

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

**The 65th Meeting of APEC Energy Working Group (EWG65)**  
21-22 May 2023 (EDT) - Detroit, Michigan, US

Glen SWEETNAM  
Senior Vice President, APERC



# Outline

- Progress toward the APEC **energy intensity goal**
- Progress toward the APEC **renewable energy share doubling goal**
- Energy intensity and renewable energy share **projections** from the *APEC Energy Demand and Supply Outlook 8<sup>th</sup> 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*	2.5%	3.6%	0.7%	-1.3%	5.4%	4.4%	1.9%	1.5%	-0.2%	0.5%	0.5%	1.7%	3.5%	0.3%	-3.8%	22.9%
Δ in GDP (PPP, constant 2017 USD)	5.2%	5.3%	2.9%	-0.2%	5.7%	4.1%	4.2%	3.8%	3.7%	3.7%	3.4%	4.0%	4.1%	3.4%	-1.5%	66.0%
Δ in final energy intensity	-2.6%	-1.7%	-2.2%	-1.0%	-0.2%	0.2%	-2.2%	-2.2%	-3.8%	-3.0%	-2.9%	-2.2%	-0.6%	-2.9%	-2.3%	<b>-26.0%</b>

\* *FEC* – final energy consumption (excluding non-energy)

Δ = change

Sources: APEC statistics (EGEDA), WB (GDP PPP), CT (WEO), APERC analysis

- Final energy intensity fell 26.0% between 2005 and 2020.
- In 2020, the decline in GDP (1.5%) and final energy consumption (3.8%) were may be due to reduced activity due to lockdown imposed during the pandemic.
- The double decline (GDP and energy consumption) in 2020 is similar to what we observed in 2009 (following the financial crisis).

# Primary energy supply 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*	2.5%	3.4%	0.7%	0.0%	5.1%	3.8%	1.4%	1.5%	0.1%	-0.5%	0.8%	1.7%	3.7%	1.8%	-2.3%	26.0%
Δ in GDP (PPP, constant 2017 USD)	5.2%	5.3%	2.9%	-0.2%	5.7%	4.1%	4.2%	3.8%	3.7%	3.7%	3.4%	4.0%	4.1%	3.4%	-1.5%	66.0%
Δ in primary energy intensity	-2.5%	-1.9%	-2.2%	0.2%	-0.6%	-0.3%	-2.7%	-2.2%	-3.5%	-4.0%	-2.6%	-2.2%	-0.4%	-1.5%	-0.8%	<b>-24.1%</b>

