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12.c. Memorandum for Renewable Energy Share Doubling Goal

Shigeru Kimura (IEEJ/EDMC as EGEDA Secretariat)
Takato OJIMI (President, APERC)

Asia-Pacific
Economic Cooperation

12.c. Background of the RE Share Doubling Goal

September 2011:

- Under the Sustainable Energy for All (SE4All) Initiative, the UN has set a goal of doubling the share of renewable energy in the global energy mix by 2030.

February 2014:

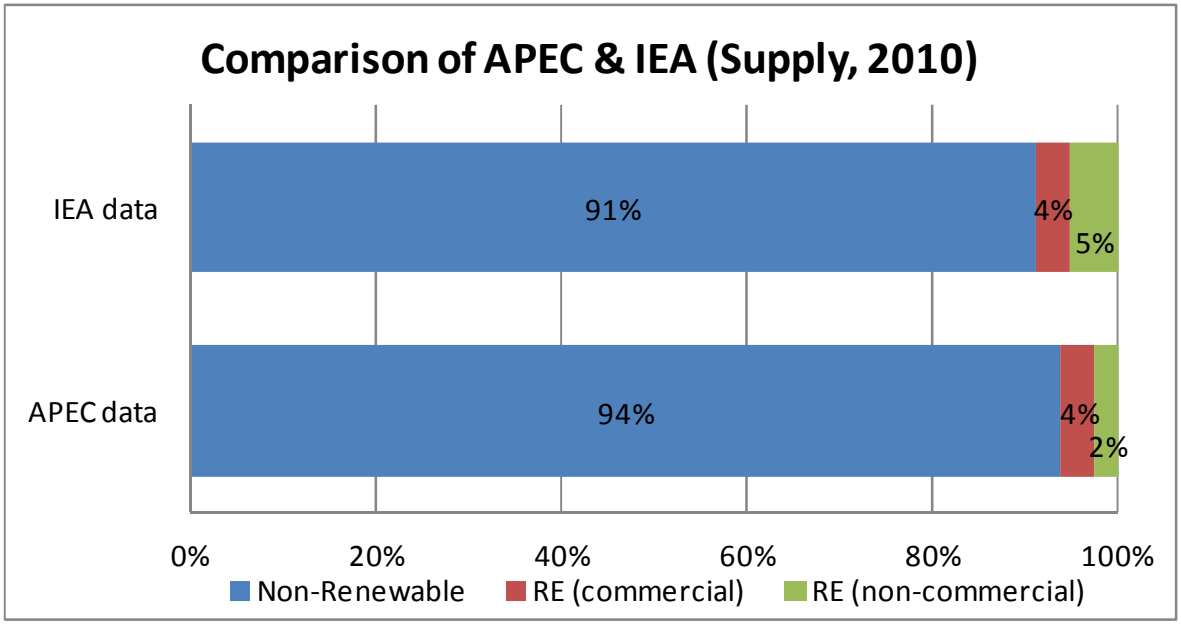
- At the First Senior Officials Meeting (SOM1) in China, members discussed the possibility of committing to a regional energy goal that is in line with the SE4ALL initiative.

April 2014:

- At the Joint EGNRET and EGEDA Meeting in Hawaii, EGNRET members discussed the technical aspects of RE goal as well as technology cost goals.
- EGEDA and APERC were tasked to prepare a memorandum to facilitate the discussions on APEC Renewable Energy Share Doubling Goal at the APEC EWG 47 Meeting in Kunming, China.

12.c. (1) Comparison of Renewable Energy (RE) Share

- RE share in APEC statistics is 6% in 2010, on the other IEA is 9%. But the share of commercial renewable energy is same in both APEC and IEA.
- IEA estimates non-commercial energy based on FAO 's survey results.



