Asia-Pacific Economic Cooperation

APERC Asia Pacific Energy Research Centre

APECエネルギー需給見通し第7版：
2050年までのAPEC地域のエネルギー動向

APEC Energy Demand and Supply Outlook <7th Edition>
Key trends for APEC through 2050

経済産業研究所 BBL セミナー

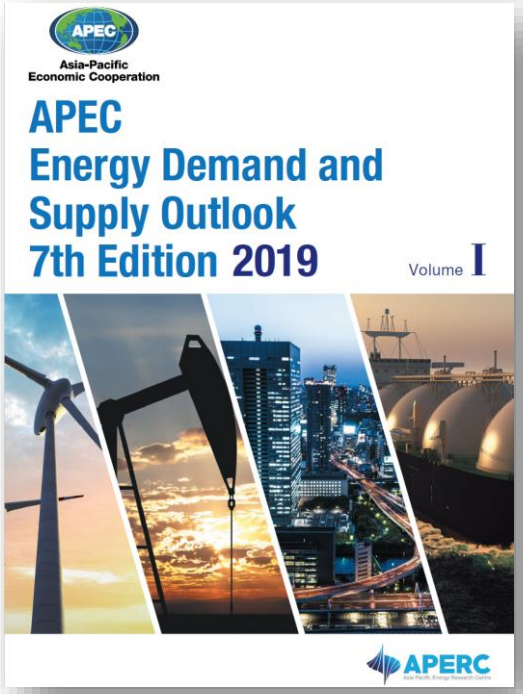
19 June 2019

Kazutomo IRIE, President of Asia Pacific Energy Research Centre (APERC)

Asia Pacific Energy Research Centre

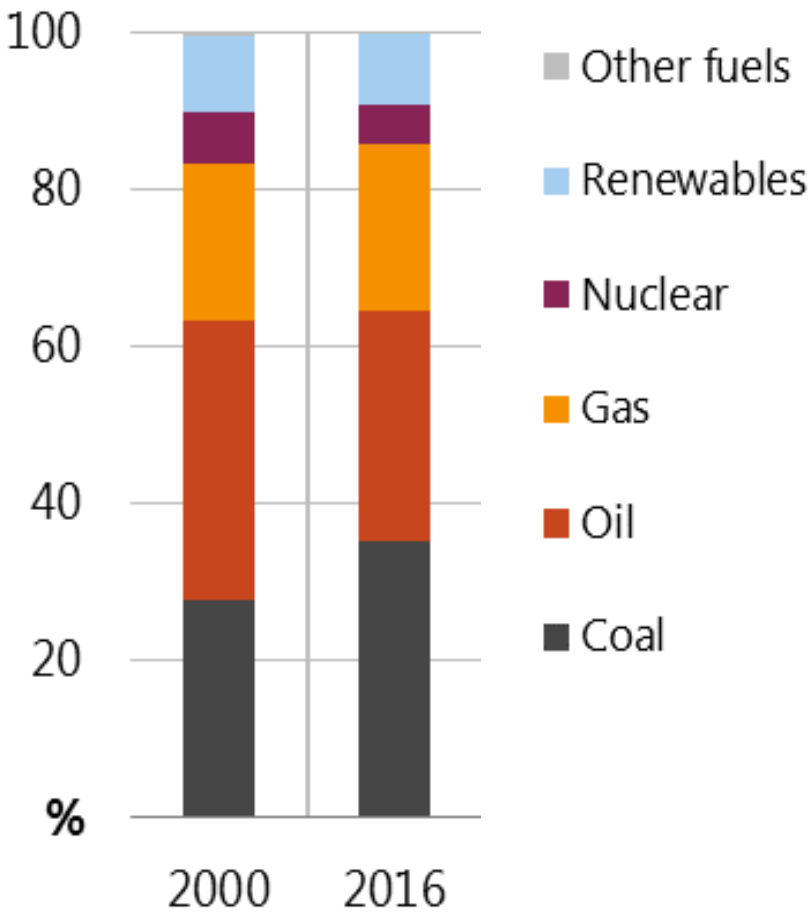
- APERC is the energy research arm of Asia-Pacific Economic Cooperation (APEC)
  - Established in 1996 by initiative of the Japanese Govt.
  - Researchers from 16 of APEC's 21 economies
  - Located in Tokyo, Japan

- Two flagship publications
  - Triennial Energy Demand and Supply Outlook
  - Annual Energy Overview



Background

- As of 2016,
  APEC represents 39% of global population and 54% of global GDP.
- APEC's total primary energy supply (TPES) has grown 27% since 2000.
- The energy supply mix is currently dominated by fossil fuels.



APEC Energy Demand and Supply Outlook

Investigates challenges faced by APEC economies:

- Affordably meeting growing energy demand
- Reducing negative energy-related environmental impacts
- Enhancing energy security and resilience

7th Edition Outlook investigates provides analysis and insight on:

- Impact of existing and alternative policies on energy demand, supply, emissions and investments through 2050
- APEC energy intensity and renewables doubling goals
- Sectoral transitions that support Paris climate ambitions

Sectors

- Final Energy Demand （FED：最終エネルギー消費）
  - Buildings（民生部門）
  - Industry（産業部門）
  - Transport（運輸部門）
- Production（生産）
- Total Primary Energy Supply （TPES：一次エネルギー総供給）
  - 国内生産＋輸入−輸出−国際船舶燃料消費−在庫純増
- Million tonnes of oil equivalent（Mtoe）
  - 100万 石油換算トン　　≒ 42 PJ
  - 石油換算トン ＝ 原油1トンが燃焼したときのエネルギー

