14.a Report on Progress toward Energy Intensity Reduction Goal, Renewable Energy Doubling Goal, and Renewable Energy Capacity Tripling Goal

The 68th Meeting of APEC Energy Working Group (EWG68)

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Glen SWEETNAM, Senior Vice President (APERC)/EGEDA Chair

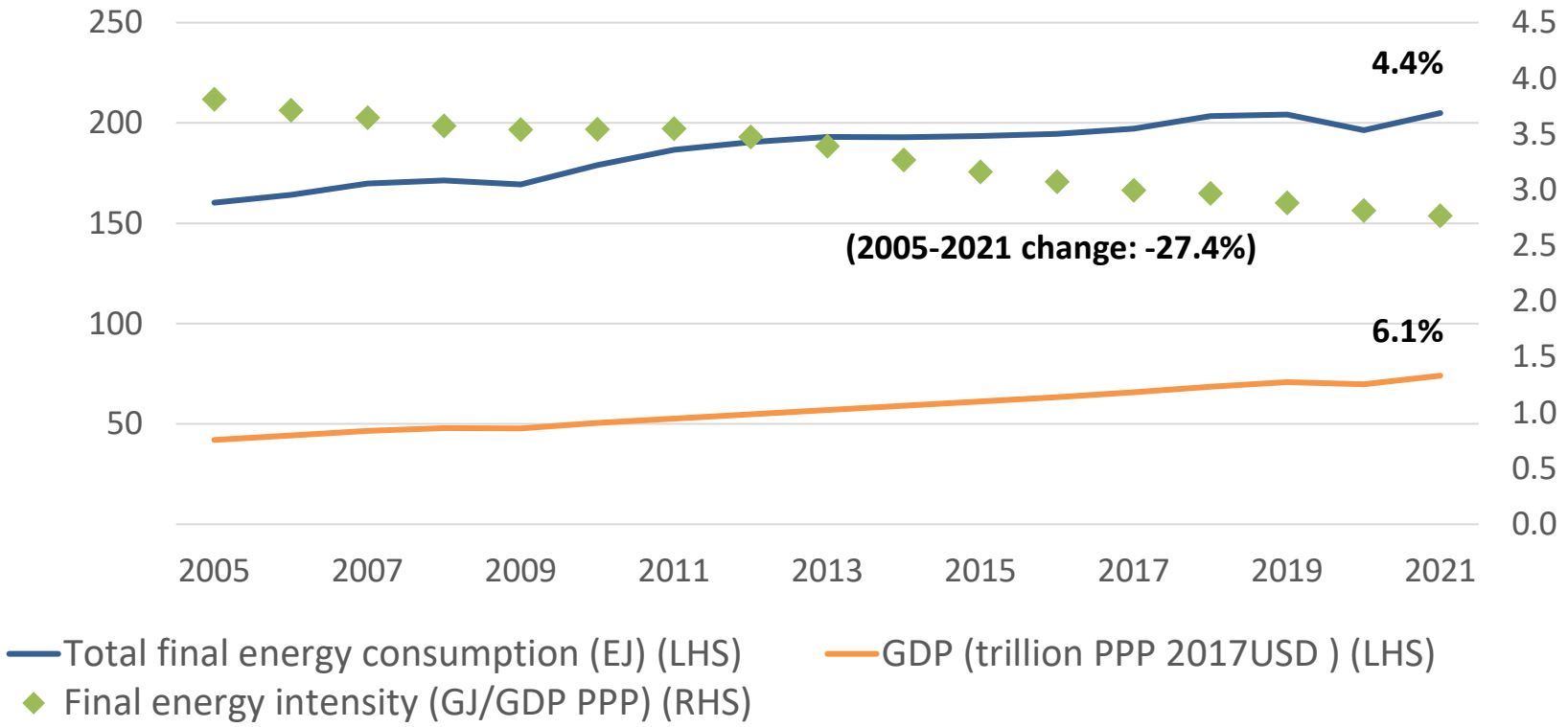
Outline

- Progress toward APEC's **energy intensity goal**
- Progress toward APEC's **renewable energy doubling goal**
- Starting point for declaration to pursue and encourage efforts to **triple global renewable energy capacity by 2030**

Progress toward APEC's energy intensity goal

Both energy and GDP rebounded in 2021

TFEC (EJ), GDP (trillion PPP 2017 USD), Final energy intensity (GJ/GDP PPP)



Sources: APEC statistics (EGEDA), APERC analysis

- Both total final energy consumption (TFEC) (+4.4%) and economic growth (+6.1%) rebounded in 2021
- Because GDP grew faster than energy consumption, energy intensity declined (-1.7%)

APEC final energy intensity continues to decline

Annual change in APEC final energy intensity, 2006-21

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2005-21
Change in Final Energy Consumption (FEC)	2.4%	3.5%	0.9%	-1.2%	5.7%	4.2%	2.0%	1.4%	-0.1%	0.3%	0.6%	1.3%	3.1%	0.4%	-3.9%	4.4%	27.9%
Change in GDP (PPP, constant 2017 US dollars)	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%	3.3%	-1.5%	6.1%	76.2%
Change in final energy consumption intensity	-2.7%	-1.8%	-2.0%	-0.9%	0.1%	0.1%	-2.1%	-2.3%	-3.7%	-3.3%	-2.8%	-2.5%	-0.9%	-2.8%	-2.4%	-1.7%	**-27.4%**

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

- Final energy intensity fell 27.4% between 2005 and 2021.
- Unlike the Great Recession in 2009, COVID 19 did not cause a reversal in final energy intensity in 2020/2021.

