



The 51st Meeting of APEC Expert Group on New and Renewable Energy
Technology (EGNRET);
Chiang Mai, Thailand; 12-13 September 2018

APERC Update for EGNRET 51

Alexey KABALINSKIY
Researcher, APERC





APEC reports by APERC

Peer Review on Low Carbon Energy Policies (PRLCE)

No.	Economy	Published	Recommendations
1	Thailand	Nov 2012	45
2	Indonesia	Nov 2013	49
3	The Philippines	Nov 2013	45
4	Malaysia	May 2014	52
5	Viet Nam	Aug 2016	66
6	PNG	Nov 2017	44

- ✓ Built on information-sharing concept,
- ✓ Focuses on low carbon energy supply,
- ✓ Work is carried out by a Review Team, which:
 - ❖ visits the host economy and
 - ❖ interviews representatives of government ministries, research institutes, industry associations, energy companies, electricity and gas market regulators, consumer associations, local government, and other relevant stakeholders

Sections of the 6th Report

- ✓ Overarching Findings
- ✓ Institutional context
- ✓ Renewable Energy Goals, targets and Strategy
- ✓ Regulation and Infrastructure
- ✓ Bioenergy – Biofuels, Biomass
- ✓ Hydropower and Ocean Energy
- ✓ Solar and PV
- ✓ Geothermal Energy
- ✓ Wind Energy
- ✓ Power Supply System, Smart Grid, Private Participation
- ✓ Greenhouse Gas Management

Source: APERC website

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

APEC Low-Carbon Model Town (LCMT)

No.	Economy	Publ'd	Recom-s
1	Yujiapu CBD, Tianjin, China	Sep 2011	32
2	Koh Samui, Thailand	Jun 2013	82
3	Da Nang, Viet Nam	May 2014	75
4	San Borja, Lima, Peru	Jan 2016	50
5	Bitung, North Sulawesi, Indonesia	Jun 2016	64
6	Mandaue, Cebu, The Philippines	May 2017	52
7	Krasnoyarsk, Russia	TBC	67

Sections of the 7th Report

- ✓ Town Structure
- ✓ Buildings
- ✓ Transportation
- ✓ Area Energy Systems & Multi-Energy Systems
- ✓ Untapped Energy
- ✓ Renewable Energy
- ✓ Building and Area Energy Management
- ✓ Greenery
- ✓ Water and Waste Management
- ✓ Pollution
- ✓ Policy Framework
- ✓ Education and Management

- ✓ combines energy-efficient buildings, transport and power systems to affordably reduce energy use and carbon emissions while creating pleasant living conditions of APEC communities
- ✓ a part of APEC's Energy Smart Communities Initiative (ESCI).

Source: APERC website

<https://aperc.ieej.or.jp/publications/reports/lcmt.html>

APEC Peer Review on Energy Efficiency (PREE)

No.	Economy	Publ'd	Recom-s
1	New Zealand	Apr 2009	22
2	Chile	Apr 2009	21
3	Viet Nam	Dec 2009	40
4	Thailand	Mar 2010	34
5	Chinese Taipei	Nov 2010	35
6	Peru	May 2011	51
7	Malaysia	May 2011	41
8	Indonesia	Jun 2012	49
9	Viet Nam (*)	Nov 2012	13+15
10	The Philippines	Nov 2012	54
11	Brunei Darussalam	Nov 2013	47
12	The Philippines (*)	Feb 2015	34
13	Thailand (*)	Feb 2016	48
14	Mexico	Oct 2017	46
15	Malaysia (*)	TBC	
16	Russia (TBC)		
17	Peru (*) (TBC)		

Sections of a Report

- ✓ Overall / Institutional Context
 - ✓ Energy Efficiency Goals, Targets and Strategy
 - ✓ Energy Data Collection and monitoring
 - ✓ Government and Buildings Sector
 - ✓ Industrial Sector
 - ✓ Transport Sector
 - ✓ Electricity Sector
 - ✓ Appliances and Equipment
- ✓ focuses on the energy efficiency policies of a single economy
 - ✓ the work is carried out by Review Team, which visits the economy and interviews a range of people knowledgeable on energy efficiency issues

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

Note: (*) – Follow-Up PREE
Source: APERC website



APEC Renewable Goal

Renewable doubling goal milestones

EWG 47 (May 2014)

- US proposed the APEC aspirational goal of doubling the share of renewable energy by 2030 and noted that it interacted with APEC's aspirational energy intensity goal.
- EGEDA and ESTO predecessor worked together on defining the doubling goal.

EMM 11 2014 (Sept 2014)

- "Doubling the **share** of renewables in the APEC energy mix, including in power generation, from 2010 levels by 2030."

EWG 54 (Nov 2017)

- To calculate the goal EWG decided that traditional biomass will not be counted;
- IRENA's definition of renewable energy is recommended;
- APEC data should be used for monitoring progress.

Renewable doubling goal calculation scorecard

Question	Options	EWG54 decision
Renewables	Definition	IRENA recommended
Biomass	All vs. modern	Traditional excluded
Hydro	All vs. small	All, per IRENA
Geothermal	In vs. out	In, per IRENA
Measurement point	Supply vs. demand	Both
Data	IEA vs. APEC	APEC
Denominator	TFED vs TPES	TFED, TPES (if resources allow)