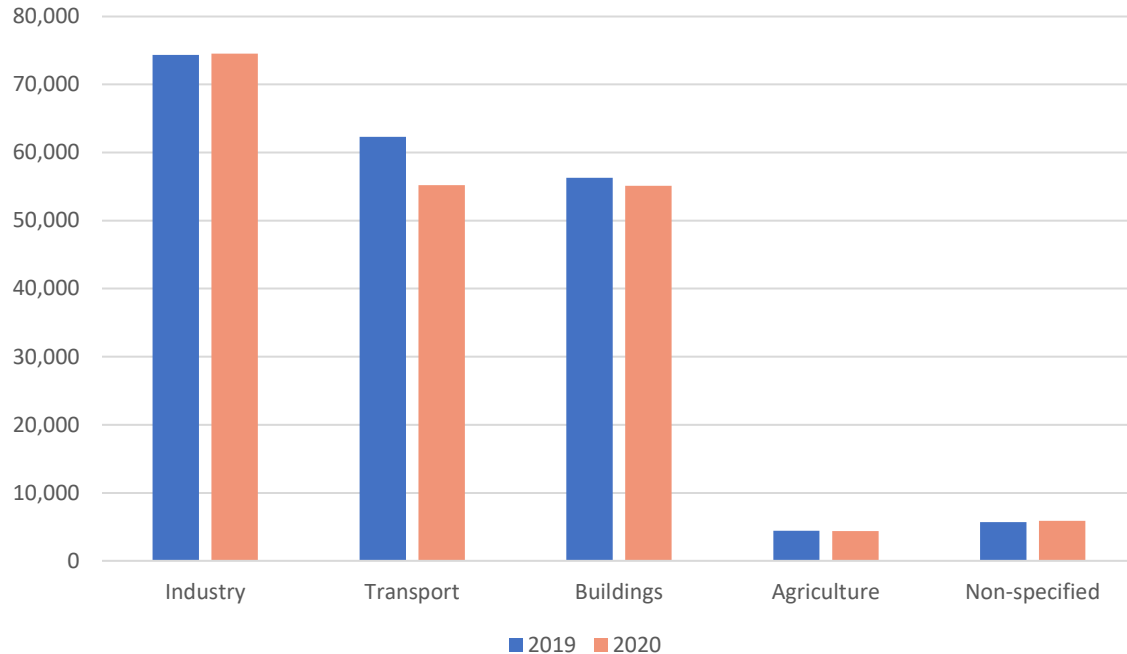
\* PES – primary energy supply

Sources: APEC statistics (EGEDA), WB (GDP PPP), CT (WEO), APERC analysis

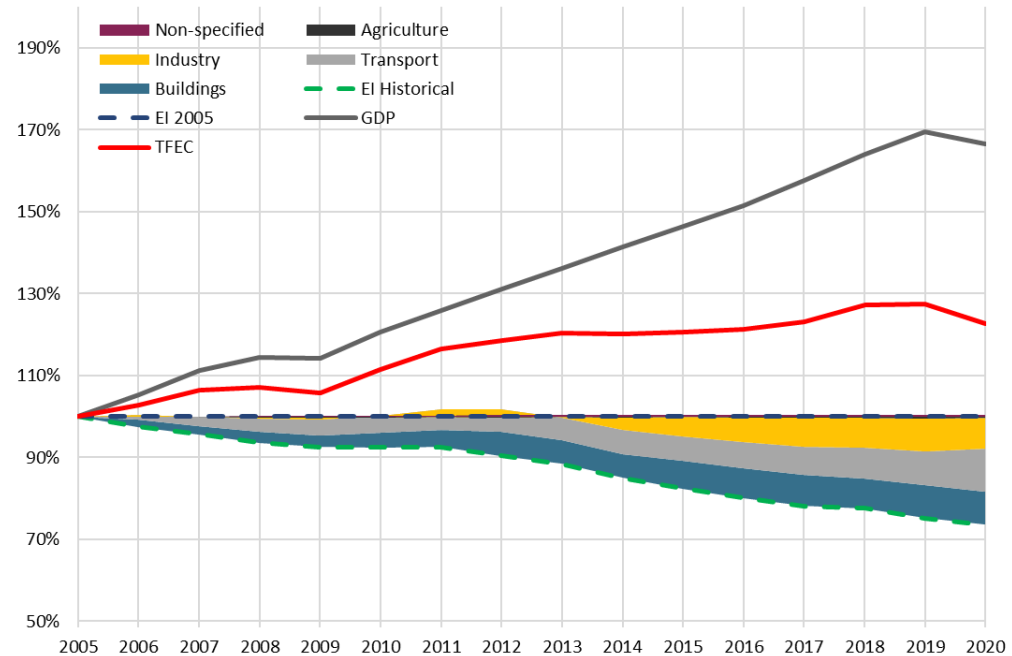
- At EWG62, APERC was asked to also show energy supply intensity.
- Year to year changes are generally similar to changes in final energy demand intensity
- Patterns of the two series appear to diverge in last two years.

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

Final Energy Consumption: 2019 versus 2020 (PJ)



Subsector contribution to Energy Intensity from 2005-2020



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.

# Progress toward APEC renewable energy share doubling goal

# Renewable energy continues to gain share

Primary energy supply, PJ

	2010	2020	% change
<b>Non-renewables</b>	<b>287,736</b>	<b>315,585</b>	<b>9.7%</b>
Coal	117,084	118,423	1.1%
Oil	89,801	94,179	4.9%
Gas	61,556	82,399	33.9%
Other non-renewables	19,295	20,583	6.7%
<b>Traditional biomass</b>	<b>3,209</b>	<b>2,886</b>	<b>-10.1%</b>
<b>Modern renewable energy</b>	<b>14,641</b>	<b>25,140</b>	<b>71.7%</b>
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	3,144	67.0%
<b>Total</b>	<b>305,586</b>	<b>343,611</b>	<b>12.4%</b>
<b>Modern RE share</b>	<b>4.79%</b>	<b>7.32%</b>	<b>52.7%</b>

Final energy consumption, PJ

	2010	2020	% change
<b>Non-renewables</b>	<b>163,732</b>	<b>174,738</b>	<b>6.7%</b>
Coal	30,469	24,511	-19.6%
Oil	64,451	63,806	-1.0%
Gas	26,147	35,637	36.3%
Electricity	34,570	40,605	17.5%
Heat	7,882	9,837	24.8%
Other non-renewables	213	342	60.2%
<b>Traditional biomass</b>	<b>3,209</b>	<b>2,886</b>	<b>-10.1%</b>
<b>Modern renewable energy</b>	<b>10,693</b>	<b>18,585</b>	<b>73.8%</b>
Electricity	6,230	13,168	111.3%
Heat	64	58	-10.0%
Modern biomass	2,824	2,847	0.8%
Other renewables	1,575	2,513	59.6%
<b>Total</b>	<b>177,634</b>	<b>196,209</b>	<b>10.5%</b>
<b>Modern RE share</b>	<b>6.02%</b>	<b>9.47%</b>	<b>57.4%</b>

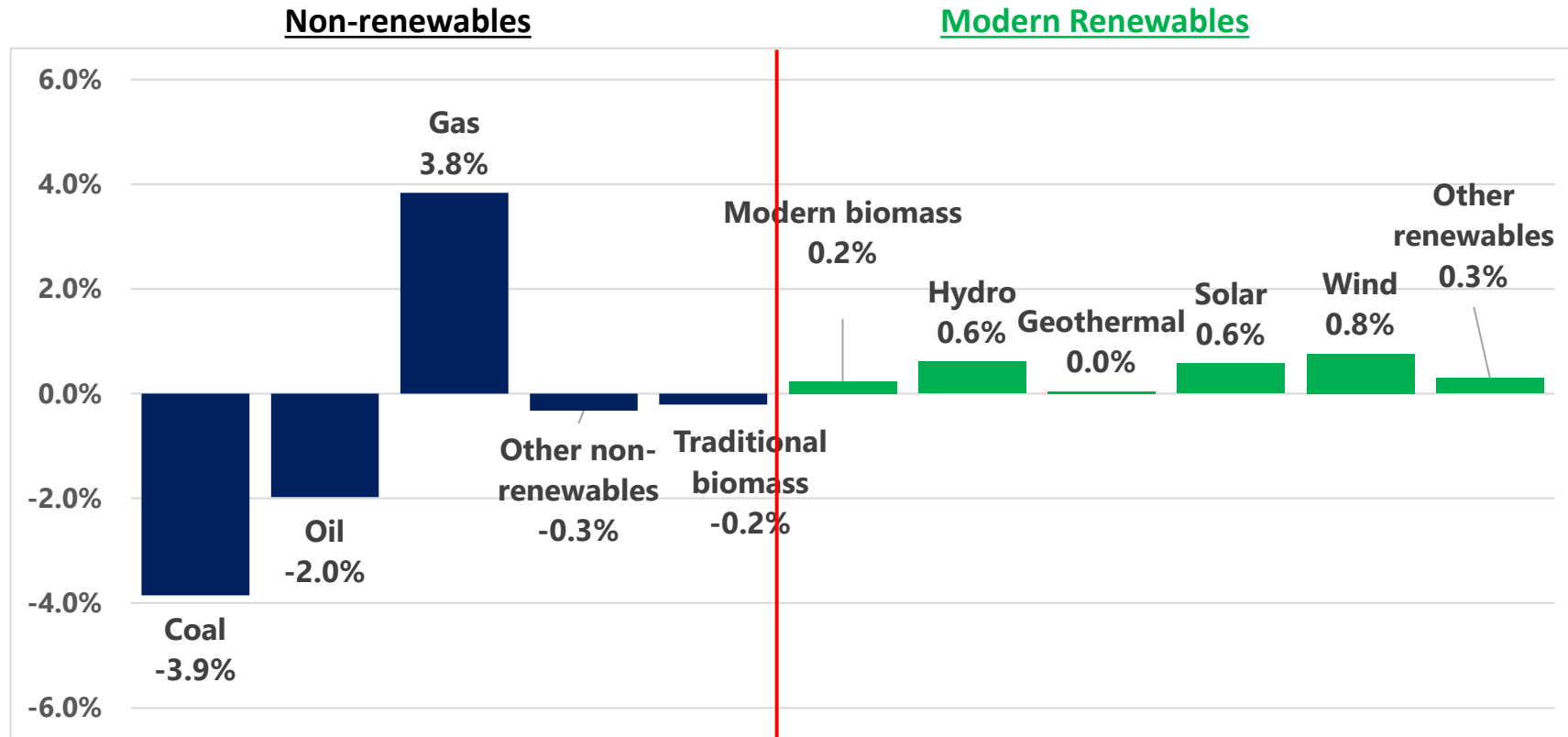
Note: Consumption of electricity and heat from renewables is calculated from the share of total electricity and heat production.

