

10.a. Report on Progress toward the Energy Intensity Reduction Goal and Renewable Energy Doubling Goal

**The 64th Meeting of the APEC Energy Working Group (EWG64)
1-3 November 2022 (GMT+8)**

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Outline

- Progress toward the APEC **energy intensity goal**
- Progress toward the APEC **renewable energy doubling goal**
- Energy intensity and renewable share **projections** from the *APEC Energy Demand and Supply Outlook 8th Edition*

Progress toward the APEC energy intensity goal

APEC Final Energy Intensity change

Annual change in APEC final energy intensity, 2006-20

	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	2005-20
Δ in FEC*	2.7%	3.6%	0.6%	-1.3%	5.5%	4.4%	1.8%	1.5%	-0.2%	0.5%	0.5%	1.6%	3.4%	0.2%	-3.9%	22.6%
Δ in GDP (PPP, constant 2018 USD)	5.4%	5.5%	2.9%	-0.2%	5.7%	4.2%	4.2%	3.8%	3.8%	3.6%	3.4%	4.1%	4.1%	3.4%	-1.8%	66.5%
Δ in final energy intensity	-2.5%	-1.8%	-2.2%	-1.1%	-0.2%	0.2%	-2.3%	-2.2%	-3.9%	-3.0%	-2.8%	-2.4%	-0.7%	-3.0%	-2.1%	-26.4%

* *FEC* – final energy consumption (excluding non-energy)
 Δ = change

Sources: APEC statistics (EGEDA), APERC analysis

- Final energy intensity fell 26.4% between 2005 and 2020.
- In 2020, COVID-19 caused a decline in GDP and final energy consumption.
- The 2020 result is similar what we saw in 2009 (the financial crisis).
- What are the implications of 2010 – 2011 for 2021 – 2022?

Primary energy intensity improved y-o-y as well

Annual change in APEC primary energy intensity, 2006-20

	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	2005-20
Δ in PES*	2.6%	3.3%	0.7%	0.0%	4.9%	4.0%	1.1%	1.7%	0.1%	-0.4%	0.8%	1.7%	3.6%	1.7%	-2.3%	26.0%
Δ in GDP (PPP, constant 2018 USD)	5.4%	5.5%	2.9%	-0.2%	5.7%	4.2%	4.2%	3.8%	3.8%	3.6%	3.4%	4.1%	4.1%	3.4%	-1.8%	66.5%
Δ in primary energy intensity	-2.6%	-2.1%	-2.2%	0.2%	-0.7%	-0.2%	-3.0%	-2.0%	-3.6%	-3.9%	-2.5%	-2.3%	-0.4%	-1.7%	-0.5%	-24.3%

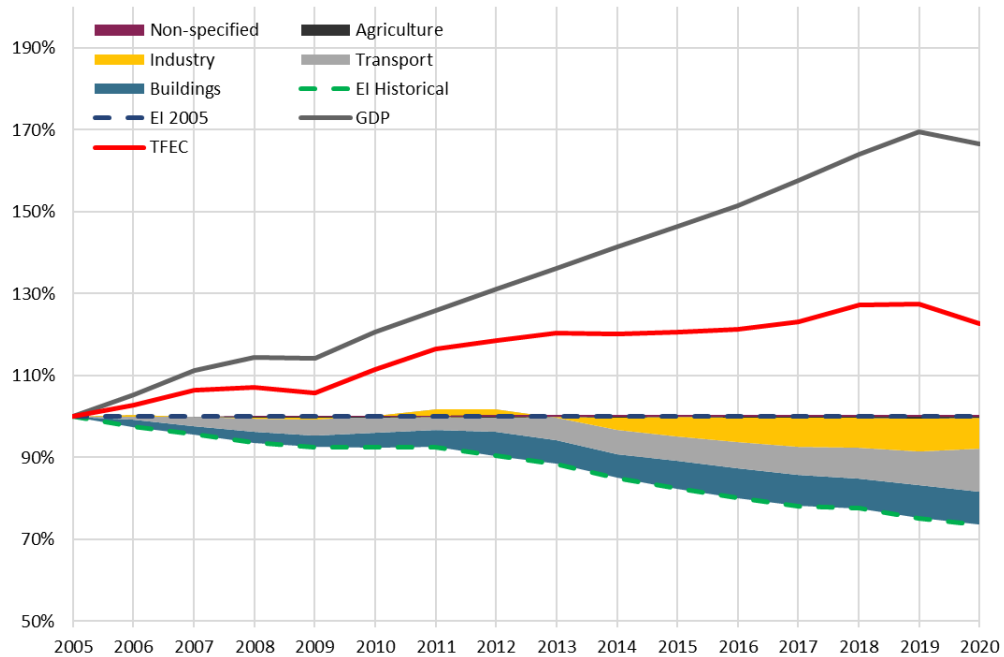
* PES – primary energy supply

Sources: APEC statistics (EGEDA), APERC analysis

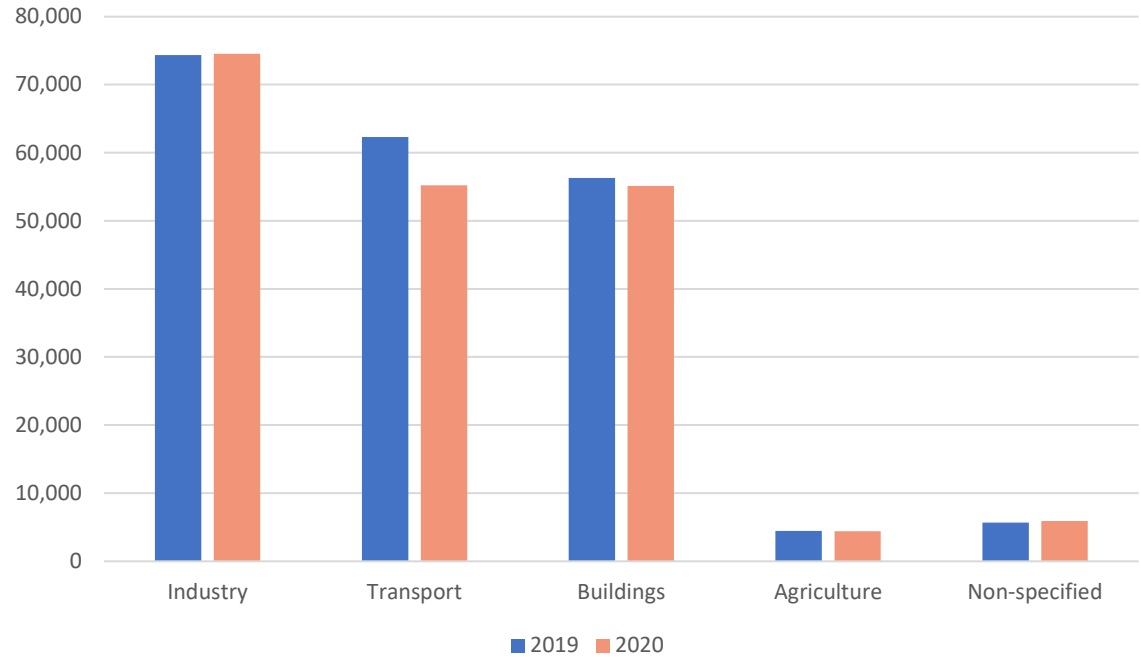
- At EWG62, APERC was asked to also show supply intensity.
- Year to year changes are generally similar to changes in final energy demand intensity
- Patterns of the two series appear to diverge in last three years.