Primary energy intensity is now declining more slowly

Annual change in APEC primary energy intensity, 2006-21

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2005-21
Change in Primary Energy Supply (PES)	2.5%	3.3%	0.7%	-0.1%	5.2%	3.9%	1.0%	1.8%	0.1%	-0.6%	0.5%	1.7%	3.6%	1.8%	-2.3%	5.7%	32.9%
Change in GDP (PPP, constant 2017 US dollars)	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%	3.3%	-1.5%	6.1%	76.2%
Change in primary energy supply intensity	-2.5%	-1.9%	-2.2%	0.2%	-0.4%	-0.2%	-3.1%	-2.0%	-3.5%	-4.1%	-2.8%	-2.1%	-0.5%	-1.5%	-0.8%	-0.4%	**-24.6%**

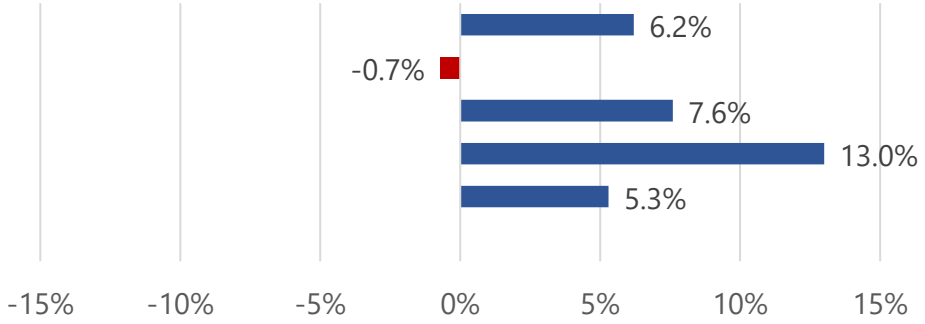
Sources: APEC statistics (EGEDA), WB (GDP PPP), CT (WEO), APERC analysis

- Primary energy intensity reduced by 24.6% between 2005-2021.
- Since 2018, primary energy intensity appears to be declining more slowly than final energy intensity.

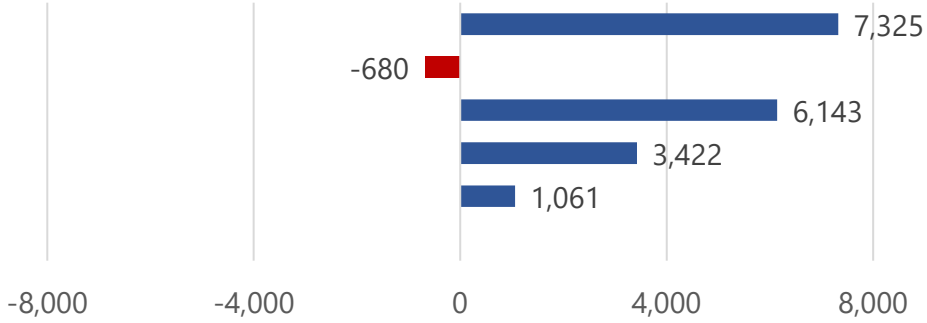
From 2018 to 2021, renewables grew faster -- but from a smaller base

TPES

% change: 2018 to 2021



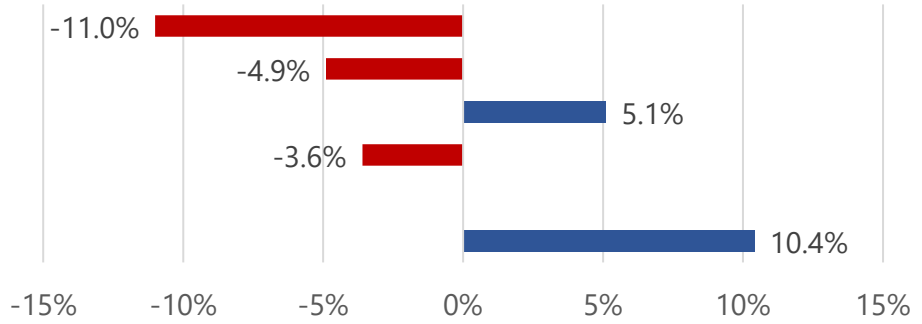
PJ change: 2018 to 2021



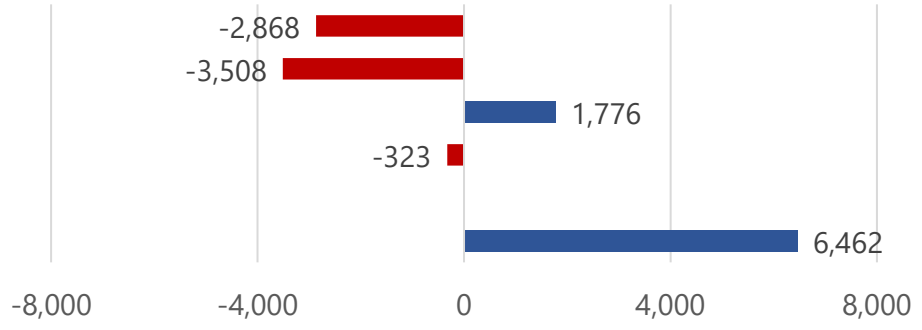
Coal
Oil
Gas
Renewables
Other
Electricity