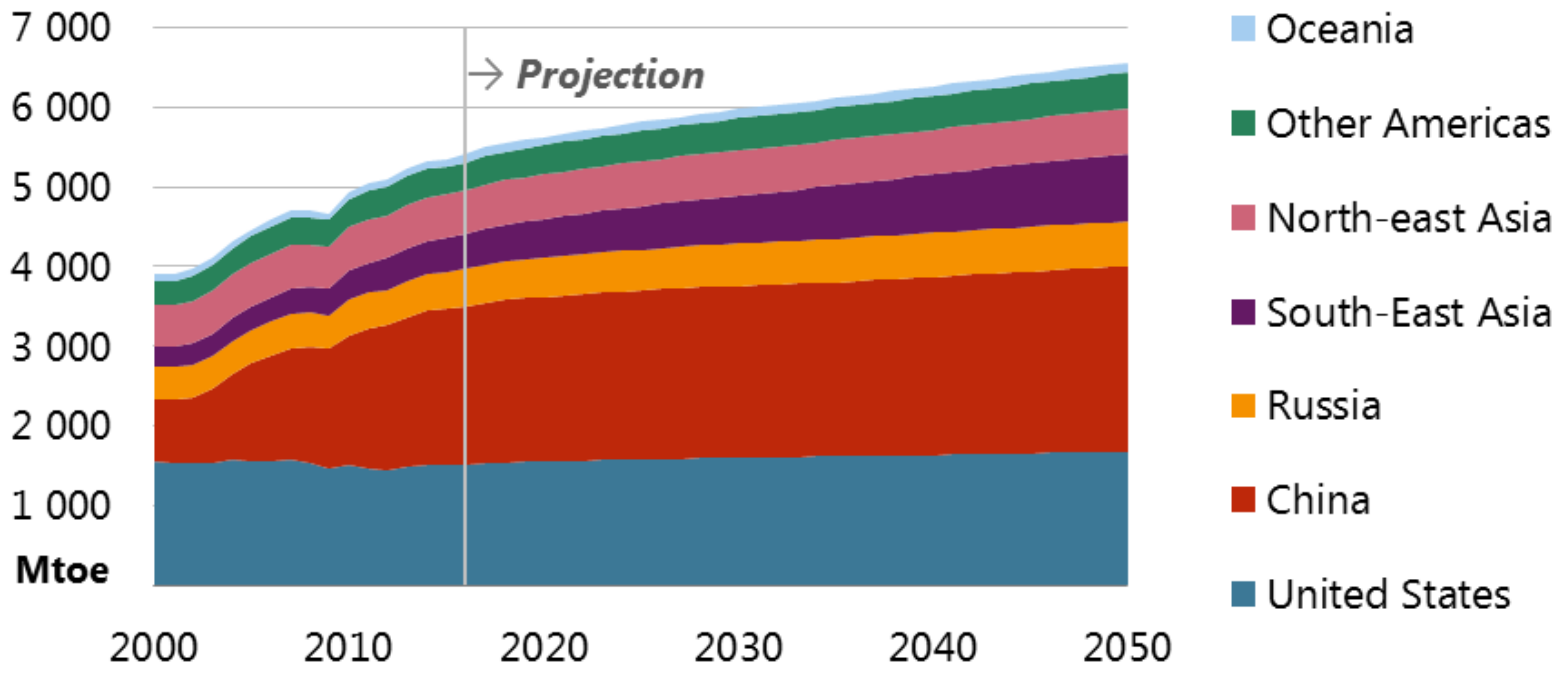
Scenarios

Business-as-Usual (BAU)	APEC Target (TGT)	2-Degrees Celsius (2DC)
Recent trends and current policies.	Pathway that achieves APEC-wide goals to • reduce energy intensity 45% by 2035 • double the share of renewables by 2030.	Pathway that provides a 50% chance of limiting average global temperature rise to 2°C.
Provides a baseline for comparison.	Explores implications of alternative scenarios and identifies gaps to overcome.	

1. BAU Scenario

Final Energy Demand increases 21% in 2050

Final energy demand by region in BAU, 2000-50

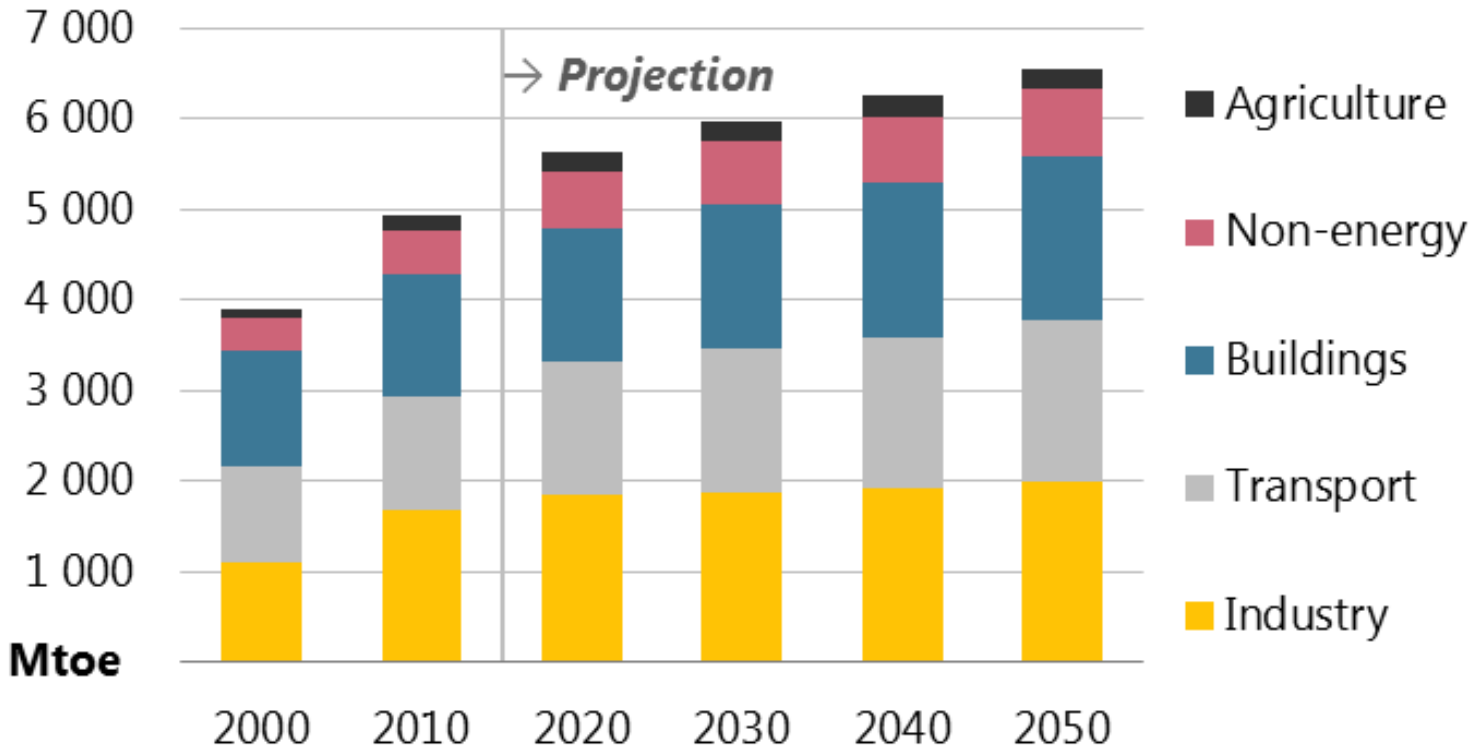


Sources: APERC analysis and IEA (2018a).

FED grows to over 6 500 Mtoe in 2050, driven primarily by GDP and population growth in south-east Asia.

