THE OXFORD INSTITUTE FOR ENERGY STUDIES

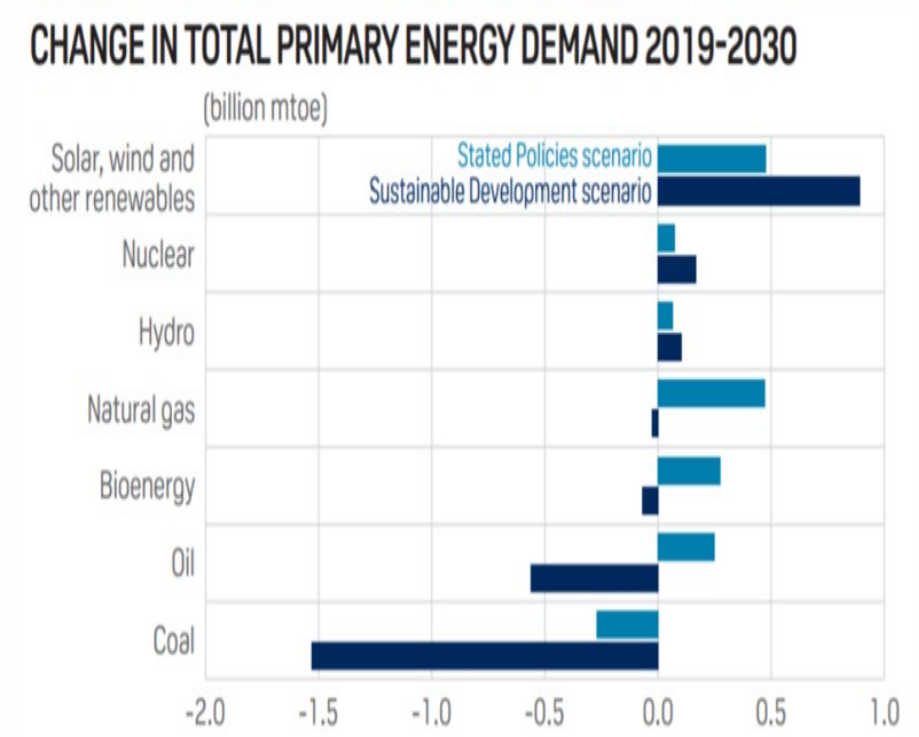
Economic Diversification & Low Carbon Development in Resource & Hydrocarbon Dependent Economies

SBSTA and SBI technical expert meeting on practical approaches to economic diversification and transformation

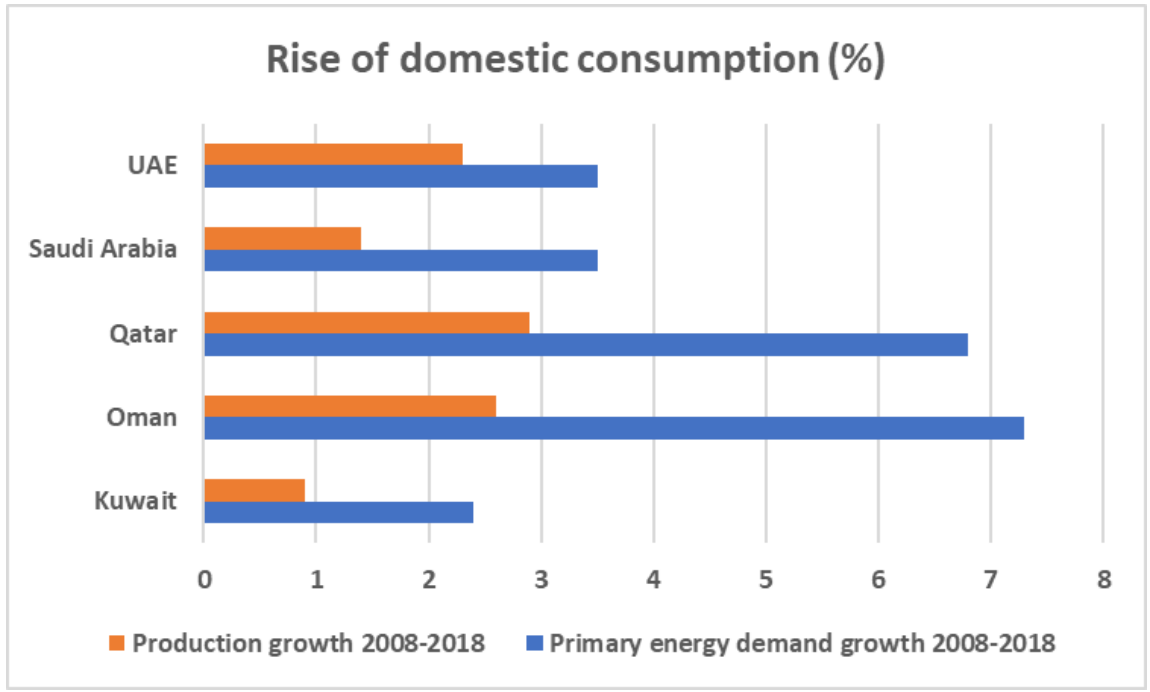
Dr. Manal Shehabi
Senior Research Fellow, manal.Shehabi@oxfordenergy.org