TFEC

% change: 2018 to 2021



PJ change: 2018 to 2021

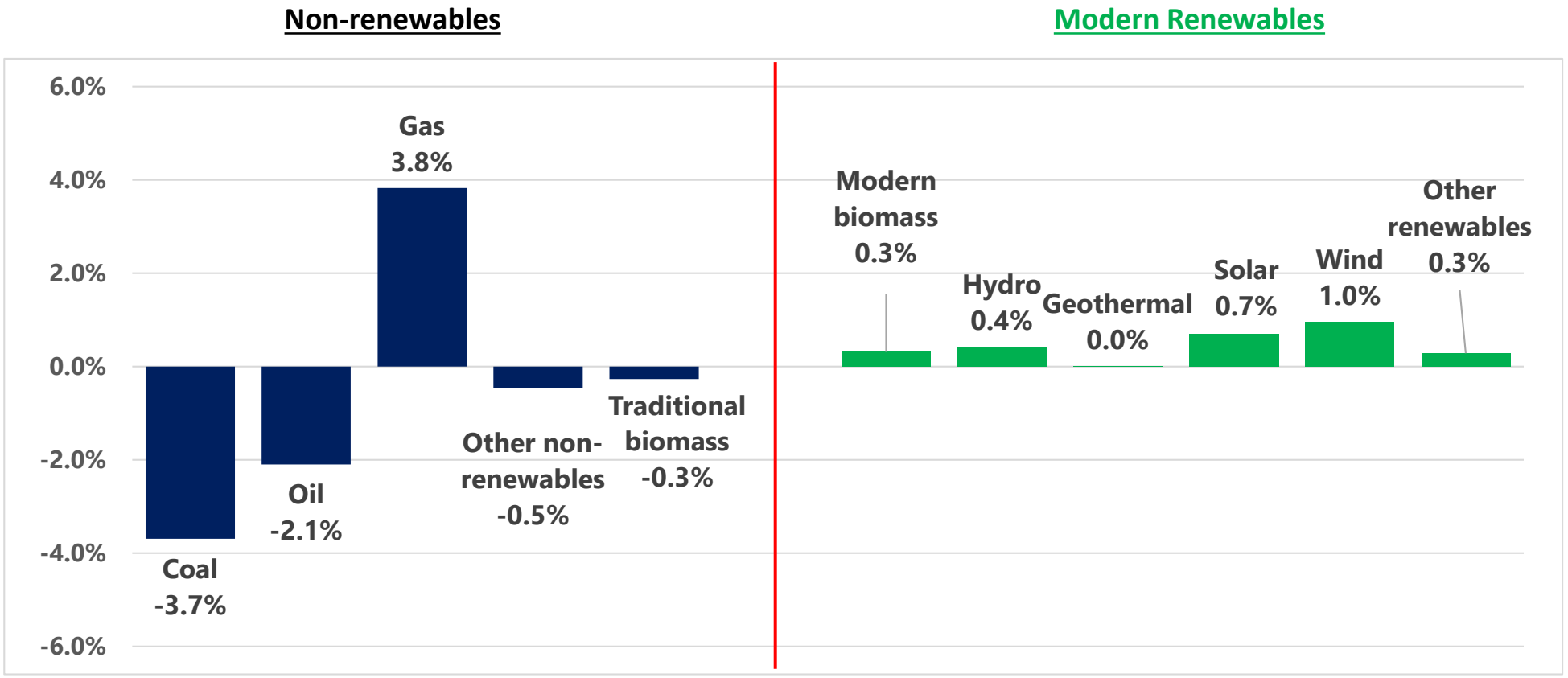


- For TFEC, electricity grew faster than all other fuels both in terms of percentage and absolute quantity.
- In terms of percentage change, renewables in total primary energy supply (TPES) grew twice as fast as coal or gas; but in terms of quantity, TPES coal and gas both grew twice as much as renewables.

Progress toward APEC renewables doubling goal

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

Percent change in fuel shares in **primary energy supply**, 2010-2021



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

Source: APEC data

- From 2010 to 2021, the renewable share increased by 2.7 percentage points, 56% of the way to the goal.

Renewable energy continues to gain share

Primary energy supply, PJ

	2010	2021	% change
Non-renewables	**288,015**	**332,038**	**15.3%**
Coal	117,088	125,186	6.9%
Oil	90,002	98,909	9.9%
Gas	61,630	86,765	40.8%
Other non-renewables	19,296	21,178	9.8%
Traditional biomass	**3,209**	**2,836**	**-11.6%**
Modern renewable energy	**14,578**	**26,970**	**85.0%**
Modern biomass	4,147	6,047	45.8%
Hydro	6,335	9,016	42.3%
Geothermal	1,471	1,793	21.9%
Solar	157	2,687	1615.0%
Wind	586	4,169	611.8%
Other renewables	1,883	3,259	73.1%
Total	**305,803**	**361,845**	**18.3%**
Modern RE share	**4.77%**	**7.45%**	**56.3%**