Source: Key conclusions of EWG54

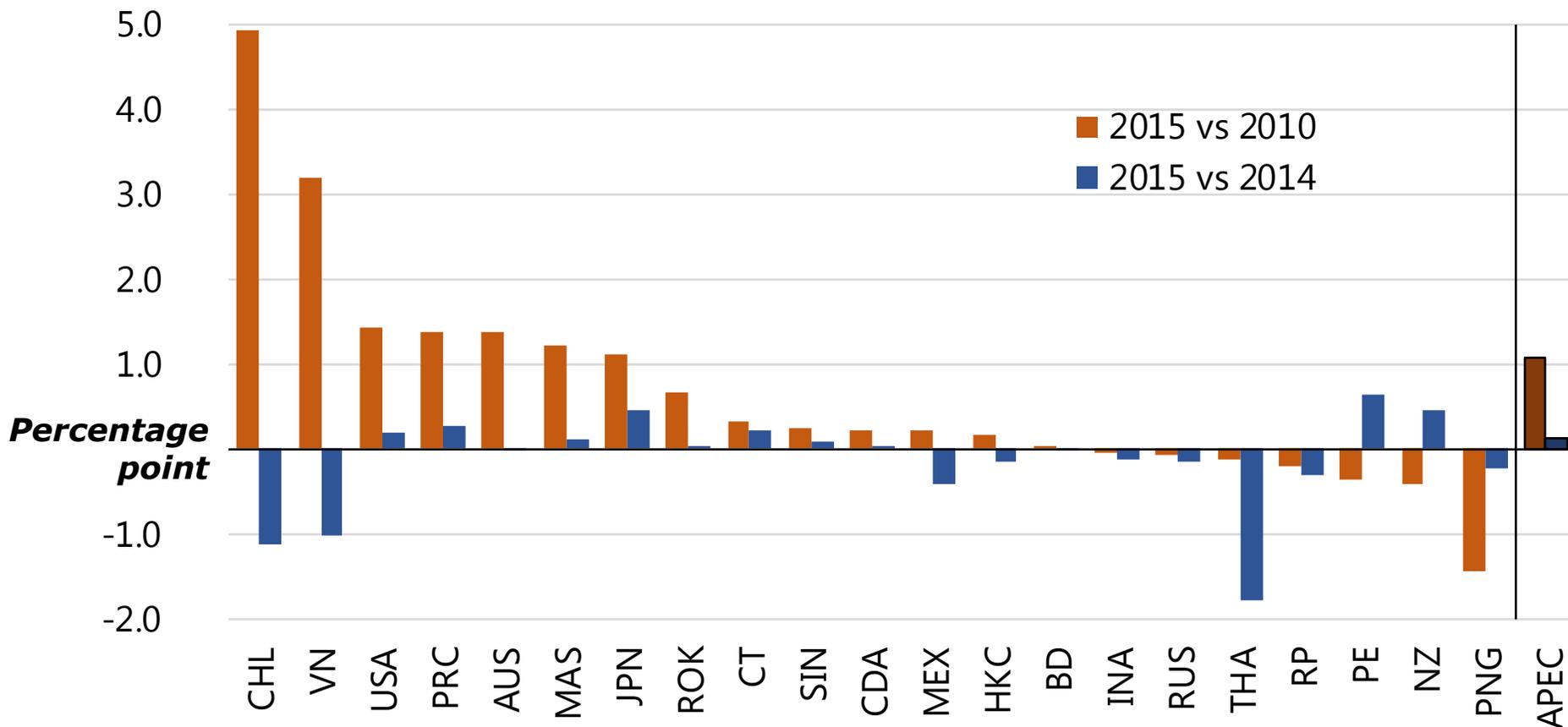
APERC and EGEDA developed the definition of renewables to be used for doubling goal monitoring:

- Biomass used in the residential and commercial sectors is assumed to be **traditional biomass** because solid biofuels are typically used in these sectors for heating (residential) and cooking (residential and commercial), with inefficient technologies that often have adverse effects on human health. In addition, lack of data from non-OECD economies. Traditional biomass will not be part of the renewables goal. This definition is applied to all APEC member economies, including those that are members of the Organisation for Economic Cooperation and Development (OECD);
- All other renewables (hydro, geothermal and so on) including biogas and wood pellets are considered **modern renewables** (although data on wood pellets are limited) and their share in total final energy consumption will be monitored for the renewables doubling goal.

In short, Biomass is counted as traditional in:

- ❖ **Residential**, although wood pellets are a modern source, no data are available;
- ❖ **Commercial**, mostly used for cooking; and
- ❖ **Agricultural** and **non-specified**, mostly used for crop drying.

Economies' RE shares change in 2010-2015



APEC's share of Renewable Energy increased by 1.1 percentage point from 2010 to 2015, however, not fast enough to double by 2030

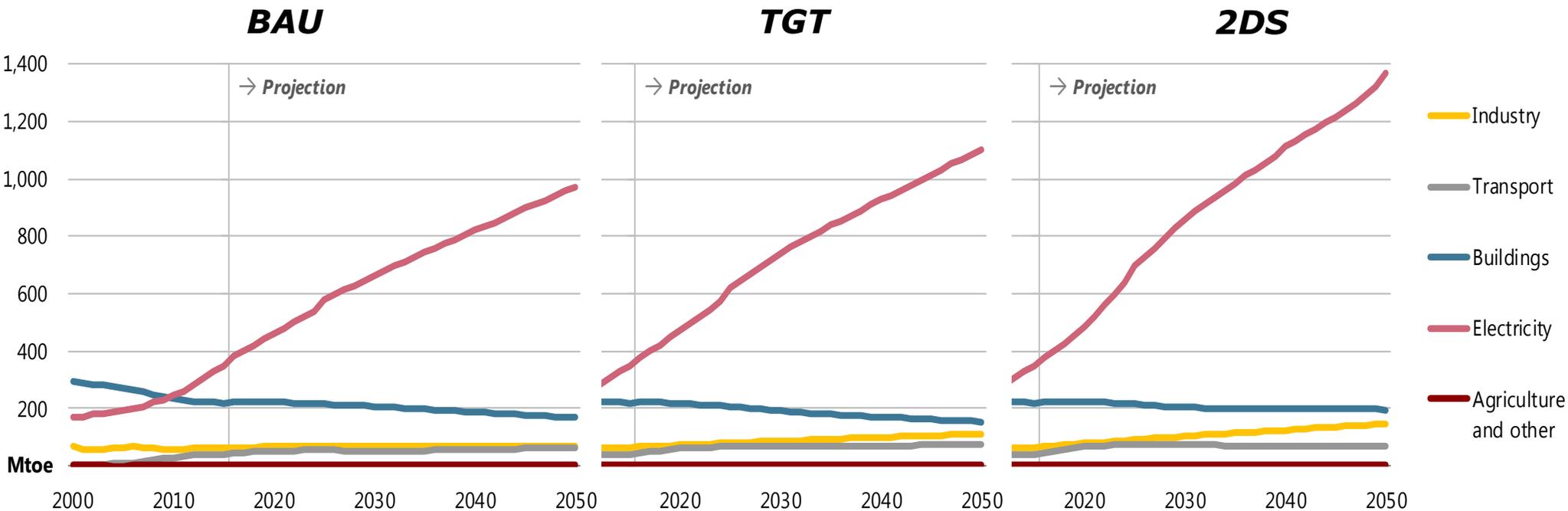
Source: EGEDA (2017).