October 18, 2021

Urgency for economic diversification



Source: International Energy Agency (IEA) (2020), *World Energy Outlook 2020.*



What is needed is export diversification, *not simply 'economic diversification'*

Gulf states' oil and gas sectors, 2014 prior to oil price declines

	Share of energy sectors (%)		
Country	In value added	In exports (includes re-exports)	In government revenue
Bahrain [a]	40	69	83
Iran [b]	17	36	56
Iraq [c]	60	99	36
Kuwait [d]	61	91	91
Oman [e]	54	84	79
Qatar [f]	32	85	90
Saudi Arabia [g]	50	80	88
UAE [h]	45	78	60

Data Sources: Shehabi based on:

[a:] For Bahrain: National accounts and budget from Bahrain Open Portal Data (2018); government budget form Bahrain Ministry of Finance (2018); United Nations value added data (2018).

[d:] For Iran: National accounts from Iran Central Statistical Bureau (2018), International Monetary Fund (2019).

[c:] For Iraq: National Nations Development Program (2018), International Monetary Fund (2019).

[d:] For Kuwait: National accounts from Kuwaiti Central Statistical Bureau (2018); government budget form Kuwait Ministry of Finance (2018).

[e:] For Oman: National accounts from Oman National Centre for Statistics and Information (2018); government budget from Oman Ministry of Finance (2015); United Nations value added data (2018).