Final energy consumption, PJ

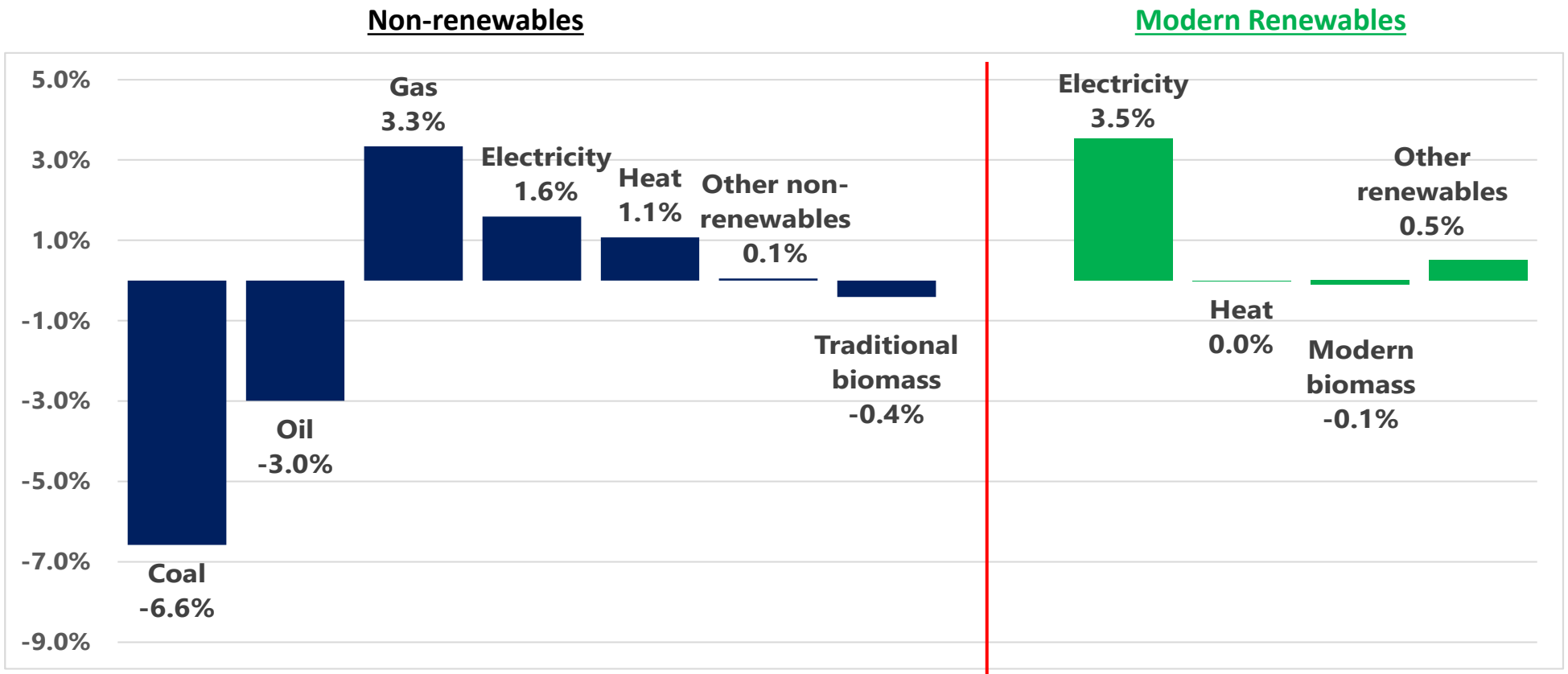
	2010	2021	% change
Non-renewables	**165,064**	**181,698**	**10.1%**
Coal	31,981	23,127	-27.7%
Oil	64,230	67,375	4.9%
Gas	26,187	36,806	40.6%
Electricity	34,571	42,827	23.9%
Heat	7,882	11,213	42.3%
Other non-renewables	213	350	63.9%
Traditional biomass	**3,209**	**2,836**	**-11.6%**
Modern renewable energy	**10,705**	**20,298**	**89.6%**
Electricity	6,233	14,358	130.3%
Heat	65	58	-10.5%
Modern biomass	2,824	3,016	6.8%
Other renewables	1,583	2,866	81.0%
Total	**178,978**	**204,832**	**14.4%**
Modern RE share	**5.98%**	**9.91%**	**65.7%**

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

Source: APEC data.

In final energy use, the pattern was similar

Percent change in fuel shares in **final energy consumption**, 2010-2021



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

Source: APEC data.

- From 2010 to 2020, the renewable share increased 3.9 percentage points, 66% of the way to the goal.

