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Nationally determined contributions under the Paris Agreement

Synthesis report by the secretariat

Addendum

Additional information on domestic mitigation measures

Summary

This addendum provides additional information on domestic mitigation measures synthesized from the 48 new or updated nationally determined contributions communicated by 75 Parties in accordance with decision 1/CP.21 and recorded in the interim registry of nationally determined contributions as at 31 December 2020.

Abbreviations and acronyms

CH_4	methane
CO_2	carbon dioxide
F-gas	fluorinated gas
GHG	greenhouse gas
GWP*	global warming potential
IPCC	Intergovernmental Panel on Climate Change
LT-LEDS*	long-term low-emission development strategy(ies)
LULUCF	land use, land-use change and forestry
MRV*	measurement, reporting and verification
NDC	nationally determined contribution
R&D*	research and development
SLCP*	short-lived climate pollutant
SR1.5	Intergovernmental Panel on Climate Change Special Report on Global Warming of 1.5 °C

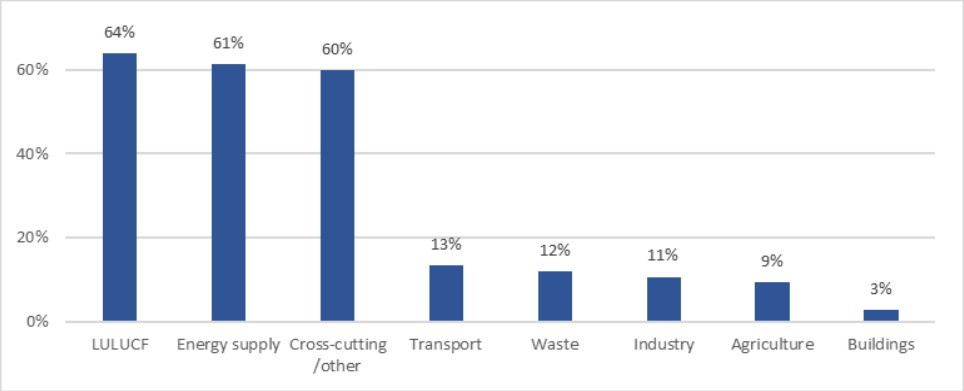
* Used exclusively in figure 3.

I. Quantitative mitigation targets specific to priority areas or sub-areas

1. Figure 1 shows the percentage of Parties that identified quantitative mitigation targets specific to priority areas or sub-areas for domestic mitigation measures[1] in their NDCs. Such targets were provided most frequently for LULUCF, followed by energy supply and cross-cutting or other[2] (see the table below for examples of the targets). In many cases, the type (e.g. absolute emission reduction target, 'business as usual' emission reduction target), base year (e.g. 2013) and target year (e.g. 2025, 2030) of the Parties' targets are consistent with those of their overall NDC mitigation targets in order to effectively underpin them. Such consistency is more frequently observed where the overall NDC mitigation targets were determined by calculating the aggregate mitigation potential of the domestic mitigation measures using a bottom-up approach.

Figure 1

Share of Parties providing quantitative mitigation targets specific to priority area or sub-area in nationally determined contributions



Note: If a Party provided more than one quantitative mitigation target specific to a priority area or sub-area, it was counted as one Party providing targets for that area.

Examples of quantitative mitigation targets specific to priority area or sub-area

Priority area	*Examples*
Energy supply	▪ Share of renewable energy in the energy mix by 2030 ▪ Share of renewable energy in the electricity mix by 2030 ▪ Share of renewable energy in final energy consumption by 2030
Transport	▪ Level of CO_2 emissions for 2030 ▪ CO_2 emission percentage reduction below base-year level for 2030 for shipping
Buildings	▪ Level of CO_2 emissions for 2030 for residential, commercial and other buildings
Industry	▪ Level of CO_2 emissions for 2030 ▪ Relative GHG emission percentage reduction from 'business as usual' level for 2030
Agriculture	▪ Relative GHG emission percentage reduction from 'business as usual' level for 2030
LULUCF	▪ Level of CO_2 removals and emissions for 2030 ▪ Percentage of total land area of the country under forest cover for 2030 ▪ Relative GHG emission percentage reduction from 'business as usual' level for 2030

[1] In this report, (domestic) mitigation measures refers to specific policies and actions that contribute to mitigation, including adaptation actions and economic diversification plans with mitigation co-benefits.

