

APEC Renewable Energy Forecast

Challenges from RE side to achieved APEC energy goals

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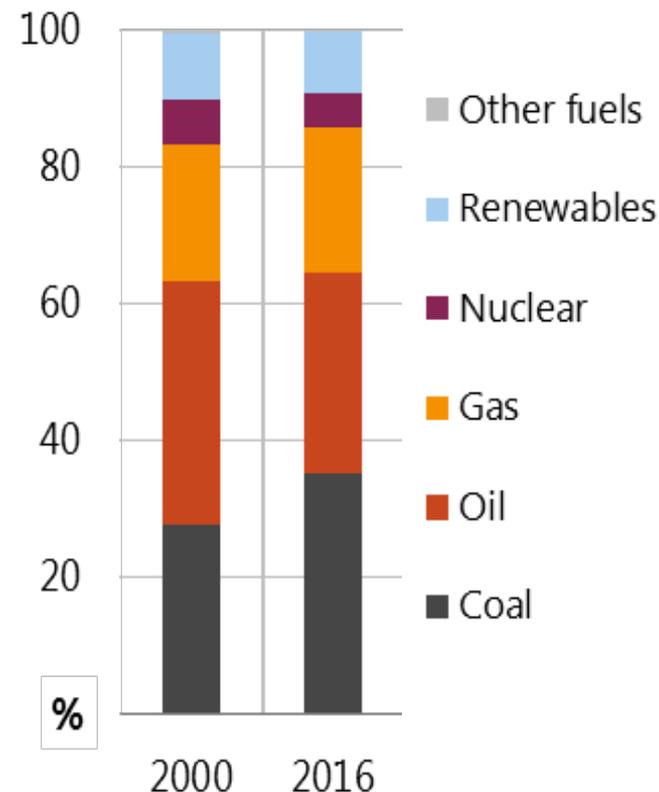
What does APERC's Outlook do?

Challenges faced by APEC economies:

- Affordably meet growing energy demand
- Reduce negative energy-related environmental impacts
- Enhance energy security and resilience

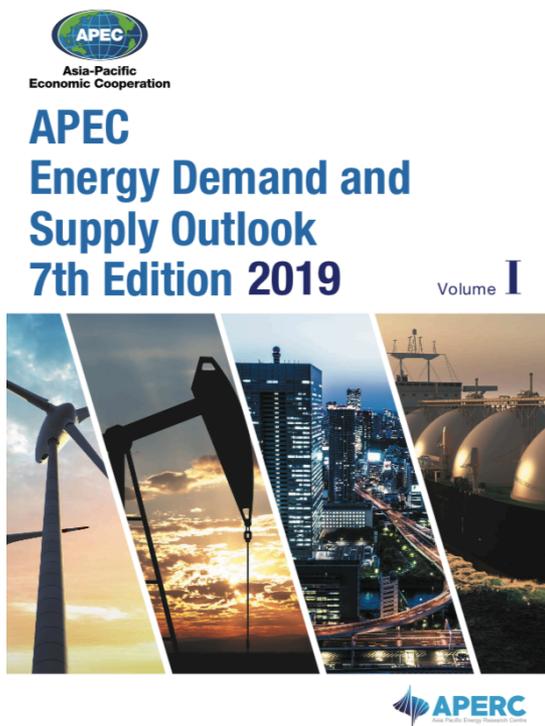
APERC's 7th Edition Outlook aims to answer:

- What would energy demand, supply, and emissions in APEC look like in 2050, based on present practices?
- How can we achieve global decarbonisation goals?
- How would acting on such goals change future energy demand, supply, investment, or security?



APEC primary energy supply mix [%]

Renewables modelling in the 7th Edition



- Integrated renewables analysis into Demand and Power models;
- Improved policy analysis, incorporate technical limits etc.;
- Expanded list of renewable technologies: separated large, medium, small and pumped hydro; onshore and offshore wind; and introduced concentrated solar power and marine energy;
- Improved hourly demand and generation data (load curves) to quantify the impacts of variable renewables in Electricity;
- Assessed potential for renewable heating and cooling;
- Based on historical data availability biomass is counted as traditional in Residential and Commercial buildings and Agricultural and non-specified.