In 2020, the largest drop in energy use was in transport

Subsector contribution to Energy Intensity from 2005-2020



Final Energy Consumption: 2019 versus 2020 (PJ)

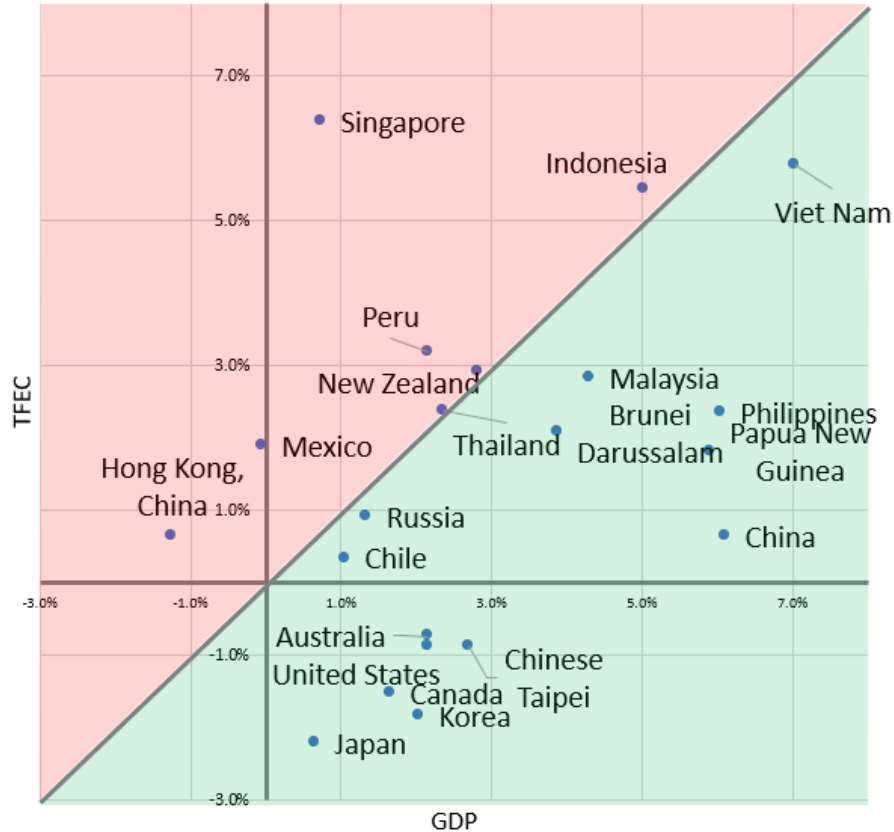


Sources: APEC statistics (EGEDA), APERC analysis

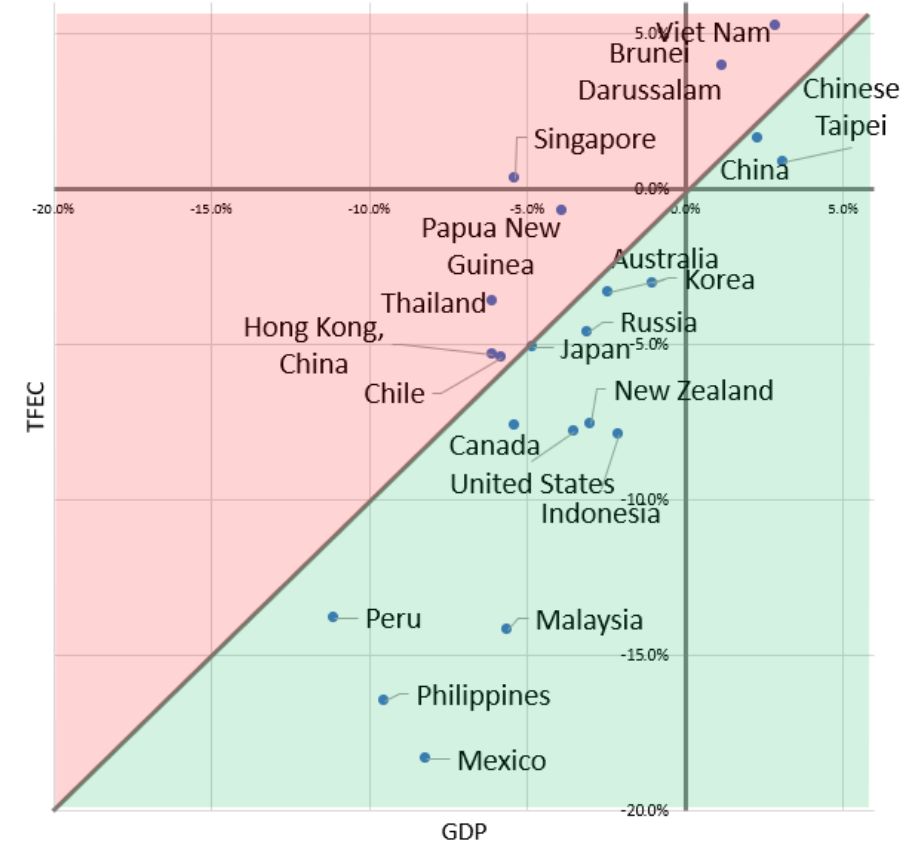
- Compared to 2019, final energy consumption in transportation fell 11.4% in 2020, likely the result of COVID-19 mobility restrictions.

Changes in total final energy consumption and GDP

2019/2018 change



2020/2019 change (preliminary)



- Due to COVID-19, both TFEC and GDP declined in 2020 in most APEC economies, although there were exceptions
- Similar to 2009 – 2011, the short-term economic and energy effects are uncertain in 2021 and 2022.