[2] This priority area covers domestic mitigation measures applicable to more than one priority area or none of the priority areas, such as measures for multisector energy efficiency improvement.

Priority area	*Examples*
Waste	▪ Relative GHG emission percentage reduction from 'business as usual' level for 2030
Cross-cutting /other	▪ CH_4 emission percentage reduction below base-year level for 2030 ▪ Energy efficiency improvement through relative reduction in final energy consumption from 'business as usual' level for 2030 ▪ Relative GHG emission percentage reduction from 'business as usual' level for 2030 for energy sector

II. Sub-areas and mitigation options under priority areas

A. Energy supply

2. In the priority area of energy supply,[3] energy generation, transmission and storage was by far the most frequently identified sub-area for domestic mitigation measures (see figure 2). Some[4] Parties communicated measures for reducing emissions from fossil fuel exploration, production, transport and distribution, and a few identified measures in the cross-cutting sub-area.[5]

3. The mitigation options[6] indicated by Parties in this area include renewable energy generation (e.g. solar, wind, biomass, hydropower, geothermal); nuclear energy generation; reducing primary energy from coal; energy storage; grid improvement; shifting to low- or zero-carbon fuels; energy efficiency improvement; carbon dioxide capture and storage; electrification; and reducing or utilizing fugitive emissions.

4. Renewable energy generation was by far the most frequently indicated mitigation option in this area (see figure 3), with most Parties mentioning cross-cutting renewable energy generation,[7] some solar power generation and some hydropower generation. Measures relevant to these options include (1) cross-cutting renewable energy generation: conducting a study for developing a road map on integrating renewable energy sources into the energy mix, with the aim of achieving a 25 per cent renewable energy share by 2030; and adopting an act for promoting use of renewable energy sources; (2) solar power generation: installing solar mini-grids in off-grid rural areas by 2030; and deploying innovative modes of solar photovoltaics, such as floating and building-integrated photovoltaic systems, through research, development and demonstration; and (3) hydropower generation: developing a pumped-storage hydropower project to meet electricity demand during peak hours or as needed; and installing small hydroelectric power plants by 2025 with a focus on co-benefits for irrigation.

5. Many Parties set out quantitative targets for increasing renewable energy, expressed, for example, in terms of installed capacity, electricity generation or final energy consumption. A few communicated quantitative targets for the share (ranging from 13 to 100 per cent) of renewable energy in the electricity mix by 2030; and some of those target shares

[3] This area covers measures targeting emissions from energy supply, such as electricity and heat generation. Measures targeting emissions from fuel use in transport, buildings, industry, agriculture, LULUCF and waste were allocated to the respective priority areas.

[4] The following terms are used in this report to indicate the percentage of Parties whose NDCs mention particular information: "a few" for less than 10 per cent; "some" for 10–40 per cent; "many" for 41–70 per cent; "most" for 71–90 per cent; and "almost all" for more than 90 per cent.

[5] The cross-cutting sub-area covers measures applicable to more than one sub-area under a priority area. For example, the cross-cutting sub-area under energy supply covers measures applicable to both energy generation, transmission and storage, and fossil fuel exploration, production, transport and distribution.

[6] In this report, mitigation options refers to expected key mitigation effects or categories of domestic mitigation measures, which were identified on the basis of the analysis of the trend in the measures set out in the new or updated NDCs, and by referring to those identified in the previous NDC synthesis report and relevant IPCC reports, including the SR1.5.

[7] Covering domestic mitigation measures that contribute to more than one type of renewable energy generation.

fall within or above the range of 47–65 per cent in electricity generation,[8] which is indicated by the IPCC as an interquartile range of the global share of renewable energy in electricity production in 2030 that is consistent with a 1.5 °C emission pathway.

6. In terms of the other most frequently indicated mitigation options in this area, many Parties indicated cross-cutting options,[9] while some mentioned energy efficiency improvement, some grid improvement and some shifting to low- or zero-carbon fuels. Measures relevant to these options include (1) cross-cutting measures: implementing integrated national energy and climate plans for 2021–2030 to achieve energy and climate targets; and developing climate policies for the petroleum sector, such as CO_2 taxes and carbon dioxide capture and storage; (2) energy efficiency improvement: reducing partial load operation and establishing a minimum efficiency level of 48 per cent for all new power plants; and significantly increasing cogeneration in thermal power plants by 2030; (3) grid improvement: upgrading grids to reduce grid loss to 5 per cent or lower; and strengthening transmission and distribution links to support upscaling of e-cooking, e-heating, e-transport and charging stations; and (4) shift to low- or zero-carbon fuels: replacing fuel oil with natural gas in dual thermal power plants; and replacing diesel with liquefied natural gas in electricity generation.