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

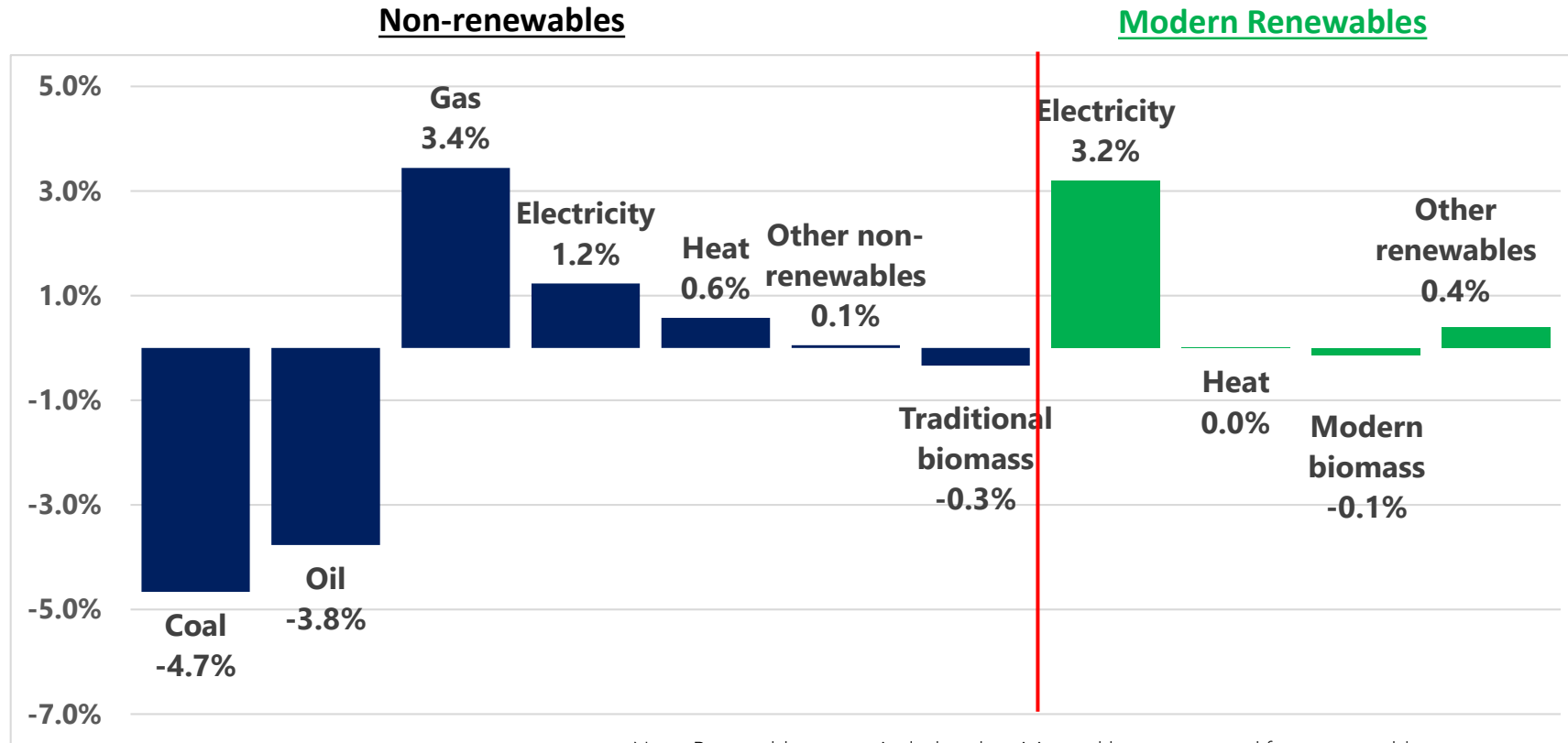


Note: Renewable energy includes electricity and heat generated from renewable energy sources  
Source: APEC data

- 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, 57% of the way to the goal.