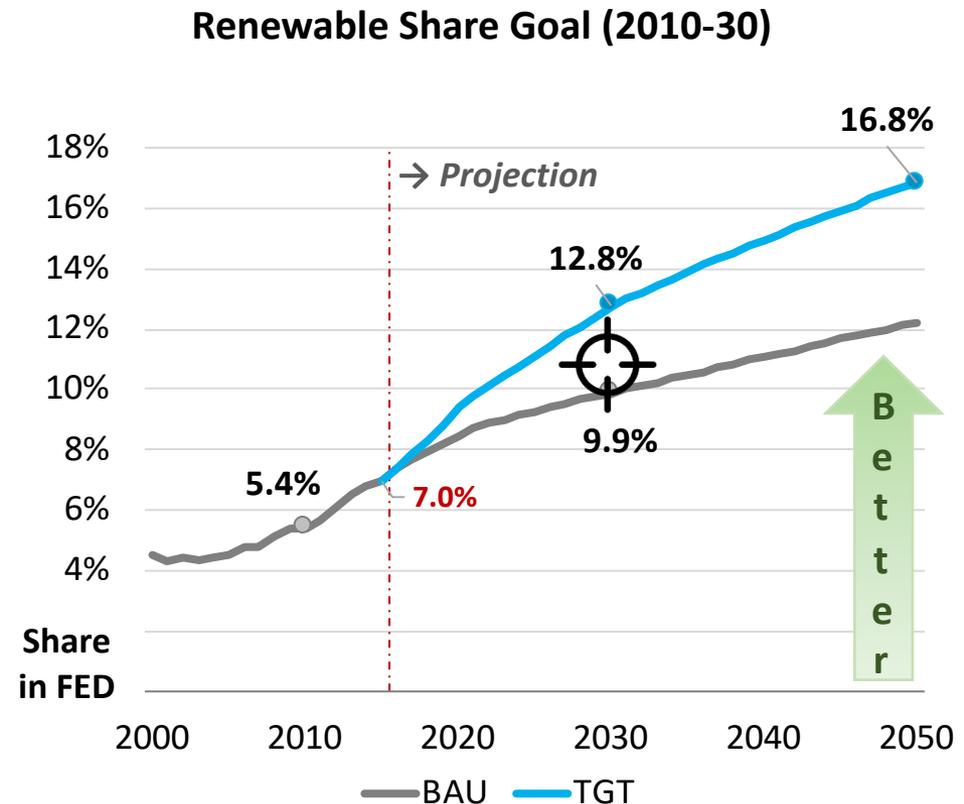
Scenarios

Business-as-Usual (BAU)	APEC Target (TGT)	2-Degrees Celsius (2DC)
Recent trends and current policies.	Pathway that achieves APEC-wide goals to <ul style="list-style-type: none">• reduce energy intensity 45% by 2035• double the share of renewables by 2030.	Pathway that provides a 50% chance of limiting the average global temperature rise to 2°C.
Provides a baseline for comparison.	Explores implications of alternative scenarios and identifies gaps to overcome.	

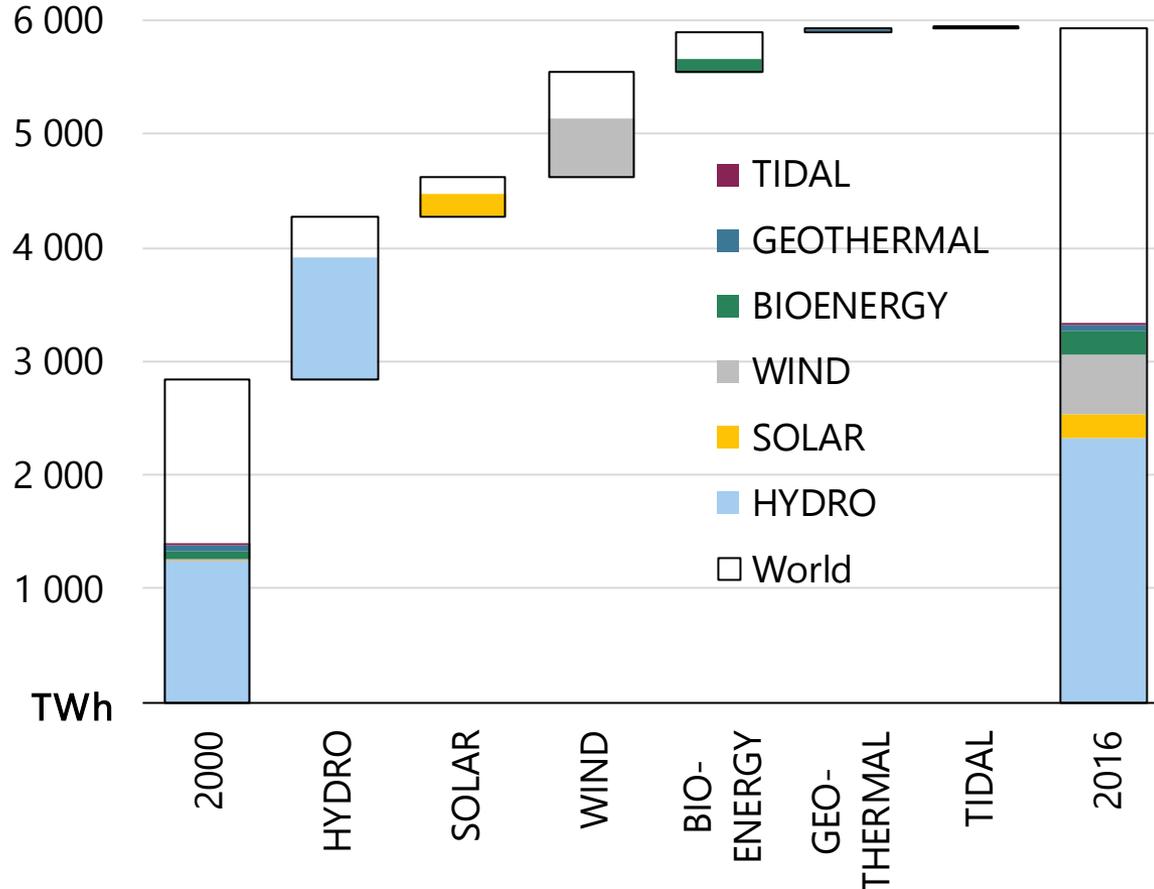
APEC aspirational goal: A super wicked problem

APEC is poised to achieved its aspirational goal to reduce the energy intensity 45% (2035) and double the share of RE by 2030.

- The APEC energy intensity goal is met but the renewable share doubling goal is not. (renewable share falls just short of the goal).
- Efficiency, renewables, nuclear and CCS are all required for COP 21 goals



In 2016, APEC generated 56% of global renewable energy (TWh)