Note: non-renewable: Coal, Oil, Gas, Nuclear, Electricity, Heat, Industrial Wastes
commercial RE: Hydro, Wind, Geothermal, Solar, Biogas, Bioliquids etc.
non-commercial RE: Primary solid biomass
Source: APEC energy database, IEA

12.c. (1) Data Submission Status in APEC Data Collection

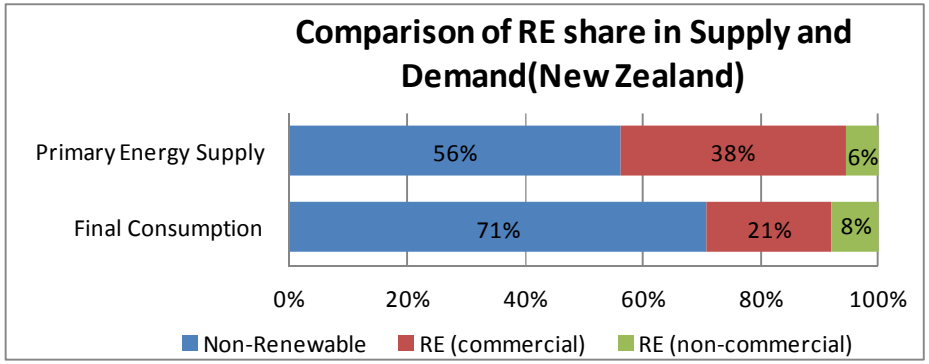
- Some member economies do not submit their RE data , especially for non-commercial products. Submission of RE data among APEC economies is inconsistent.

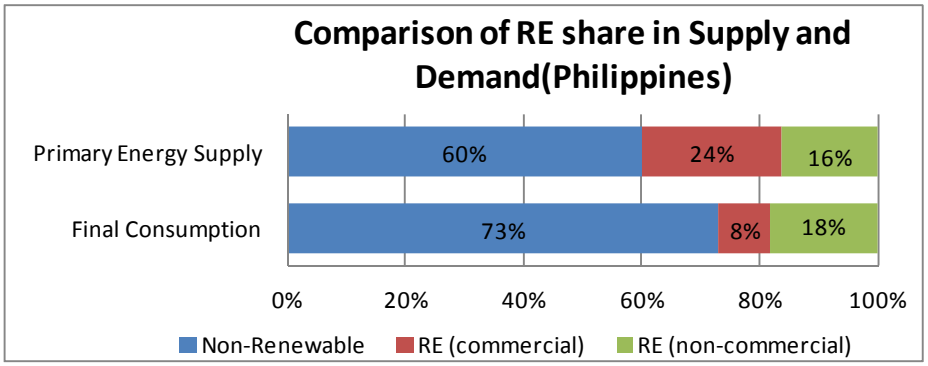
Table: Data Submission of RE from APEC non-OECD economies (2010)

	Hydro	Geothermal Power	Photovoltaic	Tide,Wave, Ocean	Wind	Solar thermal	Geothermal Heat	Solar Heat	FuelWood & Woodwaste	Bagasse	Charcoal	Other Biomass	Biogas	Industrial Waste	Municipal Solid Waste	Liquid Biofuels
Brunei	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
China	✓	-	-	-	✓	-	-	-	-	-	-	-	-	✓	-	-
Hong Kong, China	-	-	✓	-	✓	-	-	✓	-	-	✓	-	✓	-	-	✓
Indonesia	✓	✓	✓	-	✓	-	-	-	-	-	-	✓	-	-	-	-
Malaysia	✓	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-
Papua New Guinea	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peru	✓	-	✓	-	-	✓	-	-	✓	✓	✓	✓	-	-	-	✓
Philippines	✓	✓	✓	-	✓	-	-	-	✓	✓	✓	✓	-	-	✓	✓
Russia	✓	✓	-	-	✓	-	-	-	✓	-	-	-	-	✓	-	-
Singapore	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-
Chinese Taipei	✓	-	✓	-	✓	-	-	✓	✓	-	-	-	✓	-	✓	-
Thailand	✓	✓	-	-	✓	✓	-	-	✓	✓	✓	✓	✓	-	✓	✓
Viet Nam	✓	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-

12.c. (1) Comparison of RE Share in Supply and Demand

- To calculate indigenous production of renewable energy, following efficiencies are applied in APEC energy balance tables.
  - Geothermal: 10%
  - Hydro and Other RE Power except biomass: 100%
- Then, geothermal energy brings higher renewable share in primary supply than final consumption. This shows that renewable energy share in primary supply is not appropriate.





