimes it is possible to receive assistance from the co-fund of the Union, which donates up to a third of the development expenses.

Solar ERA Net: cooperation for promoting technologies related to manufacturing electricity from the sun, in which more than 20 companies are members. Israel has participated also in two rounds of calls for proposal and is expected to do so over the next years as well.

ERA Net SG+: cooperation for promoting a smart electricity network, which will also engage in smart energy, with 21 member countries. Israel has lately joined this cooperation, and Israeli companies may participate in the upcoming calls for proposals. [194]

Water Joint Programming Initiatives (WATER JPI)

Joint Programming Initiatives are inter-governmental collaborations meant to tackle major societal challenges unable to be addressed by individual countries and in doing so contribute to the development of the European Research Area. Member States and Associated Countries participate in joint initiatives on a voluntary basis in order to increase the value of relevant national and European R&D funding through joint planning, implementation and evaluation of national research programs. Launched in 2010, the Water Joint Programming Initiative for a changing world, known as the WATER JPI, tackles the ambitious challenge of achieving sustainable water systems for a sustainable economy in Europe and abroad. Israel is one of the 20 partner countries in the WATER JPI. [195]

Joint Research Center (JRC)

The JRC of the European Union is operated by the European Commission. It aims to determine European policy, regulation and standardization in the fields of technology and energy. Israel's Ministry of Energy finances the share of Israeli projects of which there have been one to two each year since 2013. [196]

[194] Ministry of Energy - International Research and Development Cooperation website, 2024
[195] Water JPI website, 2024
[196] Ministry of Energy - International Research and Development Cooperation website, 2024

Research and Development Cooperation with the USA

BSF

The United States-Israel Binational Science Foundation (BSF) promotes scientific research cooperation between the US and Israel. Since its creation, BSF has awarded over 1 billion dollars to over 5,500 research projects in various fields of basic and applied science, including in climate related fields.

The US-Israel BSF aims to make a positive contribution to the development of climate solutions through cross-disciplinary, collaborative research, and publishes a bi-annual call (once every other year) for cross-disciplinary proposals that advance the conceptualization, development and/or implementation of climate solutions.

Examples of funded climate related research include: [197]

- Biological and geochemical enhancement of coral recruitment and calcification for future reefs, University of Haifa Israel, University of Rhode Island USA, Technion – Israel Institute of Technology
- Biomimetic Spider Web- Like Sensing System for Ultrasensitive Whispering-Gallery-Mode Detection of Trace Airborne Analytes and Pollutants, Virginia Polytechnic Institute & State University USA, Tel Aviv University Israel
- Efficient Spin-Based Hydrogen Technology, Hebrew University Israel, University of California, Los Angeles, USA

BIRD Foundation

BIRD (Israel-U.S. Binational Industrial Research and Development) Foundation, established in 1977 by the U.S. and Israeli governments, aims to stimulate and support industrial R&D beneficial to both nations. This partnership between Israel and the United States began due to the United States-Israel Cooperation in Energy Independence and Security Act of 2007 and the Israeli Government approval of the program in 2008. BIRD's activities include connecting Israeli and American companies. It provides matchmaking support and funding of up to 50% of project costs, up to $1 million per project, without taking equity. BIRD covers diverse sectors, including Agriculture, Communications, Life Sciences, and Renewable Energy, supporting around 25 projects annually. Cumulative sales from BIRD projects have exceeded $10 billion, with approximately 1000 projects approved involving major U.S. companies like IBM, General Electric, and Bayer. Some of the joint projects and innovations funded by BIRD Energy are already realizing their commercial potential. In December 2014, the United States President signed into law the United States-Israel Strategic Partnership Act. This act, together with the Israel Government resolution of January 2016, extended the cooperation through BIRD ENERGY to 2024.

Examples of funded projects in 2023 are: [198]

[197] Binational Science Foundation website, 2024

[198] Bird Foundation website, 2024

- Bar Ilan R&D Company (Ramat Gan, Israel) & Forge Nano (Thornton, CO) to develop flim coating for higher capacity anodes
- SolarPaint (Yokneam Illit, Israel) and Lippert Components (Elkhart, IN) to develop a flexible solar panel for RVs, residential balconies, and more
- CarbonBlue (Haifa, Israel) & Energy & Environmental Research Center (Grand Forks, ND) to develop solutions to enhance soil carbon sequestration and integrate different species and bacteria into the soil to provide agricultural benefits
- Boson Energy Ltd(Modi'in, Israel) & Drexel University's (Camden NJ)C. and J. Nyheim Plasma Institute to scale ocean-based carbon dioxide removal technology for use in the desalination industry
- PowerPlug (Tel Aviv, Israel) & Cirrus Nexus (New York, NY) to develop SaaS platform for monitoring and reducing the IT carbon footprint across IT devices, data centers, and cloud resources
- AIR EV (Pardes Hanna, Israel) & Nidec Motor Corporation (St. Louis, MO) to develop electric motor for mid-size eVTOL aircraft
- Trigo Solar (Sde Hemed, Israel) & Texas A&M AgriLife Extension Sponsored Research Services (College Station, TX) to develop compressed air energy storage in wind turbine towers

Israeli-USA Strategic Climate-Tech Cooperation

In July of 2022, Israel announced the launch of a strategic cooperation alongside the United States in the field of advanced technologies. Both countries expressed commitment to intensify technological cooperation. One of the topics chosen for this technological cooperation was climate change. This includes technological collaboration and technology deployment to promote equitable solutions to the climate crisis. The main goal is to develop tools to impact the climate crisis on a global scale. [199]

US-Israel Binational Agricultural Research and Development Fund (BARD Foundation)

BARD is a competitive funding program for mutually beneficial, mission-oriented, strategic and applied research of agricultural problems, jointly conducted by American and Israeli scientists. This cooperation aims to support beneficial, mission-oriented, strategic and applied research of agricultural, food and nutrition challenges.

Thus far, the foundation awarded 345 million USD to 1450 projects.