Progress toward APEC renewables doubling goal

Renewable energy continues to gain share

Primary energy supply, PJ

	2010	2020	% change
Non-renewables	287,866	315,490	9.6%
Coal	117,084	118,423	1.1%
Oil	90,037	94,440	4.9%
Gas	61,451	82,034	33.5%
Other non-renewables	19,295	20,594	6.7%
Traditional biomass	3,209	2,886	-10.1%
Modern renewable energy	14,641	25,129	71.6%
Modern biomass	4,148	5,457	31.5%
Hydro	6,396	9,292	45.3%
Geothermal	1,473	1,793	21.7%
Solar	157	2,159	1277.7%
Wind	586	3,295	462.6%
Other renewables	1,882	3,133	66.5%
Total	305,717	343,505	12.4%
Modern RE share	4.79%	7.32%	52.7%

Final energy consumption, PJ

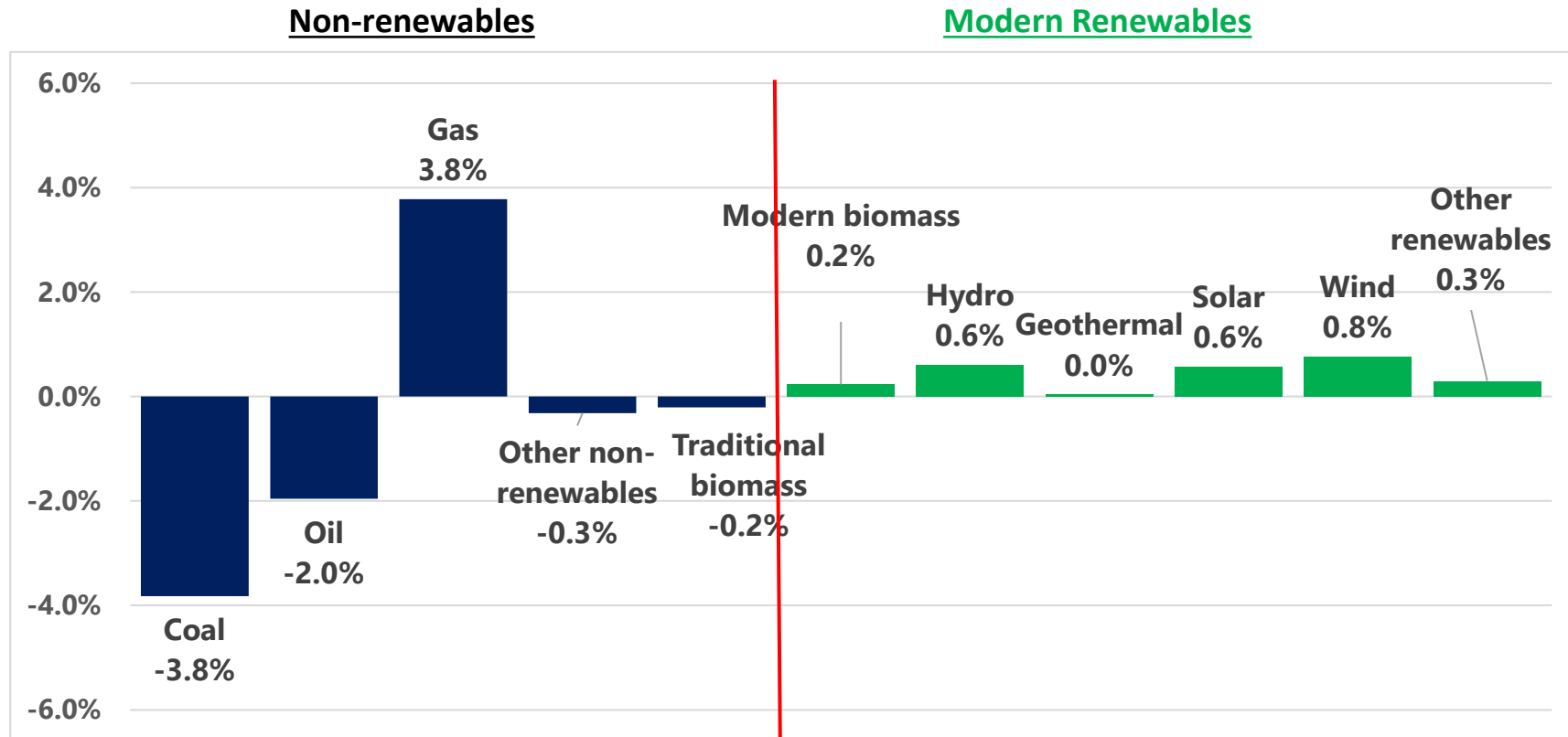
	2010	2020	% change
Non-renewables	163,800	173,930	6.2%
Coal	30,471	24,513	-19.6%
Oil	64,516	63,727	-1.2%
Gas	26,147	34,901	33.5%
Electricity	34,570	40,605	17.5%
Heat	7,882	9,837	24.8%
Other non-renewables	213	347	62.5%
Traditional biomass	3,209	2,886	-10.1%
Modern renewable energy	10,693	18,580	73.8%
Electricity	6,230	13,168	111.3%
Heat	64	58	-10.0%
Modern biomass	2,824	2,847	0.8%
Other renewables	1,575	2,508	59.3%
Total	177,702	195,397	10.0%
Modern RE share	6.02%	9.51%	58.0%

Note: Consumption of electricity and heat from renewables is calculated from the share of total electricity and heat production.

Source: APEC data.

In energy supply, coal and oil lost shares to gas and renewables . . .