APEC Renewables in 2000-2050

Renewable demand grows in all scenarios

Renewables demand in different sectors and scenarios

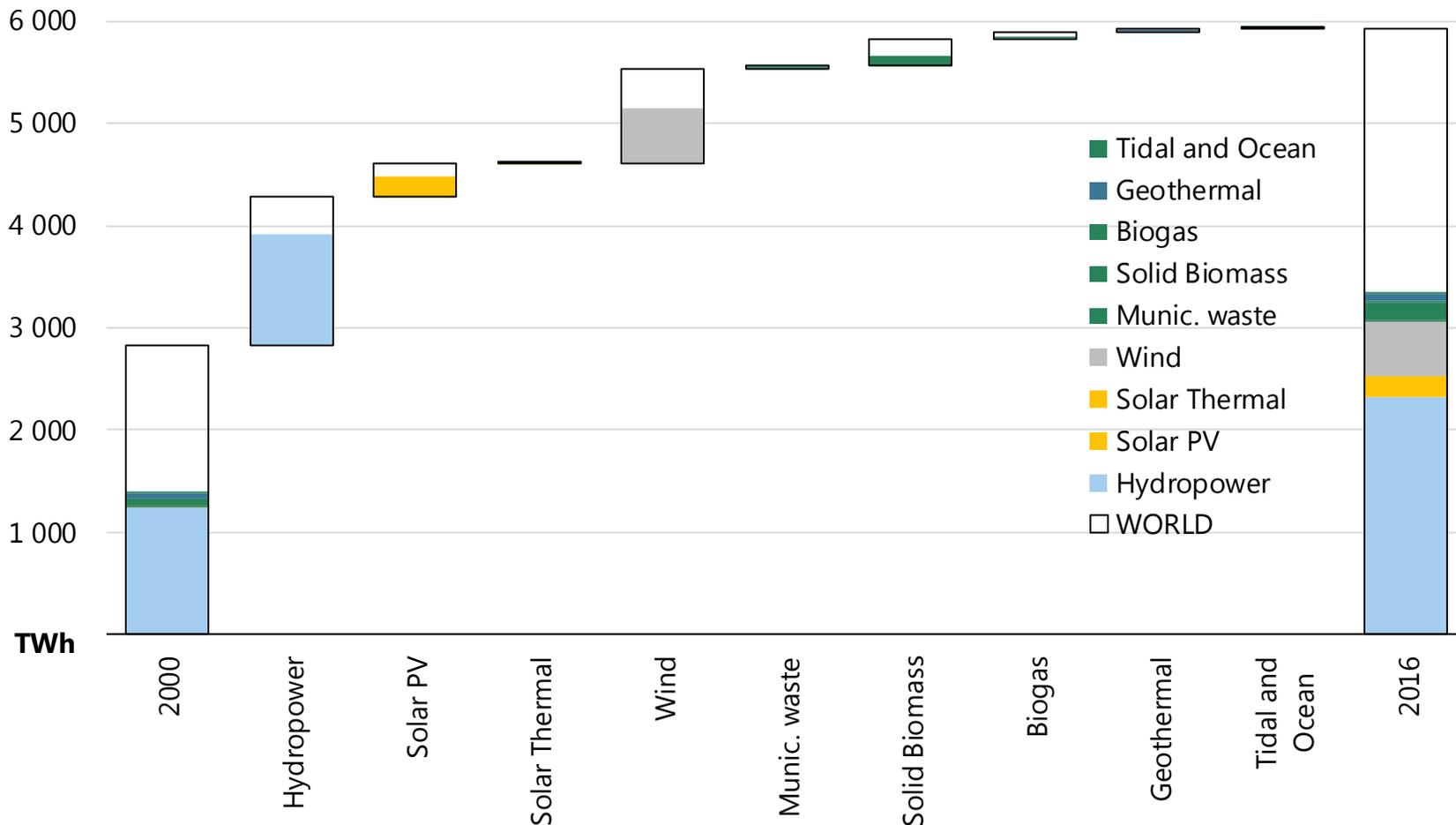


**Renewables demand is mainly driven by the electricity sector.
Residential buildings drive the direct use of renewables.**

Source: IEA (2018) and APERC analysis.

APEC represents over 50% of global RE

Renewable power generation in APEC and globally, by technology

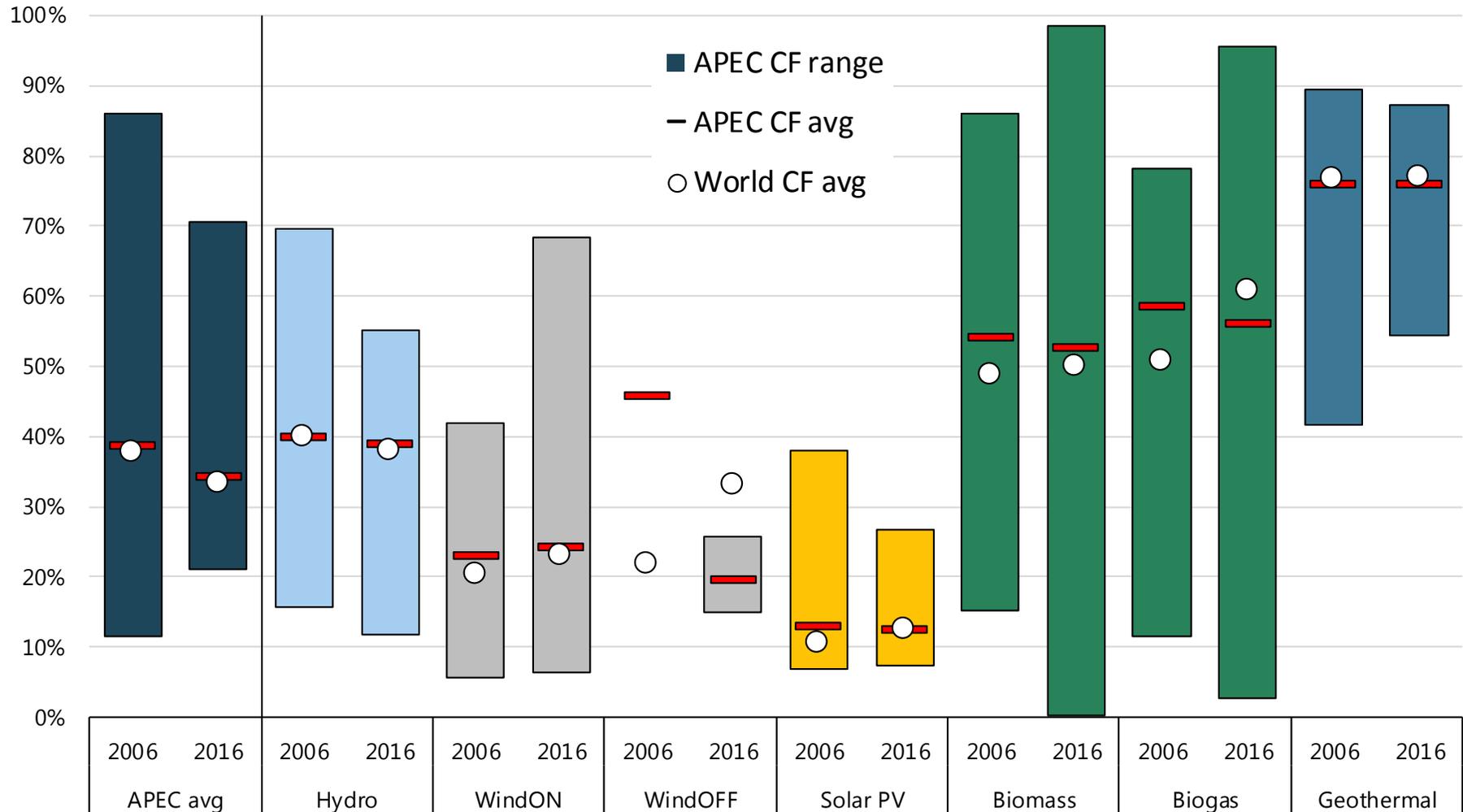


During 2000-16, APEC share grew from 49% to 56% of RE. Key drivers have been hydro and wind generation.