[199] Ministry of Innovation, Science and Technology website, 2024

Other International Research and Development Cooperations

The German-Israeli Cooperation in Water Technology Research under The Middle East Regional Water Technology Cooperation Program

This bilateral cooperation between the German Federal Ministry for Education and Research (BMBF) and the Israeli Ministry of Science, Technology and Space (MOST) was established in 1974. Since then, 162 projects with Israeli and German partners have led to trusted relations between Israeli and German researchers.
Germany and Israel, both world-renowned manufacturers of water technologies, work together to provide answers to water related challenges. As part of the cooperation, research and development projects in the field of water technology are funded.
The overarching technical spectrum of the cooperation includes:

- increase of water availability and quality
- wastewater treatment and reuse
- energy efficiency in the water sector
- groundwater investigation and remediation
- drinking water treatment and health aspects of the drinking water supply
- integrated water resources management [200]

Awarded proposals are given to research conducted by at least one German research group, one Israeli research group, and one non-Israeli research group from the Middle East for up to 500,000 EURO (534,000 USD). [201]

- Examples of funded projects which were completed in 2022 include:
- CatMemReac: CO2 reduction in oxidation of micropollutants - energy intensive vs. novel solar based processes.
- MoDiCon: Online Monitoring and Digital Control in drinking water distribution systems.
- NEMWARE: NanoElectroMembrane processes for micropollutant removal in water reuse.
- LowGHGWatt: Reduction green-house gas emissions in the water treatment sector by integrated technologies for biofouling mitigation.
- Red-CO2-PNA: Water technology to reduce the CO2-Footprint of the water sector. [202]

[200] FONA - Research for Sustainability website, 2024
[201] The BMBF-MOST Middle East Regional Water Technology Cooperation Program Call for Joint Proposals for 2020
[202] MOST- BMBF Cooperation in Water Technology Research, Status Seminar, 2022

CORDEX

The IMS is part of the Coordinated Regional Climate Downscaling Experiment (CORDEX), which coordinates multiple results from models all around the world, In the framework of the project, the IMS operates a numeric module modified for climate forecasts in local conditions, providing climate change forecasts on Israel and the Middle East, and advance knowledge sharing and cooperation with other research centers in the area and around the world. The climate change module addresses not only the question of how much the temperature will rise or how precipitation levels will decrease, but the frequency and intensity of extreme events, the degree of dispersion of precipitation over time and space in the future and the behavior of atmosphere in general. [203]

COSMO-CLM regional climate simulations

The Israel Meteorological Service (IMS) is a member of the COSMO - the Consortium for small scale modeling. The goal of COSMO is to build a model for weather forecasting which has various applications for members of the consortium. Before its final release, Israel contributed to the development of COSMO, now called the ICON model. Israel as well as other members of the CLM community are responsible for adapting the ICON model to climatic runs. In 2018, the Israel Meteorological Service finished running the CLM-COSMO model with a resolution of about 44 km to assess climate change in the Middle East and North Africa (MENA) region. Although the data has not been uploaded to the global database, it is available to those who request it. Today the group is working on calibrating the Icon model with a resolution of 12 km (for the Mediterranean region) and 2.5 km (for the Israel region) and aiming to begin runs that will be used to assess the climate changes between 1950 and 2100. [204] [205]

International Energy Agency (IEA)

The CSO (Chief Scientist Office) in the Ministry of Energy works closely with the IEA, an independent organization operating within the OECD, which unites 34 developed countries around the world.

The IEA carries out a program for cooperation between Several OECD countries in the field of energy, aiming to develop and implement new and improved technologies. The cooperation is in the framework of the designated IA agreements (Implementation Agreements) that detail the obligations and rights of all parties, protection of proprietary information, etc.

Israel's participation in these programs is important for promoting research and development, and cooperating and forming work relations with key entities worldwide. The IA agreements serve as a platform for creating and guiding cooperation in research, implementation and finance at the scientific and technological arenas of the various energy fields.

[203] Cordex website, 2024
[204] Israel Meteorological Service website, 2024
[205] COSMO website, 2024

Membership in the IA agreements enables various organizations and institutions across the country, including companies, businesses, industries, research entities and non-governmental organizations, to take part in the international research and development activity.
The State of Israel, via the CSO in the Ministry of Energy, signed 6 implementation agreements in the field of energy:

- AFC-TCP: Advanced Fuel Cells Technology Collaboration Program
- Solar Paces-TCP: Solar Power And Chemical Energy Systems
- HIA-TCP: Hydrogen Implementing Agreement
- PVPS-TCP: Photovoltaic Power Systems Program
- HTS-TCP: High-Temperature Superconductivity
- AMF-TCP: Advanced Motor Fuels. [206]

Climate and Clean Air Coalition
The Climate and Clean Air Coalition (CCAC) is a partnership of governments addressing the challenge of short-lived climate pollutants, such as black carbon, methane, and HFCs. Reducing these pollutants can have immediate benefits, including protecting human health and the environment in the short term, and together with long-term policies can slow down the rate of climate change. Israel became a partner in the coalition in 2012. [207]

The Korea-Israel Industrial R&D Foundation (KORIL-RDF)
The Korea-Israel Industrial R&D Foundation (KORIL-RDF) is a bi-national foundation established in May 2001 through a bilateral agreement between the Korean Ministry of Trade, Industry & Energy (MOTIE) and the Israel Innovation Authority. [208] It aims to foster collaborative industrial R&D between Korean and Israeli companies, promoting technological innovation and strengthening economic and trade relations between the two countries. Each country contributes 4 million USD annually to the foundation, which provides grants up to 5 million USD per joint project. These grants are subject to repayment based on commercial revenues generated from the developed products. [209]
KORIL-RDF supports various technology sectors with the requirement that the developed products must have civilian applications and be market-oriented. Grants can cover up to 50% of the direct R&D expenses of a joint project, with specific caps depending on the program. [210]

[206] Ministry of Energy and Infrastructure website, 2024
[207] Ministry of Environmental Protection website, 2024
[208] The Korea- Israel Industrial R&D Foundation (KORIL-RDF) website, 2024
[209] Korea-Israel Industrial R&D Foundation (KORIL-RDF) website, 2024
[210] The Korea- Israel Industrial R&D Foundation (KORIL-RDF) website, 2024

Israel-India Industrial R&D and Technological Innovation Fund (I4F)

The **Israel-India Industrial R&D and Technological Innovation Fund (I4F)** is a joint initiative between India's Department of Science and Technology (DST) and the Israel Innovation Authority, aimed at supporting collaborative industrial R&D projects between Indian and Israeli companies. With a 40 million USD fund over five years, the program seeks to co-develop and commercialize innovative technologies in agreed focus sectors, benefiting both countries.

The grant funding provides 0.25 to 1.25 million USD per project from both the Israeli and Indian sides, covering up to 50% of the project cost, with the industry project lead required to match this funding and repay it as royalties if the project succeeds. Eligible applicants include Israeli for-profit R&D companies, registered and operating in Israel, and compliant with Israeli R&D laws, as well as Indian companies, incorporated under the Companies Act 2013, and at least 51% Indian-owned. Indian academic and research institutions are also encouraged to participate as partners. [211]

Singapore Israel Industrial R&D Foundation (SIIRD)

The Singapore Israel Industrial R&D Foundation (SIIRD) is a cooperative initiative between the Singapore Economic Development Board (EDB) and the Israel Innovation Authority, aimed at promoting and supporting joint industrial R&D collaboration between Singapore-based and Israel-based companies across various industries. SIIRD provides research grants and government funding for small and medium-sized enterprises (SMEs), offering up to 1 million USD for joint R&D or pilot projects.[212] This collaboration has enabled companies to create and enhance products and technology, expand their product portfolios, enter new markets, and accelerate the time to market for new or improved products and technologies. To date, SIIRD has approved over 170 joint R&D projects with a total research investment of 230 million USD. [213]