Percent change in fuel shares in **primary energy supply**, 2010-2020

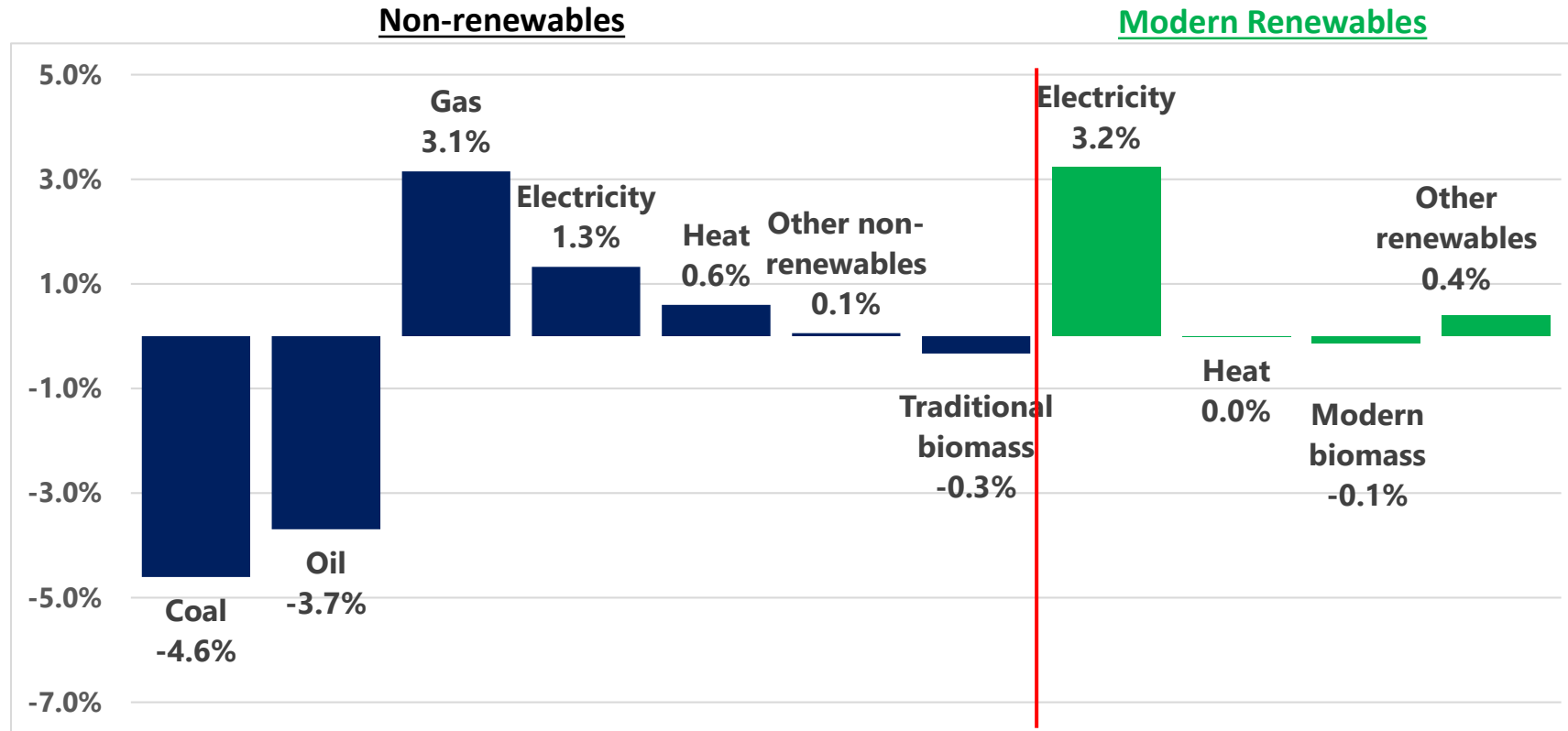


Note: Renewable energy includes electricity and heat generated from renewable energy sources
Source: APEC data

- From 2010 to 2020, the renewable share increased 2.5 percentage points, 53% of the way to the goal.

In final energy use, the pattern was similar

Percent change in fuel shares in **final energy consumption**, 2010-2020



Note: Renewable energy includes electricity and heat generated from renewable energy sources

Source: APEC data.

- From 2010 to 2020, the renewable share increased 3.5 percentage points, 58% of the way to the goal.

Renewable power generation doubled over the last decade

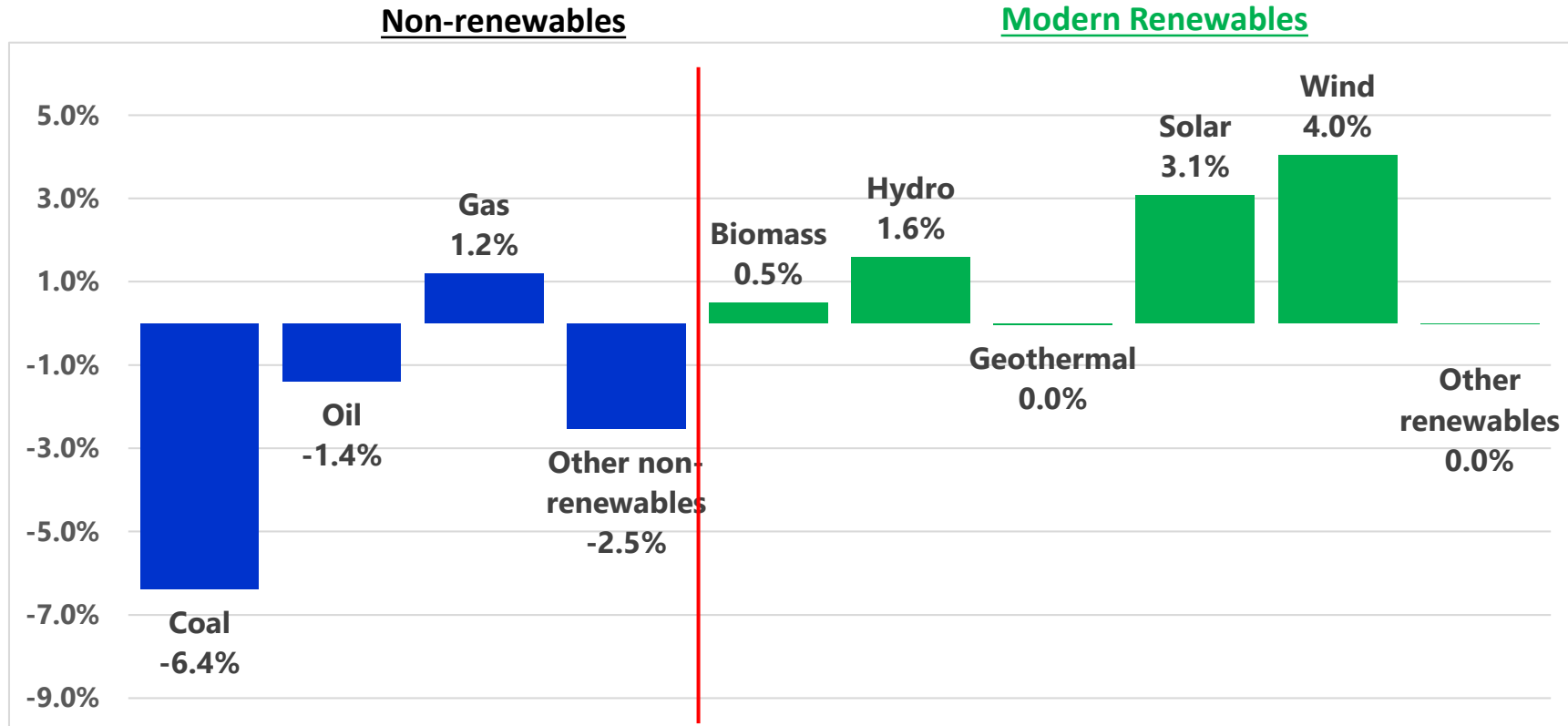
Electricity Generation, TWh

	2010	2020	% change
Non-renewables	11,374	13,160	15.7%
Coal	6,576	7,417	12.8%
Oil	324	176	-45.7%
Gas	2,713	3,726	37.3%
Nuclear	1,658	1,742	5.0%
Other non-renewables	102	100	-2.5%
Modern renewable energy	2,099	4,316	105.6%
Modern biomass	67	172	157.3%
Hydro	1,780	2,584	45.2%
Geothermal	53	63	18.6%
Solar	9	548	5990.5%
Wind	163	915	462.6%
Other renewables	27	33	19.1%
Total	13,472	17,476	29.7%
Modern RE share	15.58%	24.69%	58.5%