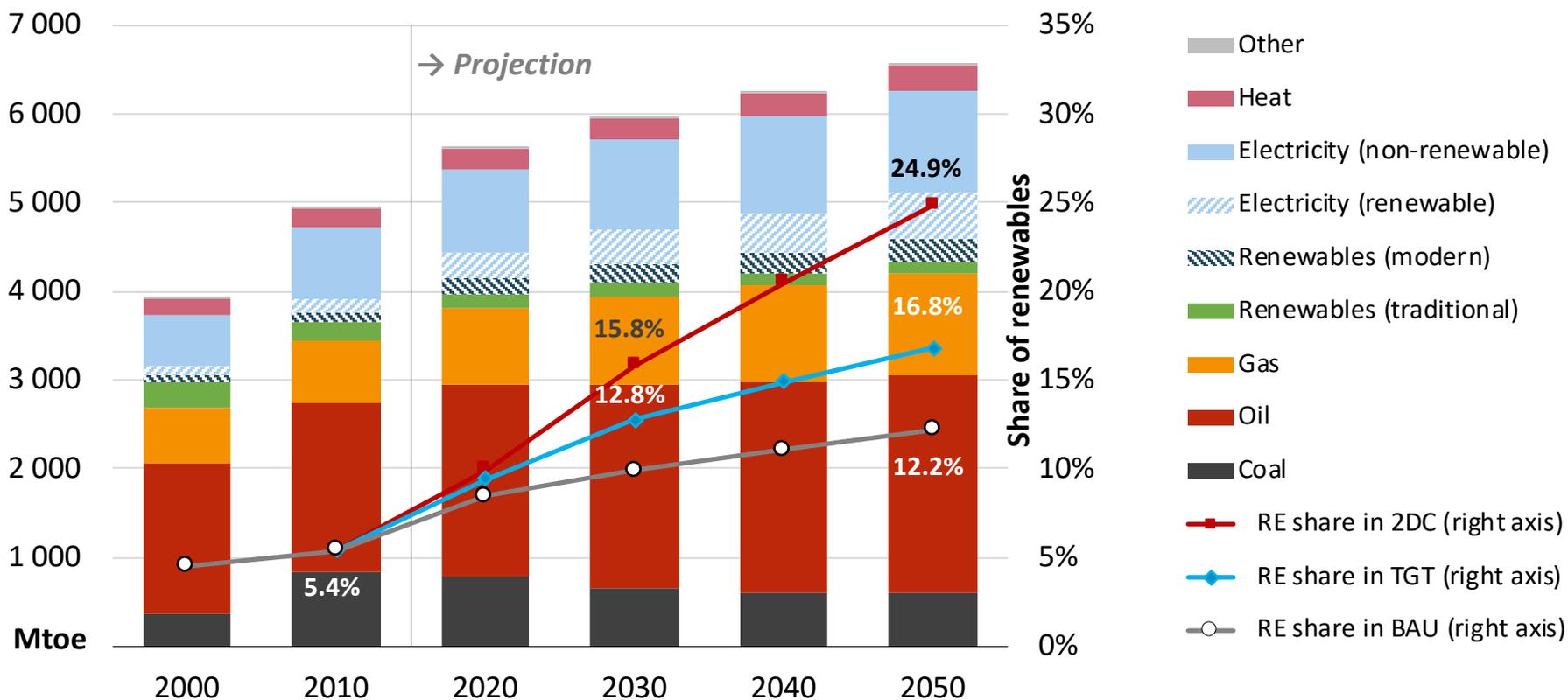


- In 2000-16, APEC generated 49% to 56% of global renewables electricity.
- Key drivers have been hydro and wind generation.

Sources: IRENA (2018), APERC analysis.

Share of renewables grows in all scenarios

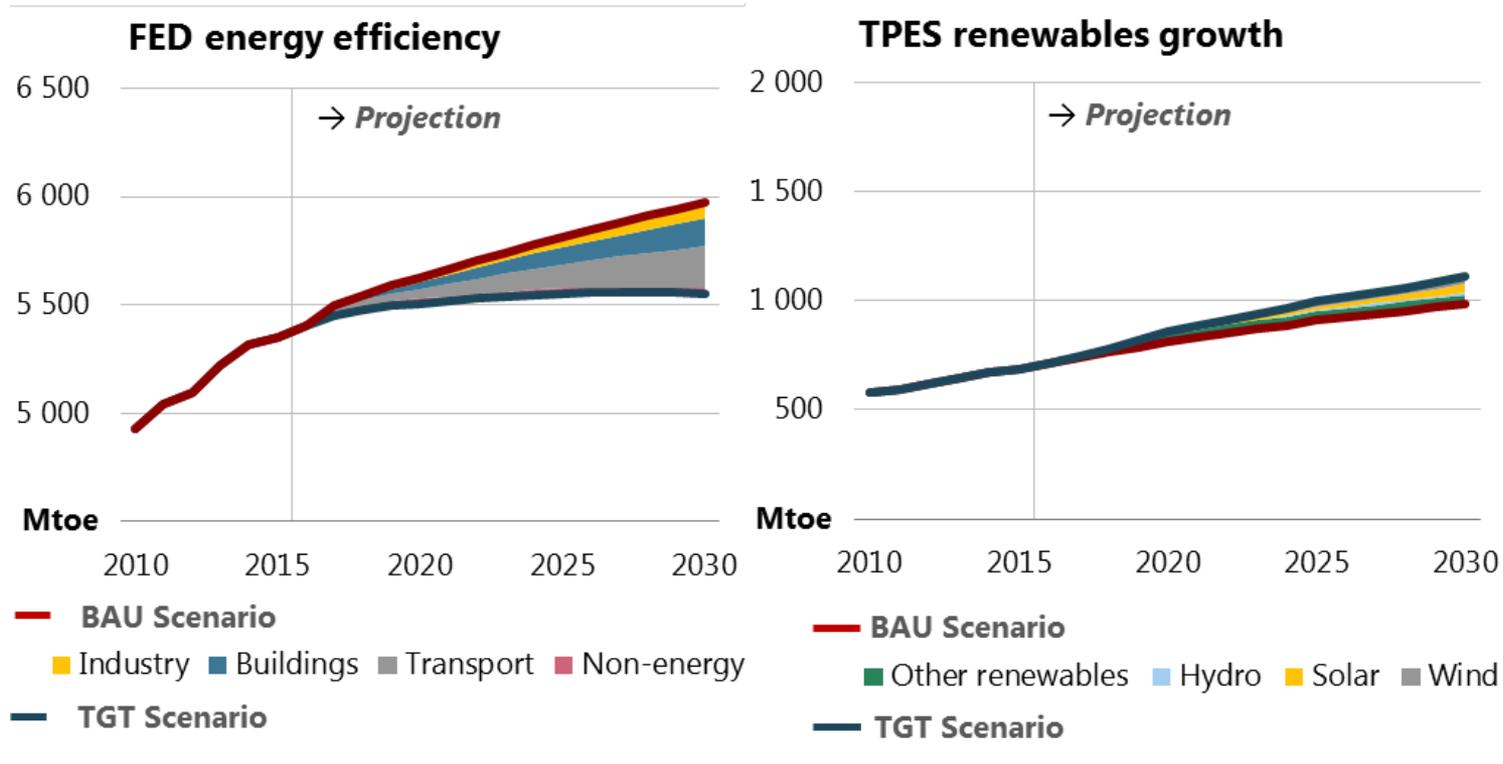
APEC Final Demand in BAU share of renewables