Renewable power generation doubled over the last decade

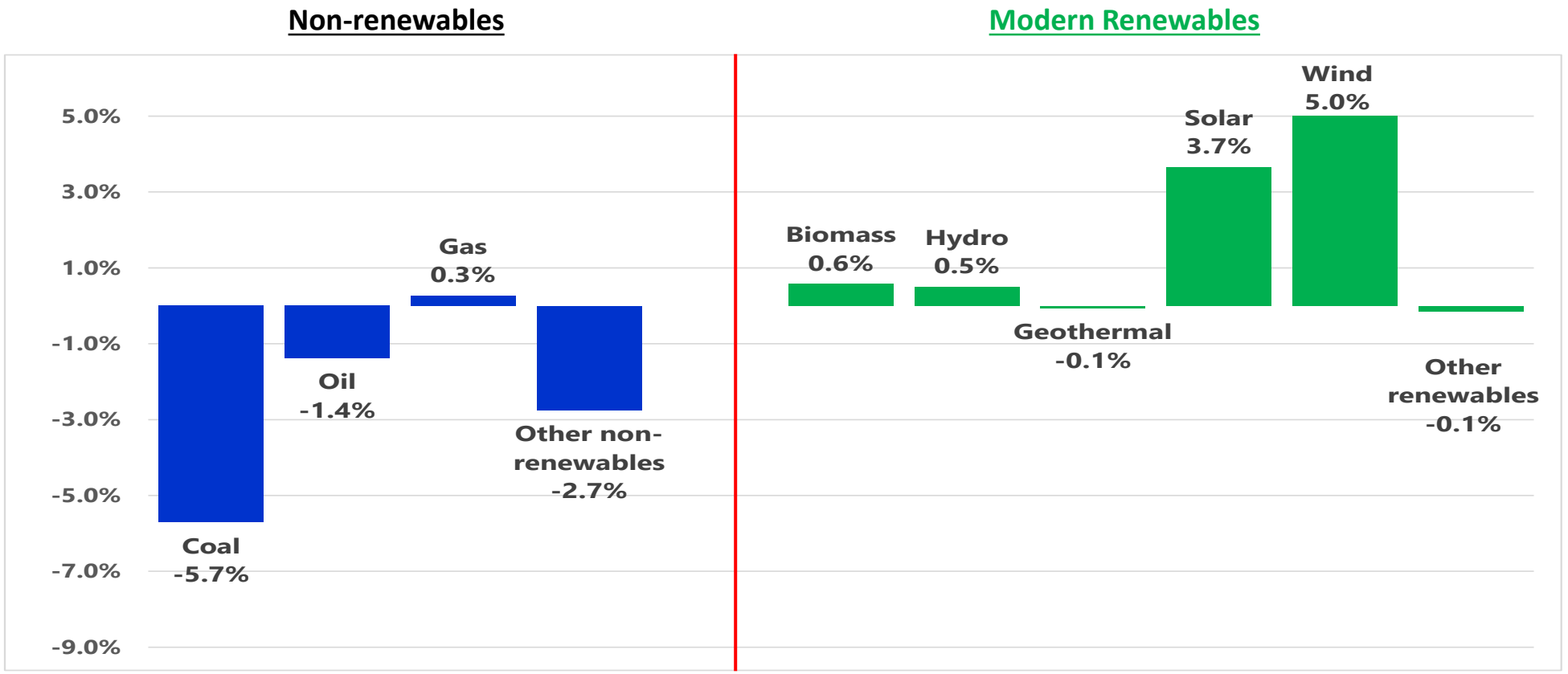
Electricity Generation, TWh

	2010	2021	% change
Non-renewables	**11,358**	**13,908**	**22.4%**
Coal	6,576	8,020	22.0%
Oil	324	190	-41.1%
Gas	2,713	3,797	39.9%
Nuclear	1,658	1,804	8.8%
Other non-renewables	87	96	9.5%
Modern renewable energy	**2,114**	**4,696**	**122.2%**
Modern biomass	67	201	199.1%
Hydro	1,780	2,551	43.3%
Geothermal	53	62	17.9%
Solar	9	693	7595.3%
Wind	163	1,158	611.7%
Other renewables	42	32	-24.6%
Total	**13,472**	**18,603**	**38.1%**
Modern RE share	**15.69%**	**25.24%**	**60.9%**

- In 2021, modern renewable energy provided a quarter of total power generation.

Coal and oil lost shares to renewables and gas

Percent change in electricity generation market share, 2010-2021

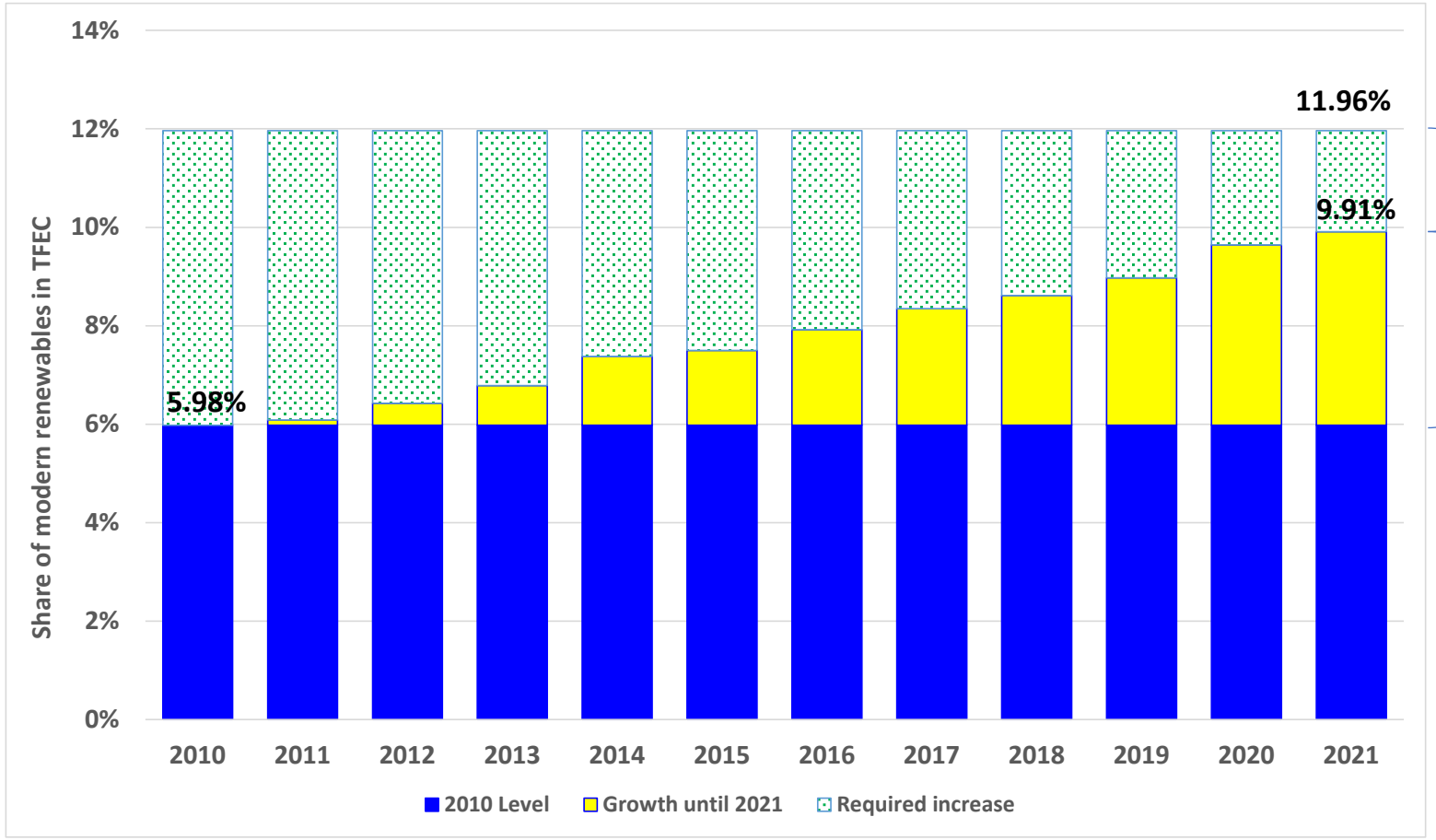


Note: Renewable energy includes electricity and heat generated from renewable energy sources

Source: APEC data.

- From 2010 to 2021, the renewable share increased by almost ten percentage points, 61% of the way to the goal.