- In 2020, modern renewable energy provided a quarter of total power generation

Coal and oil lost shares to gas and renewables

Percent change in electricity generation market share, 2010-2020



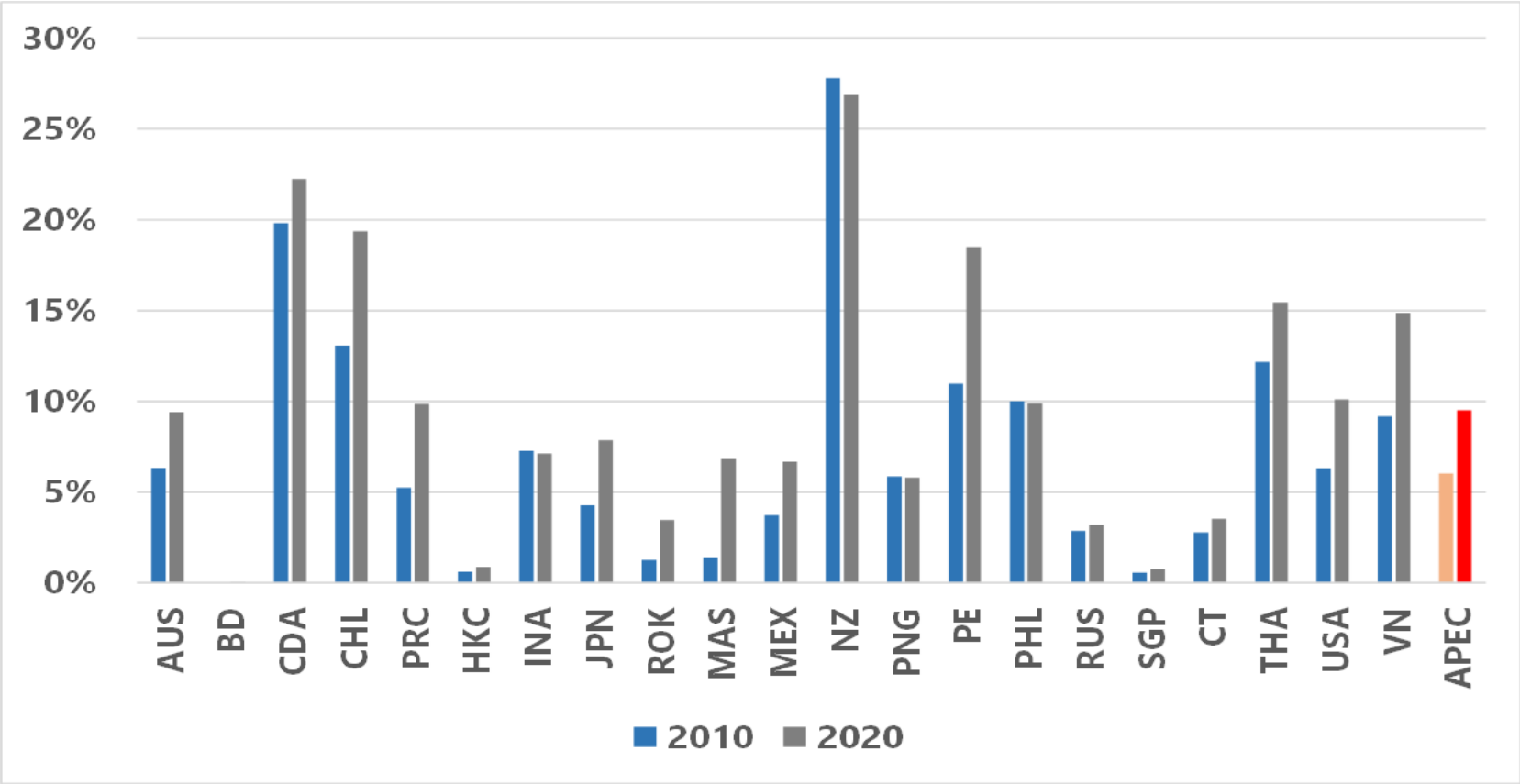
Note: Renewable energy includes electricity and heat generated from renewable energy sources

Source: APEC data.

- From 2010 to 2020, the renewable share increased 9.1 percentage points, 59% of the way to the goal.

RE share of energy use varies widely by economy

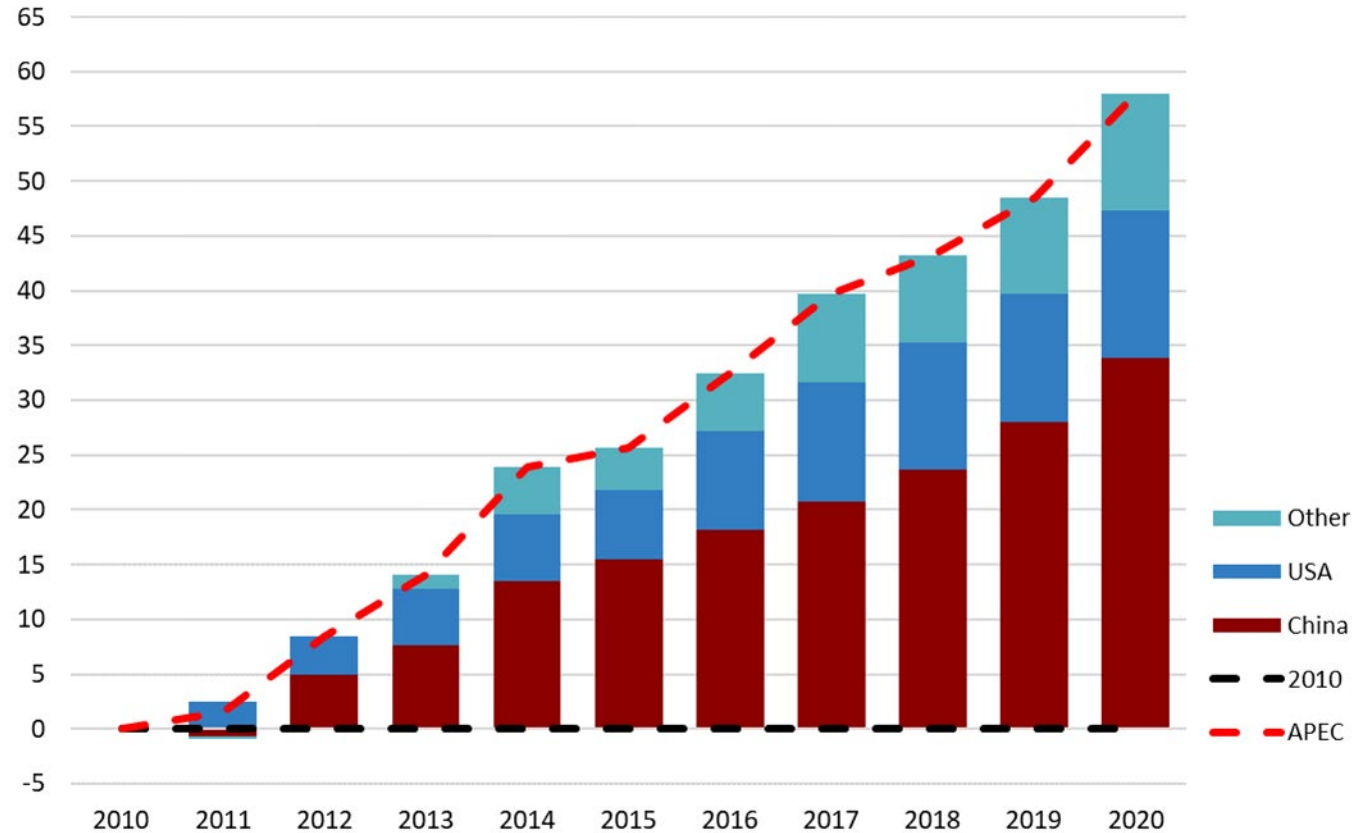
Renewable energy share of final energy consumption in 2010 and 2020