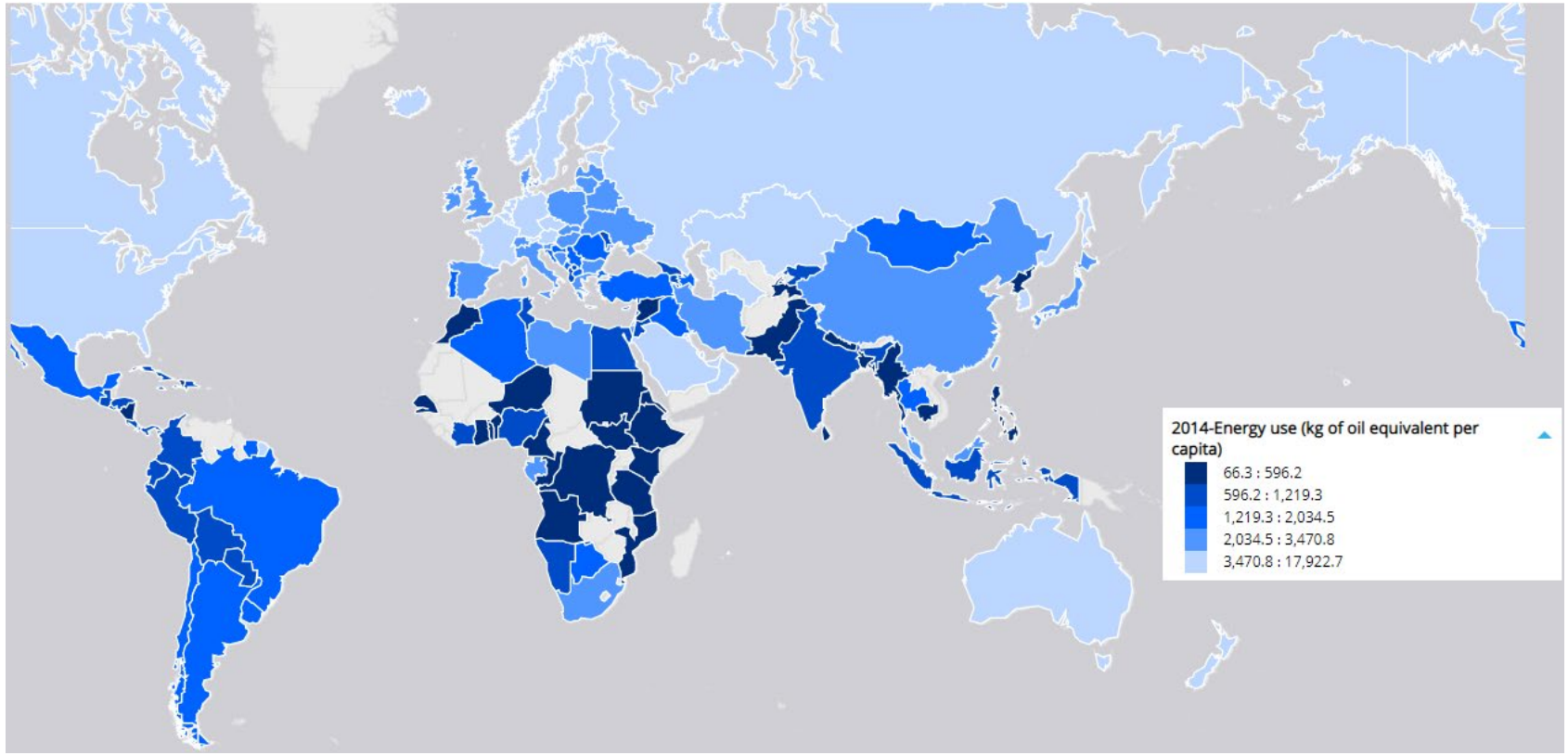
[f:] For Qatar: National accounts from Ministry of Development Planning and Statistics (2018), Staff Concluding Statement for the 2018 Article IV Mission (2018); IMF Qatar Country Report (2013).

[g:] For Saudi Arabia: National accounts from Saudi General Authority for Statistics (2018); government budget from Saudi Arabia Ministry of Finance (2018).

[h:] For UAE: United Nations value added data (2018); UAE Annual Economic Report (2016, 2017).

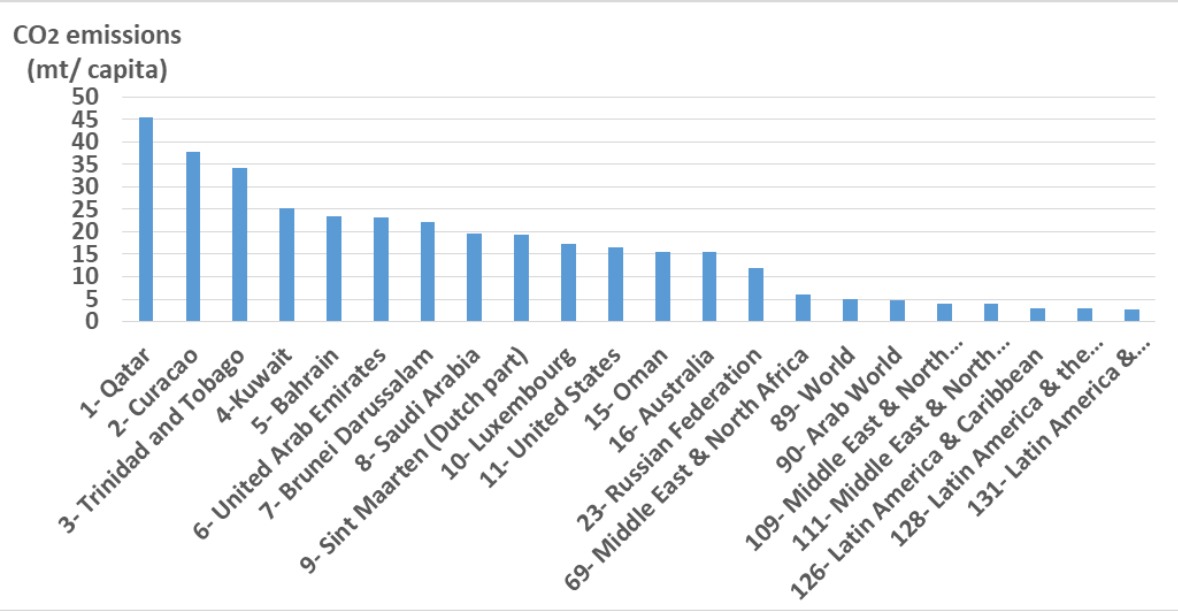
Resource abundance and subsidies contribute to high consumption and high emissions levels