- The **doubling goal is NOT achieved in BAU**, and energy sector is dominated by fossil fuels;
- In **TGT**, accelerated development of **renewables achieve the goal in 2025**.

Slightly more renewables in the TGT Scenario

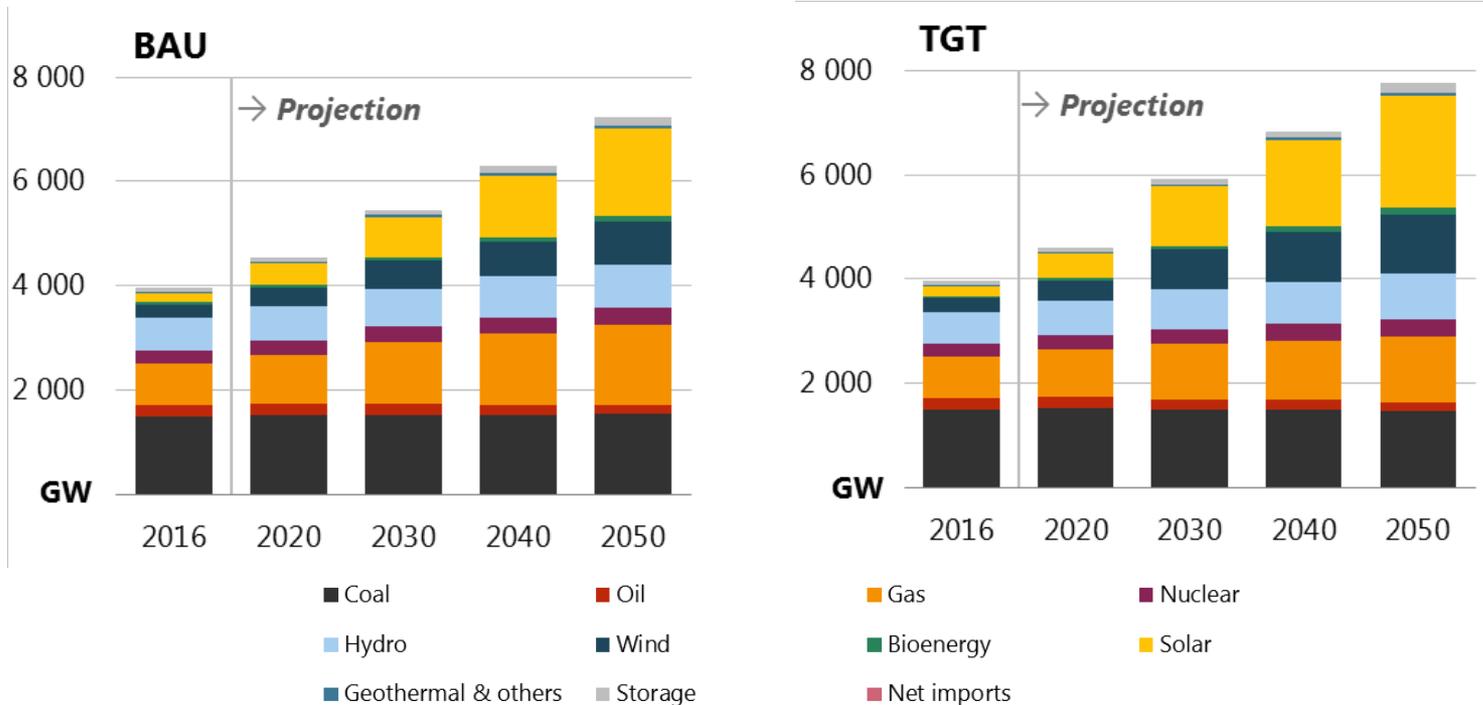
Energy efficiency and renewables in the BAU and TGT, 2010-30



Final energy demand falls (mainly transport), but renewable supply increases (mainly solar), which has a two-fold impact on the doubling goal.