Growth is mainly in transport and buildings

Final energy demand by sector in BAU, 2000-50

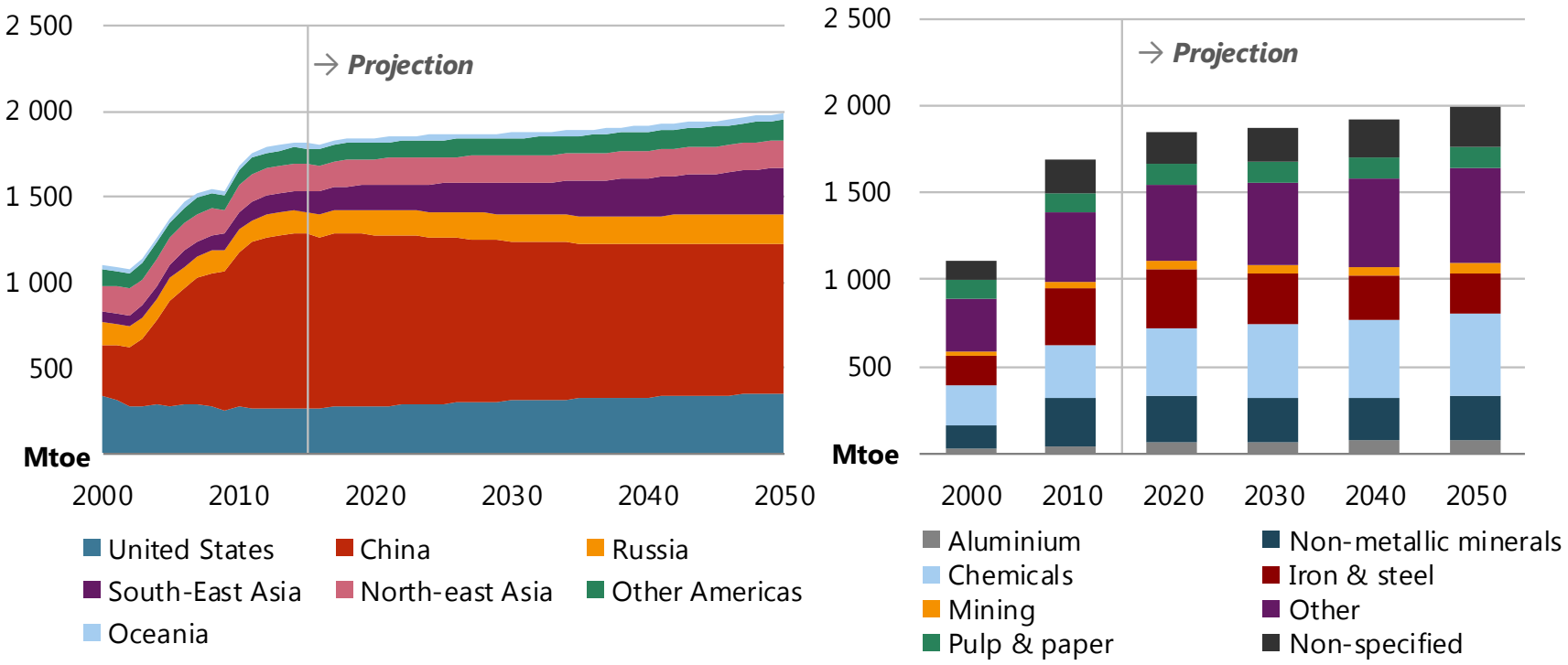


Sources: APERC analysis and IEA (2018a).

Non-energy use grows at the fastest pace. Electricity use grows as buildings and transport sector demand increases. Industry remains the largest sector.

Industry is largest but growth is slow

Industry final energy demand by region and subsector in BAU, 2000-50

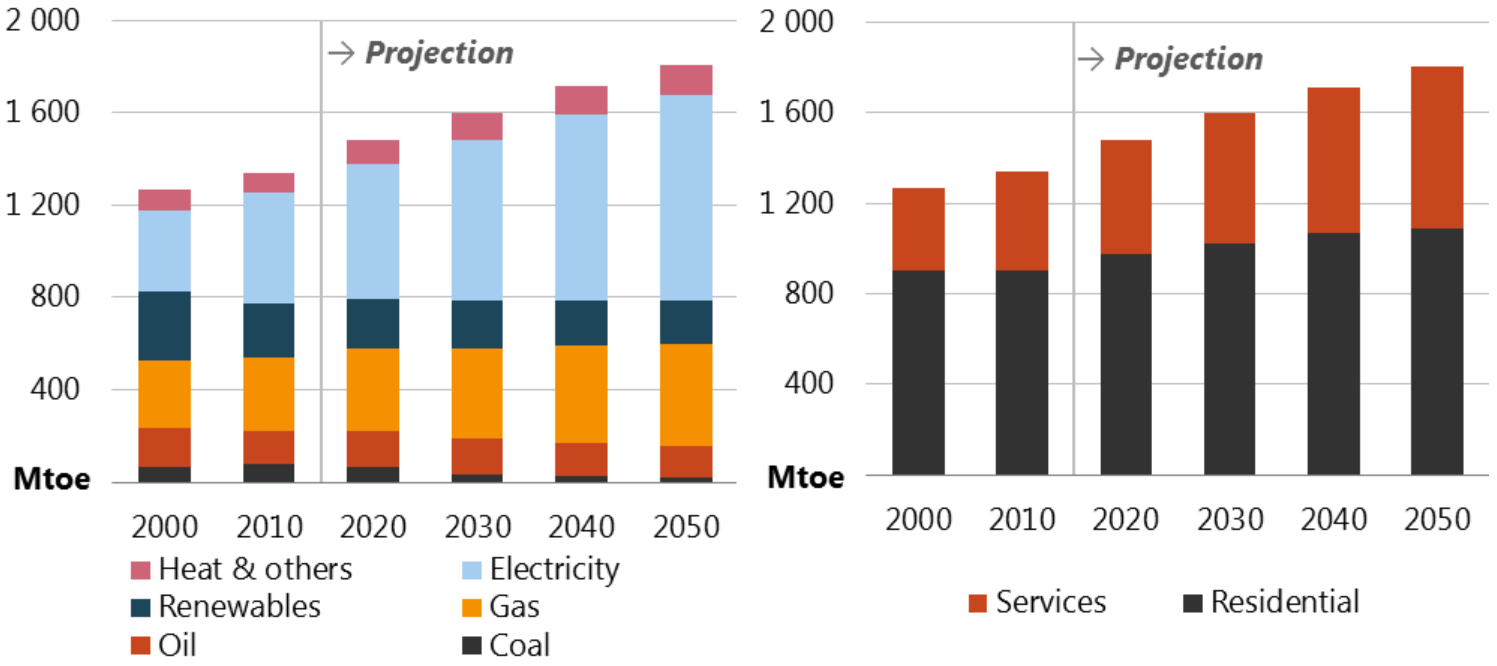


Sources: APERC analysis and IEA (2018a).

Industry demand grows moderately, due to a shift towards high value-added manufacturing in China, associated with shifting economic structure.