# Renewable power generation doubled over the last decade

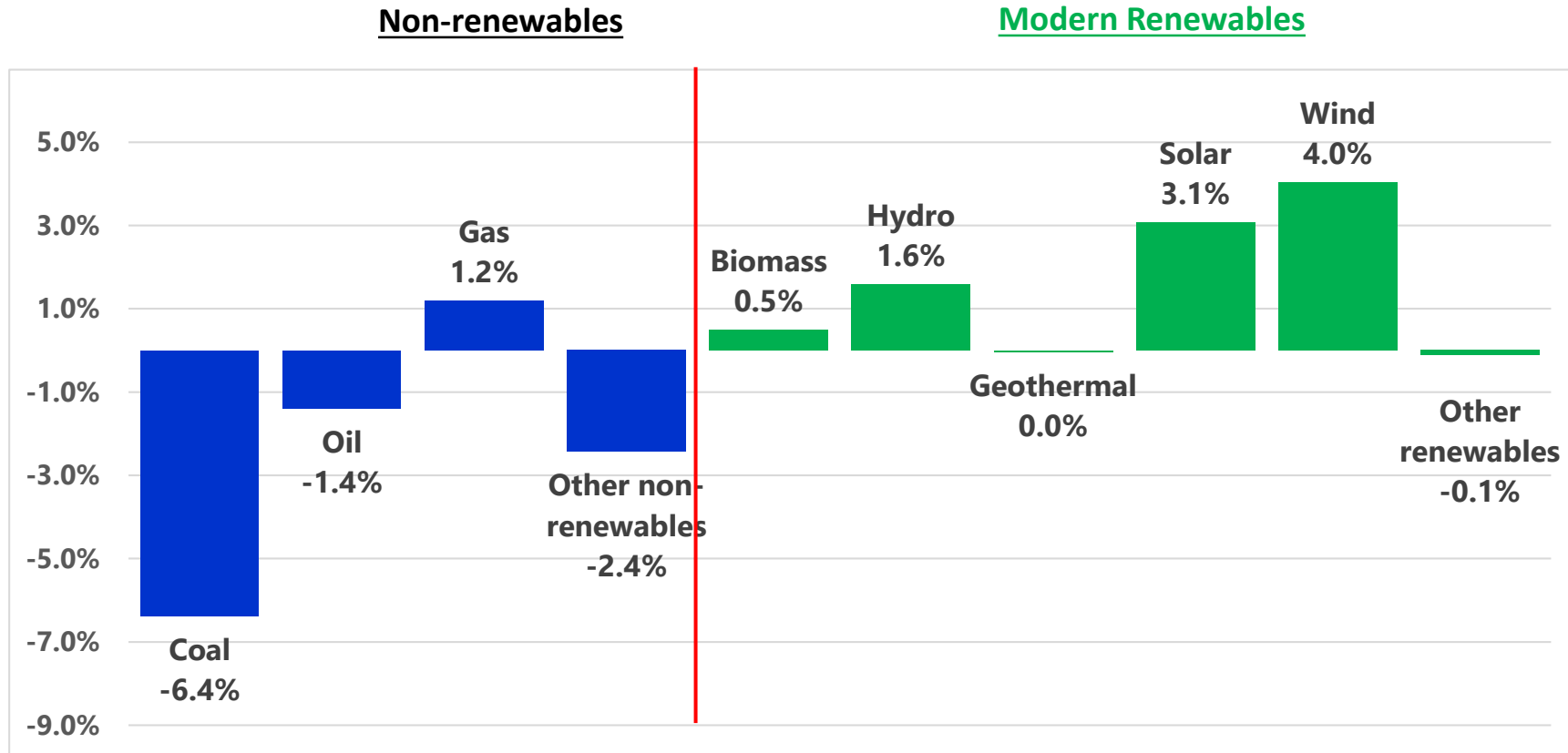
## Electricity Generation, TWh

	2010	2020	% change
<b>Non-renewables</b>	<b>11,358</b>	<b>13,158</b>	<b>15.8%</b>
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	87	98	11.7%
<b>Modern renewable energy</b>	<b>2,114</b>	<b>4,318</b>	<b>104.3%</b>
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	43	35	-17.8%
<b>Total</b>	<b>13,472</b>	<b>17,476</b>	<b>29.7%</b>
<b>Modern RE share</b>	<b>15.69%</b>	<b>24.71%</b>	<b>57.5%</b>

- 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



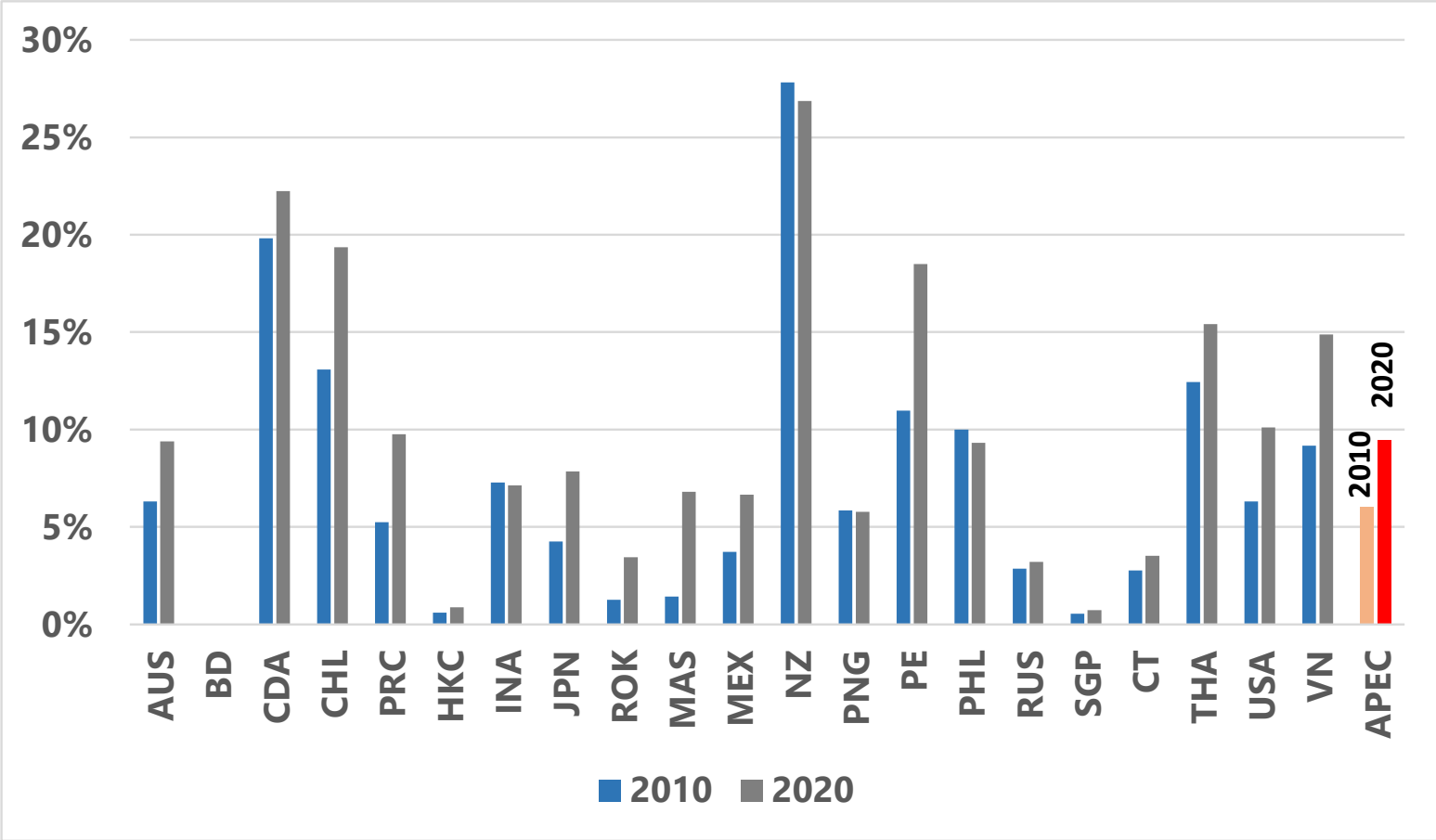
Note: Renewable energy includes electricity and heat generated from renewable energy sources