kg of oil equivalent/ capita

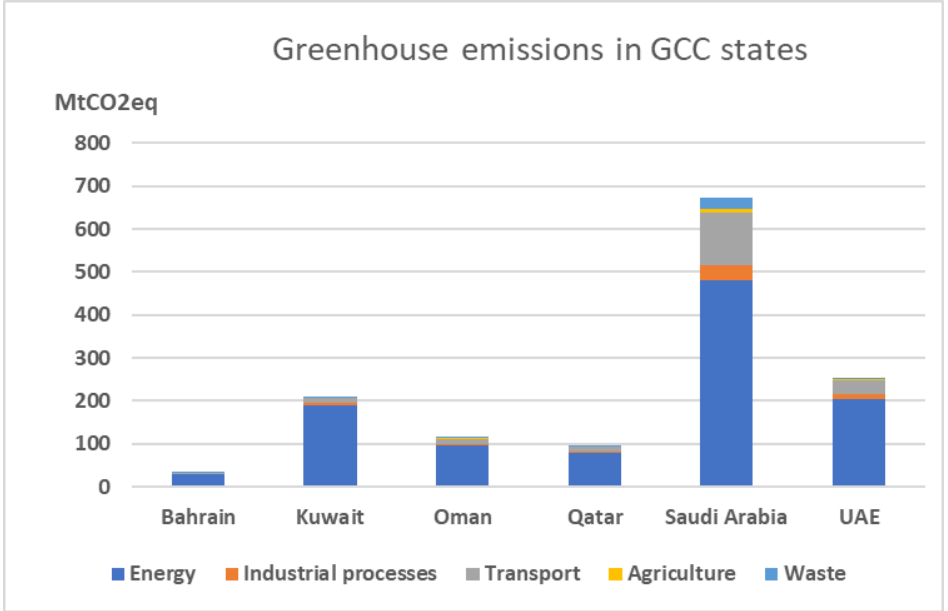


Source*:* World Bank data.