Tracking the APEC renewable energy doubling goal

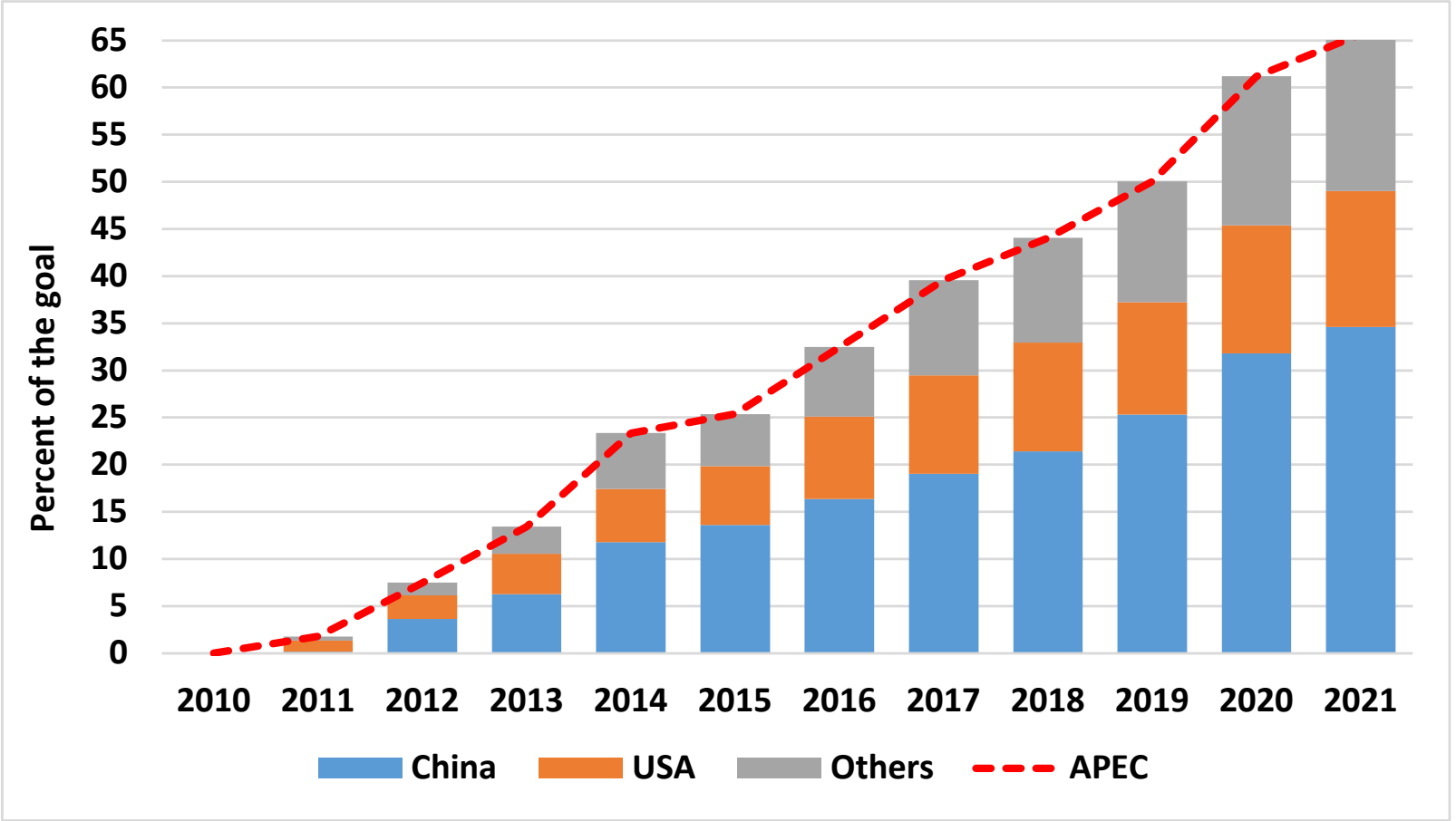


Just 2.05 percentage points more in the next 9 years

3.93 percentage points increase in the last 11 years

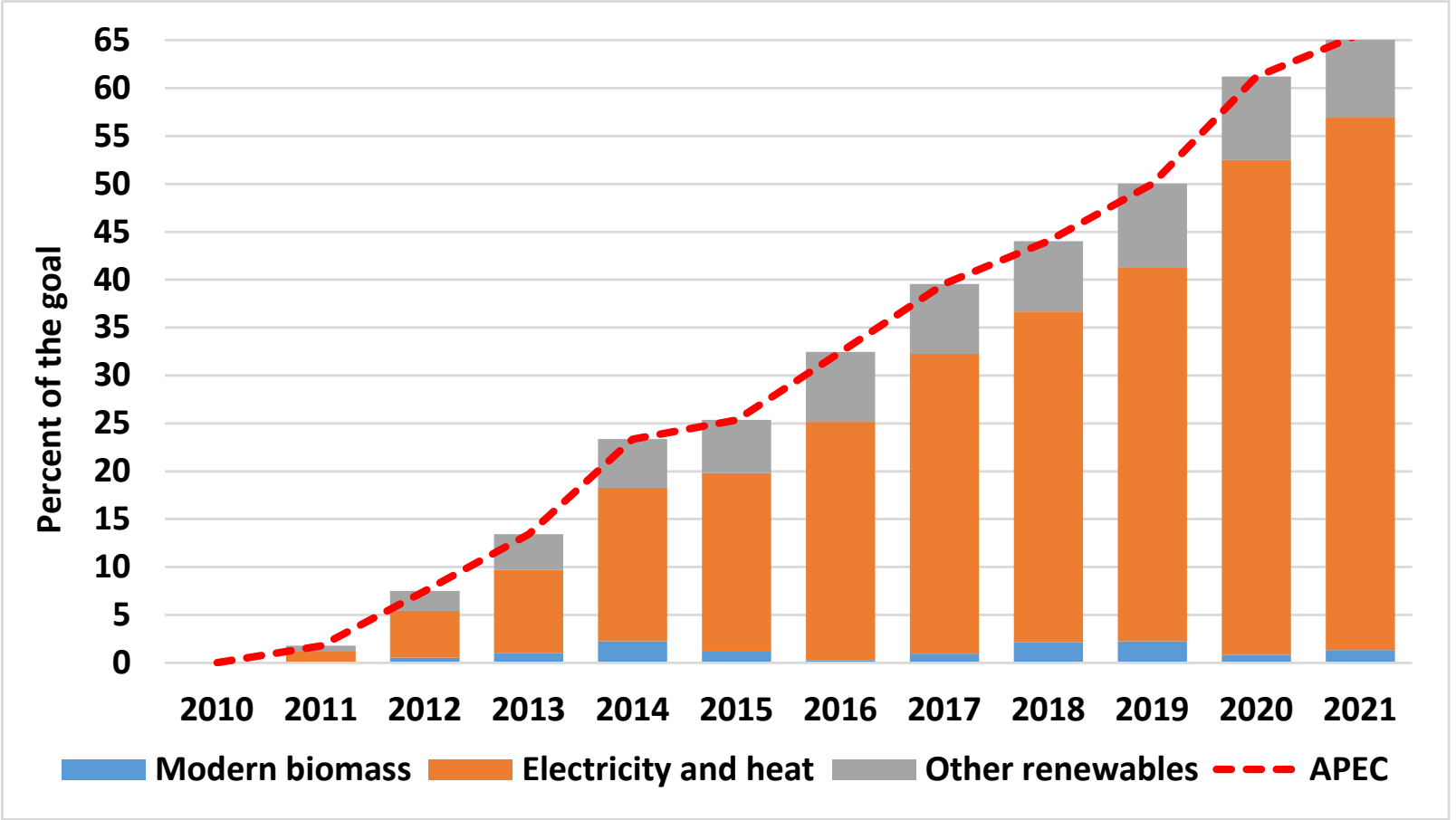
- In 2021, which is still 9 years to 2030, APEC has increased RE share in final energy consumption by 3.93 percentage points, needing to increase by just 2.05 percentage points more in the next 9 years (2022 to 2030).