Source: APEC data.

- From 2010 to 2020, the renewable share increased 9.0 percentage points, 58% of the way to the goal.

# RE share of energy use varies widely by economy

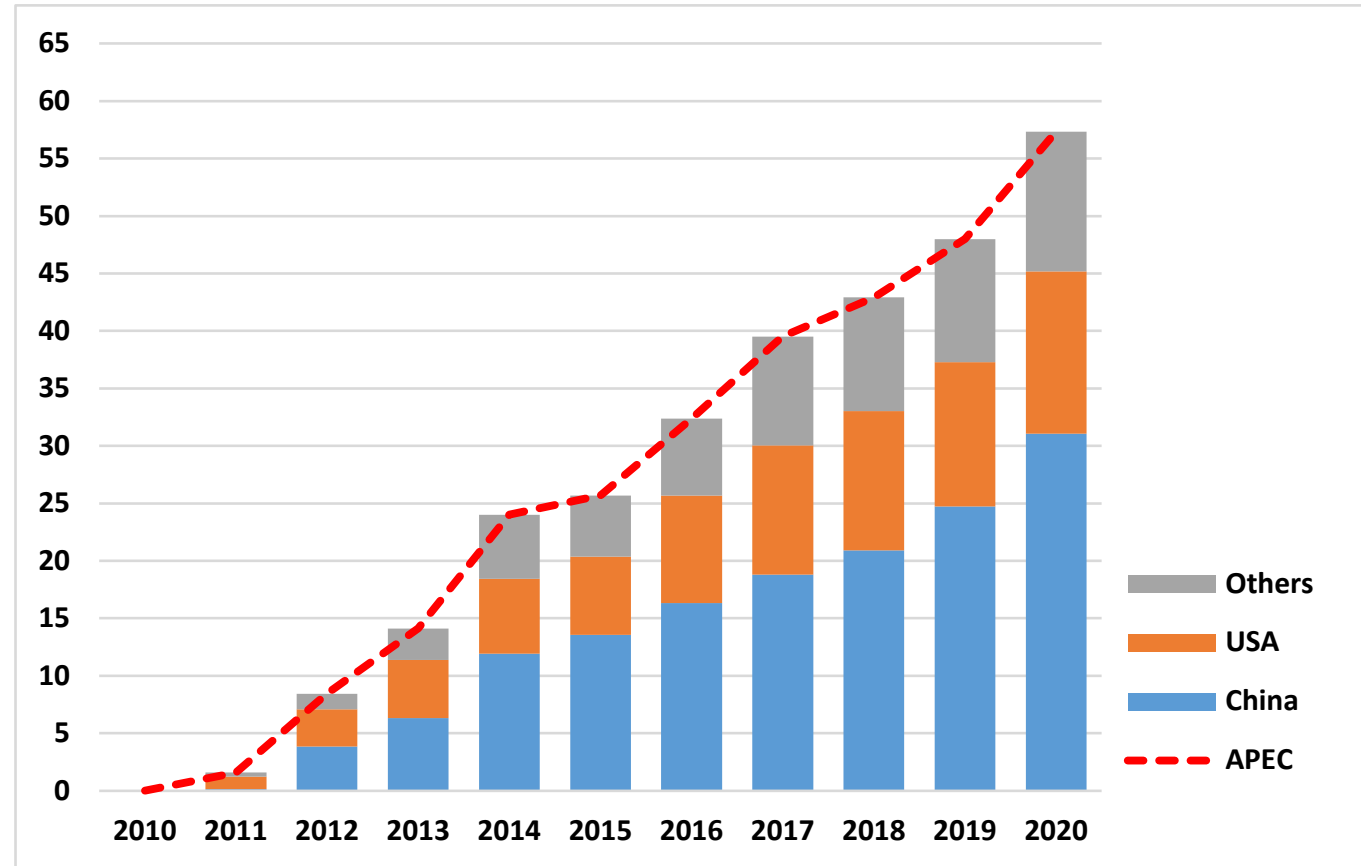
Renewable energy share of final energy consumption in 2010 and 2020



Note: the RE doubling goal is a collective goal.