Energy abundance and high emissions



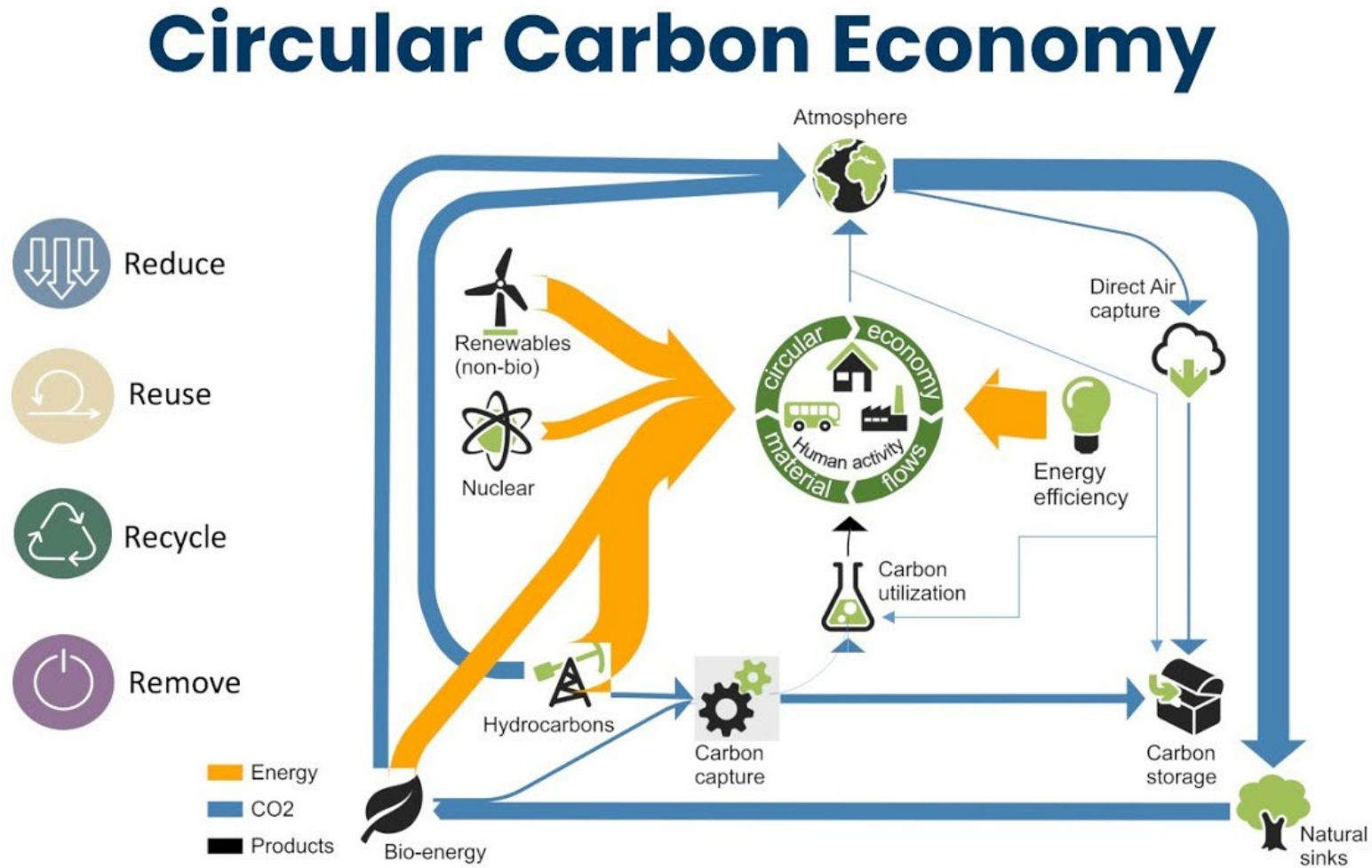
Source: World Bank (2014), World Development Indicators.



Source: Shehabi (2021)

- Hydrocarbon exporting economies have some of the world's highest emissions per capita levels
- Example for the GCC shows highest emissions are generated from the energy sector (power, oil, and gas) followed by transport and industrial processes, suggestion scope for domestic decarbonization opportunities which can also be combined with economic export diversification.
- In resource exporting economies, capital and infrastructure are locked in resource sectors and countries have existing comparative advantage in the resource sectors.
- **Thus, there is an obvious opportunity for transforming existing high-emitting resource industries to low-carbon sectors. Energy diversification as a source of export-oriented economic diversification.**

Opportunities to expanding green energy exports: Circular Carbon Economy framework



Source: Circular Carbon Economy Guide (2020)

Framework can offer flexible opportunities to meet economic diversification goals as well as low carbon development