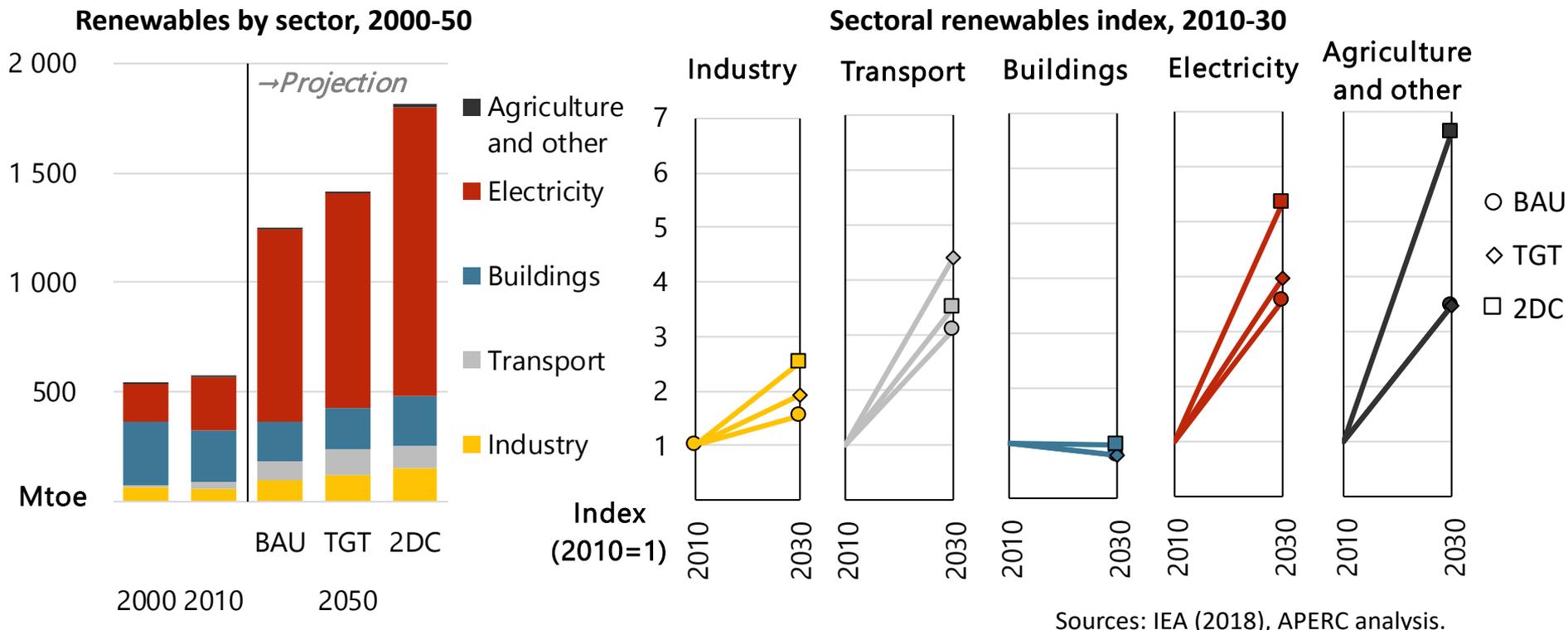
25% more renewable capacity additions needed per year in TGT

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



To reach the renewables doubling goal, APEC needs to add an average 119 GW of renewable capacity (excluding pumped hydro) each year from 2016 to 2030, a 25% increase on the average additions in the BAU.

Electricity drives renewable development



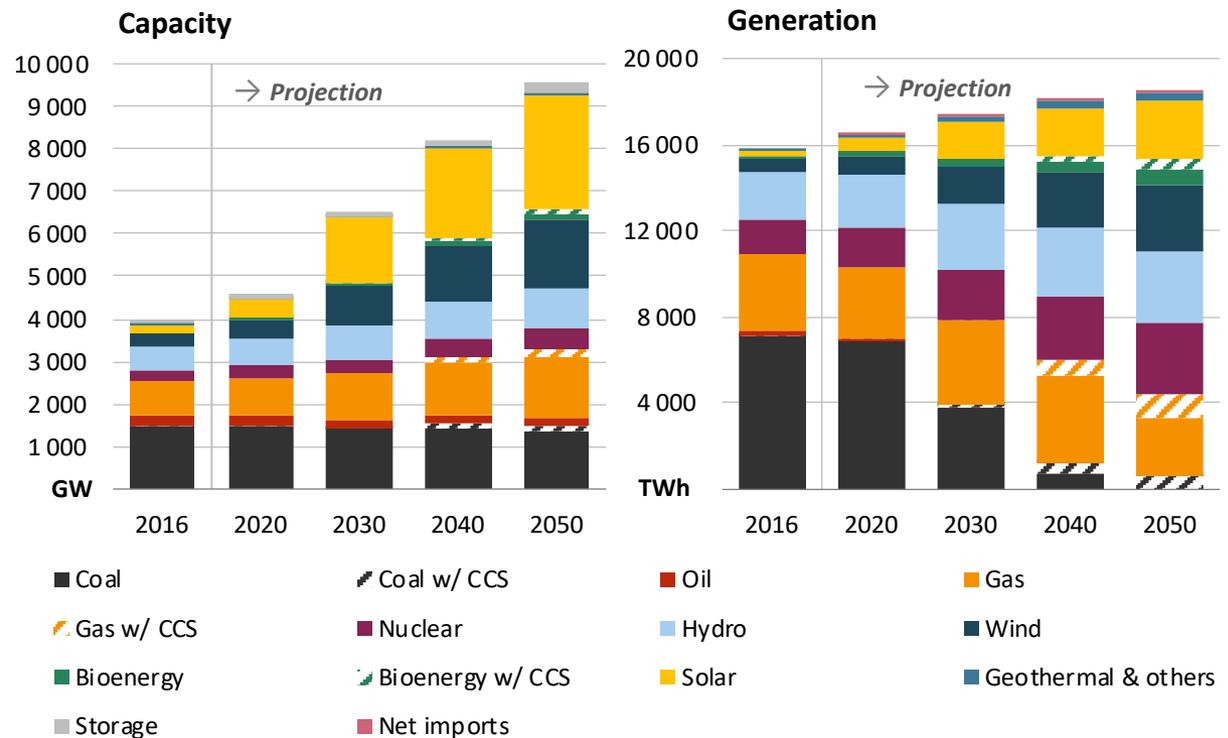
Sources: IEA (2018), APERC analysis.

- In BAU, renewable electricity more than triples and accounts for 70%,
- In TGT, combination of energy efficiency and modest RE growth, helps achieve the doubling goal,
- In 2DC, Electricity decarbonisation drives renewables demand.

To meet the 2DC pathway, RE would need to increased and its requires consolidated efforts by all APEC economies.

For the electricity sector, the deployment of a range of technologies, including VRE is needed.