Buildings FED increases by 28% in 2050

Buildings final energy demand by fuel and subsector in BAU, 2000-50

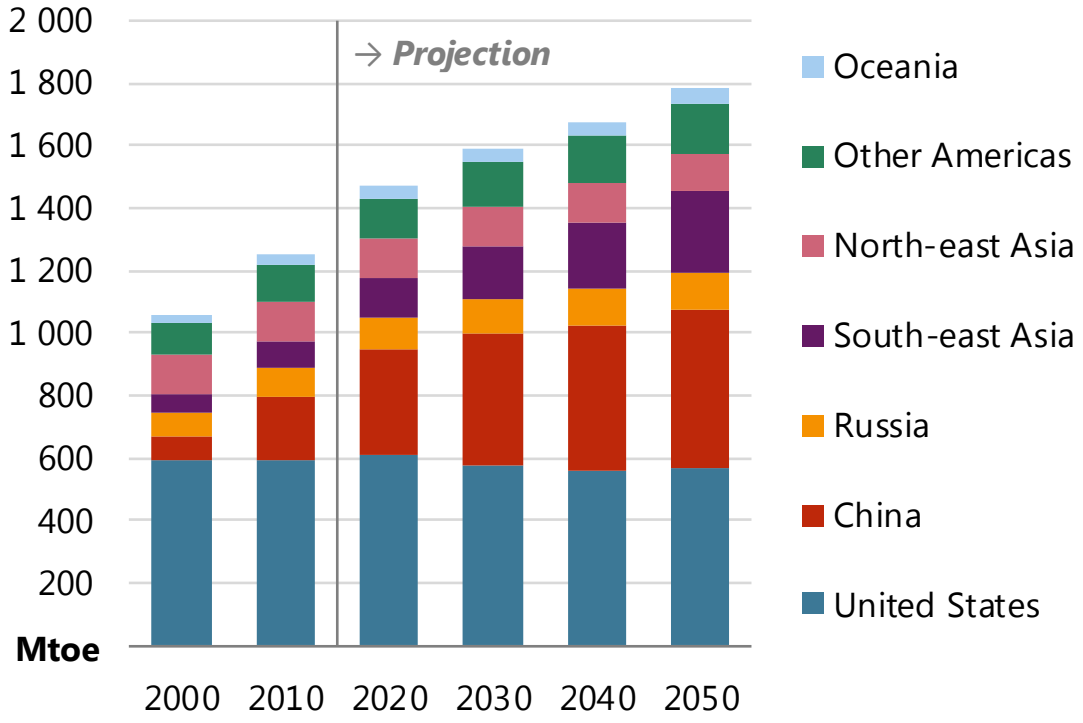


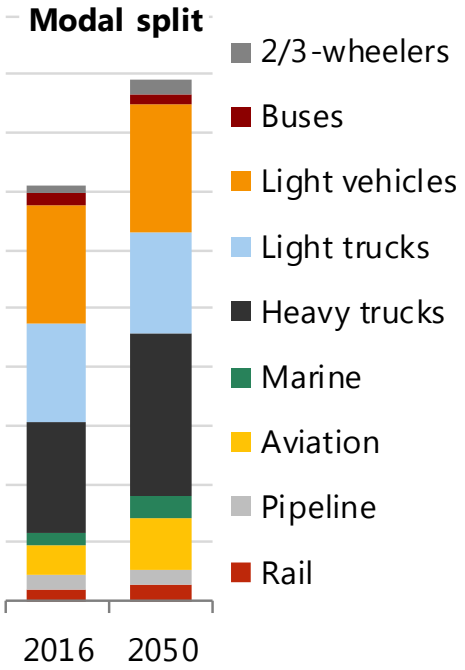
Sources: APERC analysis and IEA (2018a).

Buildings accounts for 28% of FED in 2050. Space cooling is the fastest-growing source of energy demand in buildings.

Transport FED grows by 25% in 2050

Transport demand by region and mode in BAU, 2000-50



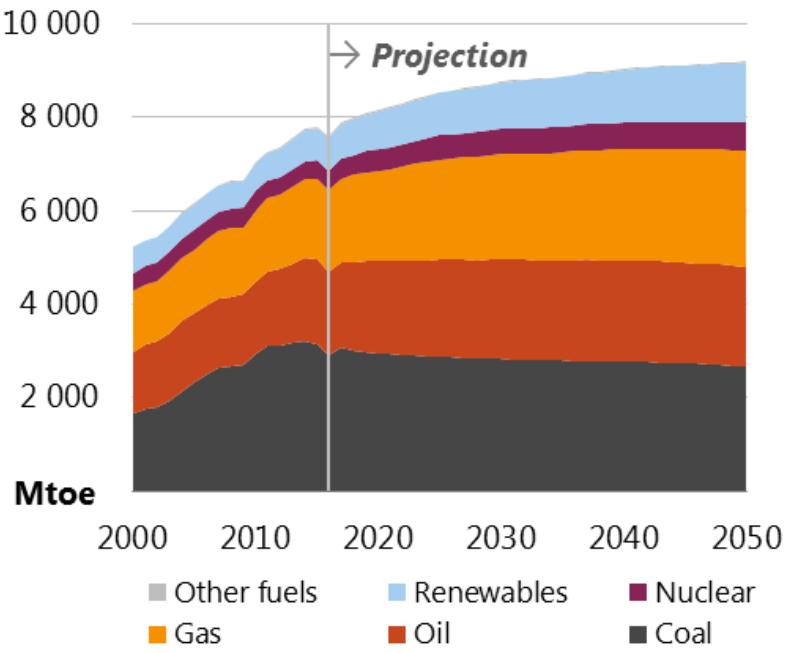


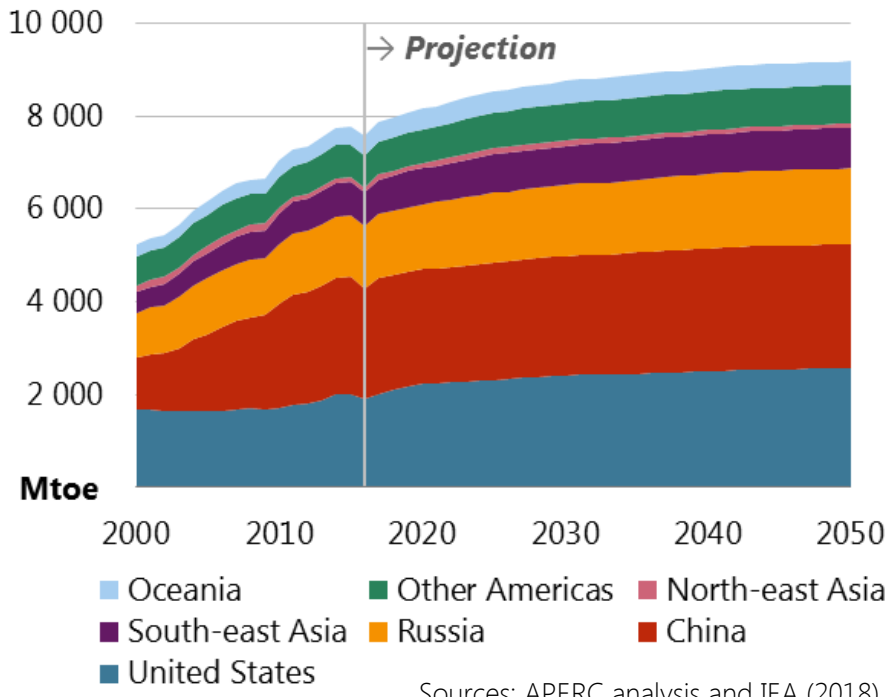
Sources: APERC analysis and IEA (2018a).

South-east Asia demand more than doubles. In China, demand increases by 70%.

Renewables production grows most rapidly

Total primary energy production by fuel and region in BAU, 2000-50





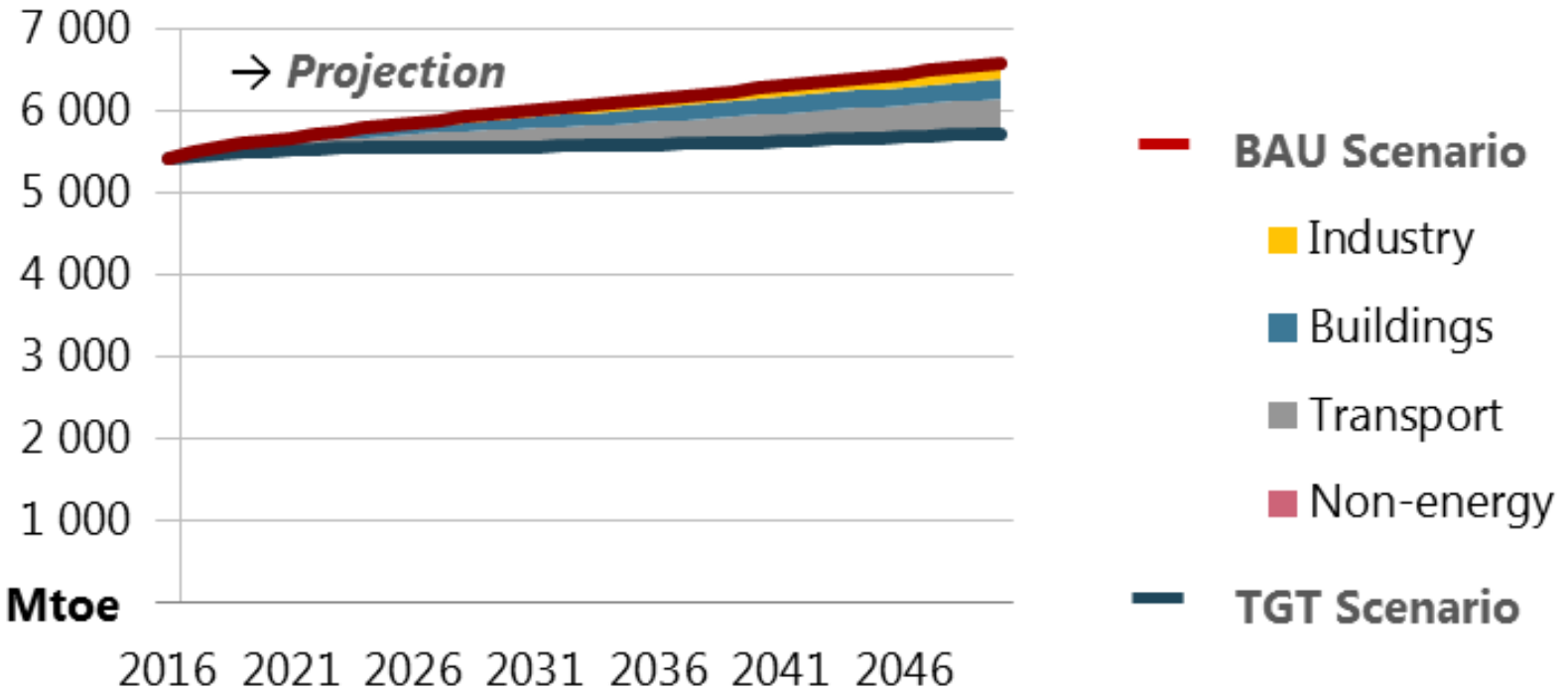
Sources: APERC analysis and IEA (2018).