Source: IEA (2018).

APEC RE power is modern and efficient

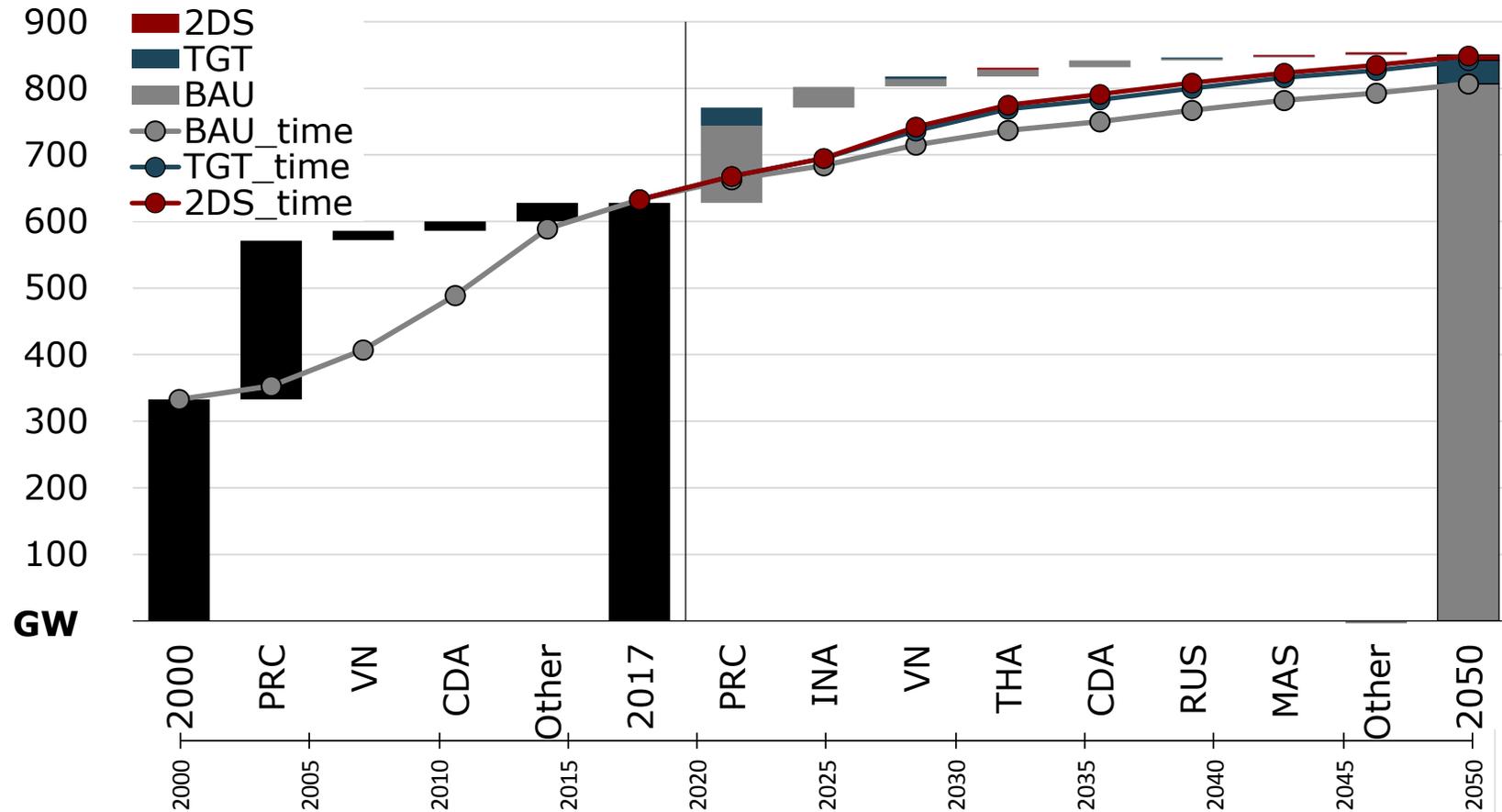
APEC Renewable power technology capacity factors



Source: IEA (2018), IRENA (2018) and APERC analysis.