Note: Commercial renewable energy include electricity generated by RE energy.
Source: APEC energy database (data of 2010)

12.c. (2) Survey of Definitions of Renewable Energy (RE)

- **Definitions of hydro power should be harmonized to IEA and IRENA.**
- **Standard methodology for renewable energy survey is recommended.**

Table: Comparison of definition of RE (excerpt)

IRES	IRENA	IEA	APEC
Municipal waste (renewable)	Renewable Municipal Waste	Municipal Waste - Renewable	**Municipal Solid Waste**
Municipal waste (non-renew)	other (non-renewable)	Municipal waste (non-renew)	
Wood pellets	Wood and straw pellets/briquettes	Solid biofuels excluding charcoal	**FireWood & Wood waste**
Other Fuelwood, wood residues and by-products	Fuelwood		
	Wood waste		
Other vegetal material and residues	Rice husks		**Other Biomass**
	Straw		
	Other vegetal and agricultural waste		
	Other primary solid biomass		
Black liquor	Black liquor		
Bagasse	Bagasse		**Bagasse**
Hydro electricity	Hydro	Hydro	**Hydro**
	Hydro-1 MW	Hydro-1 MW	
	Hydro 1-10 MW	Hydro 1-10 MW	
	Hydro 10+ MW	Hydro 10+ MW	
	Pumped Hydro	Pumped hydro	

12.c. (3) Alternative Definitions

3-1. Purpose of the Doubling Goal

ÅWhat is the purpose of RE share doubling goal?

Priority	Geothermal	Solar	Wind	Tidal/Wave	Large Hydro	Small Hydro	Modern Bioenergy	Traditional Biomass	Waste	Imported RE
Energy Security	√	√	√	√	√	√	√	√	√	X
Emissions Reduction	√	√	√	√	√	√	√	√	√	√
Sustainable Development	√	√	√	√	X	√	√	X	√	√

12.c. (3) Alternative Definitions

3-2. An Example of Alternative Definitions

ÅFrom the viewpoint of sustainable development which covers not only CO_2 reduction but also environmental protection, health promotion and other social values, it is possible to define "RE to be promoted by APEC".

"Sustainable RE" consists of:

a) Small-scale hydro;
b) Wind;
c) Solar (photovoltaic and solar heat);
d) Geothermal;
e) Bioenergy *excluding* traditional firewood and charcoal for households;
f) Upcoming Alternative energies that meet the sustainable criteria.

12.c. (3) Alternative Definitions

3-2. An Example of Alternative Definitions

- **If the "Sustainable RE" definition is adopted, a more concrete agreement for categorizing "small-scale hydro" is needed.**
  - **EGEDA will need to collect additional data collection since hydro in APEC Energy Statistics is aggregated without any classification by scale.**
  - **EGNRET network will need to be mobilized to acquire definition, data and estimates of small-scale hydro in each economy.**

12.c. (4) Other Issues

4-1. Goal Setting Period

Å2005 and 2035 is proposed for the base year and the target year to maintain consistency with the APEC Energy Intensity Reduction Goal.

4-2. Denominator in Share Calculation

ÅBoth Total Primary Energy Supply (TPES) and Total Final Energy Consumption (TFEC) are possible.

ÅIn order to avoid overestimating the role of RE when low efficiency accounting method is assumed (or conversely), it is proposed that APEC uses TFEC as a denominator in RE share calculation.