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

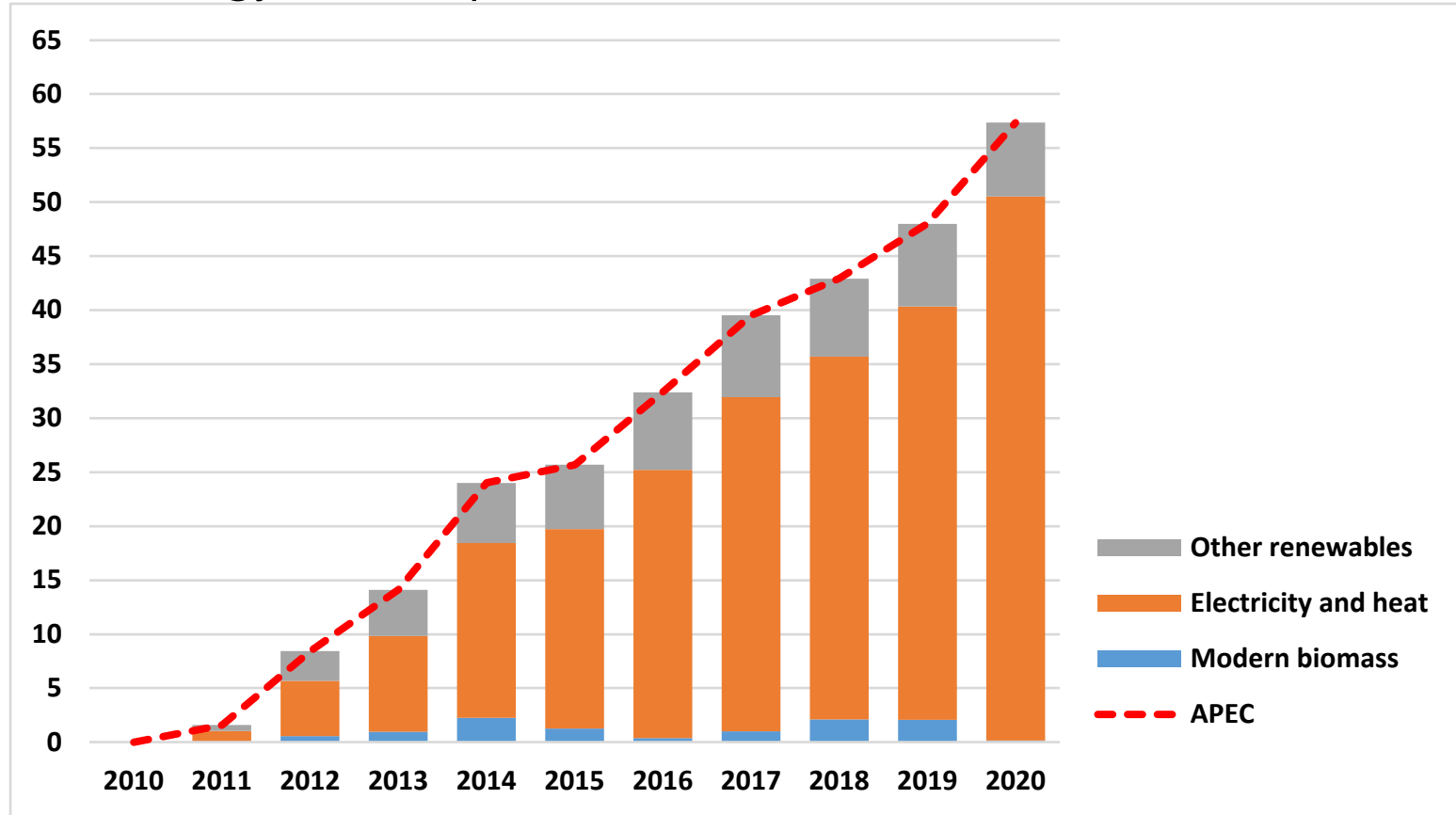
Regional contributions to the percentage increase in RE share of final energy consumption (FEC) relative to 2010



- Each column reflects the percentage increase in RE share of FEC relative to 2010
- Economy shares of 2010-2020 increase: China 54%, USA 25%, and other economies 21%

# 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



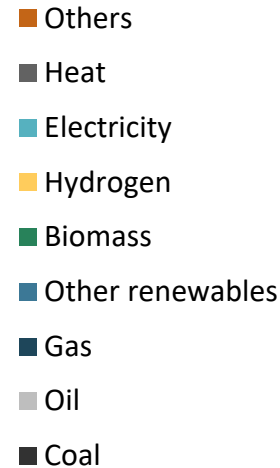
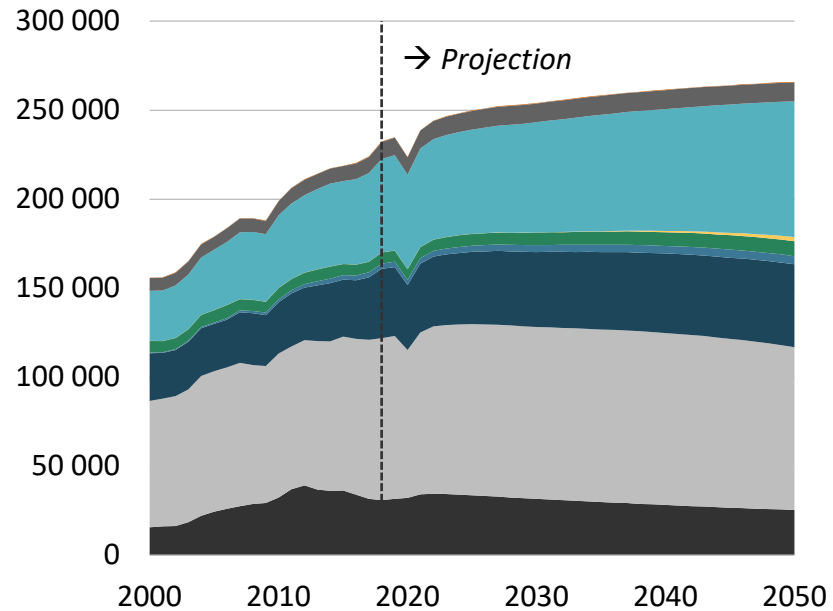
- Each column reflects the percentage increase in RE share relative to 2010
- Contributions: Electricity 88%, modern biomass 0.3%, other renewables 12%