7. A few Parties specified reducing primary energy from coal as a mitigation option in this area, for example, by phasing out use of unabated coal to produce electricity by 2025, banning construction of coal-fired power plants and shifting from coal to lower-carbon fuels such as liquefied natural gas. A few Parties mentioned quantitative targets, such as an energy mix target for coal-fired power generation by 2030, in relation to this option.

8. As indicated in the Parties' previous NDCs, renewable energy generation was the most frequently indicated mitigation option in this priority area, with the share of Parties indicating this option more than doubling (from 37 to 87 per cent) since the previous NDCs. Similarly, renewable energy remained a major focus of quantitative mitigation targets specific to this area, with the share of Parties communicating such renewable energy targets also more than doubling (from 27 to 61 per cent) since the previous NDCs.

B. Transport

9. In the priority area of transport, road transport was by far the most frequently identified sub-area for domestic mitigation measures (see figure 2). Some Parties communicated measures for reducing emissions in the cross-cutting sub-area, while some identified measures for rail and a few mentioned measures for shipping and/or aviation.

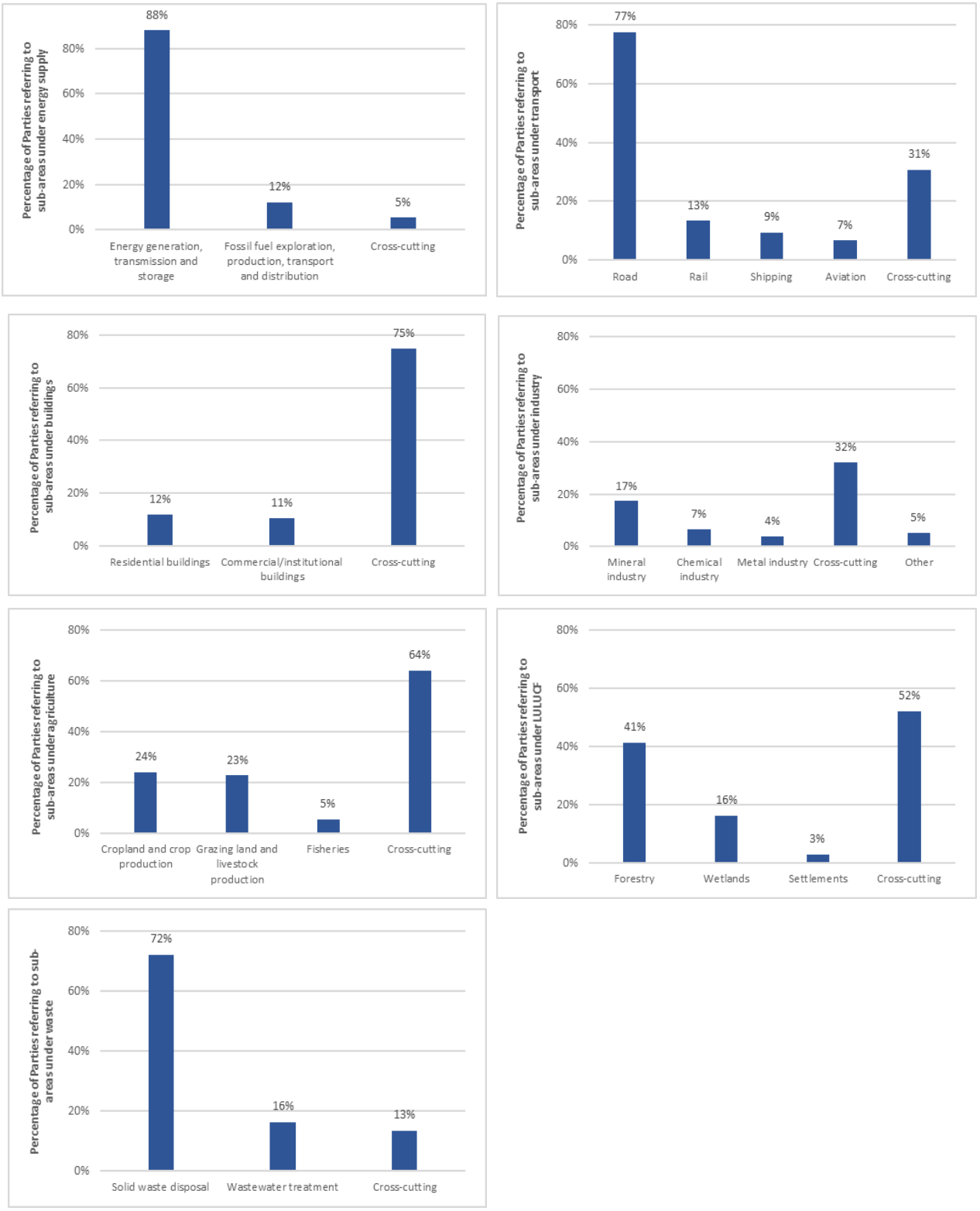
10. Energy efficiency improvement, especially in the sub-area of road transport, was the mitigation option most frequently indicated by Parties in this area (see figure 3). Measures for improving energy efficiency include introducing fuel efficiency standards; providing fiscal, financial or customs incentives for purchasing more efficient light-duty vehicles to boost annual energy efficiency by 2 per cent; establishing mandatory energy efficiency labelling for light-duty combustion engine vehicles by 2025; and modernizing cargo vehicles that exceed the thresholds set for their gross weight and age.