12.c. (5) A Trial Calculation

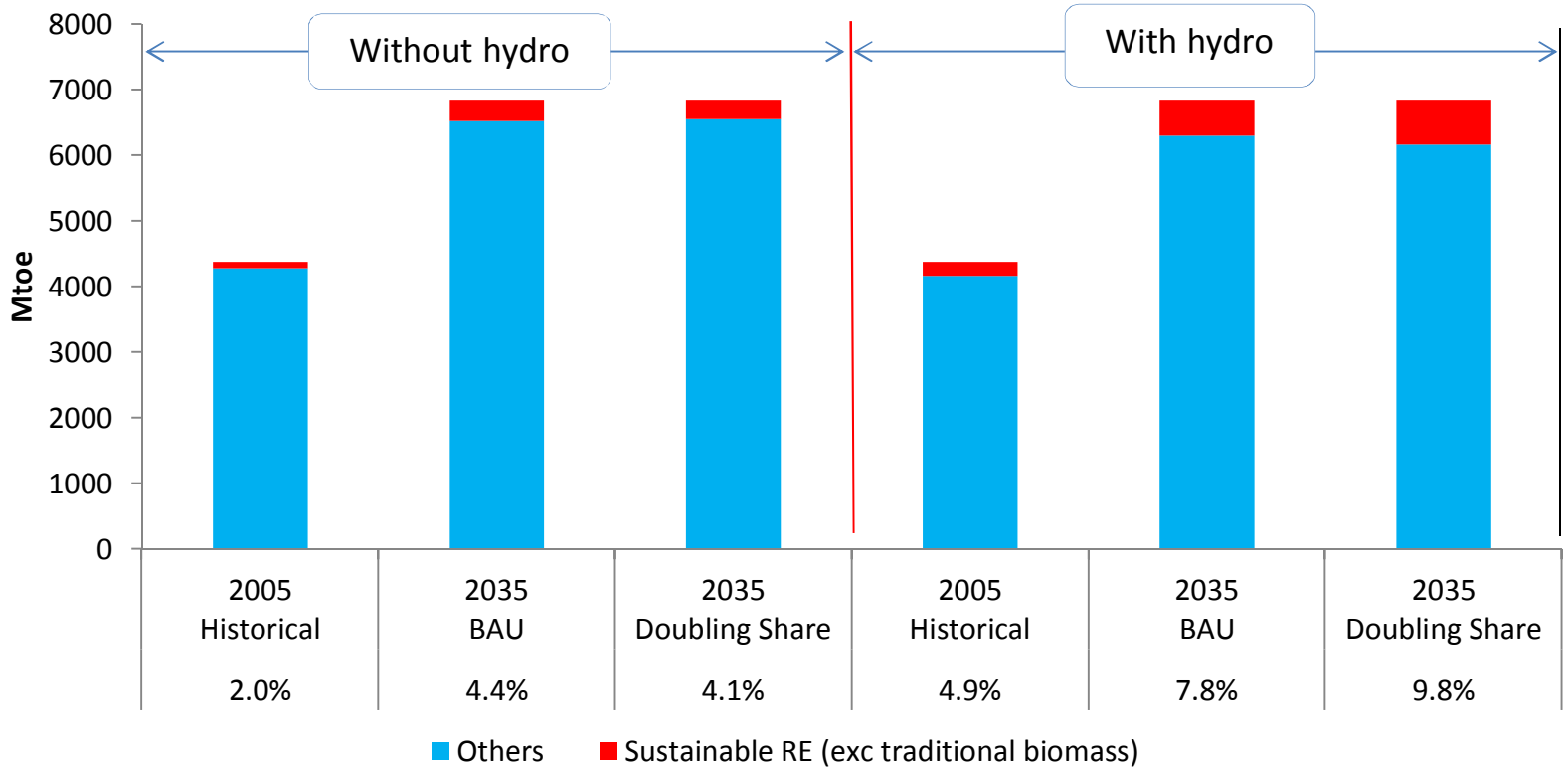
- This trial calculation makes use of
  1. The IEA Energy Balance Database for 2005 data.
  2. The APEC Energy Demand and Supply Outlook 5th Edition for the forecasted data.

- Due to the data constraints, the “Sustainable RE” categorization here consists of:
  1. All RE power generation.
  2. Direct-use of RE (but <u>excludes</u> RE in the residential, commercial and other sector).

- The denominator is the Total Final Energy Consumption (TFEC).