APEC hydro capacity growth slows in 2015-50

Hydro installed capacity in APEC, 2000-50

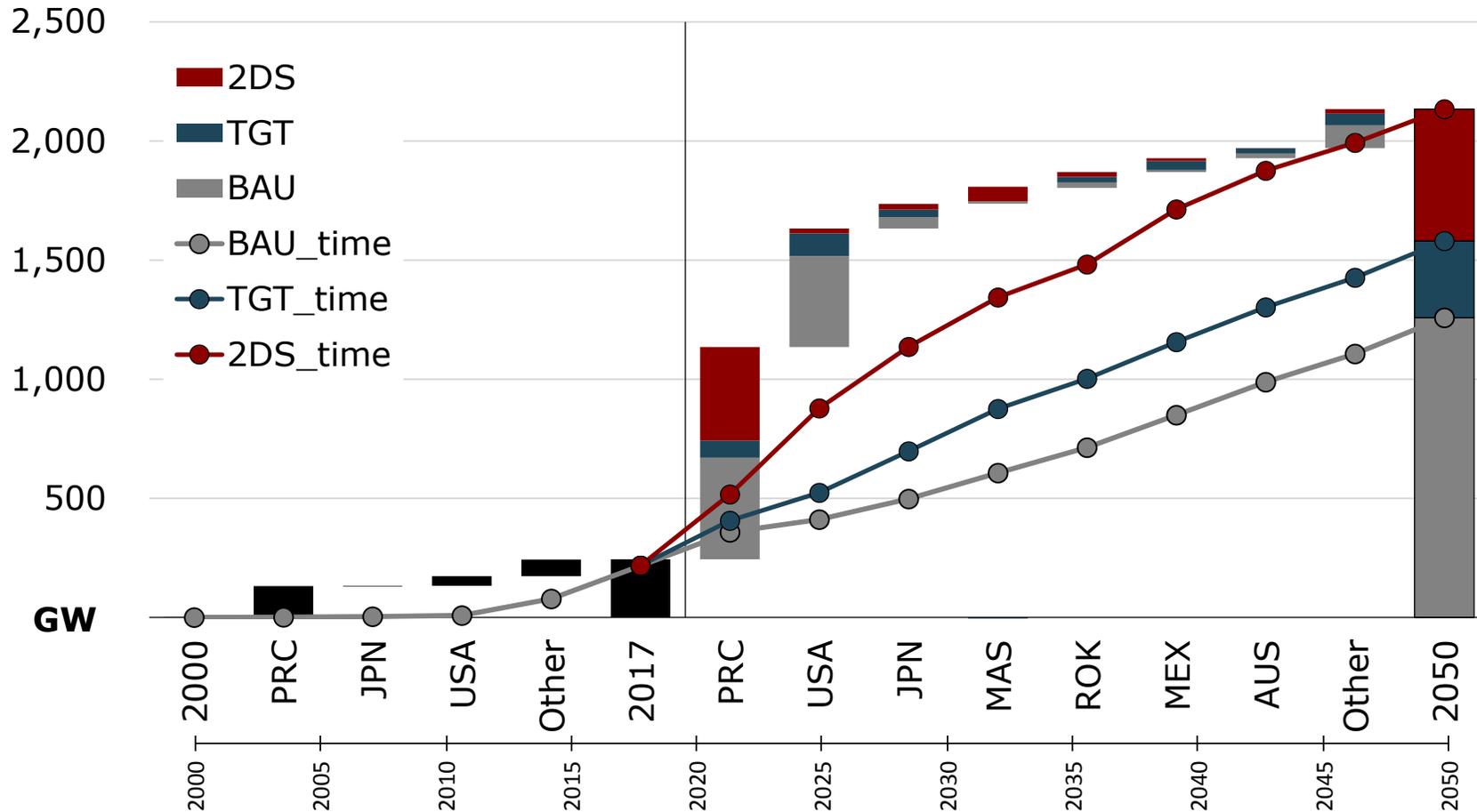


In 2000-16, most of large hydro development took place in China. Development in 2017-2050 is more modest, due to competition with solar PV and wind.

Source: IRENA (2018) and APERC analysis.

In 2015-50, APEC solar PV grows 6-10 times

Solar PV installed capacity in APEC, 2000-50

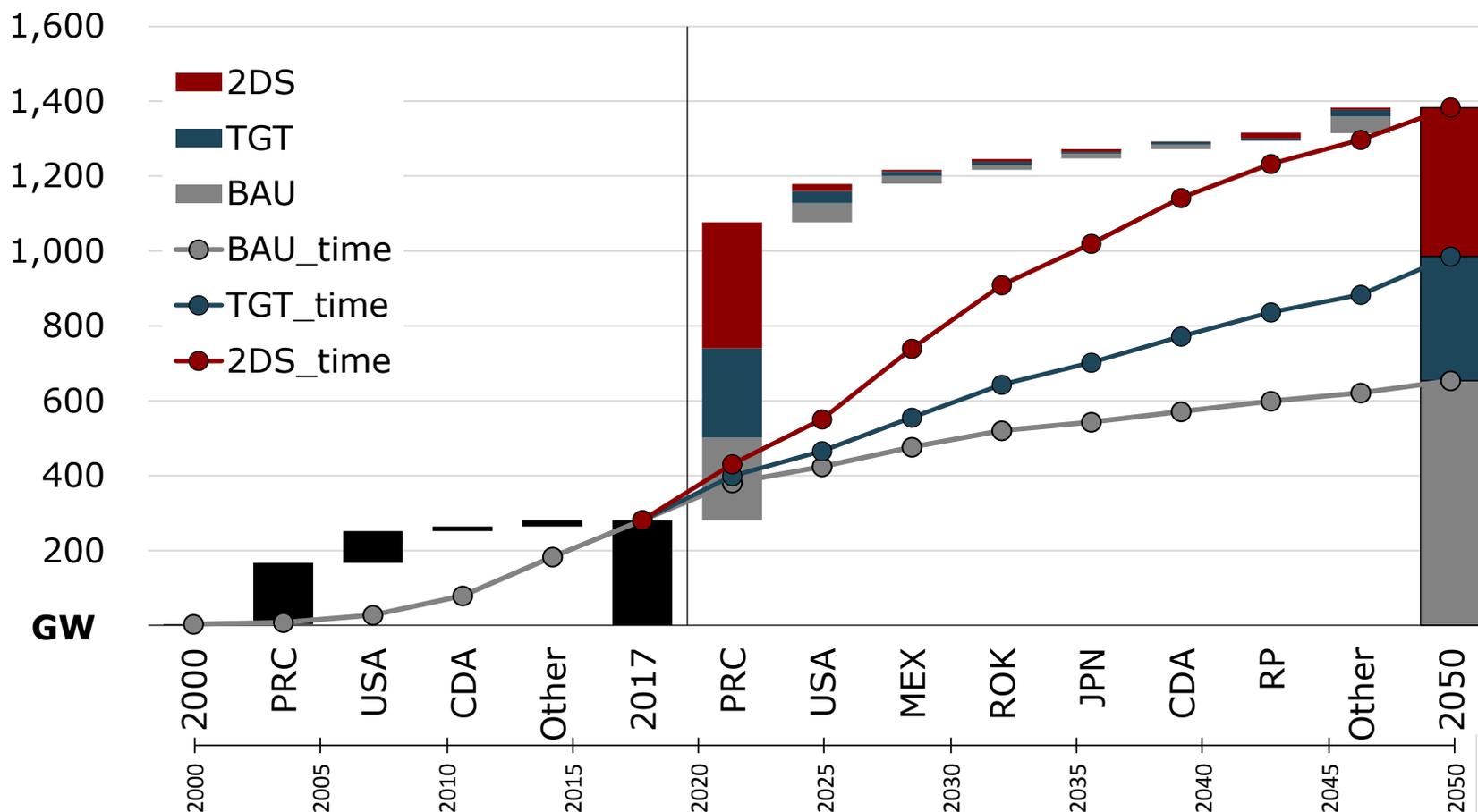


In the 2DS, driven by cost reductions and policies in China and the US, solar PV capacity expands to 2TW from 2015 to 2050.

Source: IRENA (2018) and APERC analysis.