Natural gas and oil production increase while coal production declines.

2. Scenario Comparisons

Energy Intensity Goal slows demand growth

Final energy demand reduction by sector, TGT to BAU, 2015-50

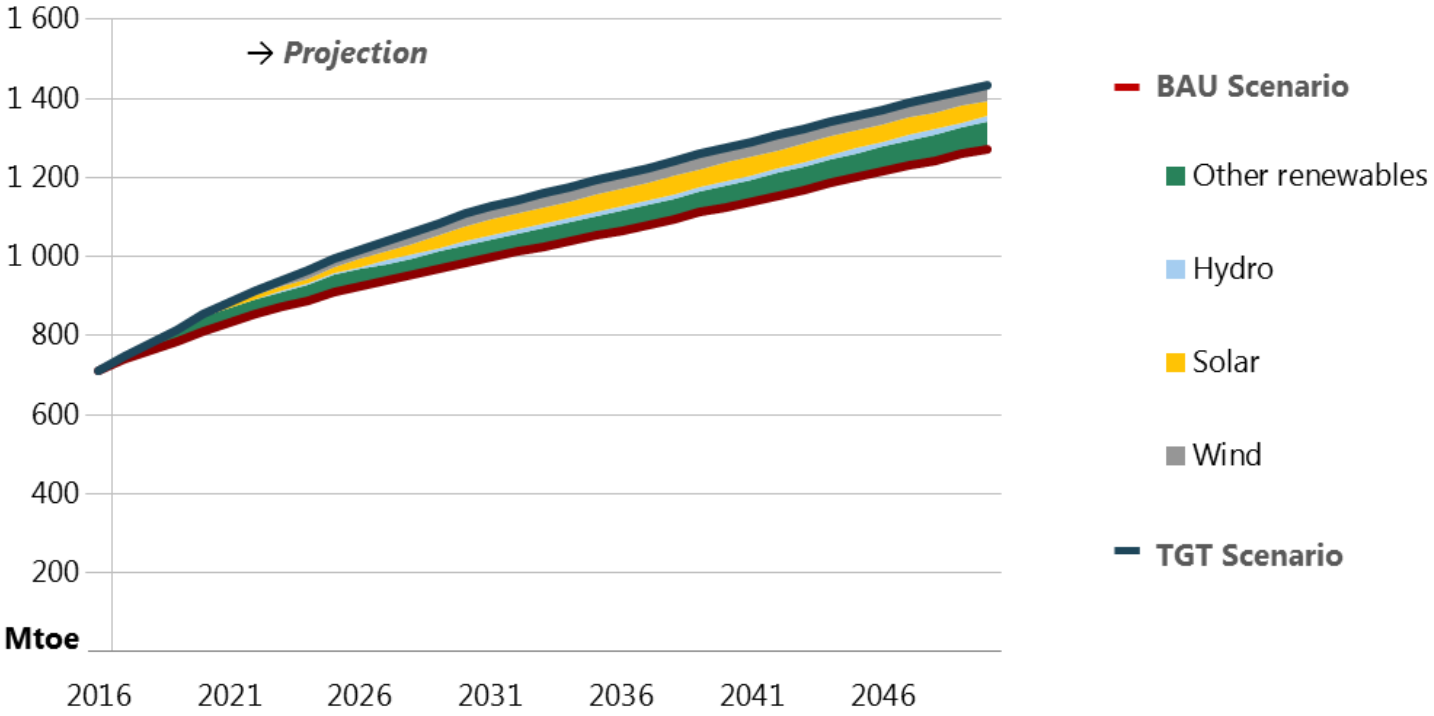


Notes: FED energy efficiency shows energy demand reduction by sector. Sources: APERC analysis and IEA (2018).

Fuel efficiency standards and technology switching in transport deliver nearly half of the intensity improvements.