Examples of funded projects in climate related fields include:

- Extraordinary Capacity Of Nanotubes Towards High Power And High Energy Lithium-Ion Batteries
- HYPLWN - Hybrid Power Line And Wireless Mesh Smart Grid Communications Network System
- Electric Vehicle Battery Charging Interfacing With Smart Grid (Elbat)
- High Voltage High Power Normally-Off Packaged GaN Transistor With 30A/600V Current/Voltage Capability For Energy Conversion Market
- Asymmetric Supercapacitors For High Energy Applications [214]

[211] Israel – India Industrial R&D and Technological Innovation Fund website, 2024
[212] SIIRD website, 2024
[213] Israel – Singapore Industrial R&D Foundation website, 2024
[214] SIIRD website, 2024

3. Government-supported research

Israel Meteorological Service (IMS)

The Israel Meteorological Service is a unit within the Ministry of Transport and Road safety which aims to provide high-quality meteorologic services. IMS has several responsibilities including the release of weather forecasts and extreme weather warnings, the establishment of meteorological stations, and supply of meteorological data. [15]

National climate computing center

In 2022, the Government passed resolution 1791 to establish a national climate computing center, and allocated over 20 million NIS (1.09 million USD) to this purpose. [215] The center, aims to provide the computing resources necessary to form more complex climate simulations. These projections allow the government to anticipate future climate challenges and therefore prepare for them in an informed way. [15]

2019 Israel Climate Change Research Report

For the first time, this report provides an extensive analysis of temperature trends, using past data from across the country. It provides an analysis of regional climate models for the coming decades. In addition to the predictions, a revised dataset of past data was created. Both data sets are currently available to researchers and will be made available to the general public in the coming months. In the coming years, this work will also be expanded to additional climatic components. [216]

Historical and Predicted Precipitation and Temperature Patterns in Israel

Considering growing concerns about the impact of climate change on the water and agriculture sectors in Israel, the IMS created a forecast for precipitation and temperature patterns until the year 2100 under different potential scenarios: 4.5RCP (GHG abatement) and 8.5RCP (BAU). These scenarios include various elements, including an analysis of minimum and maximum temperatures, rain amounts, seasonality, the distribution of rain, and the SPI index. Probabilities of drier years than average were also calculated. [217]

In 2020, the IMS issued a report on the temperature trends projections, providing a full range of statistical analyses. [218]

Reference scenarios for extreme weather events in Israel

To enhance preparedness for future extreme weather situations, a collaborative effort has been established between the IMS and the National Emergency Management Authority (NEMA). This joint work process aims to formulate reference scenarios for extreme weather events.

[215] Israel Meteorological Service website, 2024, and information received from IMS, 2024

[216] Yosef, Y., Baharad, A., Uzan, L., Osetinsky-Tzidaki, I., Carmona, I., Halfon, N., Furshpan, A., Levi, Y., Stav, N. (2019). Climate change in Israel – historical trends and future predictions of temperature and precipitation. Research Report No. 4000-0804- 2019-0000075, Israel Meteorological Service.

[217] IMS website, 2024

[218] Trends in Temperature Change in Israel: Projections Until 2100, IMS, 2020

As a result, a report was issued describing the reference scenarios compiled by IMS.
These scenarios are based on extreme weather events that have impacted the region over the past 100 years, creating "likely worst" case scenarios. Each scenario includes examples of past extreme events alongside the most severe known scenario to date.

The document addresses various weather phenomena, including snow and cold, extreme rain events, prolonged heat waves, dust storms, haze, and fog.
Originally prepared in 2015, the document was last updated in March 2023 and now includes updates regarding heat load.

Additionally, two special scenarios were developed: one for coastal authorities addressing extreme rain events and another for extreme wave events. [219]

The Ministry of Environmental Protection, Office of the Chief Scientist
During recent years, The Office of the Chief Scientist of the Ministry of Environmental Protection has given much support to research and development. Below are some key examples of climate-specific research funded by the ministry, and conducted during 2017-2021:

- International review of policy tools for encouragement of Plug-in Electric Vehicles use and recommendations for implementation in Israel [220]
- Regulation of greenhouse gas emissions from passenger and light commercial vehicles in Israel
- Effects of heat waves on mortality [221]
- Strategies to prepare food systems for the effects of climate change [222]
- A comparative study of the carbon capture alternatives in the production of natural gas-based transportation fuels
- Environmental, technological and economic aspects of second generation biofuel production from biomass
- Environmental implications of diesel engines feeding by the alternative renewable fuel Dimethyl ether (DME)
- Development of bioethanol production scheme from surplus crops, of agricultural vegetated wastes and from aquatic plants
- Olive mill solid waste - pretreatment, use of yeasts for bioethanol production
- Isolation and characterization of novel cellulolytic enzymes from meta genomics libraries for the degradation of agricultural waste for the production of bioethanol
- Novel biologically-based bio-methanation process for fuel production from organic waste-upgrading of biogas [223]

[219] IMS website, 2024
[220] Ministry of Environmental Protection website, 2024
[221] Ministry of Environmental Protection website, 2024
[222] Ministry of Environmental Protection website, 2024
[223] Environmental Research - Research Completed in the Years 2017-2019, Ministry of Environmental Protection.

- Environmental regulations and standardization of regulation of alternative fuels for transportation, greenhouse gas emissions from passenger and light commercial vehicles in Israel. [224]
- Assessment of ecosystem services and human wellbeing in Mount Carmel Biosphere Reserve. [225]
- Research and Development of Liquid Crystal Material Based Smart Window with Fast Switching Speed and Energy Independent Control. [226]

In 2022, the Ministry published three calls for studies and surveys dealing with the issue of climate change:

1. 1 million NIS (approximately $270,00 USD) for the subject of climate change impacts on the Arab society, including surveys of moist habitats and nature-based solutions to climate change risks.
2. 1.5 million NIS (approximately $400,000 USD) for studies on the effects of climate change on ecosystem services, or nature-based solutions to climate change risks
3. 1 million NIS (approximately $270000) for studies on GHG and air pollutants emissions reduction from different sectors, including transportation, livestock and households.

In addition to these surveys, two calls for scholarships were published in 2022 in this field, awarding research scholarships to master's and doctoral students in the field of environment between 25,000 NIS and 32,000 NIS [227]

In addition, in 2022, the Ministry of Environmental Protection, through the Office of the Chief Scientist, allocated 1 million NIS (approximately 270,000 USD) to assess greenhouse gas emissions from the livestock sector in collaboration with the World Food and Agriculture Organization (FAO). [228]

Moreover, in 2022, the Ministry of Environmental Protection and the Innovation Authority launched a joint project to support innovative technologies in various fields related to climate change and environmental protection. Through this collaborative pilot track, companies receive funding to conduct demonstration projects focused on recycling grass clippings, managing urban waste systems, detecting fuel pipeline leaks, micro-grid management, and cold energy storage.

