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12.d.i. Progress toward Renewable Energy Doubling Goal

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Milestone

EWG 47 (May 2014)	US proposed the APEC aspirational goal of doubling the share 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."
	Energy ministers instructed the EWG through the EGNRET to develop the road map.
Leaders' meeting (2015)	Reaffirmed the doubling goal.
EGNRET49 (Oct 2017)	EGNRET proposed an indicator to track progress of the doubling goal in its roadmap. EGEDA proposed using the same measure to track history.

APEC renewable energy data collection

APERC collects annual data on all energy products from the 21 member economies including:

- Hydroelectricity
- Geothermal heat and electricity
- Solar heat and electricity
- Wind electricity
- Biomass (fuelwood, wood wastes, agricultural waste, etc.)
- Liquid biofuels
- Biogases
- Wastes

Considerations in tracking progress

- In tracking progress, what data should be used? IEA or APEC data?
- is it better to measure renewable energy share in final energy consumption than share in primary energy supply?
- Should traditional biomass be excluded or included in the calculation of the RE share?
  - Three member economies are not able to report consumption of this energy source.
  - It is possible that some member economies cannot disaggregate biomass into modern and traditional biomass.
- Large hydro
  - Except for pumped-storage, EGEDA considers hydro, regardless of size, as renewable energy. This is similar to the definition used by IRENA and IEA.
- Geothermal
  - EGEDA, like IRENA and IEA, considers geothermal as renewable energy.

Renewable energy in primary energy supply

- ESTO prepares the energy balances using the ***physical energy content method****
  - In this method, the normal physical value of the primary energy form is used for the production figure
  - For hydro, solar PV and wind, the primary energy form is the electricity output
  - For electricity generation from primary heat such as nuclear, geothermal and concentrating solar; heat is the primary energy form
  - Since it is difficult to measure the heat flow to the turbines, UN IRES recommends that an estimate of heat input be used based on an efficiency of ***33% for nuclear and concentrating solar***, and ***10% for geothermal***
- The other methods are ***substitution method*** and ***direct equivalent method***

* UNSD. 2016. International Recommendations on Energy Statistics. New York.

Primary RE supply calculated using three methods

Unit: ktoe

	Physical Energy Content Method		Direct Equivalent Method		Substitution Method	
	2010	**2015**	**2010**	**2015**	**2010**	**2015**
Coal	2,771,873	2,895,653	2,771,873	2,895,653	2,771,873	2,895,653
Oil	2,176,940	2,298,595	2,176,940	2,298,595	2,176,940	2,298,595
Gas	1,491,403	1,684,013	1,491,403	1,684,013	1,491,403	1,684,013
Nuclear	433,564	395,217	**143,076**	**130,422**	433,564	395,217
Other non-renewables	25,927	32,977	25,927	32,977	25,927	32,977
Renewable Energy	**467,633**	**578,697**	**435,429**	**544,308**	**785,548**	**1,034,289**
Biomass	211,317	229,546	211,317	229,546	211,317	229,546
Hydro	153,422	190,692	153,422	190,692	**460,265**	**572,075**
Geothermal	35,782	38,210	**3,578**	**3,821**	**10,843**	**11,579**
Solar	3,754	11,853	3,754	11,853	**11,376**	**35,918**
Wind	13,983	37,814	13,983	37,814	**42,372**	**114,589**
Others	49,376	70,581	49,376	70,581	49,376	70,581
Total	**7,367,341**	**7,885,152**	**7,044,649**	**7,585,967**	**7,685,256**	**8,340,744**
Renewable Energy Share	**6.3%**	**7.3%**	**6.2%**	**7.2%**	**10.2%**	**12.4%**

Note: Thermal efficiency used in the substitution method is 33%. Traditional and modern biomass are included. China, Malaysia and Papua New Guinea have no data on traditional biomass.

Source: APEC data.