[8] The interquartile range of global renewable energy share in electricity generation by 2030 in the modelled emission pathways that limit global warming to 1.5 °C with no or limited overshoot in the SR1.5.

[9] Cross-cutting (mitigation) options cover domestic mitigation measures that contribute to more than one mitigation option in a priority area.

Figure 2

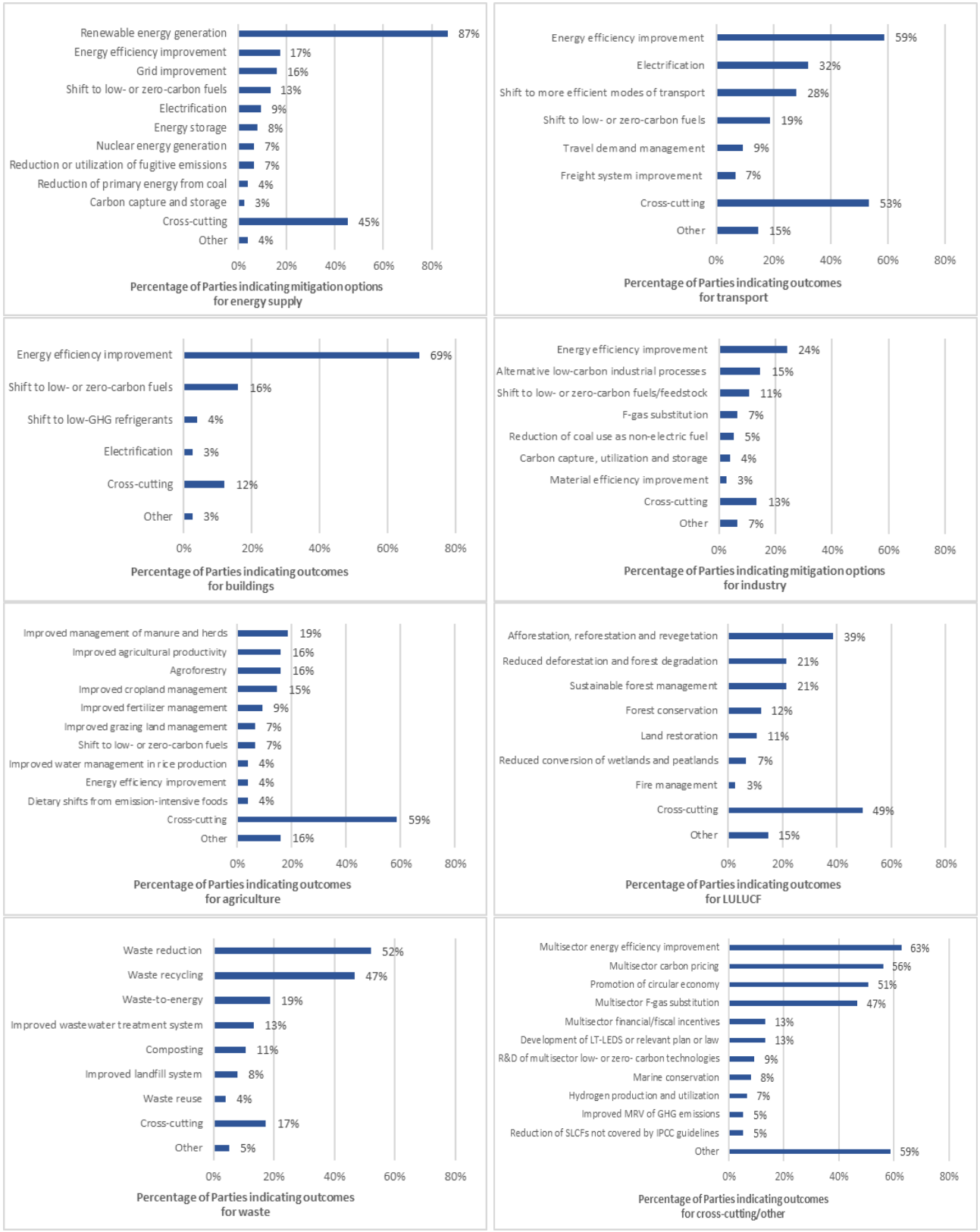
Share of Parties referring to sub-areas of the priority areas for domestic mitigation measures in nationally determined contributions