Note: the RE doubling goal is a collective goal.

Two economies accounted for most of the 2010-20 RE share increase

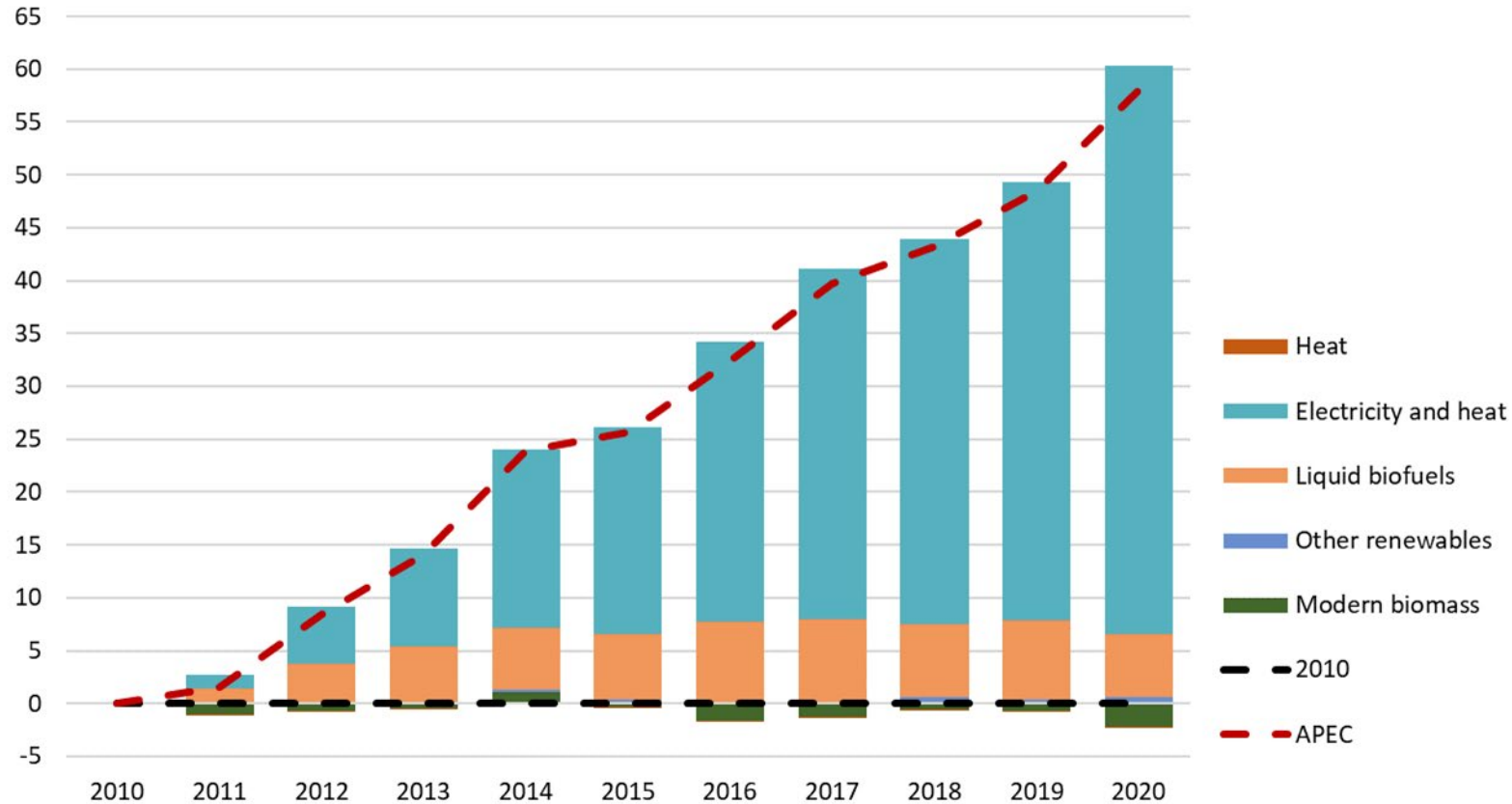
Regional contributions to the percentage increase in RE share of final energy consumption relative to 2010



- Each column reflects the percentage increase in RE share relative to 2010
- Economy shares in 2020: China 58%, USA 23%, and other economies 18%

Electricity generation dominates the increase in RE use

Fuel type contributions to the percentage increase in RE share of final energy consumption relative to 2010

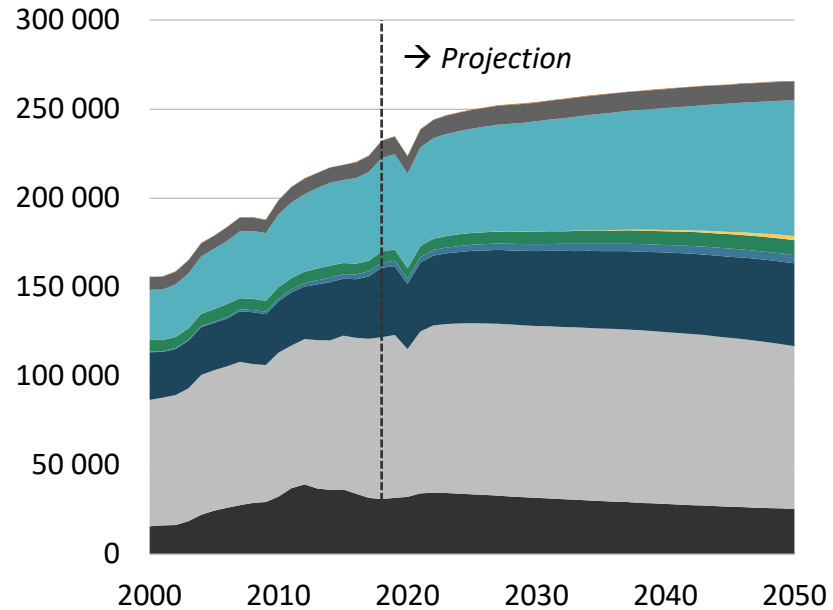


- Each column reflects the percentage increase in RE share relative to 2010
- Contributions: Electricity >90%, liquid biofuels +10%, modern biofuels -2%