[224] Environmental regulations and standardization of Regulation of alternative fuels for transportation, Pareto Group, 2020
[225] Assessment of ecosystem services and human wellbeing in Mount Carmel Biosphere Reserve, Prof. Ido Itshaki, 2019
[226] Ministry of Environmental Protection website, 2024
[227] Ministry of Environmental Protection website, 2024
[228] Ministry of Environmental Protection, 2024

The initiative, which has approved over 40 pilot programs with total support amounting to approximately 50 million NIS (approximately 13 million USD), aims to foster Israeli entrepreneurship in cleantech industries and address market failures in environmental technologies. By encouraging the development and commercialization of these technologies, the project seeks to contribute to the fight against climate change and enhance Israel's environmental performance.

Israeli Climate Change Information Center

The Israeli Climate Change Information Center (ICCIC) was established and funded by the Ministry of Environmental Protection at Haifa University in March 2011. Operation of the Center was coordinated with the Technion-Israel Institute of Technology, Tel Aviv University, and the Samuel Neaman Institute. The ICCIC was founded in accordance with Govt. Resolution No. 474, approved in June 2009 that, inter alia, called for experts to generate knowledge on climate change and formulate a national adaptation program. The ICCIC brought together some 100 representatives from government, academia, industry, and NGOs to gather and analyze information, identify existing knowledge gaps, identify risks and climate change implications, and to submit recommendations on prioritized research requirements, for the national and local adaptation policy, and ways to market the scientific and technological knowledge collated for application in Israel and around the world. The policy documents developed by the center were integrated into the National Adaptation Plan.

The ICCIC has not published reports in recent years, but it collects and publishes relevant information on climate change such as reports published by other bodies, articles and more. [229]

The Ministry of Energy and Infrastructure

Between the years of 2017-2022, the Ministry of Energy and Infrastructure invested in projects related to climate change mitigation and adaptation:

Sustainable Campuses

In June 2019, the Ministry of Energy decided to support and encourage budgeted energy efficiency in higher education institutions. To this end, a call was launched proposing energy efficiency projects focusing on the development of energy conservation technologies in these higher education institutions. The goal of this program is to save at least 50,000 kWh per year in each of the institutions that are taking part in the project.

[229] ICCIC website, 2024

16 institution submitted 33 proposals; 13 of which were won by 7 institutions:

- Tel Aviv University
- Ben Gurion University
- Weizmann Institute of Science
- Bar Ilan University
- Hadassah Academic College
- Tel Hai Academic College
- Ashkelon College

The grant provided for each of these proposals was 200,000 NIS (54,000 USD) for a total of 2.2 million NIS (590,000 USD). [230]

Calls for Proposals and Tenders by the Ministry of Energy

1. In 2022, the Ministry issued a call for proposals supported by a budget of approximately 6 million NIS (Approximately 1.6 million USD) to establish an energy research institute focused on nuclear fusion and hot plasma, including: training of professionals, enhancement of R&D infrastructure, and the involvement of the private sector. [231]
2. In 2022, the Ministry issued a call for proposals supported by a budget of approximately 20 million NIS (Approximately 5 million USD), to create an energy research institute dedicated to electrochemical storage. The proposed Institute aims to bolster scientific research infrastructure in this critical area, ensuring Israel remains at the forefront of technological innovation in energy storage solutions. [232]
3. The Ministry issued six calls for proposals to fund research in the fields of energy and earth and marine sciences, in the years 2017 [233], 2018 [234], 2019 [235], 2020 [236], 2021 [237] and 2022 [238], with a budget of approximately 100-300 thousand NIS per year per research (approximately 26,000 – 80,000 USD). These calls aim to enhance Israel's infrastructure and technological capabilities in the fields of energy storage, renewable energy, the electricity grid, energy efficiency, emission reduction, climate adaptation and more, including encouragement of collaboration with industry, academia, and international organizations.

The Ministry of Energy Chief Scientist Office (CSO)

The Chief Scientist Office (CSO) is a unit within the Ministry of Energy and Infrastructure (MoE) which acts as a knowledge hub for the MoE and the local energy and natural resources market. It promotes innovation and entrepreneurship, guiding the government towards long-term, evidence-based policymaking by identifying opportunities and best practices.

[230] Call for Proposals 133/2022, Ministry of Energy and Infrastructure website, 2024
[231] Call for Proposals 55/2022, Ministry of Energy and Infrastructure website, 2024
[232] Call for Proposals 76/17, Ministry of Energy and Infrastructure website, 2024
[233] Call for proposals 55/2018, Ministry of Energy and Infrastructure website, 2024
[234] Call for proposals 45/2019, Ministry of Energy and Infrastructure website, 2024
[235] Call for proposals 45/2020, Ministry of Energy and Infrastructure website, 2024
[236] Call for Proposals 41/2021, Ministry of Energy and Infrastructure website, 2024
[237] Call for proposals 72/2022, Ministry of Energy and Infrastructure website, 2024
[238] Subjects for research and development for Submission Under the Ministry of Energy Calls for Proposals, 2023

The CSO also develops and facilitates international, inter-agency, academic and commercial support programs and collaborations to sustain new research and commercial initiatives, thereby supporting the MoE's future goals in line with Israel's economic and social growth.

The CSO invests most of its resources in several key areas of interest, including land and sea research, utilization of natural resources, renewable energy, nuclear energy (both fission and fusion), gas and oil, the electricity grid, energy storage, energy efficiency and decentralization of energy systems, fuels and fuel substitutes for transportation and industry (including electric propulsion, fuel cells, and hydrogen technologies), water and desalination, waste and sewage treatment, environmental and climate strategies (both mitigation and adaptation), energy security, safety, and cyber protection. [239]

The CSO support programs during the years 2017-2022:

1. **Start-up Fund** - This fund enables entrepreneurs to test the feasibility of novel technological concepts or build prototypes. The program grants up to 62.5% funding for projects up to 1.2 million NIS (Approximately 0.3 million USD). In 2022, the CSO invested 13.8 million NIS (Approximately 3.6 million USD) in 24 start-up projects in various fields, including Renewable Energy, Environment, Clean Transportation, etc. [240]
2. **Pilot & Demonstration Fund** [241] - Aimed at assisting companies to scale their products to production and demonstrate them under real market conditions, this program grants up to 50% funding per 3 million NIS (Approximately 0.8 million USD) project. In 2022, the CSO invested over 31 million NIS (Approximately 8 million USD) in 26 projects across various fields such as environment, renewable energy, smart grid, hydrogen, utilization of natural resources, energy storage, and water energy nexus. Eligible projects must address relevant issues, demonstrate technological feasibility, involve limited R&D, include experienced companies or entrepreneurs, and have a clear commercialization path. Funding covers up to 50% of the approved budget, capped at 1.5 million NIS (Approximately 401,833 USD) for general energy fields and 3 million NIS (Approximately 801,030 USD) for oil substitutes in transportation. [242]
3. **Academic Research Fund** - The CSO funds academic research projects, covering up to 100% of costs. In 2022, the CSO invested over 35 million NIS (Approximately 9 million USD) in 60 academic research projects across various fields, including hydrogen, utilization of natural resources, nuclear energy, earth and marine sciences, environment, smart grid, renewable energy, clean transportation, earthquakes, energy storage, water energy nexus, and energy efficiency. For example:

[239] The "Start-up Fund", Ministry of Energy website, 2024
[240] Research and Development 2020-2022, Ministry of Energy and Infrastructure, 2023
[241] Ministry of Energy website, 2024
[242] Research and Development 2020-2022, Ministry of Energy and Infrastructure, 2023

- 2018: 500 thousand NIS (Approximately 130 thousand USD) to develop advanced ceramic membranes for water purification
- 2020: 750 thousand NIS (Approximately 200 thousand USD) to develop a systematic methodology addressing the interdependencies between water, energy, food, and ecosystems (WEFE), including collaboration between Israeli researchers and the EU Joint Research Center (JRC).
- 2021: 500 thousand NIS (Approximately 130 thousand USD) to develop a hybrid photovoltaic-thermoelectric (PV-TE) device aimed at improving the efficiency of solar cells in hot climates.
- 2021: 600 thousand NIS (Approximately 160 thousand USD) to study the ecological, economic, and agricultural impacts of agri-voltaic systems.
- 2021: nearly 670 thousand NIS (Approximately 180 thousand USD) to develop flexible semi-transparent solar cells for green building purposes.
- 2021: nearly 650 thousand NIS (Approximately 170 thousand USD) to explore the potential for storing hydrogen gas in deep geological layers in Israel.
- 2021: nearly 670 thousand NIS (Approximately 180 thousand USD) to conduct the first systematic study of marine mammals in Israel's deep waters, for conservation purposes in light of gas mining in the Mediterranean Sea. [243]

4. Scholarships for Students and Postdoctoral Researchers: The CSO aims to build a strong knowledge base and high-quality human capital in energy fields and offers scholarships to exceptional students in energy, geology, and geophysics to boost graduation rates and develop economically vital knowledge areas. Scholarships are 10,000 NIS (approx. 2,700 USD) per year for bachelor's students, 50,000 NIS (approx. 13,400 USD) for master's students, and 60,000 NIS (approx. 16,000 USD) for doctoral students. The Ministry also supports postdoctoral studies abroad in fields with insufficient research in Israel. [244]

5. Israeli-German Energy Research Meetings: The CSO supported bringing 20 young Israeli researchers to meet with young researchers from Germany. During the two-day meeting, the researchers discussed their fields of energy research and potential collaborations. [245]

[243] Ministry of Energy and Infrastructure website, 2024
[244] Ministry of Energy and Infrastructure, 2024
[245] Ministry of Energy and Infrastructure, 2024

The Ministry of Economy and Industry

The Ministry of Economy focuses on tools to encourage Israel's economic growth. Its key priorities include assisting in the development of an efficient and profitable industry with competitive capabilities to drive accelerated economic growth, enhancing export, and expanding economic cooperation and trade with neighboring countries. Additionally, the Ministry is dedicated to developing human capital to meet the needs of industry and the economy, encouraging public consumer awareness, and maintaining fair trade practices to ensure individual welfare and increase market competitiveness. Lastly, the Ministry focuses on developing off-budget financing tools, using the state budget wisely to create incentives for capital market participation in funding development and industrial projects. [246]

Innovation Communities

The Ministry of Economy and Industry established the Innovation Communities Headquarters to drive economic growth through innovation. These communities develop ecosystems focused on specific content areas, enhancing Israel's local and global leadership. They facilitate collaboration among companies, startups, academia, and public sector bodies, aiming to increase innovation, encourage large companies to adopt new technologies, and tailor government support and regulations.

Below are examples of communities managed under this initiative:

1. WaterEdge.ILis a water innovation community established in early 2021 through a collaboration between the Ministry of Economy, the Water Authority, the Innovation Authority, and Kinneret College. It aims to advance the Israeli water industry by fostering innovation and inter-sector collaborations, attracting technologies, raising resources, and enhancing human capital.
2. The Energy Community was established by the Ministry of Economy, Ministry of Energy, and the Innovation Authority to raise awareness and foster innovation in Israel's energy sector. It serves as a hub for local and international energy professionals, promoting information sharing, expanding human capital, and facilitating connections for applications and pilot projects.
3. EcoMotion Community is a collaborative platform for smart mobility startups to engage with industry representatives, entrepreneurs, academia, government, and investors. It encourages research and innovation through events like meetups, challenge competitions, and the annual Main Event, fostering networking and exploring synergies among community members. [247]

[246] Ministry of Economy and Industry website, 2024
[247] Innovation Communities website, 2024

Support for cleantech companies
In 2021, The Director of Industries and the Director of Foreign Trade at the Ministry of Economy and Industry issued a call for proposals for recycling and cleantech companies interested in establishing smart connections for business opportunities in international markets. Eligible applicants included Israeli companies with a service, tangible product, technological product, or prototype ready for export in the field of waste recycling and industrial by-products. [248]

The Israel Innovation Authority In early 2016, the CSO of the Ministry of Economy and Industry became an independent authority, the Israel Innovation Authority. This authority also replaces the Israeli Industry Center for Research and Development, pursuant to Amendment No. 7 to the Law for the Encouragement of Research, Development, and Technological Innovation in Industry.

The Israel Innovation Authority is responsible for the country's innovation policy, aiming to promote sustainable and inclusive economic growth. Israel's robust entrepreneurial culture, technological infrastructure, and skilled workforce have made it a global innovation hub, with the highest number of startups per capita and over 500 multinational R&D centers. The Authority supports the Israeli innovation ecosystem by providing grants for technological innovations, preparing for future technologies, and enhancing productivity and global competitiveness. Its strategy involves continuous monitoring, research, planning, evaluation, and budgetary control to adapt to the evolving needs of local and international innovation ecosystems. [249]

Examples for programs and initiatives managed by **Israel Innovation Authority:**
Technological Innovation Incubators Program
The Technological Innovation Incubators Program supports entrepreneurs in founding startups based on innovative technological ideas, in a variety of areas including inter alia climate and energy. The program provides early-stage investment and a comprehensive framework. These incubators, selected through a competitive process for an eight-year franchise period, are distributed across Israel. The program aims to help early-stage R&D entrepreneurs who face difficulties in securing private financing and require lab support to mitigate project risks and reach significant funding milestones.