# Projections from the *APEC Energy Demand and Supply Outlook 8<sup>th</sup> Edition*

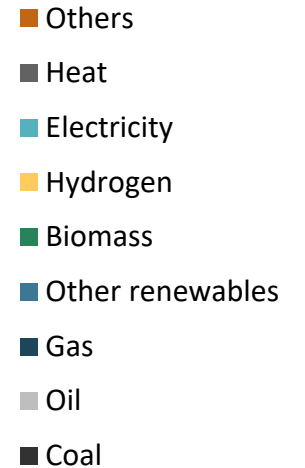
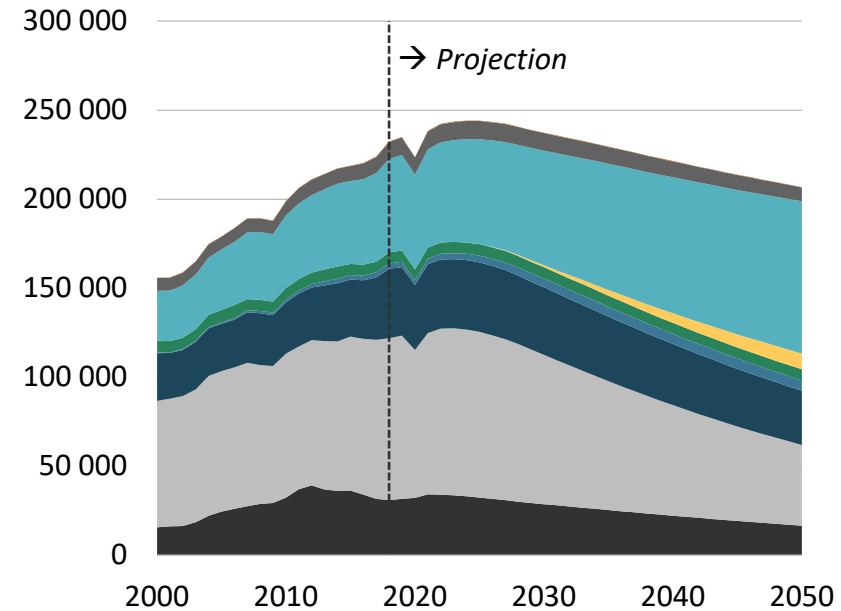


# Energy demand decouples significantly from economic activity

Energy demand by fuel in REF (PJ)



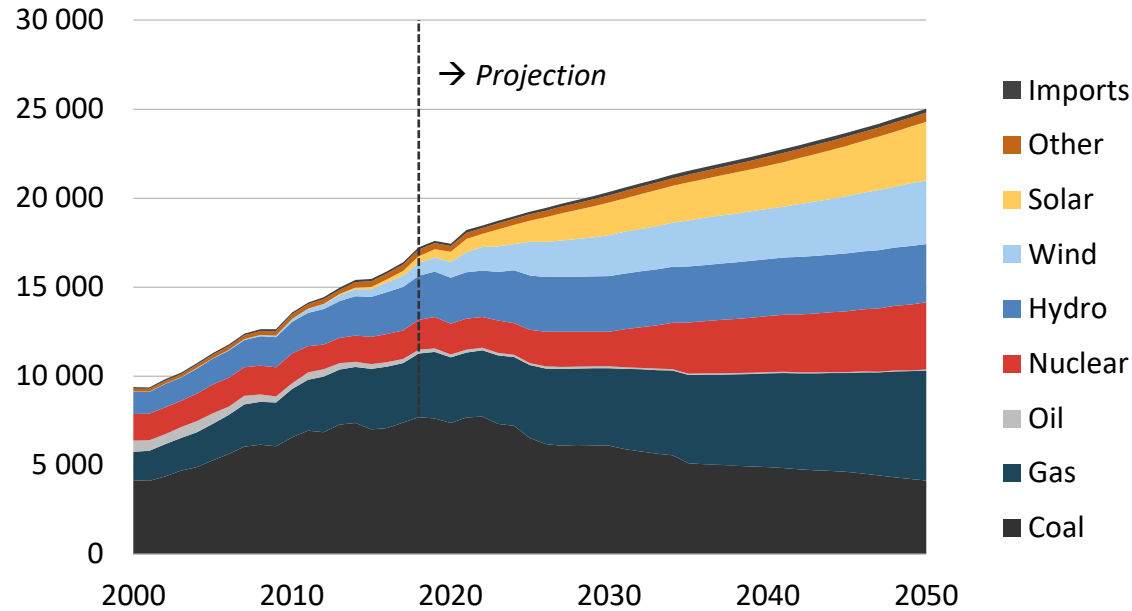
Energy demand by fuel in CN (PJ)



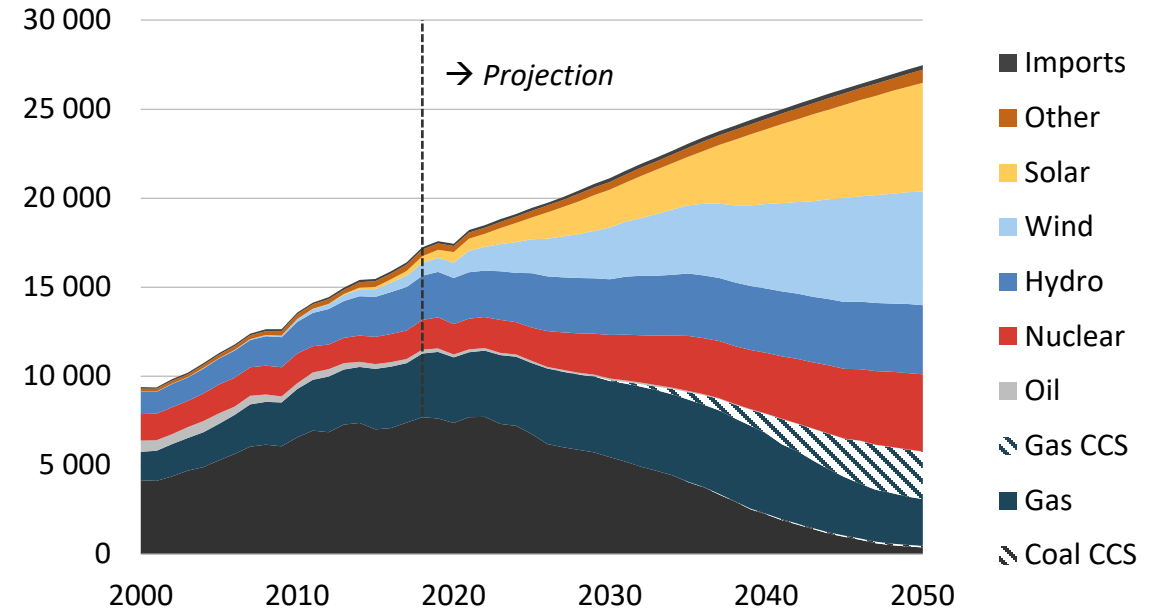
- In CN, energy efficiency and electrification enable energy demand to be 22% lower in 2050 relative to REF.
- In CN, energy use peaks in 2025.