Renewables Doubling Goal achieved on time

TPES Renewables growth by fuel type, TGT to BAU, 2015-50

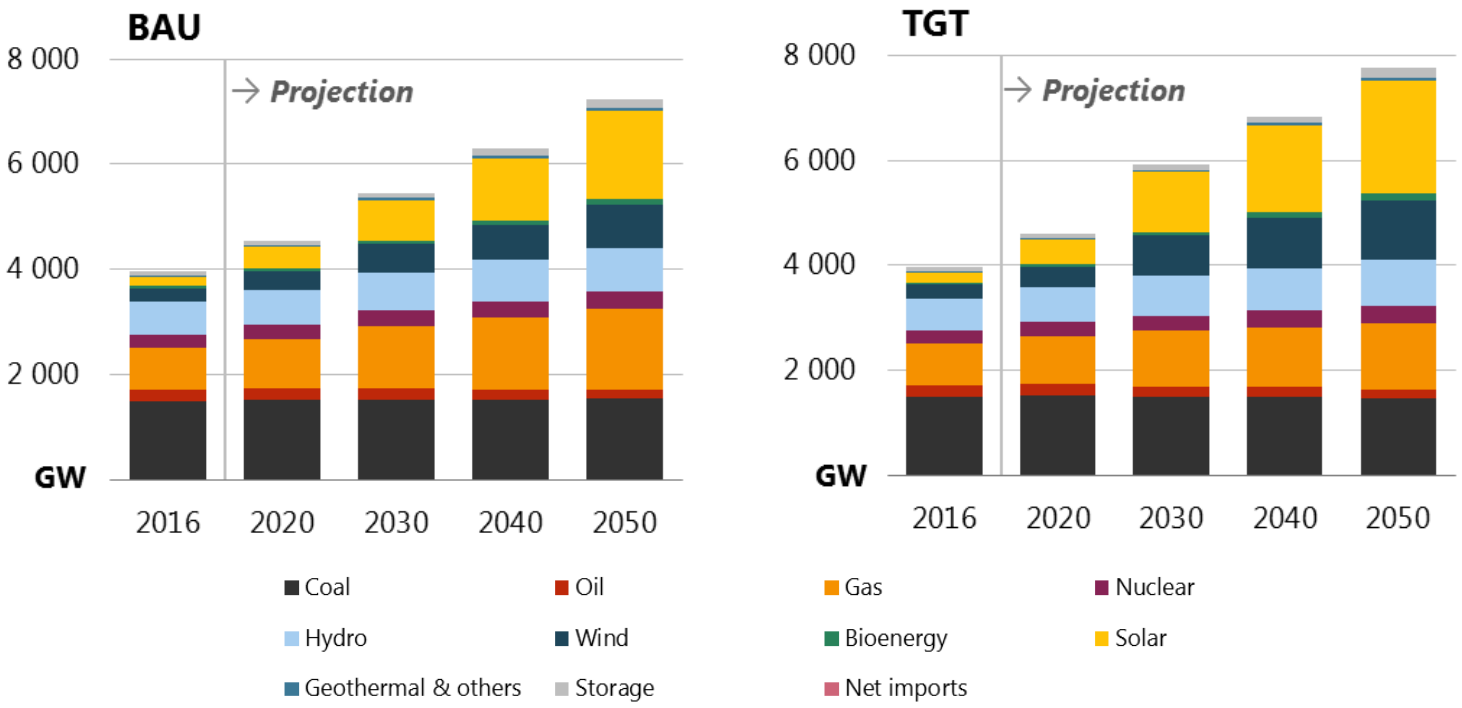


Notes: TPES renewables growth shows additional renewables by fuel type but excludes solid bioenergy in the buildings sector.
Sources: APERC analysis and IEA (2018).

An additional 851 GW of renewable power, 38 Mtoe of biofuels for transport, and 24 Mtoe of fuels for industry is required.

An additional 25% renewable power capacity needed to support the Doubling Goal

Generation capacity by fuel, TGT to BAU, 2016-50

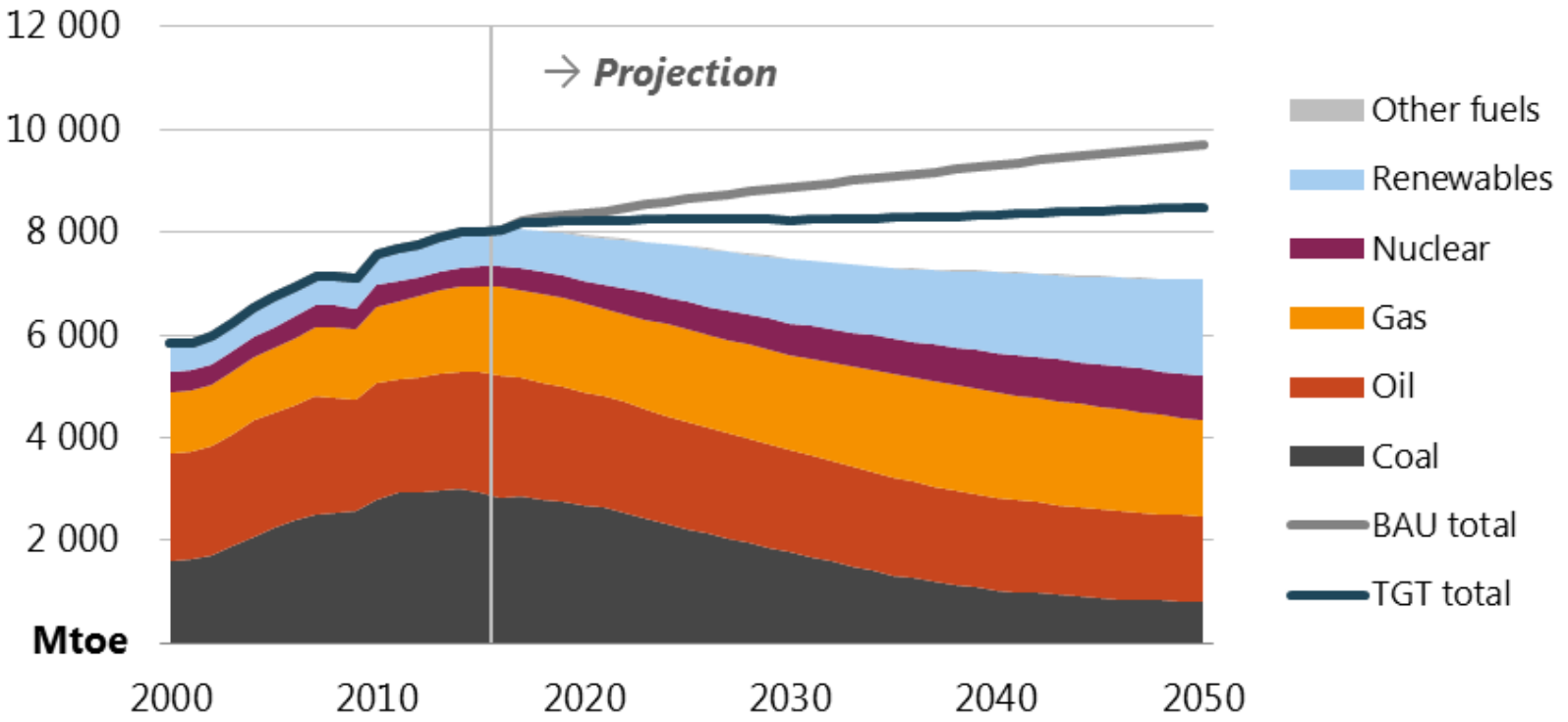


Sources: APERC analysis and IEA (2018).

APEC would need to add 119 GW of renewable capacity (excluding pumped hydro) each year from 2016 to 2030.