Renewable energy in final energy consumption

Unit: ktoe

Including all biomass

	2010	2015
Non-renewables	**3,980,169**	**4,284,290**
Coal	733,659	774,478
Oil	1,596,319	1,719,021
Gas	629,517	692,095
Electricity	830,893	899,393
Heat	186,542	195,744
Other non-renewables	3,239	3,558
Renewable Energy	**356,116**	**443,942**
Electricity and Heat	145,980	217,750
Biomass	179,372	183,649
Geothermal Heat	512	749
Solar Heat	2,871	3,372
Others	27,382	38,421
Total	4,336,285	4,728,232
RE Share	**8.2%**	**9.4%**

Excluding traditional biomass

	2010	2015
Non-renewables	**3,980,169**	**4,284,290**
Coal	733,659	774,478
Oil	1,596,319	1,719,021
Gas	629,517	692,095
Electricity	830,893	899,393
Heat	186,542	195,744
Other non-renewables	3,239	3,558
Traditional Biomass	**63,799**	**64,908**
Modern Renewable Energy	**292,318**	**379,034**
Electricity and Heat	145,980	217,750
Modern Biomass	115,573	118,741
Geothermal Heat	512	749
Solar Heat	2,871	3,372
Others	27,382	38,421
Total	4,336,285	4,728,232
RE Share	**6.7%**	**8.0%**

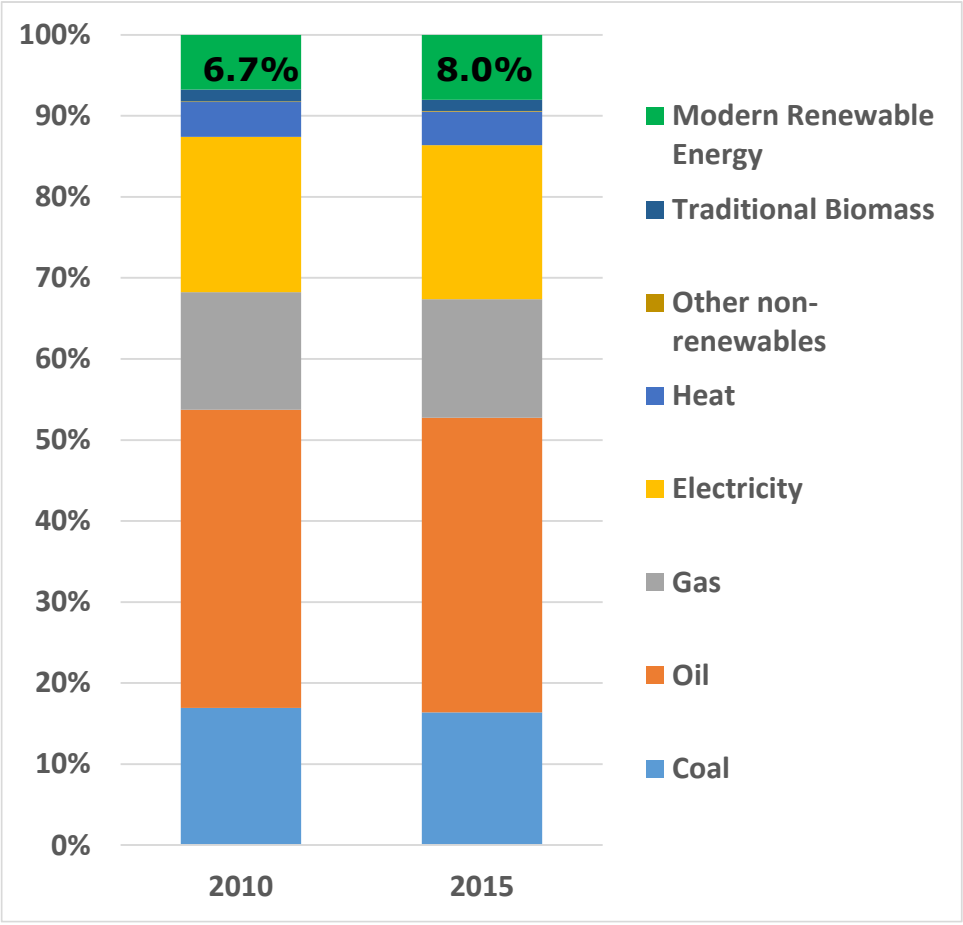
Note: Consumption of electricity and heat from renewables is calculated from the share of total electricity and heat production. China, Malaysia and Papua New Guinea have no data on traditional biomass. Unreported biomass is excluded from the calculations.

Source: APEC data.