[248] Ministry of Economy and Industry website, 2024
[249] Israel Innovation Authority website, 2024

Targeted at private entrepreneurs, new Israeli startups, researchers, and institutions, the program offers grants covering up to 85% of the approved budget, with a maximum of 3.5 million NIS (approximately 0.9 million USD) for up to two years, and potential extension to a third year. Additional investment from the incubator completes the total budget, ensuring 100% coverage without requiring financial investment from the entrepreneur. The program also provides extensive support, including physical space, administrative services, technological and business guidance, legal advice, and access to partners, investors, and customers. Additionally, the Bio-Convergence program offers increased grants of 2.5 million to 3.5 million NIS (Approximately 0.6 to 0.9 million USD) for initial implementation, focusing on innovative solutions combining biology and engineering. [250]

MAGNET Consortiums

The MAGNET Consortiums Program provides grants for R&D collaboration among industrial companies and research institutions to develop groundbreaking technologies. The program fosters long-term R&D engagement and supports infrastructure technology funding, promoting knowledge distribution and cooperation. There are three types of consortiums: Industrial Consortiums, which involve collaboration between industry leaders and academic researchers on impactful technologies; Knowledge-Building Consortiums, focusing on applied academic studies with industry mentorship; and Ma'agadon, a smaller consortium for specific technological developments. The program targets Israeli companies and academic research groups, offering up to 66% funding for companies and 100% for research institutions (80% grant, 20% consortium companies). Benefits include tailored grants, technology exposure, and intellectual property rights. [251]

The Ministry of Innovation, Science and Technology

Throughout the period of 2017-2022, the Ministry of Innovation, Science and Technology invested in research activities related to climate change, with a focus on the following:

The National Council for Research and Development

The Council examines Israel's research and development systems, identifying strengths, weaknesses, and needs. The Council produces reports and surveys on the state of research in Israel and recommends national research and development policies to the government.

[250] Technological Innovation Incubators Program, Israel Innovation Authority website, 2024
[251] The MAGNET Consortiums Program, Israel Innovation Authority website, 2024

The Council includes sub-committees focused on specific R&D issues including:

1. Committee for the Promotion of Scientific Research in Israel
   - Recommends ways to enhance scientific excellence.
   - Develops a database for excellence indicators.
   - Examines the state of research excellence in Israel.
   - Identifies barriers to research excellence.
   - Formulates funding distribution methodologies and legislative recommendations.

2. Academic Economy Relations Committee
   - Strengthens ties between academia and the economy.
   - Examines knowledge transfer mechanisms.
   - Reviews the role of chief scientists in government ministries.
   - Develops strategies for lifelong learning and continuous learning models.

3. Committee for Investment Procedures in R&D Infrastructures
   - Evaluates investment in research infrastructures.
   - Encourages collaborations between industrial, governmental, and academic R&D centers.

4. Environmental R&D Examination Committee
   - Encourages multidisciplinary environmental research and knowledge dissemination.
   - Promotes multidisciplinary environmental research.
   - Examines statutory status and regulation of biodiversity monitoring.
   - Supports technological R&D in environmental areas.
   - Ensures standards and budgets for environmental and health research.

5. Committee for the Promotion of Scientific and Technological Education
   - Develops national policies for scientific and technological education.
   - Identifies necessary tools and means for education enhancement.
   - Examines priorities in scientific and technological education.
   - Prepares the education system for future challenges.
   - Assesses infrastructure and skills required for future R&D needs. [252]

MIGAL Institute for Applied Scientific Research in the Galilee

Established in 1979 with support from the Ministry of Innovation, Science and Technology, the Institute is a regional Research and Development center, driving economic development in the Upper Galilee, in multiple fields, including Plant Sciences, Environment, Ecology, Precision Agriculture, Soil and Water. MIGAL's employees include 90 PhDs and 190 researchers deployed across 44 research groups and operating as an innovative research ecosystem that encourages collaboration across scientific, industrial, agricultural, academic and technological specialties. [253]

[252] A snapshot of Israel's research and development (R&D) annual report 2022, The National Council for Research and Development

[253] MIGAL website, 2024

The Triangle Research & Development Center

The center, established in 1999 in Kafr Qara in the Triangle Area of Israel with support from the Ministry of Innovation, Science and Technology and under the academic sponsorship of Tel Aviv University, focuses on applied research tailored to its locale [254]. Among its main climate-related research areas are solar energy in agriculture and mapping and managing water runoff in cities and towns using GIS. These initiatives aim to develop sustainable agricultural practices and improve urban water management to address climate challenges. [255]

The Desert and Dead Sea R&D

The Desert and Dead Sea R&D, established in 2006 with support from the Ministry of Innovation, Science and Technology and under the academic sponsorship of Ben Gurion University of the Negev, is a leading research center in southern and eastern Israel. [256] The center leverages the unique characteristics of its region, with activities spread across the Southern Arava, Middle Arava, Dead Sea, and Mitzpe Ramon branches. Focusing on climate-related research, the center's main areas include studying ecosystems under extreme conditions, hydrological and geomorphological research (covering groundwater, runoff, and floods), renewable energy, and agriculture in desert environments. These efforts aim to understand and address the challenges posed by the harsh climatic conditions of the region. [257]

Samaria and Jordan Valley Regional R&D

The Samaria and Jordan Valley Regional R&D ,established in 1997 and converted to Mizrah R&D in 2016 after merging with Yehuda R&D, operates under the sponsorship of Ariel University. With research facilities in Ariel and Kiryat Arba, the center addresses environmental, agricultural, and social challenges unique to the region. It conducts targeted research, offers solutions, and provides scientific and professional training, community science seminars, and educational programs for local schools and community centers.
Key research departments include:

- Environmental Studies: Tackling challenges such as mountain water depletion and increased tides in the Yarkon-Ayalon basin. Collaborative research with Al-Quds University and the Hydrological Service aims to aid Israeli and Palestinian water authorities.
- Agricultural Committee: The committee focuses on agricultural land development, farmer support, and long-term agricultural planning, including water resource management. [258]

[254] The Triangle Regional R&D Center website, 2024
[255] Triangle Regional Research and Development Center website, 2024
[256] Dead Sea & Arava Science Center website, 2024
[257] Desert and Dead Sea R&D website, 2024
[258] Samaria and Jordan Valley Regional R&D website, 2024

The Galilee Association Regional R&D

The Galilee Association Regional R&D, established in 1995 with support from the Ministry of Innovation, Science and Technology and under the patronage of the University of Haifa, is a leading research institute in northern Israel and focuses on applied scientific research in environment and health.[259] Key research areas include wastewater treatment, alternative energy, environmental microbiology, hydroponics, agro-nanotechnology, public health, and socio-economic studies of Arab society.