TPES declines in 2DC Scenario

Total primary energy supply by fuel in 2050, BAU vs TGT vs 2DC

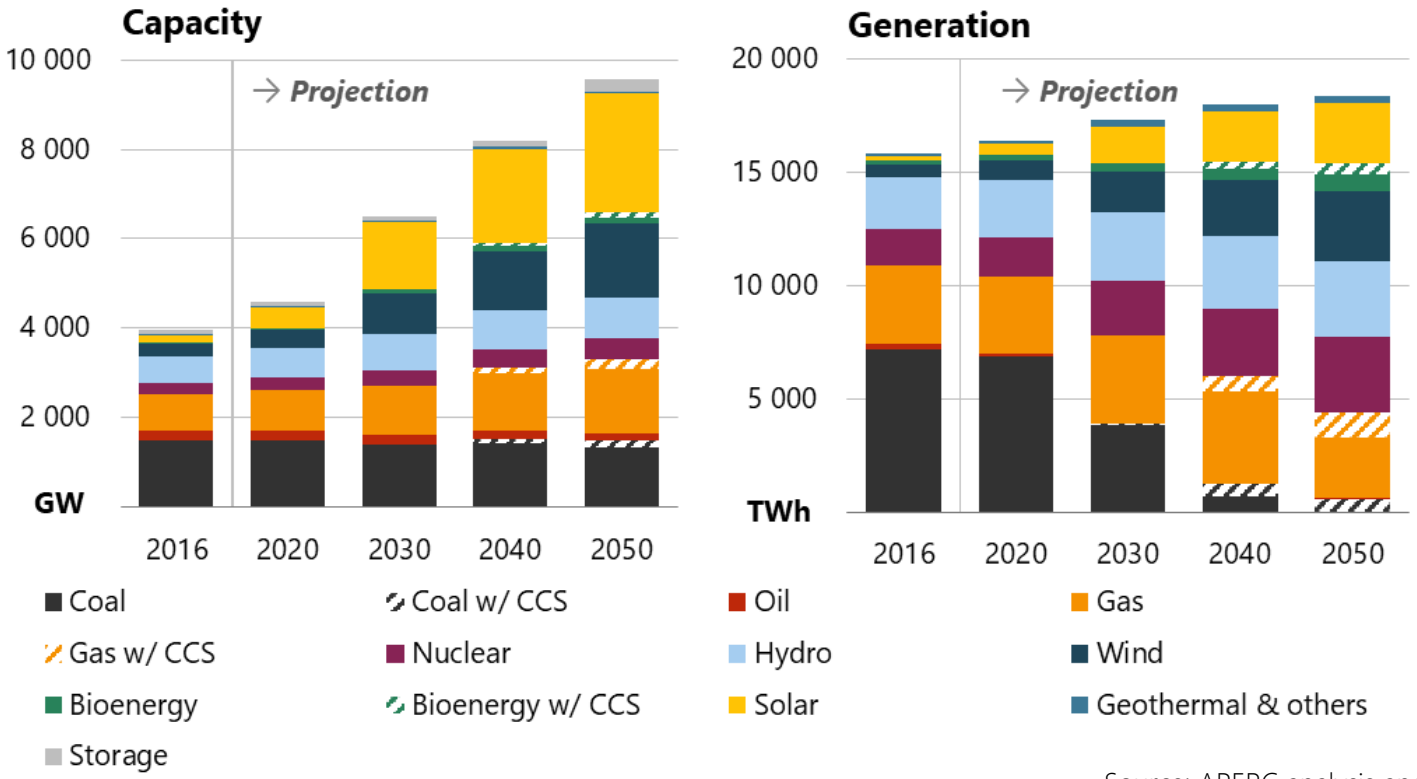


Sources: APERC analysis and IEA (2018)

Renewable share in TPES is 26% in 2DC, compared to 13% in BAU and 17% in TGT.

2DC requires much investment in power

APEC power capacity and electricity generation in the 2DC by fuel, 2016-50

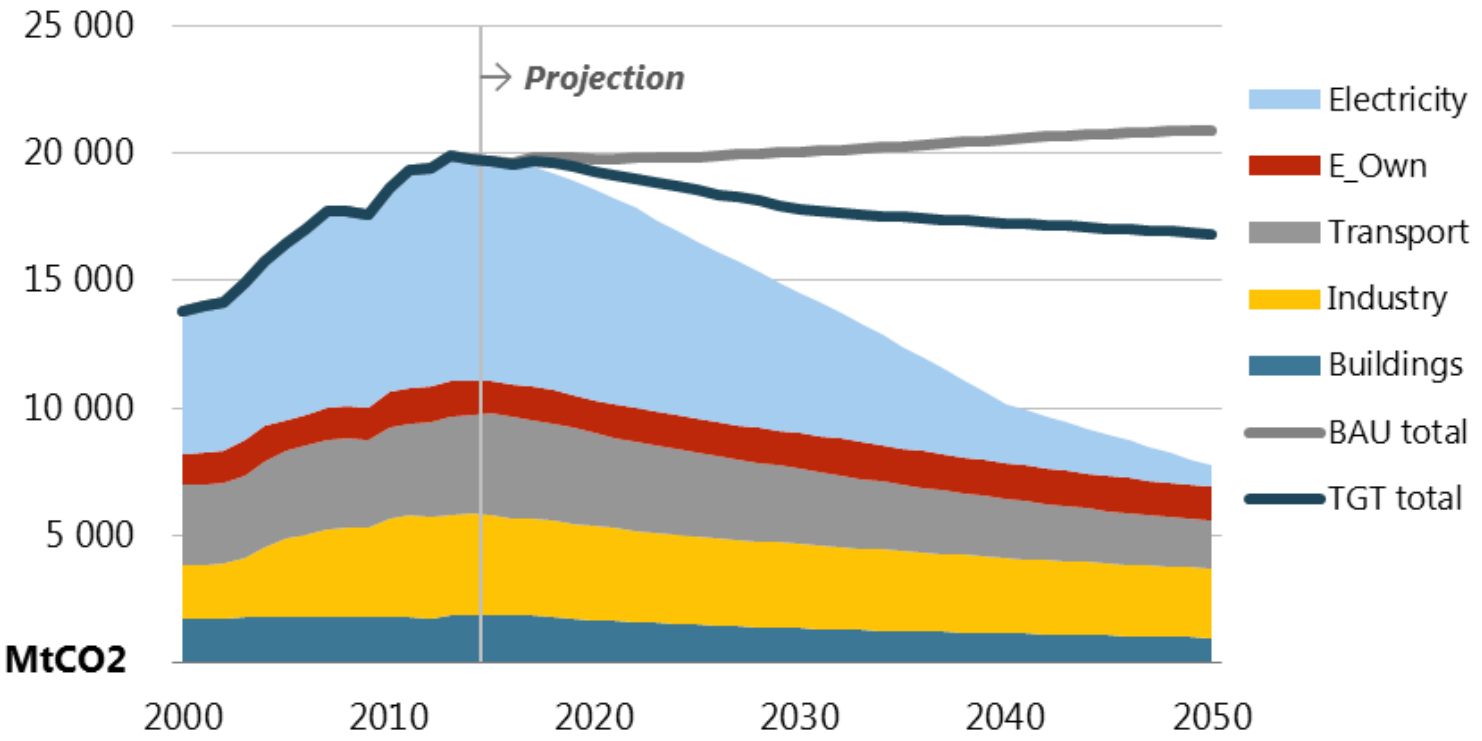


Source: APERC analysis and IEA (2018)

CCS for fossil fuel and biomass plants are key to decarbonising the electricity sector while storage supports renewables integration.