Opportunities: Low carbon hydrogen projects in Gulf hydrocarbon exporters

- 2017: Air Liquide purification plant supplies hydrogen to oil refinery
- Aramco and Air Products to build the first hydrogen fuel cell vehicle fueling station in KSA
- 2018: Jazan Greenfield Integrated Gasification Combined Cycle (IGCC) power plant project producing power, "grey" hydrogen, and utilities for Saudi Aramco
- 2020: shipped its maiden blue ammonia cargo to Japan to burn possibly together with coal and natural gas for zero-carbon power generation
- 2020: **Neom:** Helios Green Fuels Project $5 b plant owned by Air Products, Saudi's ACWA Power and Neom; to power a green hydrogen plant using 4 GW of renewable electricity; produce 650 tons of green hydrogen and 3,000 ton of ammonia daily
- 2020: Neom: Germany to supply a 20 megawatt (MW) electrolysis plant
- 2021: Work towards adopting and launching the Saudi Arabia Hydrogen Strategy.

- 2019: MoU between Dubai Electricity and Water Authority (DEWA), Expo 2020 Dubai and Siemens for the first solar-driven hydrogen electrolysis facility
- 2020: Announced investments in green and blue hydrogen projects including a fledgling fuel cell electric vehicles (FCEVs) fleet
- 2020: Hydrogen alliance (ADNOC, sovereign wealth fund Mubadala Investment Co., and ADQ)
- 2020: UAE's NDC to the UNFCCC confirmed standards for electric, hydrogen and autonomous vehicles are under development. Reduction of 23.5% in GHG emissions by 2030.
- 2021: Launching of the region's first industrial-scale green hydrogen project, in partnership between DEWA, Expo 2020 Dubai and Siemens, with a pilot project using 5,000 megawatts by 2030 in ohammed bin Rashid Al Maktoum Solar Park.

- 2020: A national hydrogen economy strategy
- 2020: Signed a Hyport Cooperation Agreement with DEME Concessions and OQ Alternative Energy to develop a green hydrogen plant in Special Economic Zone at **Duqm**
- 2021: ACME Group to invest $2.5bn for a facility to produce 2,200 m tonnes of green ammonia/day in Duqm.

- 2018-2019: KISR earned patent for enhancing magnesium's hydrogen storage for use in fuel cells; launched 1st prototype electric vehicle fueled by hydrogen stored in magnesium hydride (MgH2) MgH2), a nanoscale metal hydride.
- 2020: White Paper Towards a National Hydrogen Strategy for Kuwait.

Source: Shehabi (2021)

Challenges: Weak climate & decarbonization regulatory framework

Country/ Regulatory domain	Bahrain	Kuwait	Oman	Qatar	Saudi Arabia	UAE
CO2 classification	X	X	X	X	X	X
Ownership of surface facility	I	X	I	X	X	I
Transboundary CO2	X	X	X	X	X	X
CO2 impurity	X	X	X	X	X	X
CO2 capture regulation	I	X	I	X	X	I
CO2 transportation regulation	I	X	I	X	X	I
CO2 storage regulation	X	X	X	X	X	X
Liability during post closure period	X	X	X	X	X	X
Regulation for CCS with EOR	X	X	X	X	X	X
Incentives	I	I	X	I	I	I

Note: "X" indicates a lack of both implicit regulation and their present regulation, while "I" indicates close- to-no or no inadequacy.

Source: Shehabi (2021)

Expanding low-carbon energy sectors for exports might not translate to domestic decarbonization or expansion of green non-hydrocarbon sectors.

Important policy challenges and implications of relying on energy diversification as a source for export diversification