China and the USA are the main sources of renewable energy growth



- China's renewable energy share increased by 2.7 times from 2010 to 2021; that of the USA increased by 1.6 times during the same period. The rest of APEC also increased by 1.6 times.

Electricity generation is the main source of renewable energy growth



- Electricity generation accounted for 85% of the total increase in renewable energy share; other renewables for 13%, while modern biomass for 2%.

Pursuing and encouraging efforts to triple global renewable energy capacity by 2030

Support for tripling global renewable energy capacity

COP28 Declaration (excerpt)

To accelerate the energy transition, the COP 28 Presidency took a leading role in launching the Global Renewables and Energy Efficiency Pledge. With the endorsement of 130 national governments (as of 11 December, including the European Union (EU)), the Pledge stipulates that signatories commit to work together ***to triple the world's installed renewable energy generation capacity to at least 11,000 GW by 2030…..***

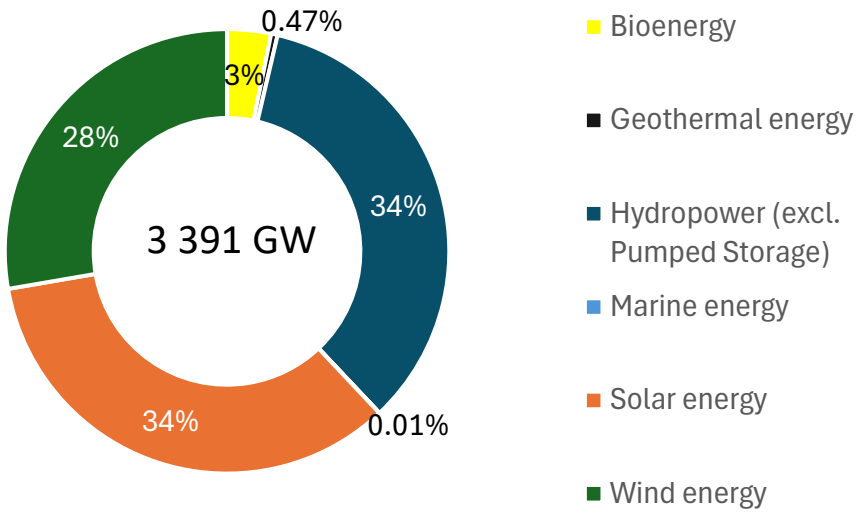
(COP28 UAE, 2023)

2023 APEC Leaders' Golden Gate Declaration (excerpt)

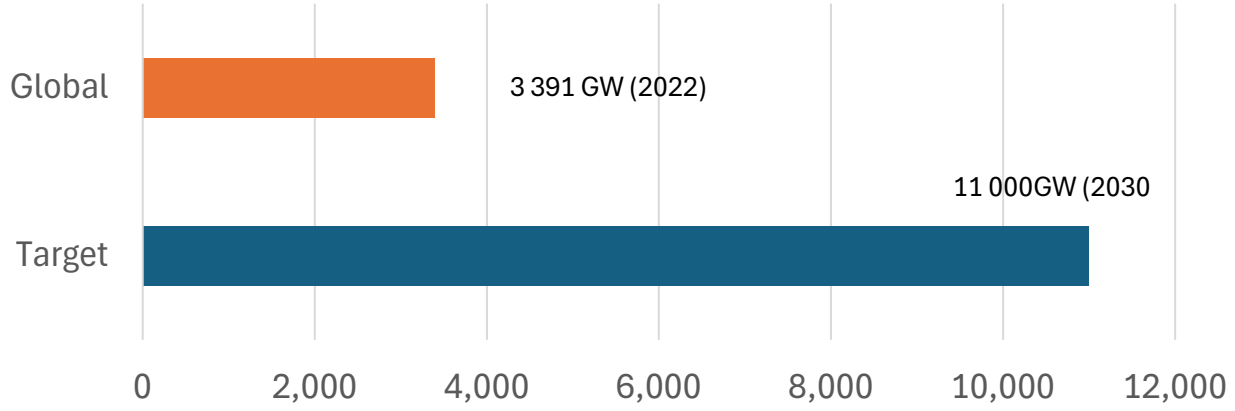
We will pursue and encourage efforts to triple renewable energy capacity globally through existing targets and policies as well as demonstrate similar ambition with respect to other zero and low emissions technologies including abatement and removal technologies in line with domestic circumstances by 2030.