Note: If a Party referred to more than one measure for a specific sub-area, it was counted as one Party referring to measures for that sub-area.

Figure 3

Share of Parties referring to mitigation options under the priority areas for domestic mitigation measures in nationally determined contributions



Note: If a Party referred to more than one measure for a specific mitigation option, it was counted as one Party referring to measures for that option.

11. In terms of the other most frequently indicated mitigation options in this area, many Parties indicated cross-cutting options, some mentioned electrification and some specified shifting to more efficient modes of transport. Measures relevant to these options include (1) cross-cutting measures: promoting decarbonization plans at ports; and introducing vehicle emission standards, including tax incentives and inspections; (2) electrification: developing a network of charging stations for electric vehicles; ending the sale of new petrol and diesel cars and vans by 2030, with all vehicles required to have zero-emission capability from 2030; and exempting electric vehicles from value-added and registration tax; and (3) shift to more efficient modes of transport: promoting use of public transport and restricting traffic, aimed at maintaining zero growth in car traffic in major urban areas; developing public transport infrastructure, including bus rapid transit and bus lanes; and introducing mass rapid transit and expanding rail networks.

12. Improving energy efficiency, electrification and shifting to more efficient modes of transport were the most frequently indicated mitigation options in this priority area, as in the previous NDCs.

C. Buildings

13. In the priority area of buildings, cross-cutting was by far the most frequently identified sub-area (see figure 2). Some Parties identified measures targeting emissions from residential buildings and some measures for commercial or institutional buildings.

14. Energy efficiency improvement was the mitigation option most frequently indicated by Parties in all sub-areas of this priority area (see figure 3). Measures for improving energy efficiency include disseminating modern and efficient cookstoves to reduce firewood and fossil fuel consumption; promoting use of thermal insulation in renovating existing houses; introducing minimum energy performance standards and appliance labelling schemes; and establishing regulations to promote large-scale installation of heat pumps, especially in off-gas-grid properties, by 2028.

15. In terms of the other most frequently indicated mitigation options in this area, some Parties indicated shifting to low- or zero-carbon fuels and some mentioned cross-cutting options. Measures relevant to these options include (1) shift to low- or zero-carbon fuels: offering loans and grants for installing solar thermal water heaters; blending hydrogen into the gas distribution grid for lower-carbon domestic heating and cooking, without affecting customer experience; and banning use of mineral oil for heating buildings; and (2) cross-cutting measures: introducing a future home standard to reduce the buildings' CO_2 emissions by 75–80 per cent.

D. Industry

16. As shown in figures 3 and 9 of document FCCC/PA/CMA/2021/2, domestic mitigation measures in the priority area of industry[10] were mentioned by Parties less frequently than measures in the other priority areas, but most Parties considered industrial processes and product use in their NDCs. The two main sub-areas for measures in this area were cross-cutting and mineral industry (e.g. cement, ceramics) (see figure 2). A few Parties identified measures targeting emissions from chemical industry (e.g. ammonia, adipic acid) and a few communicated measures specific to metal industry (e.g. iron and steel, aluminium).