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

Electricity generation in REF (TWh)



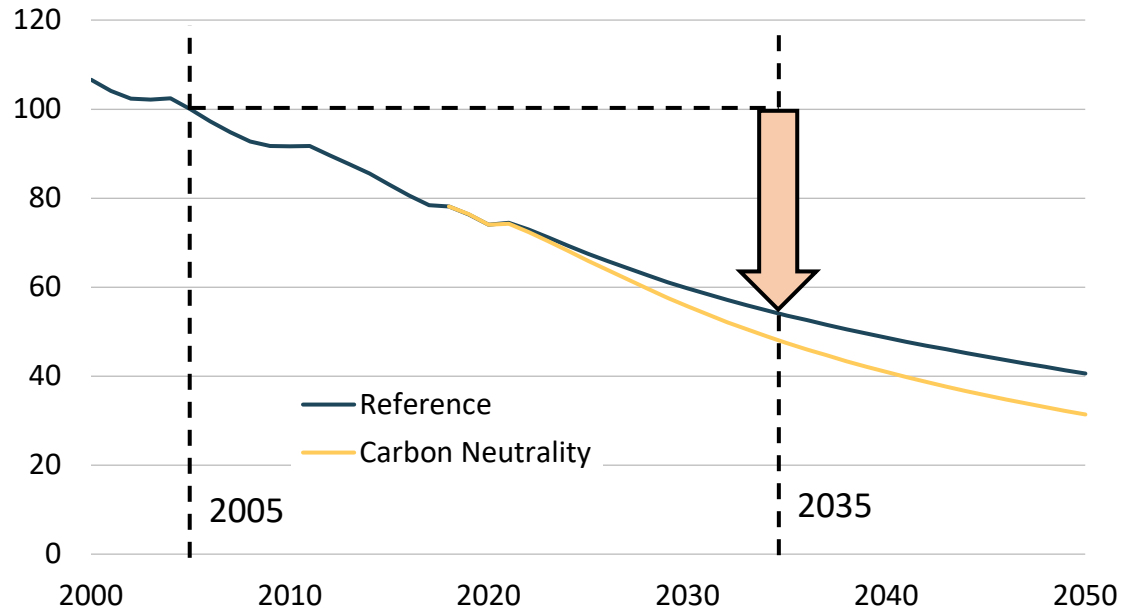
Electricity generation in CN (TWh)



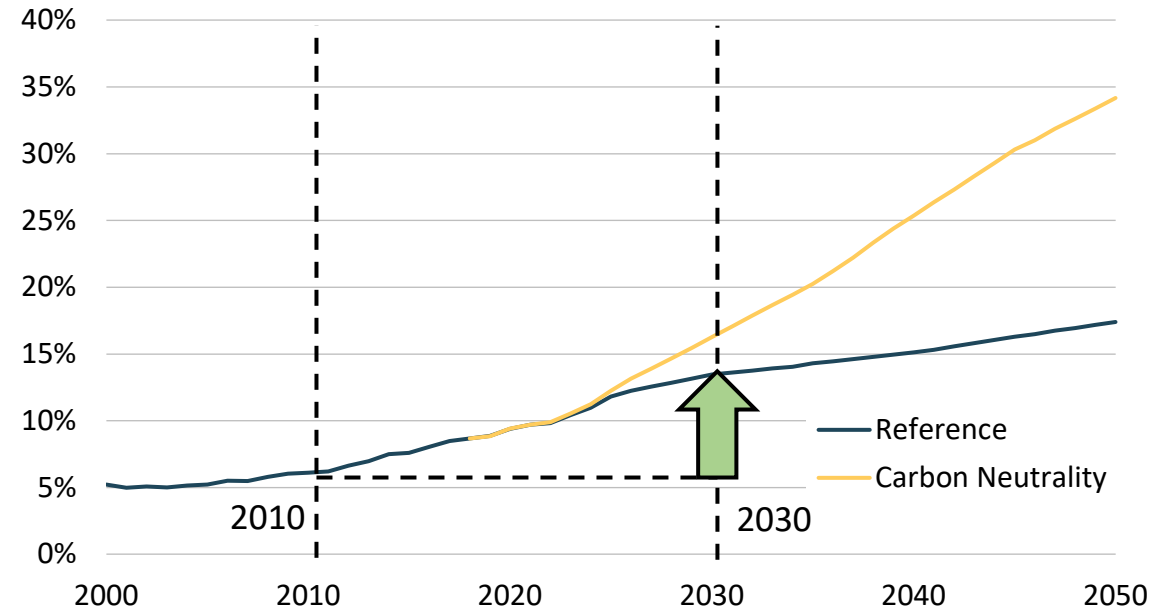
- Growth in electricity generation to meet increased demand, primarily in buildings and transport.
- Natural gas substitution for coal continues and provides balancing and ancillary services to the electric grid.

# 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 created uncertainty about near-term changes in energy intensity

COVID-19 lockdowns impacted the 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.**

**<https://aperc.or.jp>**