In 2015-50, APEC wind grows 2-5 times

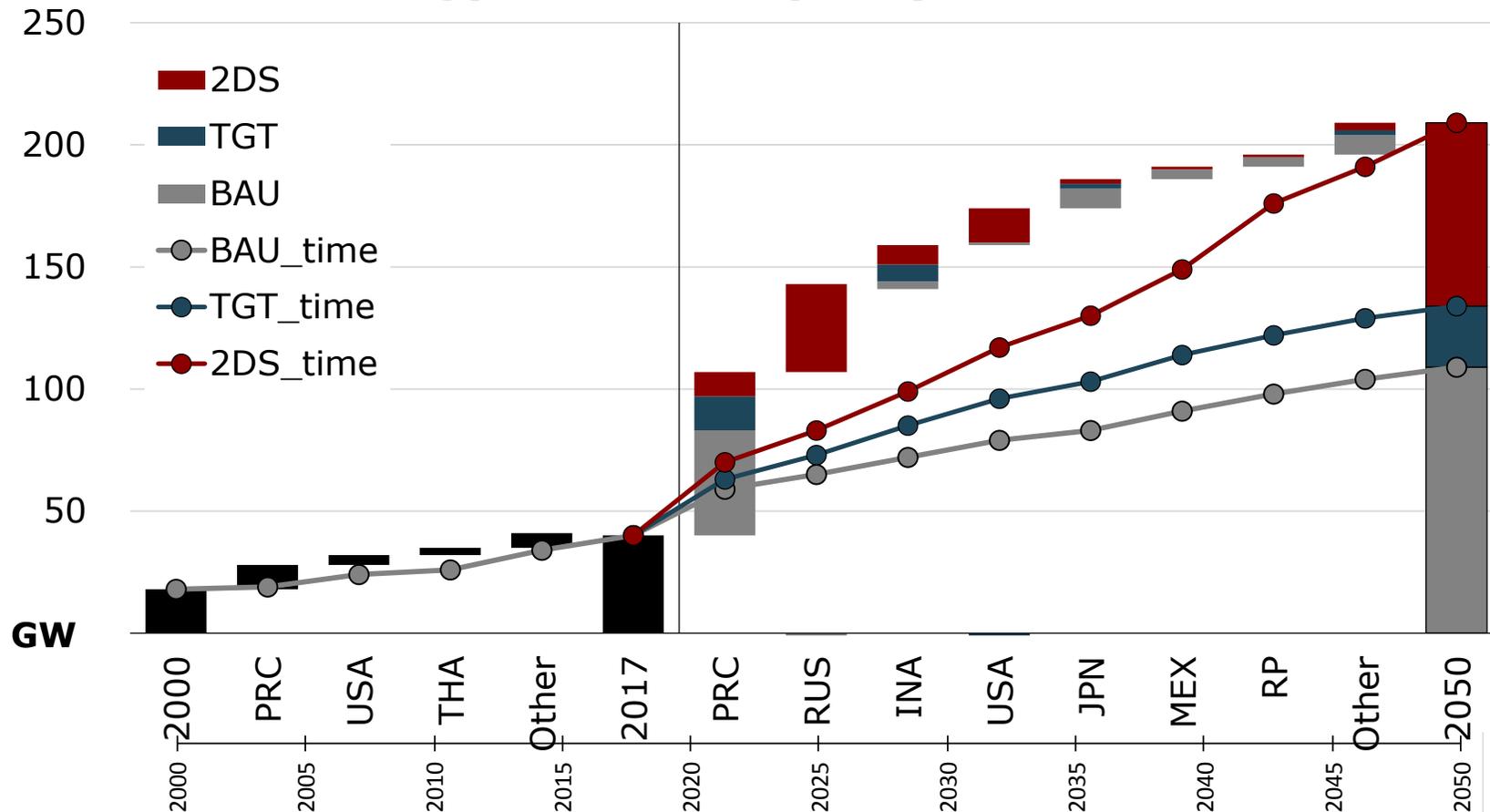
Wind installed capacity in APEC, 2000-50



Driven by cost reductions and economics of wind generation, China leads APEC with 200GW to 800GW of new capacity.

Source: IRENA (2018) and APERC analysis.

Bioenergy installed capacity in APEC, 2000-50



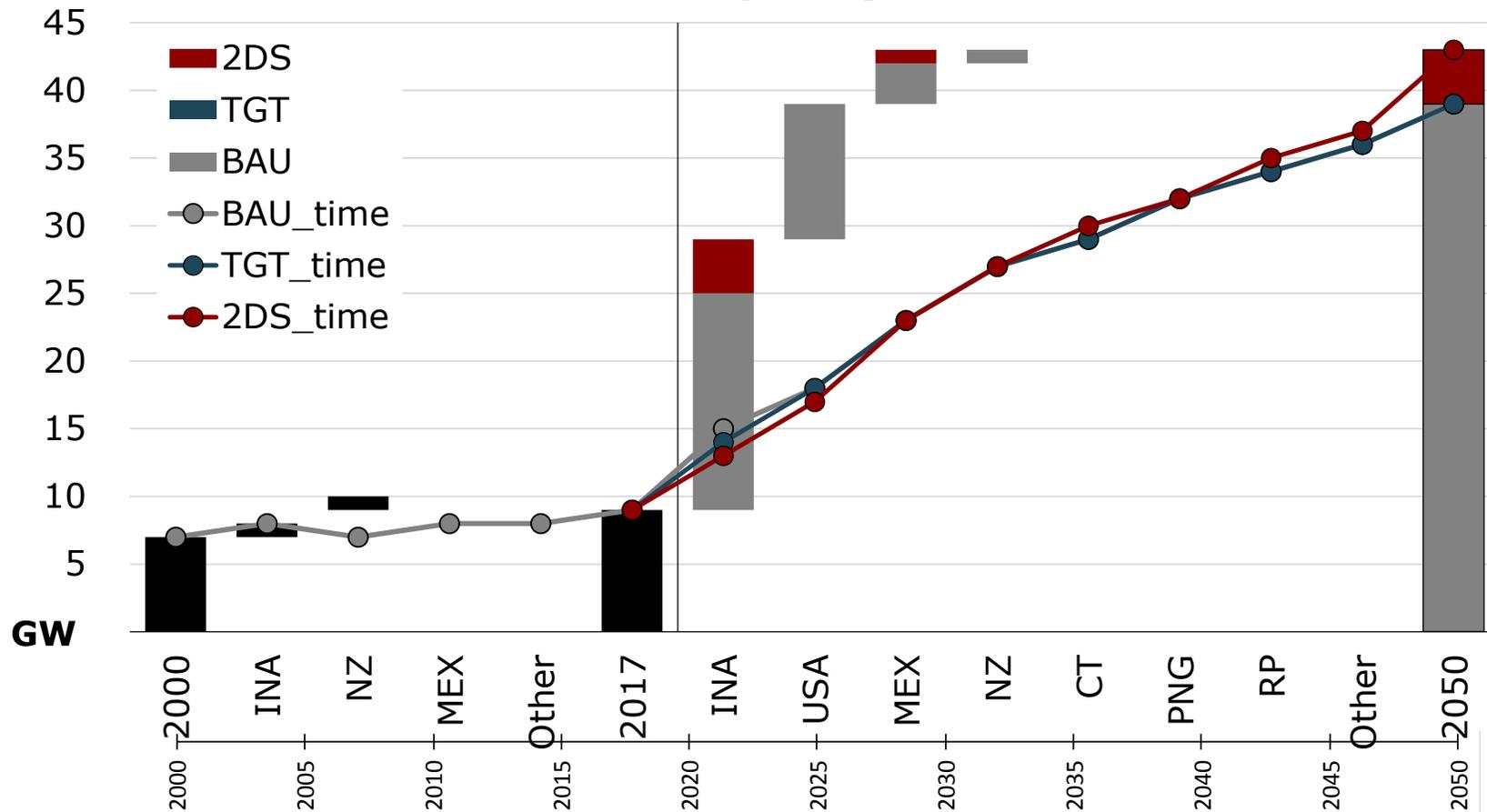
Availability of renewable municipal waste and other solid biomass drives and limits bioenergy development.