Findings

- The quality of data on traditional biomass in non-OECD APEC economies may not be reliable yet and three economies are not able to report consumption of this energy source
- Current efforts to improve the efficiency of biomass cook stoves and furnaces would decrease consumption of traditional biomass
- It would therefore be reasonable to:
  - Exclude traditional biomass in the calculation of renewable energy share
  - Track the renewable energy doubling goal as a share of final energy consumption

RE roadmap measure for tracking the doubling goal

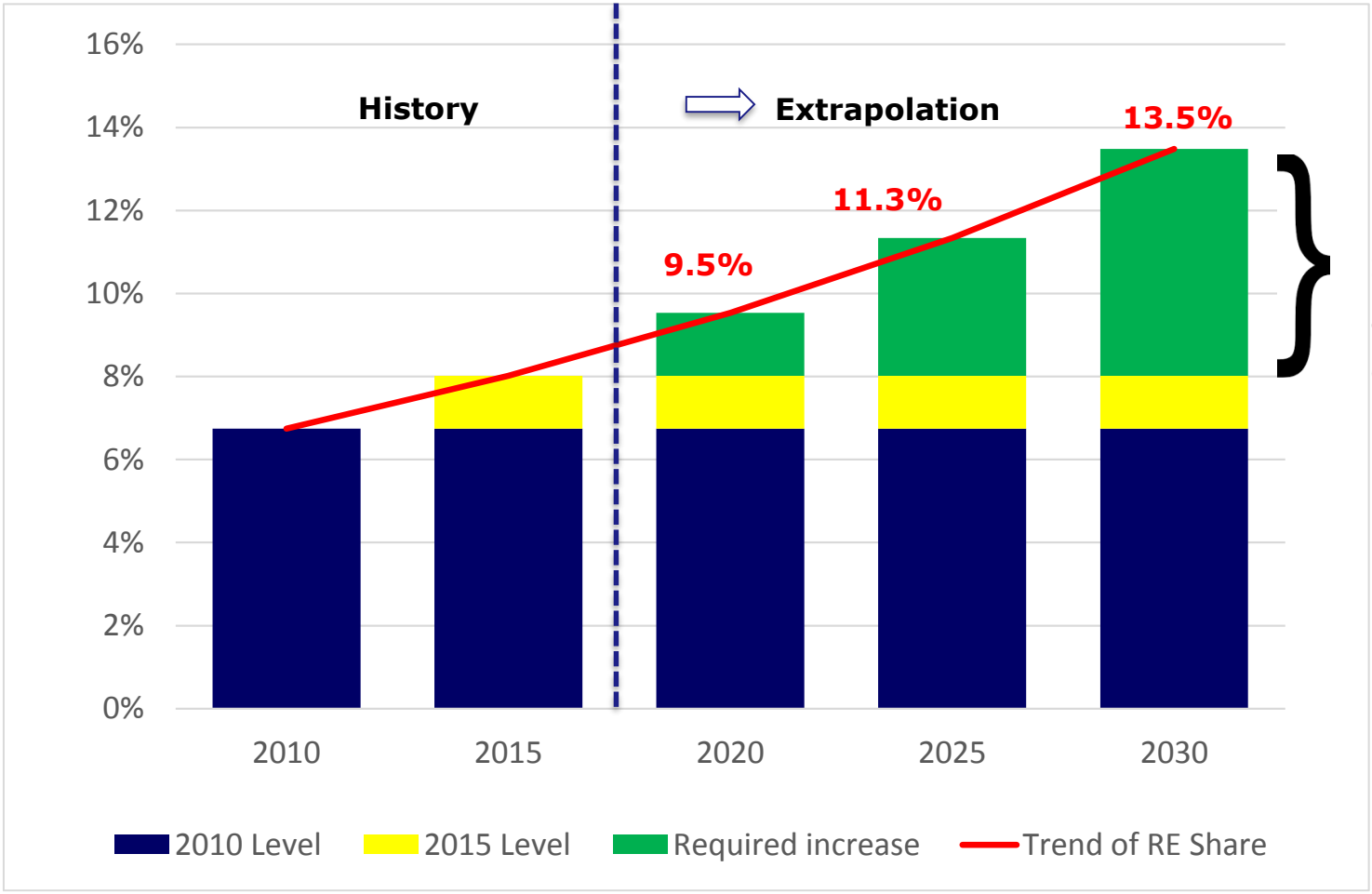


<u>Share of modern renewable energy in total final energy consumption</u> is used by the renewable roadmap project to track progress in the doubling goal

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

We need to sustain the rate of increase from 2010 to 2015 to achieve the goal in 2030

Renewable energy share excluding traditional biomass



Level of additional renewable energy share needed to achieve the doubling goal

Source: APEC data and APERC analysis.

Thank you for your kind attention

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

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