The center promotes science education among Arab students through a scientific museum and ecological garden and fosters technological entrepreneurship via the ScienTech accelerator. It has a strong track record in environmental-health education and has supported eight start-up companies. [260]

Calls for proposals published in recent years by the ministry of Innovation, Science and Technology

1. Atmospheric Measurements from Space Research Funding (2018) to enhance the understanding of atmospheric processes and improve climate forecasting, with a budget of up to 0.6 – 1 million NIS (approximately 0.2 to 0.3 million USD). [261]
2. Exact and technological sciences research pre-proposals for 2020, in the fields: green chemistry, development of environmentally friendly materials, with a total budget of 3.9 – 5 million NIS (approximately 1 – 1.3 million USD). [262]
3. Environmental sciences research pre-proposals for 2020 – focused on Mediterranean marine ecosystems and changes in terrestrial ecosystems due to rapid development, with a total budget of 4.5 – 5.8 million NIS (approximately 1.2 – 1.5 million USD). [263]
4. Agricultural, environmental and water sciences research pre-proposals for 2019. Focus areas included: marine sciences, cleantech and terrestrial ecology, with a total budget of 9 million NIS (approximately 2.4 million USD). [264]
5. Environmental sciences, agriculture and water research pre-proposals for 2018 focused on cleantech and ecosystem changes in the Kinneret due to recent droughts, with a total budget of 6 million NIS (approximately 1.6 million USD). [265]

[259] The Galilee Society
[260] The Galilee Association Regional R&D website, 2024
[261] Atmospheric Measurements from Space Research Funding website, 2024
[262] Ministry of Innovation, Science and Technology website, 2024
[263] Ministry of Innovation, Science and Technology website, 2024
[264] Ministry of Innovation, Science and Technology website, 2024
[265] Ministry of Innovation, Science and Technology website, 2024

The Ministry of Agriculture and Rural Development Office of the Chief Scientist
Over the period of 2017-2022, the Ministry of Agriculture and Rural Development's Office of the Chief Scientist invested in climate-change related research including:

Adaptation and Mitigation Methods in Agriculture
In 2022, the ministry called for the improvement of fields and plantations in light of the climate crisis. In 2021, a course was published for dealing with climate change. From 2018-2020 many projects were conducted aiming to optimize water usage, soil conservation and dealing with heatstroke in livestock. [266]

Israel's Ministries of Agriculture and Energy Collaboration on Innovative Agri-Energy Research Program
A collaboration between Israel's Ministry of Agriculture and Ministry of Energy has launched a research program to promote energy production in agriculture. This initiative aims to develop technological innovations in renewable energies that work alongside agricultural practices, ensuring dual benefits of food security and energy production while reducing costs.

The collaboration focuses on optimizing the use of agricultural lands for both solar energy and crop production. One key project involves integrating solar panels on greenhouse roofs to cut electricity consumption, generate power and reduce greenhouse gas emissions. The program, funded with 3.5 million NIS (approximately 0.9 million USD), includes nationwide research by various institutions. [267]

Gilat Research Center
The Gilat Research Center, under the Ministry of Agriculture, is located in the northern Negev desert. The center focuses on sustainable agriculture in arid and semi-arid regions, developing technologies to enhance production quantity and quality while addressing climate change effects, water quality, and desertification. The center fosters research collaborations, and trains future generations. Contributions include developing crop interfaces, providing diagnostic and quality labs, and maintaining Israel's citrus variety. Achievements include promoting olive cultivation, improving water and fertilizer efficiency, and enhancing pest management. The center collaborates with international researchers and has projects with the Palestinian Authority. It also offers essential agricultural services and awards scholarships for Negev-related research through the Molcho Center. [268]

[266] Ministry of Agriculture, 2024
[267] Ministry of Agriculture website, 2024
[268] Gilat Research Center website, 2024

Calls for proposals published in recent years by the Ministry

1. Call for short-term research addressing current challenges in agriculture under climate change, 2022-2023 - with a total budget of 2.5 million NIS (Approximately 0.7 million USD). [269]
2. Call for plantation improvement research In light of climate change, and to increase industry competitiveness 2022-2023 - with a total budget of 15 million NIS (4 million USD) for 2023-2032. [270]
3. Call for soil conservation and runoff management research, 2019 - with a total budget of 2 million NIS (Approximately 0.5 million USD) for three years. [271]

Challenges and barriers

According to the Ministry there are multiple barriers to knowledge exchange and cooperation:

1. International calls for proposals are often not focused on applied solutions.
2. Regulatory differences between Israel and Europe.
3. In order to participate in calls for proposals, Ministry representatives are required to travel to Europe frequently.

Despite these challenges, the Ministry of Agriculture engages in research cooperation on agricultural issues with the United States through the BARD foundation, as detailed above. [272]

Ministry of Education and Culture

In recent years, the Ministry of Education and Culture worked on a large-scale flagship program for research in the field of sustainability and climate crisis, which was launched in 2023. The program will operate from 2024-2029 with a total budget of 450 million NIS (121 million USD). As a part of this program, support will be provided for the establishment of

new research centers in the areas of:

1. Energy and Climate
2. Agriculture, food, nutrition and biological diversity
3. Water Sciences

It is also important to note that this program is in line and coordination with the Horizon Europe program, in which the State of Israel also participates, in terms of investments in the field of sustainability research. [273]

[269] Call for short-term research 2022-2023 to solve the current challenges in agriculture under climate change, Ministry of Agriculture, 2022
[270] Call for research in the field of plantation improvement In light of climate change, and to increase the competitiveness of the industry 2022-2023, Ministry of Agriculture, 2022
[271] Call for research in the field of soil conservation and runoff management for 2019, Ministry of Agriculture, 2019
[272] Ministry of Agriculture, 2024
[273] Council for Higher Education, 2024

4. Independent and academic research activities

In addition to government-supported research, significant climate change research and development, particularly mitigation technologies, are conducted independently by both industry and academic institutions.

Research Centers

Hebrew University Climate Science Center (HUCS)

The HUCS is a center for climate research and education. Its aim is to connect experts across climate disciplines both within Israel and internationally. The center supports four main services: data analysis, climate modeling, research, and education. Specifically, it aims to provide a centralized archive of data services, technical experts for climate modeling, training and infrastructure to perform climate research, and scholarships for climate education within Israel. [274]

The Natural Resources and Environmental Research Center at University of Haifa (NRERC)

The Center primarily conducts research on natural resource management (NRM) and environmental resource management (ERM). Additionally, it was the first organization to consider the socio-economic effects of the environment in Israel. It was chosen by the Israeli Ministry of Environmental Protection to lead the Israeli Center for Climate Change (ICCC), which focused on evaluating policy related to managing the effects of climate change. [275]

Arava Institute Research Center

The Arava Institute consists of five research centers: the Jordan-Israel Center for Community, Environment, and Research, the Center for Transboundary Water Management, the Center for Renewable Energy and Energy Conservation, the Center for Sustainable Agriculture, the Center for Climate Change Policy and Research, and the Center for Arid Socio-Ecology.