Global installed renewable energy capacity in 2022

Estimated global RE capacity (GW)



Current and target global RE generation capacity

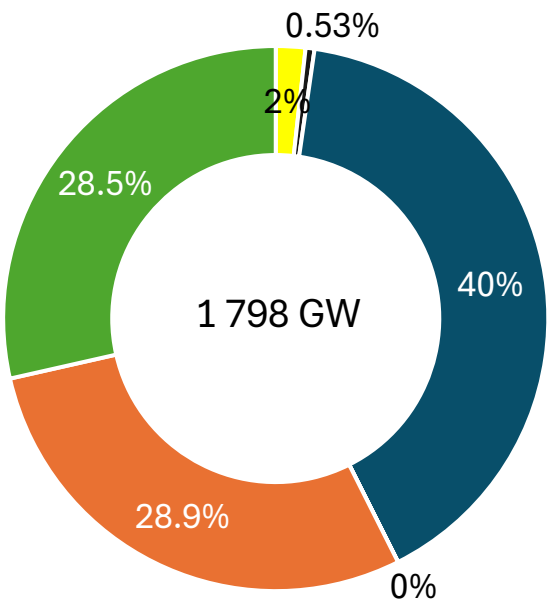


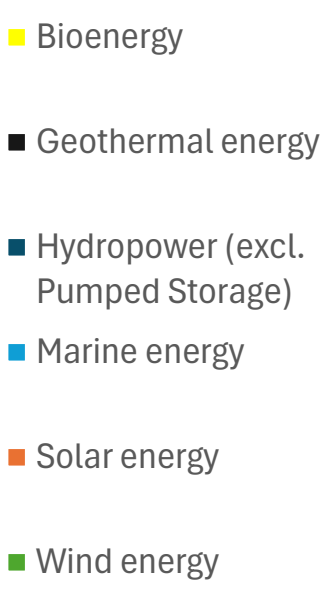
Source for both figures: IRENA

- The COP28 target for 2030 is 11 000 GW of installed renewable generation capacity.
- In 2022, IRENA estimates that hydropower, solar, and wind represented roughly equal shares of installed renewable generation capacity.

APEC's share of global RE capacity

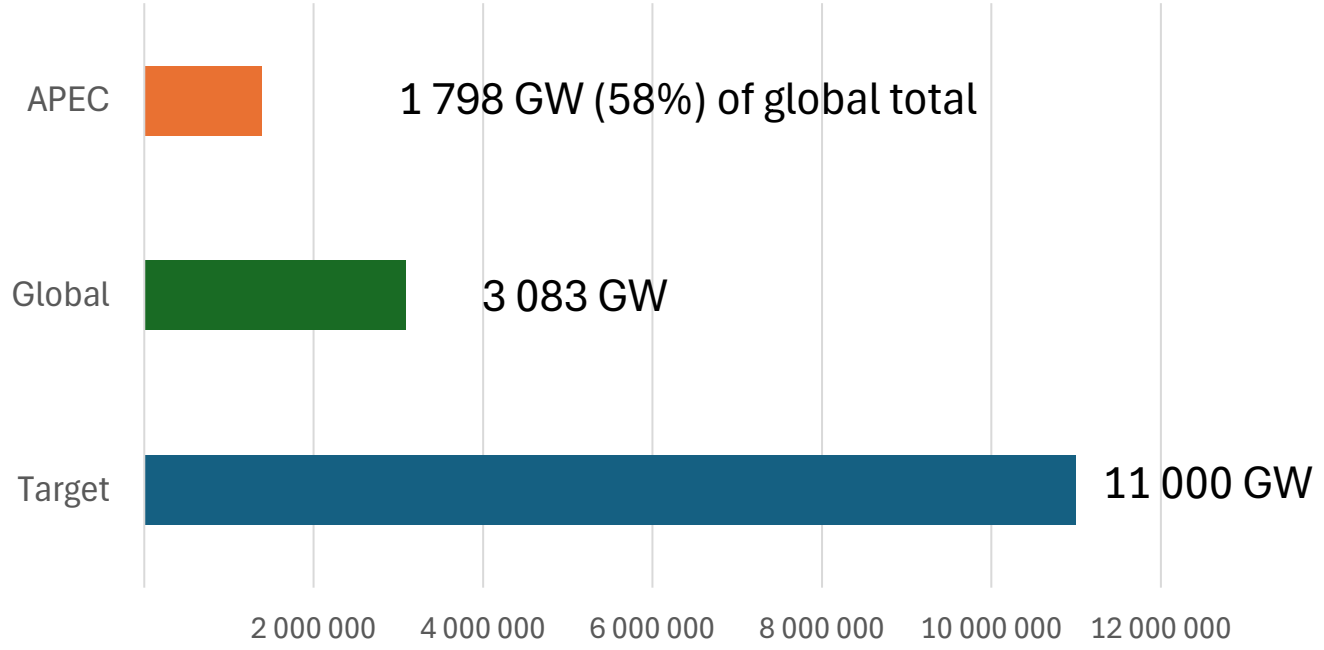
Estimated APEC RE capacity (GW), 2021





Source: EGEDA

2021 APEC and 2021 global relative to 2030 target



Sources: APEC - EGEDA, global - IRENA

- In 2021, APEC accounted for approximately 58% of global total RE generation capacity.
- Going forward, EGEDA will report on APEC's RE generation capacity.

Summary

- Following the pandemic, APEC GDP and energy consumption both rebounded.
- In 2021, GDP grew more quickly than energy consumption, so relative to 2020, energy intensity declined even as total energy consumption increased.
- Renewable energy was the fastest growing energy source in APEC in 2021.
- Based on history and APERC projections:
  - APEC is likely to meet its final energy intensity goal by 2035.
  - APEC is almost certain to meet its renewable energy doubling goal.
- In 2021, APEC accounted for approximately 58% of global renewable generation capacity.

APERC/EGEDA will continue to track energy intensity, renewable energy share, and RE generation capacity.

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Thank you.

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