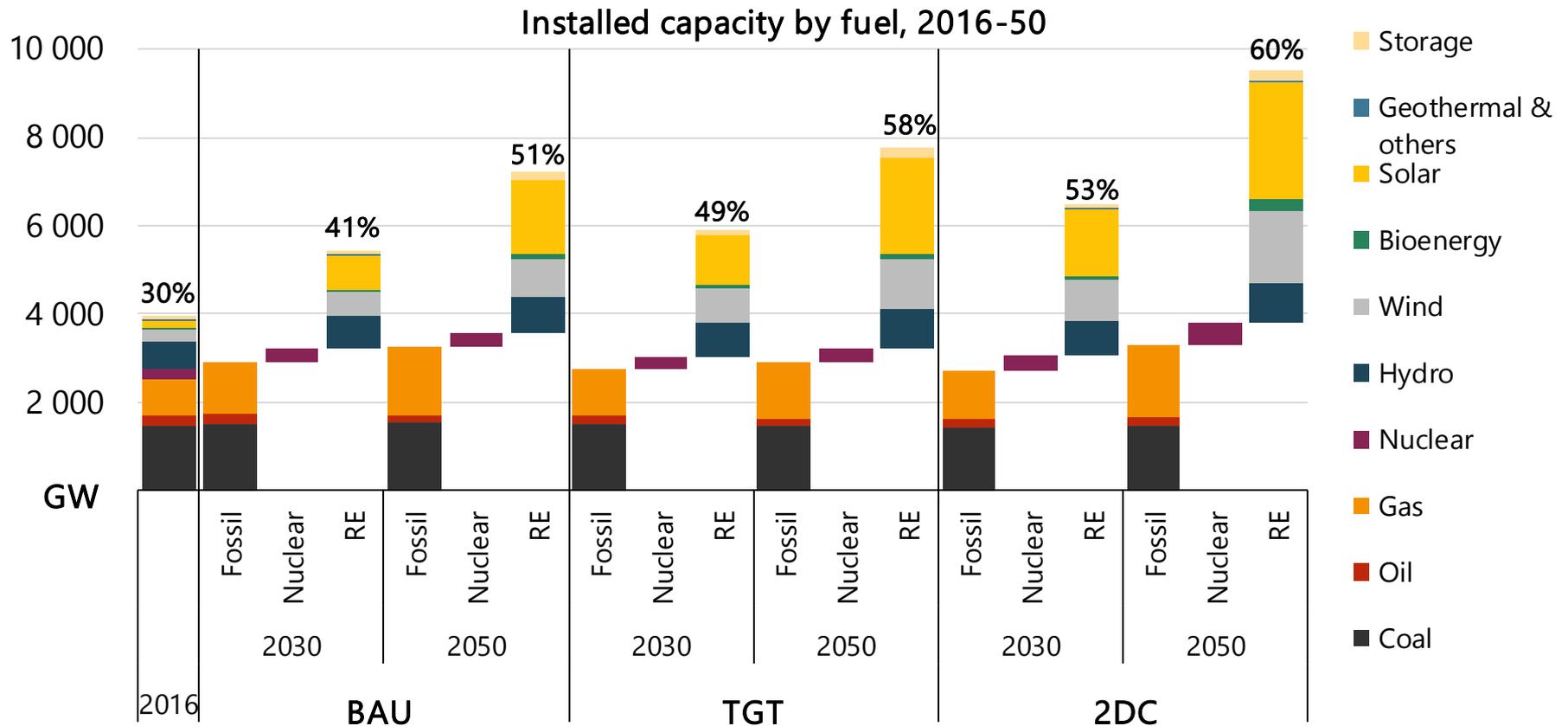
- Electricity generation from VRE in 2DC reaches 31% at 2050.
- Emission reduction is achieved by installed solar PV and wind power instead of fossil fuel-based power plants.



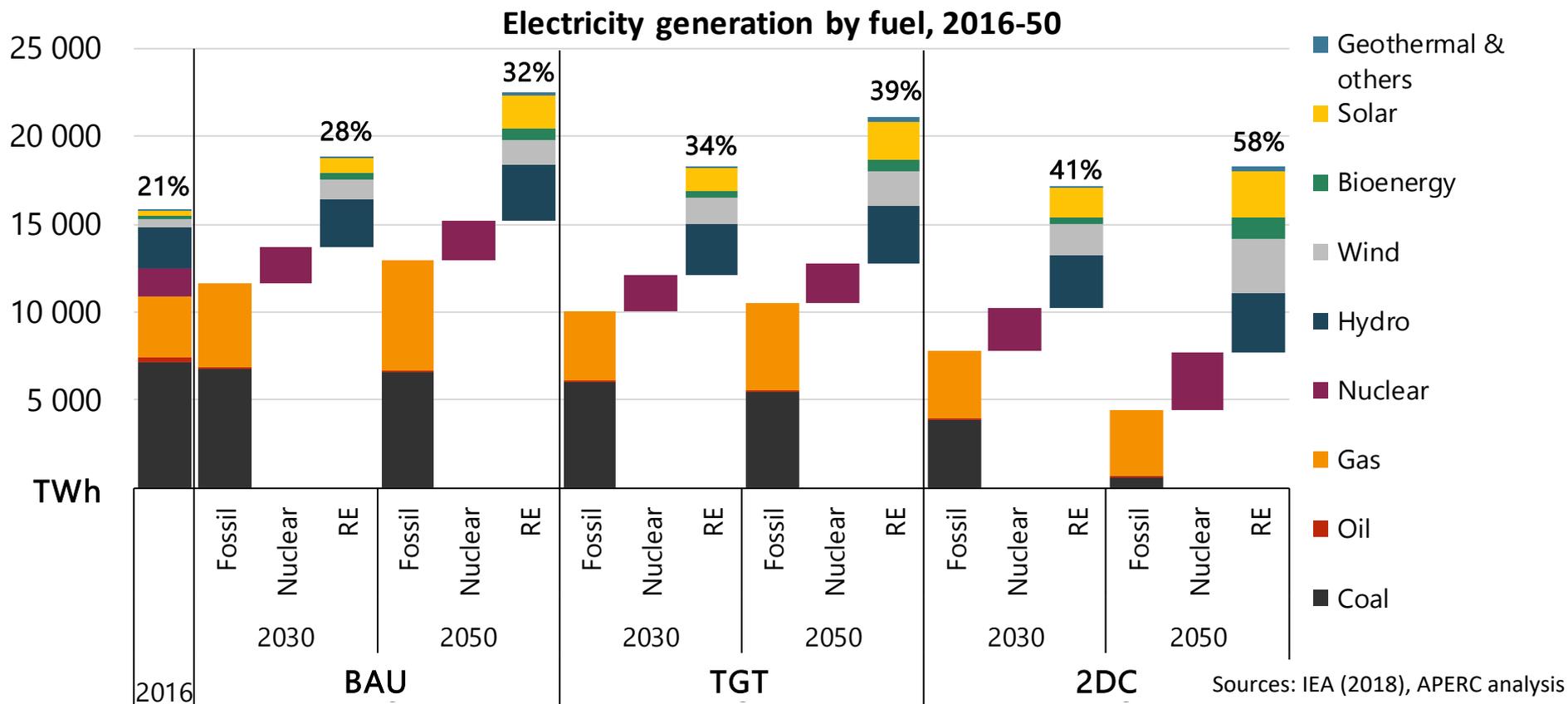
Power capacity [GW] and electricity generation [TWh] by fuel, 2016-50