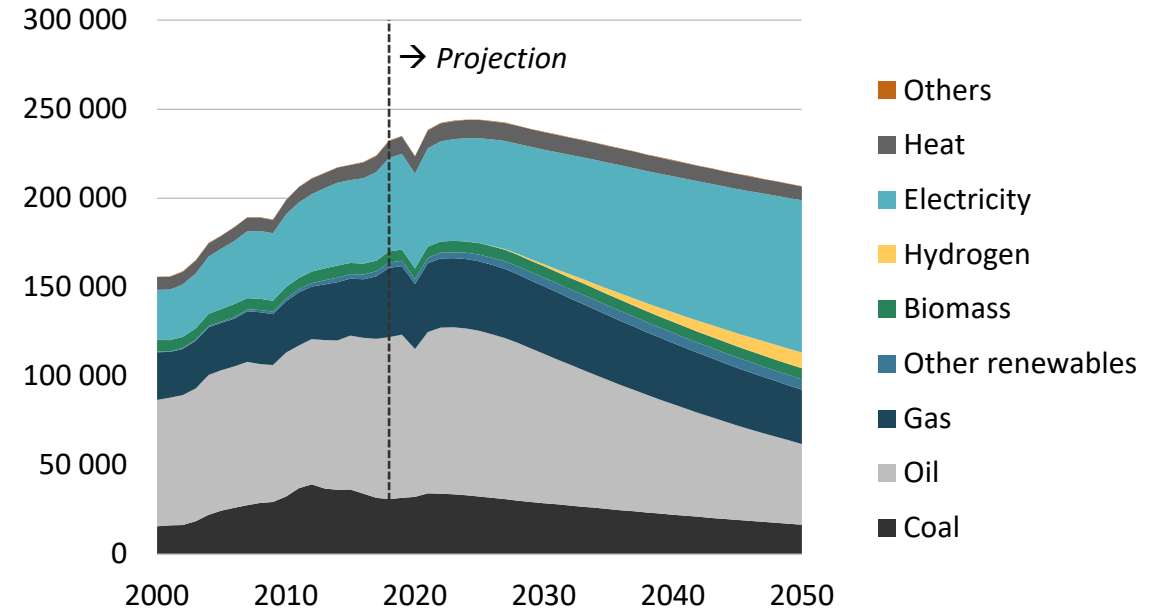
Projections from the *APEC Energy Demand and Supply Outlook 8th Edition*

Energy demand decouples significantly from economic activity

Energy demand by fuel in REF (PJ)



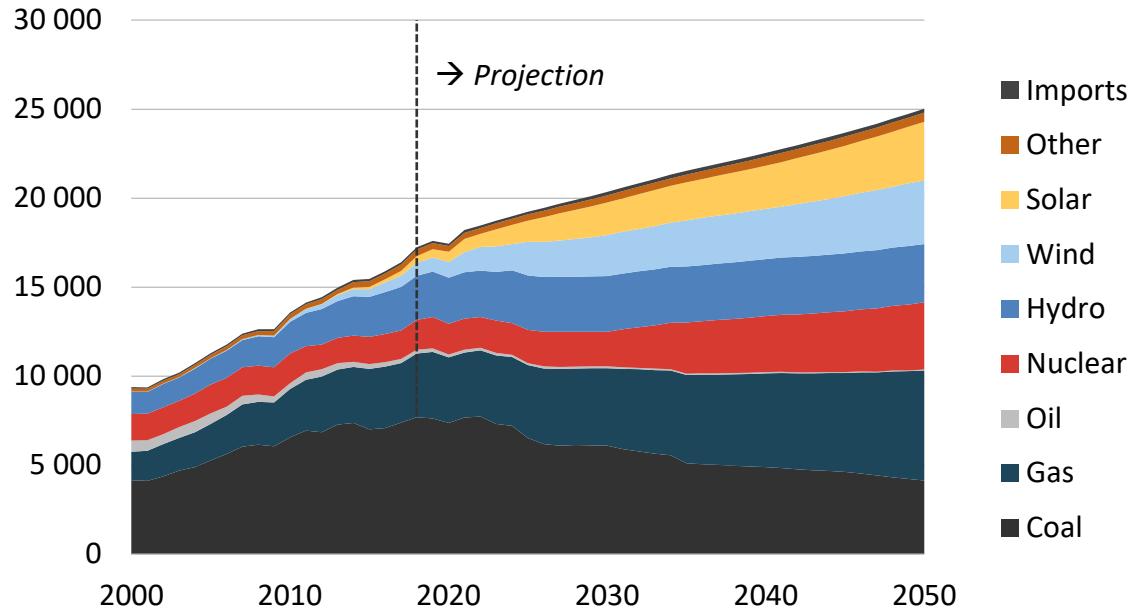
Energy demand by fuel in CN (PJ)