Liquid biofuels and biogas are marginal in the power sector.

Source: IRENA (2018) and APERC analysis.

APEC geothermal capacity grows 4 times

Geothermal installed capacity in APEC, 2000-50

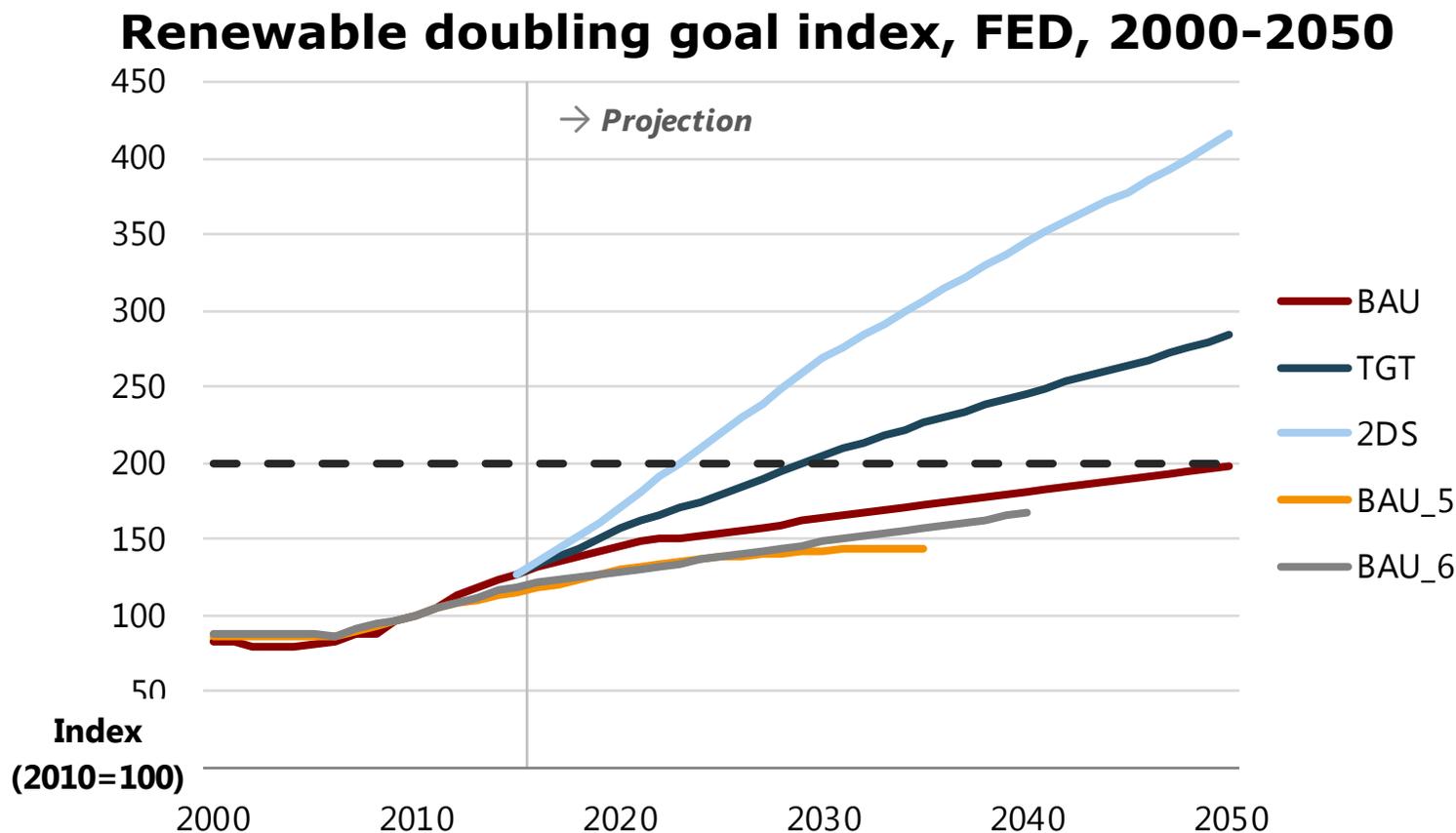


Despite the flat historical trend, geothermal capacity is projected to grow in Indonesia, Mexico and the US.

It is capital-intensive and primarily for baseload, thus limited.

Source: IRENA (2018) and APERC analysis.