17. The most frequently indicated mitigation option in this area was energy efficiency improvement (see figure 3), particularly in the cross-cutting sub-area. Measures for improving energy efficiency include using waste heat from cement plants; evaluating the performance of installed air-conditioning and refrigeration systems and developing recommendations for improving such systems through industrial energy efficiency audits;

[10] This area covers measures targeting emissions from fuel use in industry, industrial process emissions and emissions from product use.

and introducing grant schemes to cover the high upfront investment cost of energy efficiency improvement.

18. The other most frequently indicated mitigation options in this area include alternative low-carbon industrial processes, cross-cutting options and shifting to low- or zero-carbon fuels or feedstock. Measures relevant to these options include (1) alternative low-carbon industrial processes: introducing environmentally friendly steel-making processes; and partially replacing clinker with volcanic pozzolans or composite cements in cement production; (2) cross-cutting measures: formulating guidelines and establishing mechanisms for monitoring emissions from large industries; and improving regulations for the industry sector, including via periodic energy audits and controls; and (3) shift to low- or zero-carbon fuels or feedstock: using alternative fuels, such as biomass, as a substitute for fossil fuels in cement production; and adopting pollution control laws to encourage industries to switch to cleaner fuel sources such as natural gas.

E. Agriculture

19. In the priority area of agriculture,[11] cross-cutting was by far the most frequently identified sub-area (see figure 2). Some Parties identified domestic mitigation measures targeting emissions from cropland and crop production, while some communicated measures for grazing land and livestock production and a few indicated measures for fisheries.

20. Cross-cutting mitigation options were by far the most frequently indicated options in this area (see figure 3). Measures related to the cross-cutting options include implementing sustainable soil management, including conservation and organic agriculture; applying management and technology solutions in cultivation and husbandry; and formulating nationally appropriate mitigation actions for sustainable, low-carbon, climate-resilient cattle farming.

21. The other most frequently indicated mitigation options in this area include improved management of manure and herds, improved agricultural productivity, agroforestry and improved cropland management. Measures related to these options include (1) improved management of manure and herds: constructing biodigesters for farmers, aimed at reducing CH_4 emissions by 85 per cent and reducing use of fuelwood; introducing a delivery support scheme to increase utilization of livestock manure for biogas production; and promoting use of specific livestock feed (i.e. legume fodder species) for reducing CH_4 emissions from enteric fermentation; (2) improved agricultural productivity: mass adoption of rice production technology to increase yield and reduce waste; and setting up hydro- and agrometeorological stations and a climate data centre and holding participatory technical round tables to develop an agroclimatic information system by 2025; (3) agroforestry: increasing cocoa cultivation in agroforestry systems to enhance carbon stock; introducing agroforestry and silvopastoral systems to restore degraded land by 2050; and (4) improved cropland management: introducing crop rotation, terracing and multi-cropping; implementing no-till farming; and introducing further permanent agricultural systems to replace traditional shifting-cultivation methods.

F. Land use, land-use change and forestry

22. In the priority area of LULUCF,[12] the two main sub-areas of domestic mitigation measures identified by Parties were cross-cutting and forestry (see figure 2). Some Parties communicated measures targeting emissions from wetlands and a few identified measures for settlements.

[11] This area covers measures targeting emissions from fuel use in agriculture and non-fuel sources such as livestock and soil management.

[12] This area covers measures targeting emissions from fuel use in forestry and non-fuel emissions sources such as land-use change and changes to carbon pools in land-use categories, except cropland and grassland, which are covered under agriculture.

23. Of the mitigation options indicated by Parties in this area, cross-cutting options were most frequently mentioned (see figure 3). Measures for the cross-cutting options include expanding the national protection system for forest and wetlands; implementing regulations to ensure that emissions do not exceed removals; and developing a capacity-building plan for institutions responsible for monitoring forest and land-use change.

24. In terms of the other most frequently indicated mitigation options in this area, some Parties indicated afforestation, reforestation and revegetation, while some mentioned sustainable forest management and some reduced deforestation and forest degradation. Measures relevant to these options include (1) afforestation, reforestation and revegetation: increasing reforestation rates through a public–private partnership using endemic tree species that are more resistant to pests and diseases; planting and developing forests, prioritizing production forests, large timber forests and coastal forests; and increasing seedling densities in existing forest land to enhance net carbon sequestration; (2) sustainable forest management: developing mechanisms to promote sustainable community use of key mangroves to improve livelihoods; and improving sustainability of charcoal production by enforcing regulations; and (3) reduced deforestation and forest degradation: expanding early warning systems for deforestation; promoting downstream processing of logs; and drafting and implementing zero-deforestation agreements with meat chains and palm oil and cocoa farmers.