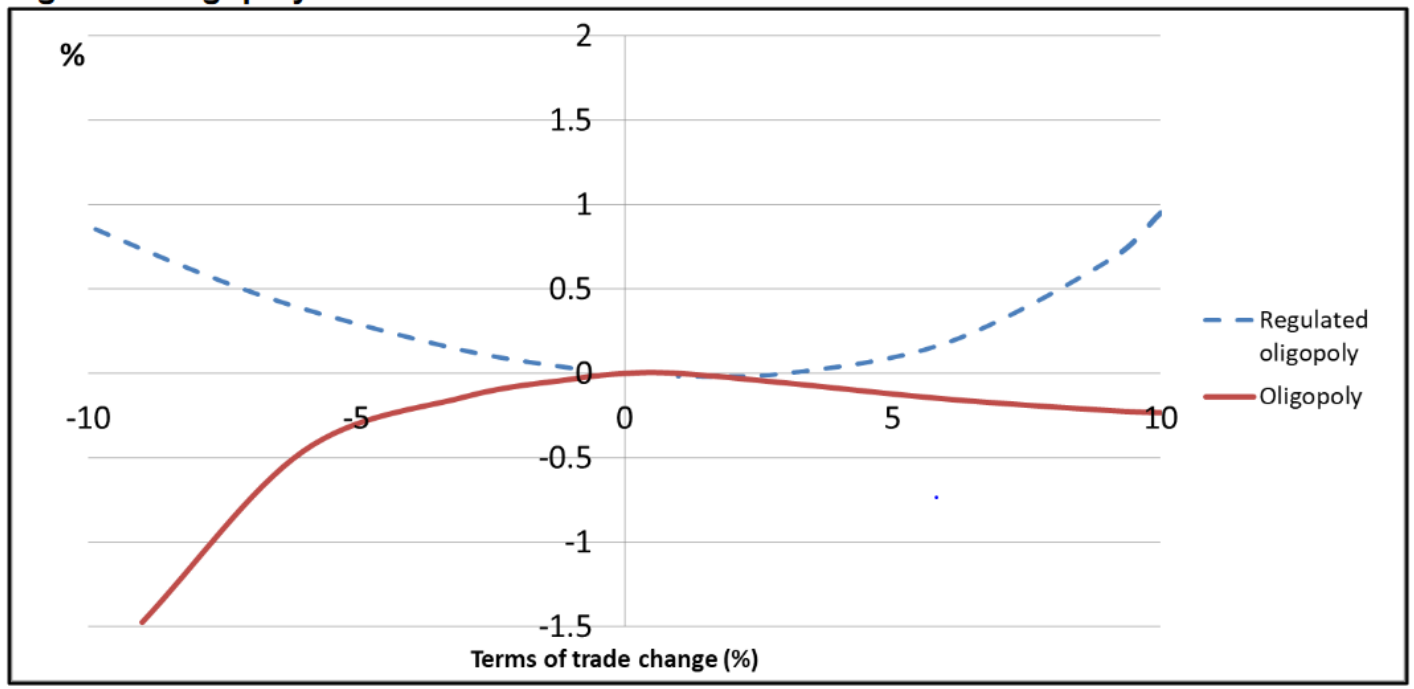
- Oligopolistic industries and low competition regulation result in lower reversed Dutch disease dynamics and non-hydrocarbon diversification that is not export-focused
- Energy transition and energy diversification for economic diversification purposes is important but capital intensive and, therefore, limits employment opportunities
- Employment and socio-economic development
  - Just transition of existing labor force, reskilling and upskilling
  - New employment opportunities and the creation of new sectors
- Requires large technological investments, including for carbon capture, storage, and utilization (CCUS)
- Costly, entailing trade-offs between socioeconomic development and energy diversification projects
- Urgent need for policymakers to increase economic resilience even at existing levels of diversification and existing energy and climate policies.
  - Energy efficiency– can reduce up to 40% of emissions
  - Competition reform
  - Human capital development

These policies will render the economy more ready to weather economic challenges, and will maximize positives and minimize negatives of implementation of response measures.

Example: Increasing economic resilience under same levels of economic and energy diversification

Real GDP performance to equiproportional oil price shocks under normal policy and under policy of private sector reform and regulating oligopolies.
Results from from economy-wide CGE model of Kuwait's economy

Figure 5: Short run effects of terms of trade shocks under current economic policies and regulated oligopoly



Source: Shehabi (2020)

Thank you

Dr. Manal Shehabi

Manal.Shehabi@oxfordenergy.org

Twitter: @ManalShehabi | LinkedIn: Manal Shehabi

Oxford Institute for Energy Studies

https://www.oxfordenergy.org/

Twitter: @OxfordEnergy