In 2DC, CO_2 emissions fall below 2016 levels

Total CO_2 emissions by sector in the 2DC, 2016-50

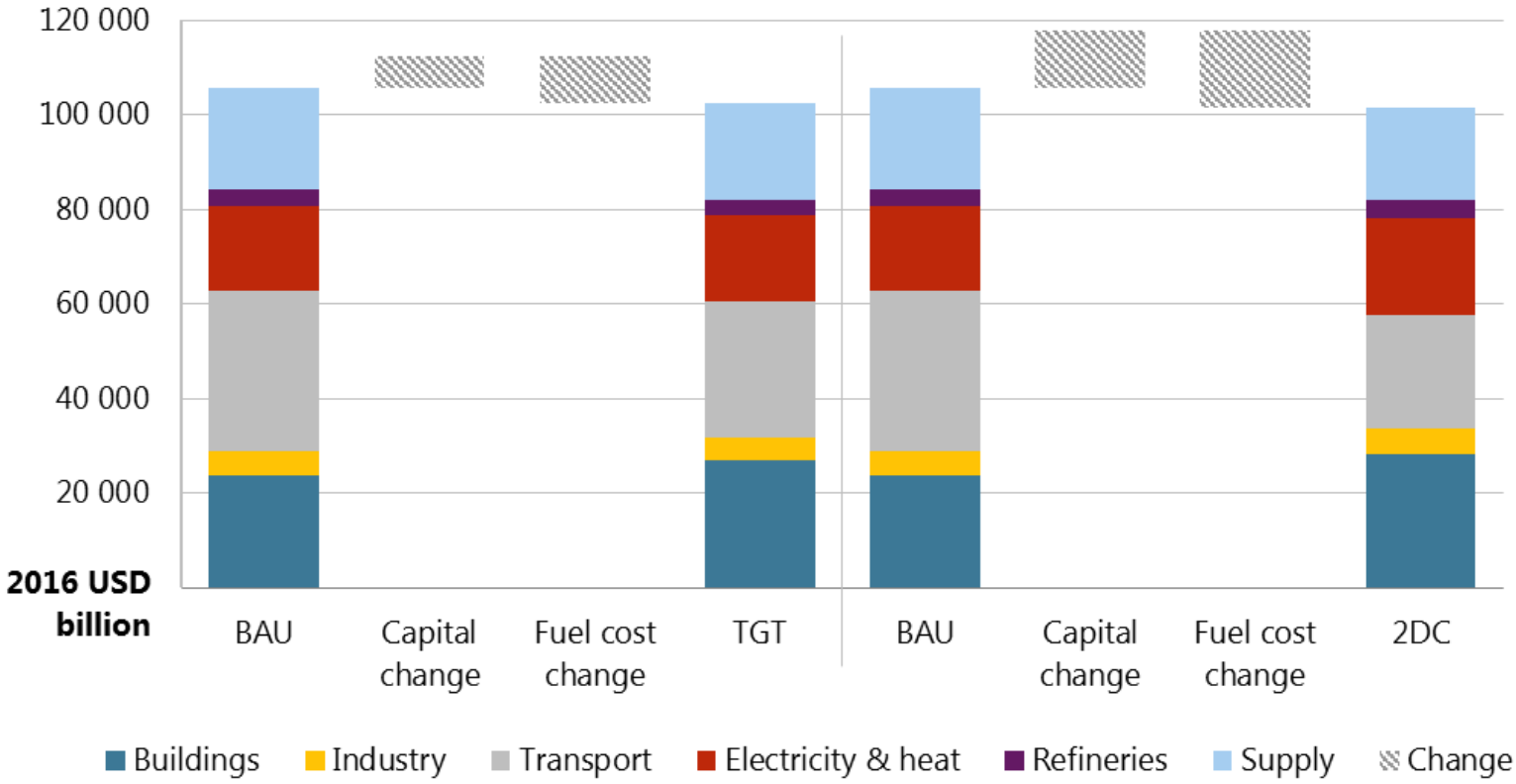


Sources: APERC analysis, IEA (2016 and 2018), IPCC (2018) and UNFCCC (2018).

Electricity sector decarbonisation drives a 2.6% per annum decrease in CO_2 emissions. Industry decarbonisation is challenging.

Investment is lower in TGT and 2DC

Total capital investment and fuel costs, by scenario, 2017-50

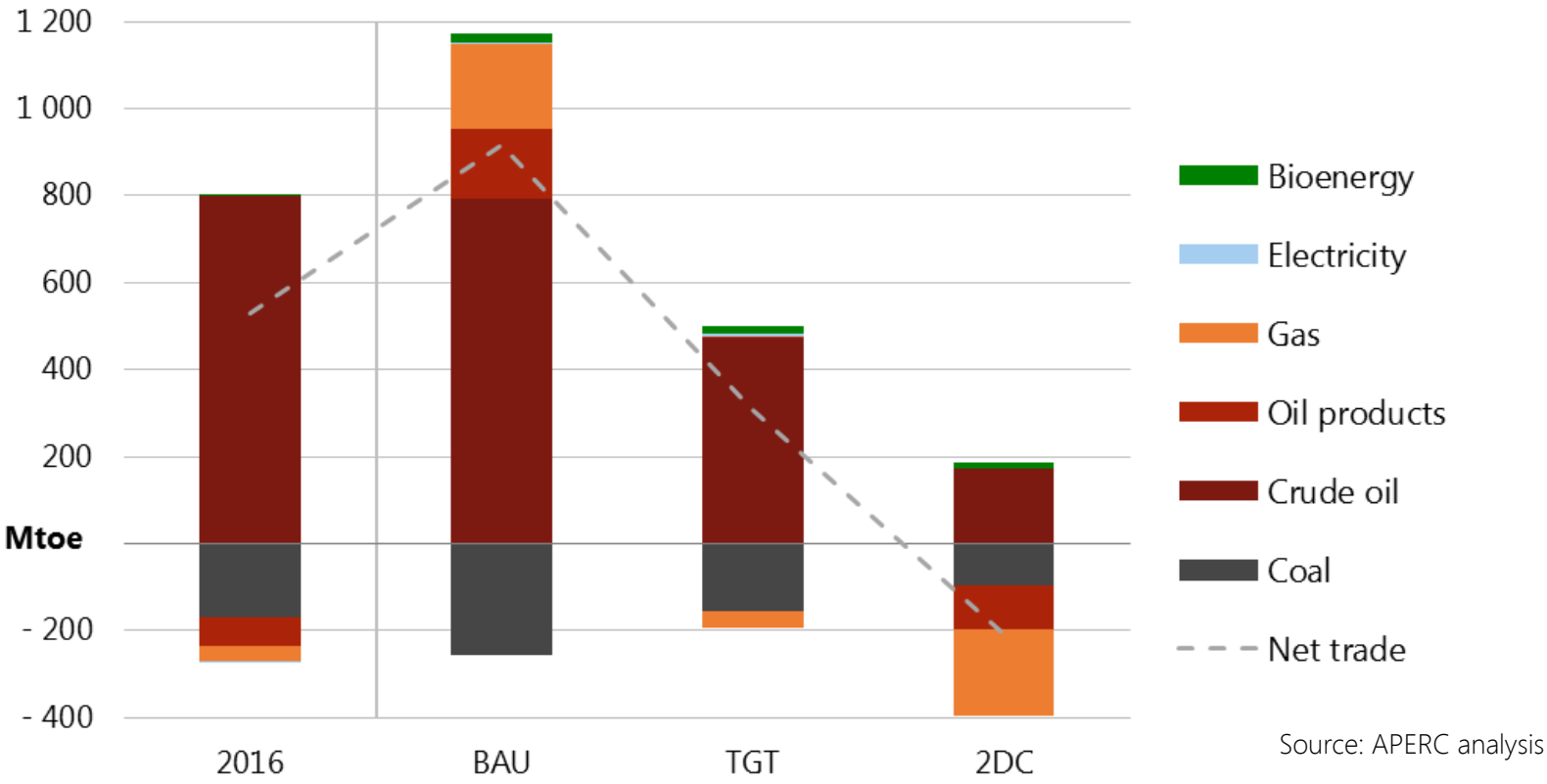


Sources : APERC analysis and IEA (2018)

Energy-related costs in BAU total USD 105 trillion in the BAU, 103 trillion in TGT and 102 trillion in 2DC. The added capital investments are offset by fuel savings.

APEC is a net oil importer in all scenarios

APEC energy imports and exports in the BAU, TGT and 2DC, 2016 vs 2050



Source: APERC analysis

Fossil fuel self-sufficiency decreases from 92% to 91% in the BAU. APEC becomes a net energy exporter in the 2DC.

Summary

- Final energy demand continues to grow, driven by transport and buildings.
- Electrification in buildings, transport, and industry increases, and is key to reducing demand and emissions.
- TGT achieves intensity and renewable doubling goals at a net cost saving.
- Efficiency, renewables, and CCS are required to achieve deep emissions reductions (as demonstrated in the 2DC).
- While efficiency and low-carbon capital investments are substantial in the 2DC, fuel savings lead to a net gain.
- Fossil fuels continue to represent at least half of FED and TPES in 2050, in all scenarios.

Thank you!

https://aperc.ieej.or.jp/

https://aperc.ieej.or.jp/publications/reports/outlook.php

APERC
Asia Pacific Energy Research Centre