25% more RE capacity additions in TGT

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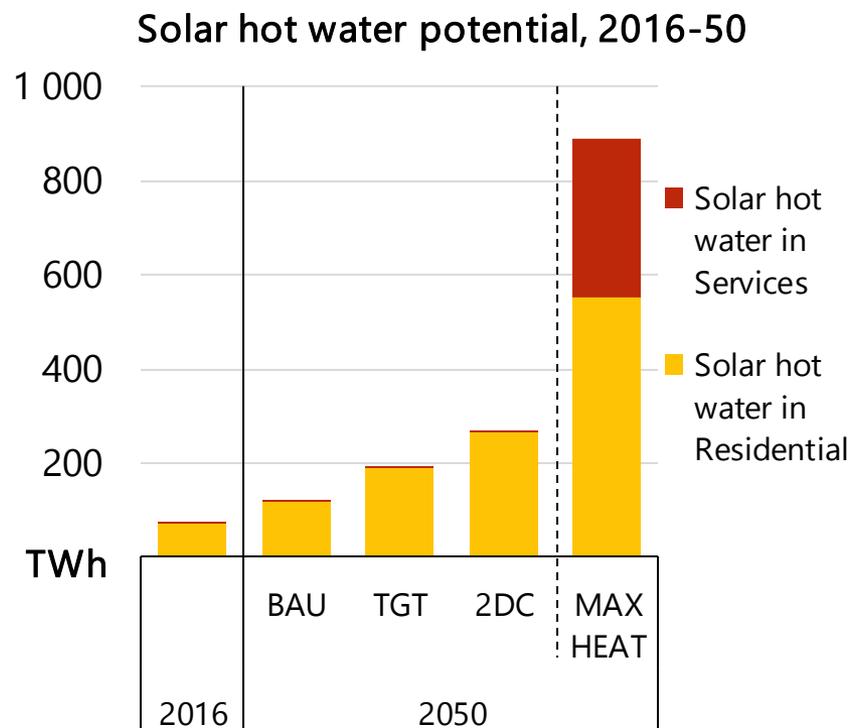
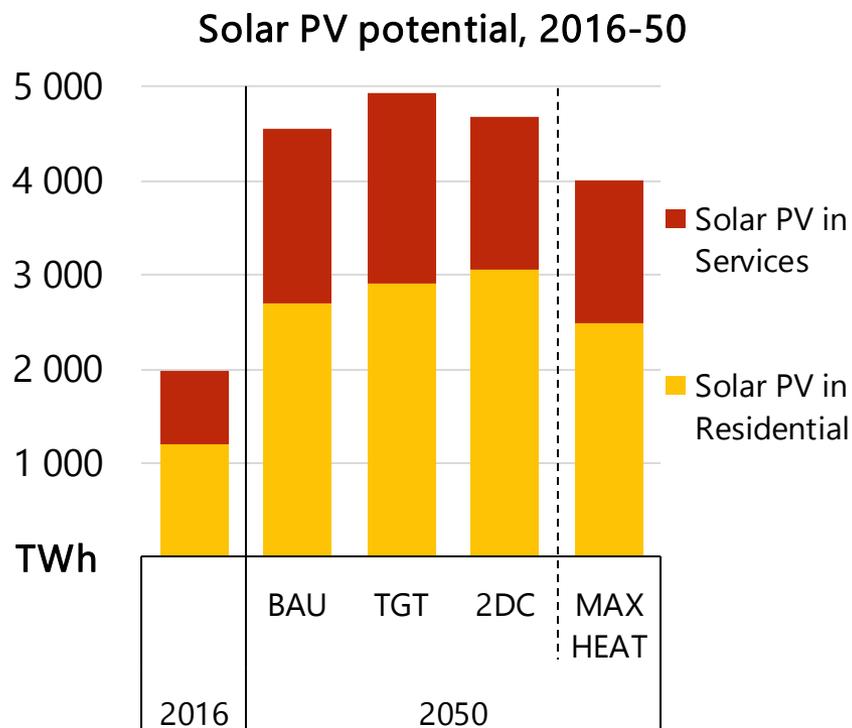


APEC renewable electricity generation share grows



- In BAU, the share of renewable electricity grows from 21% to 32%;
- In TGT, electricity demand is 16% below BAU and the share reaches 39%;
- In 2DC, carbon-free electricity is 76%; 58% is RE, driven by wind and biomass.