RE share (FED) grows faster than previous projections

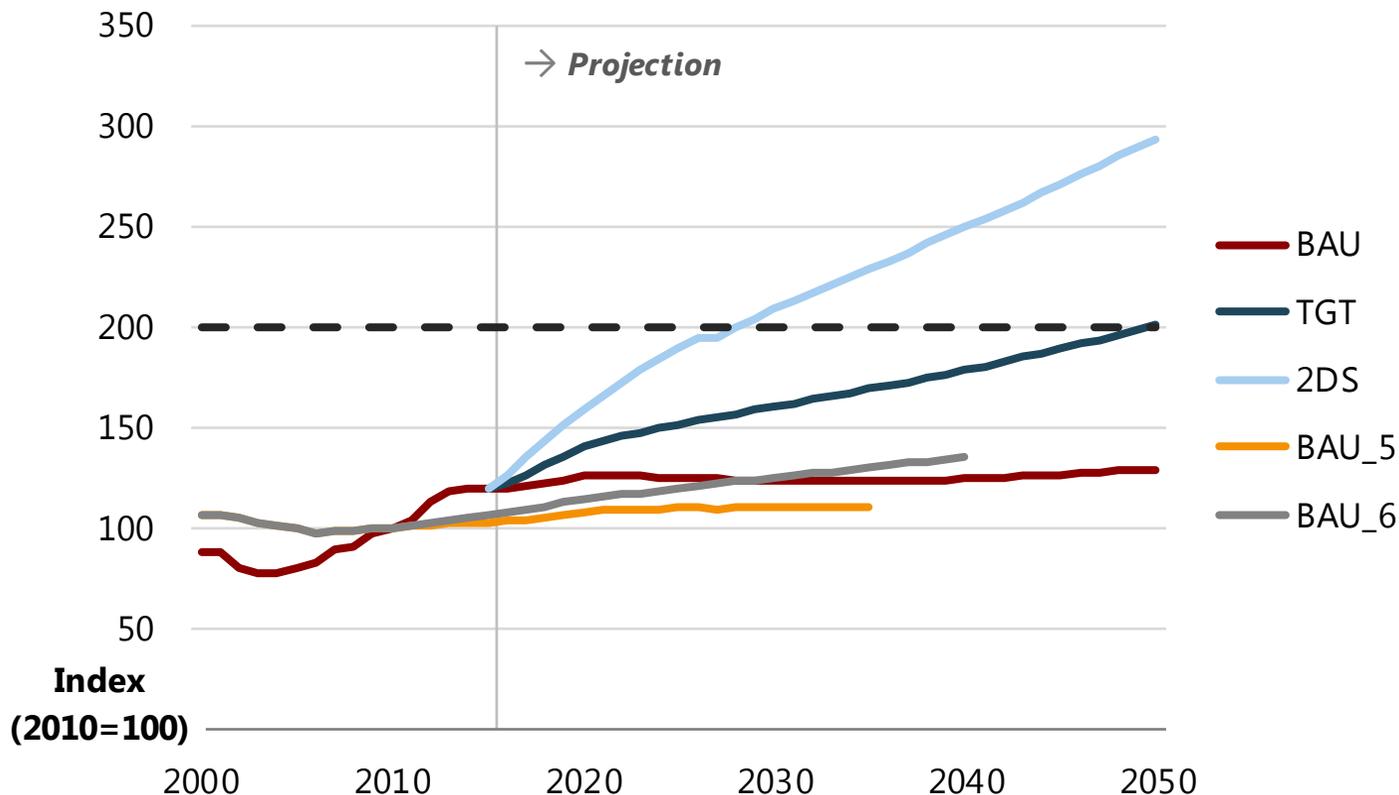


In the TGT, policy and regulations drive the fuel and technology switch and activity demand reduction. RE share doubles by 2030 and nearly triples by 2050, vs 2010.

Source: IEA (2018) and APERC analysis.

RE share (TPES) remains flat under the BAU

Renewable doubling goal index, TPES, 2000-2050



***RE shares in FED and TPES are quite different.
Slow growth of the latter is due to policies targeting FED.***

Source: IEA (2018) and APERC analysis.



Thank you for your kind attention!

<http://aperc.ieej.or.jp/>



Appendix: APEC RE Policy

APEC renewable energy policy summary (1)

Economy	Most influential policy framework	RE target in Electricity	Transport fuel (biofuel)	
			Curr. lvl	Target
Australia	Australia's Renewable Energy Target (2001)	20% (2020); wind 10% (2030), solar 14% (2030)	(state lvl only, e.g. E6 in NSW, E3 in QLD)	-
Brunei	Energy White Paper (2014)	10% (2035)	-	-
Canada	Pan-Canadian Framework on Clean Growth and Climate Change (2016)	-	E8.5 and B4	-
Chile	Energy 2050 (2015); Energy Road Map (2015)	Min. 60% (2035), 70% (2050)	-	-
China	13th Five-Year Plan, 2016-2020	15% (2020) 20% (2030)	E0 to E10 2.1 Mt/yr (E) 0.8 Mt/yr (B)	2020: E15 4 Mt/yr (E) 2 Mt/yr (B)
Hong Kong, China	Future Fuel Mix for Electricity Generation Consultation Document (2015)	Fuel mix 1% (2023)	-	-
Indonesia	National Mid-term Development Plan, 2015-2019	+50% BAU cap., TPES: 10%-16% (2020), 31% (2050)	E0 (E3 pilot) and B30	E20 (2025)
Japan	4th Strategic Energy Plan (2014); Long-term Energy Supply and Demand Outlook (2015)	22-24% (2030)	Min. of 0.5 MLOE, up to E3	E15

APEC renewable energy policy summary (2)

Economy	Most influential policy framework	RE target in Electricity	Transport fuel (biofuel)	
			Curr. lvl	Target
Korea	4 th National Basic Plan for New and Renewable Energy (2014) 8th Electricity Demand and Supply Basic Plan (2017)	20% generation, 34% capacity (2030)	E0 and B3	
Malaysia	National Renewable Energy Policy and Action Plan (2009), Renewable Energy Act (2011), Sustainable Energy Development Authority Act (2011), Eleventh Malaysia Plan 2016-2020, National Biofuel Policy (2006)	7.8% gen. (2020), cap.: 11% (2020), 17% (2030), 21 GW (2050)	E0 B0, B5, B7	B15 (2020)
Mexico	Mexico's Energy Transition Law (2015)	Min 30% (2021), 35% (2024)	B2	-
New Zealand	New Zealand Energy Strategy 2011-2021, National Policy Statement for Renewable Electricity Generation (2011), Climate Change Response (Emissions Trading) Amendment Act 2008	90% (2025)	-	-
PNG	Vision 2050 (2009)	100% (2050)	-	E7.8 and B5
Peru	National Energy Plan 2014-2025	Total production: 60% (2025)	-	-

APEC renewable energy policy summary (3)

Economy	Most influential policy framework	RE target in Electricity	Transport fuel (biofuel)	
			Curr. lvl	Target
Philippines	Renewable Energy Act (2008), Biofuels Roadmap 2017-2040, Biofuels Act (2006)	20 GW (2040)	E10 B2 to B5	E20, B10 (2020) E85, B20 (2025)
Russia	The Basic Directions of a State Policy of Renewable Energy Utilisation up to 2020 (2009), Energy Strategy 2030 (2009)	4-6% (excl. large hydro) (2030)	-	-
Singapore	Handbook for PV Systems (2011) White Paper on Renewable Energy (2014)	PV: 7.3%, 25% total demand	-	-
Chinese Taipei	Renewable Energy Development Act (2009), New Energy Policy (2016)	20% (2025)	E0 to E3	-
Thailand	Alternative Energy Development Plan 2015-2036 (AEDP)	Total consumption: 30% (2036)	E0 to E85 B7	B10 11.3 ML/day (E), 14 ML/day (B) (2036)
United States	US Energy Independence and Security Act (2007), RPS: 29 states + DC + 3 territories, RPG: 8 states and 1 territory	HI: 100% (2045); CA, NY, NJ: 50% (2030); OR: 50% (2040)	E10 to E15 B0-B20	Min. of 136 BL (2022)
Viet Nam	Renewable Energy Development Strategy (2015), Biofuels Development Scheme (2007) and the Roadmap for application (2017)	Total consumption 31% (2020), 32.3% (2030), 44% (2050)	E0 (A95) and E5 (A92)	E10