The Center for Climate Change Policy and Research aims to provide an interdisciplinary approach to grapple with climate change. By considering societal, economic, and environmental effects of climate change, the center aims to create a cohesive understanding of the necessary solutions to environmental challenges. [276]

[274] HUJI website, 2024
[275] NRERC website, 2024
[276] Arava website, 2024

Tel Aviv University Urban Innovation and Sustainability Laboratory
The center serves as a hub of research aiming to promote climate change adaptation. Collaborating with students, researchers, and businesses, the center aims to create tools for government officials and communities to promote awareness surrounding sustainability. It creates policies and initiatives to improve quality of life in urban environments, focusing on resource management and environmental assessments. It also conducts research on the transition to smart cities, questioning how to implement new sustainable practices. [277]

Tel Aviv University Center for Global Climate Change
The center mainly focuses on researching links between climate change and extreme weather as well the effects on public policy assessments and interventions on the environment. The center aims to promote both theoretical & applied interdisciplinary climate change research, while making itself a leading international research hub in the field. It also develops educational programs on climate change for undergraduate and graduate students. [278]

Tel Aviv University Center for Renewable Energy [279]
The Center was created to combat the two leading obstacles to large-scale solar integration in Israel: lack of energy storage technologies to enable solar energy storage, and the technical upgrades required for the electricity infrastructure. The Center brings together 300 researchers and serves as a platform for scientists to meet these challenges with new technologies. Other actions of the center include:

- Holding international conventions
- Offering funding for selected research projects
- Increasing public awareness of the need for renewable energy sources
- Establishing additional labs focused on energy story, solar energy, and biomass fuel. Currently, the center is overseeing a national study on electric cars.

Technion Research Center for Energy Engineering and Environmental Preservation [280]
Located at Technion- the Israel Institute of Technology, the center mainly focuses on applied research in the energy field. It focuses on how to best utilize energy while also prioritizing environmental conservation. In the past five years two new labs have been constructed within the center: an optical engineering lab and a cryogenic cooling lab. Research also focuses on the following topics:

[277] TAU website, 2024
[278] TAU website, 2024
[279] TAU website, 2024
[280] Technion website, 2024

- Solar energy
- Wind energy
- Internal combustion engines
- Vehicle engineering
- Biomass and organic waste
- Fluids engineering
- Bio-thermal modeling and heat transfer

KKL-JNF

KKL-JNF supports research on climate change across Israel, managing five research and monitoring centers in the country. These centers allow researchers to understand how climate change impacts different climate regions. Notably, one of the KKL-JNF's centers was one of the first in the world to document the death of an ecosystem, in Yatir Forest. In addition to these centers, KKL-JNF supports climate research by partnering with research competitions and academic institutions, facilitating research on species reintroduction, and forming partnerships with other countries to further promote solutions to climate challenges. [281]

Bar Ilan University Center for Energy and Sustainability

In 2022 Bar Ilan University introduced their new School of Sustainability and Energy. Over the next decade, the University intends to invest hundreds of millions of NIS (tens of millions of USD) in research and environmental projects throughout the country and around the world. This center consists for 55 research groups that focus on a range of topics, from research and development of renewable energies to encouraging entrepreneurs in the field of energy. [282]

Examples for independent industry research activity

The table below details several examples of independent research conducted by israeli industry between 2017 and 2022.

[281] KKL-JNF website, 2024
[282] BIU website, 2024

Table 19: Examples for independent research activity

Research Institute	New Research
Solutum[283]	- Created an biodegradable compound to replace plastics in packaging - Compound dissolves into biomass at predetermined temperatures and times
Brenmiller Energy[284]	- Creating an entirely self-sustainable and self-cleaning 'floating' solar thermal field in the Negev.
ECOConcrete[285]	- Creates eco-friendly construction materials for coastal infrastructure

[283] Solutum website, 2024
[284] Brenmiller Energy website, 2024
[285] ECOConcrete website, 2024

Chapter 6

Improvements in reporting

Per paragraph 7 of the MPGs, this chapter focuses on “information on areas of improvement in relation to its reporting pursuant to chapters II, III, IV, V, and VI.” These areas for improvement may be identified either by the Party itself or by the technical expert review team. This chapter is expected to gain significance in the second and subsequent BTRs.

Since this is Israel's first BTR and the review has not yet occurred, there are no specific areas of improvement identified by the technical expert review team to include in this chapter. However, areas for improvement can still be recognized by the Party itself. The transition from BUR to BTR necessitated improvements in data collection and information detailing, ensuring greater compliance with international reporting standards. Key improvements implemented in Israel include:

Projections Timeline Extension
The projection timeline for the national GHG emissions, prepared by Israel's Ministry of Environmental Protection, has been extended from 2030 (as in previous MRV national reports) to 2040 in the current BTR. This extension aims to provide policymakers with insights into the potential need for additional policies for the 2030-2040 period. It is important to note that the projections for 2030 to 2040 carry significant uncertainties, even greater than those up to 2030, due to the highly unpredictable long-term trends in the economy, technology, energy prices, international trade, and other factors.

Added Scenario to Projections
Emissions projections reported in this BTR include two scenarios, compared to one scenario reported in previous MRV national reports:

“with existing measures scenario” (WEM) which corresponds to a current/realistic implementation rate scenario (was previously reported in the national MRV report). This scenario is used to estimate the emissions and emission reductions due to the actual implementation of measures in the reporting year, and what is foreseen in the targets years (achievement or not of the targets and measures) given the current rate of implementation of measures that have been adopted but not yet fully implemented.

“With additional measures scenario” (WAM), which corresponds to a full policy implementation of adopted measures beyond the current rate of implementation, as well as planned or potential measures. This scenario reflects compliance with adopted and planned government policy during the target years and enables forecasting the emissions and emissions reduction that will be achieved by each of the measures in the target years.

This addition was made to transparently assess Israel's climate policy impact, identify gaps, assess progress, and guide further action to achieve targets.
To ensure ongoing improvements, Israel aims to continue developing its modeling framework to enhance accuracy, enable modeling of additional measures, and incorporate economic modeling capabilities.

Development of a GHG Emissions Projection Methodology Document
Israel is preparing a detailed methodological document to support the GHG emissions projections process. This document will enhance transparency and provide a comprehensive guide for policymakers and stakeholders on how the projections are created.

Preparation of the National Inventory Report (NIR)
Israel is publishing its first NIR, a comprehensive document detailing greenhouse gas emissions by sources and removals by sinks. This aligns Israel's reporting efforts with international practices and improves the overall transparency and quality of data. Moreover, the preparation of the NIR has prompted the Central Bureau of Statistics to conduct a more in-depth analysis of Israel's greenhouse gas emissions than ever before, enhancing the understanding of emission patterns and trends. Additional improvements in the emissions inventory are mentioned in the NIR.

Accelerated GHG Data Publication by the Central Bureau of Statistics
In recent years, the CBS has improved the timeliness of its national GHG emissions inventory data publication. Previously, data were published with a two-year delay; now, they are released with only a one-year gap. This improvement enhances public transparency and strengthens the government's ability to monitor trends, make data-driven decisions, and implement timely policy interventions.