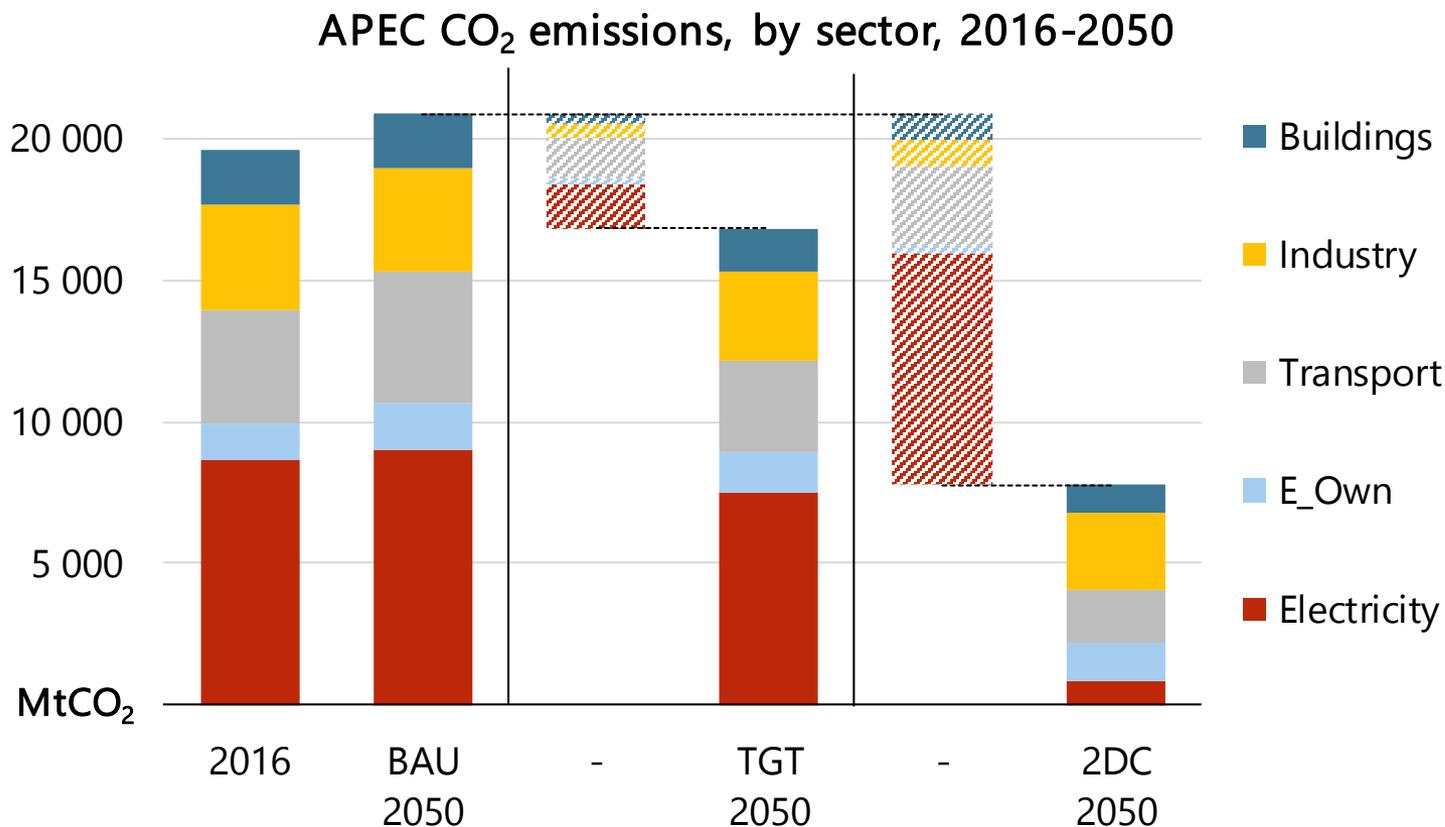
Estimating solar potential in buildings



Source: APERC analysis.

- Solar photovoltaic (PV) potential exceeds 4 500 TWh, or 395 Mtoe, in 2050.
- MAX HEAT is a case with maximised solar heating deployment. Solar water heating could supply over 30% of residential demand.

Electricity decarbonises the most in 2DC



Sources: IEA (2018) and APERC analysis.

- In TGT, electricity accounts for 37% of CO₂ reduction followed by transport (36%).
- In 2DC, the sector decarbonises the most (-91%), contributing nearly 2/3 of the total.

From the policymakers' side, increasing renewable deployment requires

- A strong institutional framework to support policies and specific energy targets: i.e., carbon neutrality policy.
- Tender process (auctions) to support the entrance and uptake of renewables.
- Easy access and priority for small-scale renewables developers
- Utility obligations/quotas (share) for modern renewables.
- Net-metering/ Net-billing implementation for end users.
- Gradually incorporation of carbon-tax and associated environmental policies to boost competitiveness.
- Reliability and adequacy in the power system need to be addressed: Flexibility is required to maximize the efficient integration of VRE.

The energy transition is an opportunity to increase the role of renewables in the energy mix but there is not a single recipe.

A dynamic policy is needed to articulate:

- New trends and technological advances/disruptions.
- Improved technical-economics modeling of energy systems
- Working with local communities
- Strength education in energy, economy and related subjects.
- New financial and market mechanisms for low-carbon technologies.
- Economical alternatives to carbon-intensive technologies and potential phase-out of inefficient power plants i.e., subcritical coal power plants.
- Direct and indirect effects of decarbonization policies on jobs local communities in the short and mid-term.

New Outlook is underway...

We have been providing data and analysis from the Outlook to support policy actions from the economies, and we open to suggestions to improve the 8th Edition of the Outlook.



Thank you!

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

Further related Work

Decarbonization roadmap

This is an opportunity to review the outcomes of the document: “**Filling the Gap to Double Renewable Energy in the APEC Region**” and update its objectives.

- Incorporating an additional perspective toward carbon neutrality, i.e., a multidisciplinary approach.
- Efficient integration of variable renewable energy.
- Carbon consequences of investment decisions, i.e., tipping points of gas investment who may affect emissions targets.
- Roadmap periodicity and flexibility.