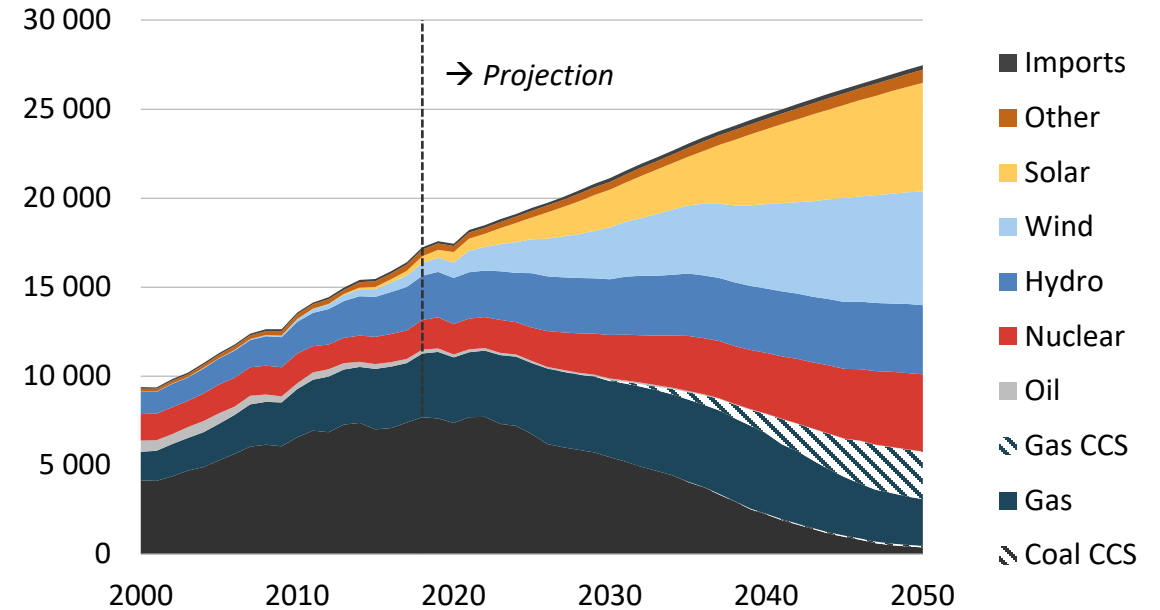
- In CN, energy efficiency and electrification enable energy demand to be 22% lower in 2050 relative to REF.
- In CN, energy use peaks in 2025.

Electricity demand is increasingly met with generation from wind and solar . . .

Electricity generation in REF (TWh)



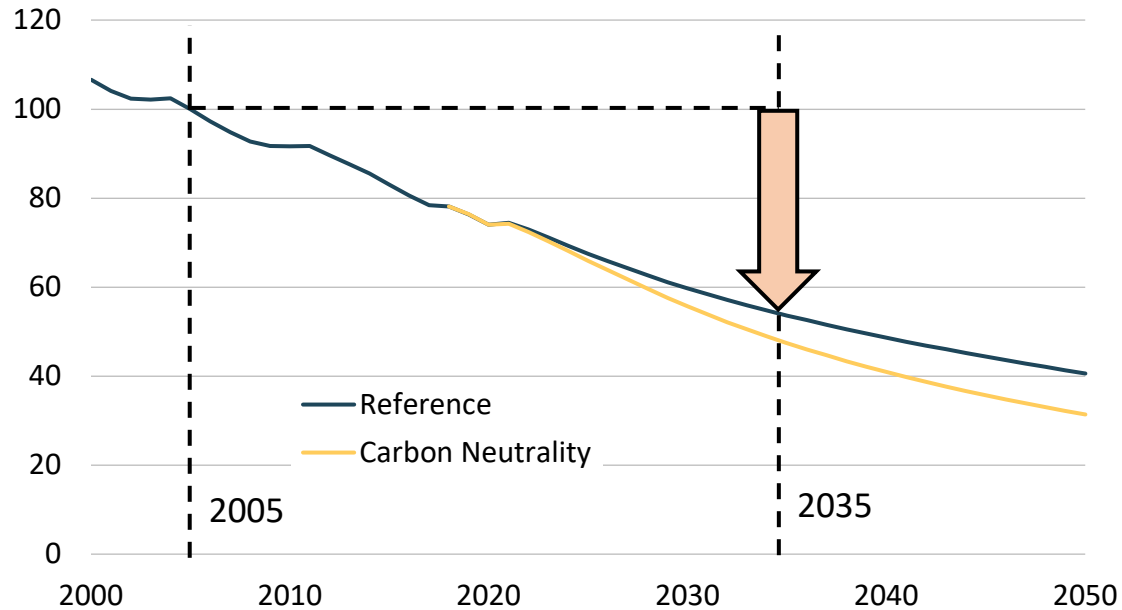
Electricity generation in CN (TWh)



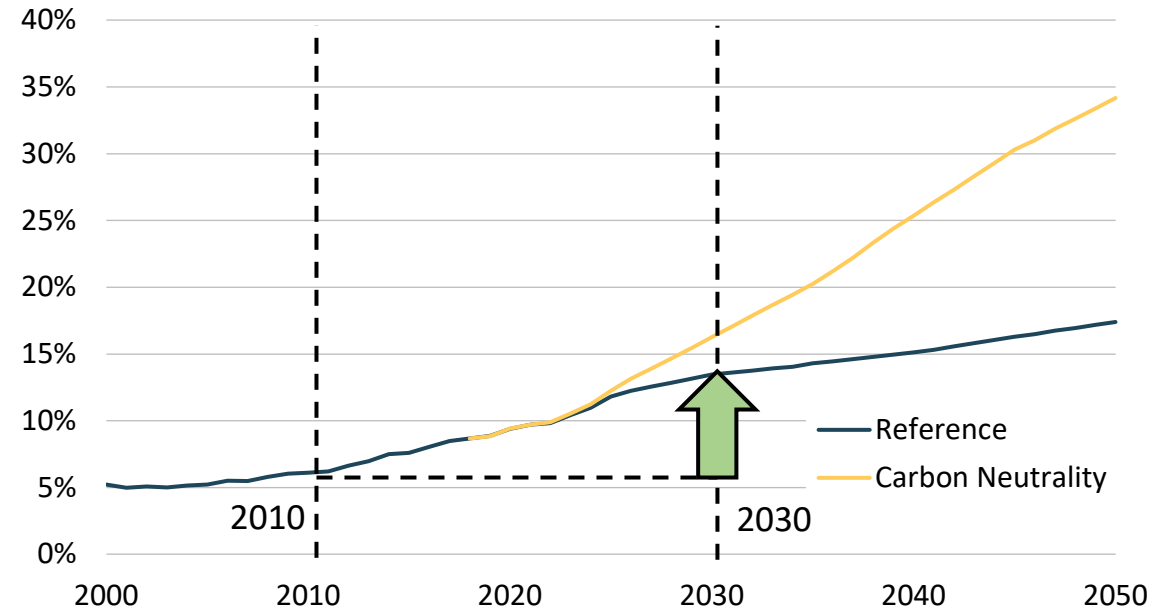
- Growth in electricity generation to meet increased demand, primarily in buildings and transport.
- Natural gas substitution for coal continues and provides balancing and ancillary services to the electric grid.

APEC projected to meet dual energy goals

Final energy intensity (2005 = 100)



Share of modern renewable energy



- Final energy intensity declines 45% by 2034 in REF and by 2031 in CN
- Modern renewable energy share doubles by 2026 in REF and by 2025 in CN

Summary

COVID-19 creates uncertainty about near-term changes in energy intensity

COVID-19 lockdowns impacted transport sector; will there be a “rebound”?

Renewable energy share driven primarily by RE electricity generation in two economies

Outlook results indicate that APEC is on track to meet both energy goals

APERC will continue to track both energy intensity and the renewable energy share

Thank you.

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