25. Afforestation, reforestation and revegetation, and sustainable forest management were the most frequently indicated mitigation options in this priority area, as in the previous NDCs.

G. Waste

26. In the priority area of waste[13], solid waste disposal was by far the most frequently identified sub-area (see figure 2). Some Parties communicated measures targeting emissions from wastewater treatment, while some indicated measures for the cross-cutting sub-area.

27. The most frequently indicated mitigation options in this area were waste reduction and waste recycling (see figure 3). Measures relevant to these options include (1) waste reduction: taking action through voluntary agreements with the food industry and expanding food waste collection to achieve zero food waste to landfill by 2030; reducing single-use plastic waste and the resulting emissions from incineration thereof; and encouraging the hospitality sector to adopt efficient food production practices through a nationwide food waste pledge aimed at halving food waste by 2030; and (2) waste recycling: operating a centralized recycling facility for industrial waste from the clothing sector; promoting sorted collection and recycling of plastic containers and packaging; and implementing waste regulations to increase recycling for a number of waste types and introducing a tax on drinks packaging.

28. The other most frequently indicated mitigation options in this area include waste-to-energy, cross-cutting options and improved wastewater treatment systems. Measures relevant to these options include (1) waste-to-energy: promoting energy generation from sewage systems; extracting and utilizing landfill gas for power generation; and introducing CH_4 capture and burning in solid waste disposal systems for power generation; (2) cross-cutting measures: developing a national organic waste strategy to increase recovery of organic waste generated at the municipal level; and creating an enabling environment for both the public and private sector to treat industrial and municipal waste, including faecal sludge, by 2030; and (3) improved wastewater treatment systems: promoting use of advanced technologies in sewage sludge incineration facilities; and improving industrial wastewater treatment systems with new CH_4 capture and burning systems in anaerobic treatment processes.

[13] This area covers measures targeting emissions from fuel use in waste and waste management and non-fuel sources such as decomposition of organic materials in solid waste and wastewater.

H. Cross-cutting or other

29. In the area of cross-cutting or other, multisector energy efficiency improvement was the mitigation option most frequently indicated by Parties (see figure 3). Measures for improving energy efficiency include introducing periodic tariff reforms for residential, commercial and industrial power consumption to advance cost-reflective pricing and encourage energy conservation; implementing energy management systems in line with national and international standards, including those of the International Organization for Standardization; implementing minimum energy performance standards and labelling regulations; and raising public awareness of means of reducing energy use.

30. The other most frequently indicated mitigation options in this area include multisector carbon pricing, promoting circular economy and multisector F-gas substitution. Measures relevant to these options include (1) multisector carbon pricing: expanding coverage of the national emissions trading scheme to reduce GHG emissions efficiently; promoting a domestic offsetting scheme to facilitate mobilization of funds; and imposing a carbon tax on direct emissions from facilities emitting GHGs beyond a fixed threshold; (2) promotion of circular economy: developing a circular economy road map for 2020–2040 with short-, medium- and long-term measures; establishing metrics and indicators for circularity; and banning import, manufacture, distribution and use of single-use plastic bags and straws; and (3) multisector F-gas substitution: implementing a regulation aimed at reducing F-gas emissions by 66 per cent by 2030 by limiting total sales of certain F-gases, banning the use of F-gases in many new types of equipment and preventing emissions of F-gases from existing equipment; and phasing out use of hydrofluorocarbons, including in refrigeration equipment for food storage and distribution, and promoting uptake of sustainable refrigeration and cold chain technologies.

31. Mitigation options related to circular economy (i.e. continual use of resources and minimizing waste to reduce demand for exploiting new resources, including minerals, fossil fuels and biomass) were also identified in other priority areas, such as waste reduction, waste recycling, waste-to-energy and composting under waste, and improving material efficiency under industry.

32. A few Parties mentioned promoting production and use of hydrogen, indicating measures for fostering growth in the hydrogen industry such as developing technologies for hydrogen production, storage and utilization; and establishing a hydrogen export hub to boost the hydrogen industry, and funding research collaborations and supply chain studies to enable demonstration and deployment.

33. As in the Parties' previous NDCs, multisector energy efficiency improvement was identified as the main mitigation option in this priority area.