12.c. (5) A Trial Calculation

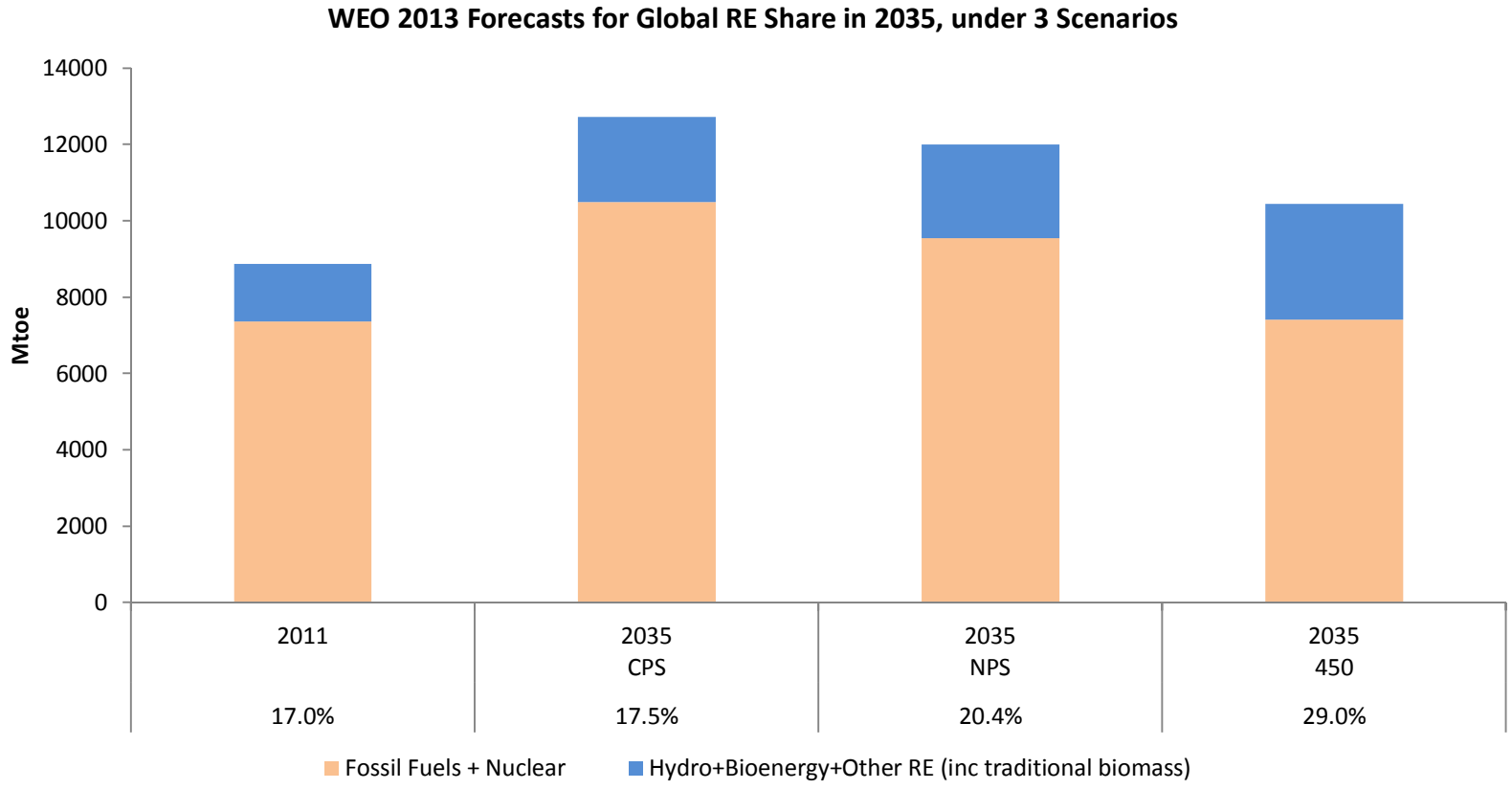
APEC Outlook Forecasts for Share of RE in APEC TFEC, in 2035:
Examining impact of including hydro in RE Share



12.c. Appendix: Comparing APEC and IEA Forecasts

Projections	Base Year	Scenarios
APEC Energy Demand and Supply Outlook, 5th Edition	2009 IEA data	A **business-as-usual (BAU)** scenario that covers all sectors and is based on the continuation of existing policies.
IEA World Energy Outlook 2013	2011 IEA data	➢ **Current Policies Scenario (CPS)**: similar to APEC's BAU. ➢ **New Policies Scenario (NPS)**: implementation of announced policies that have not been enacted yet. ➢ **450 Scenario (450)**: to set the energy system on track to have a 50% chance of keeping to 2℃ the long-term increase in average global temperature.

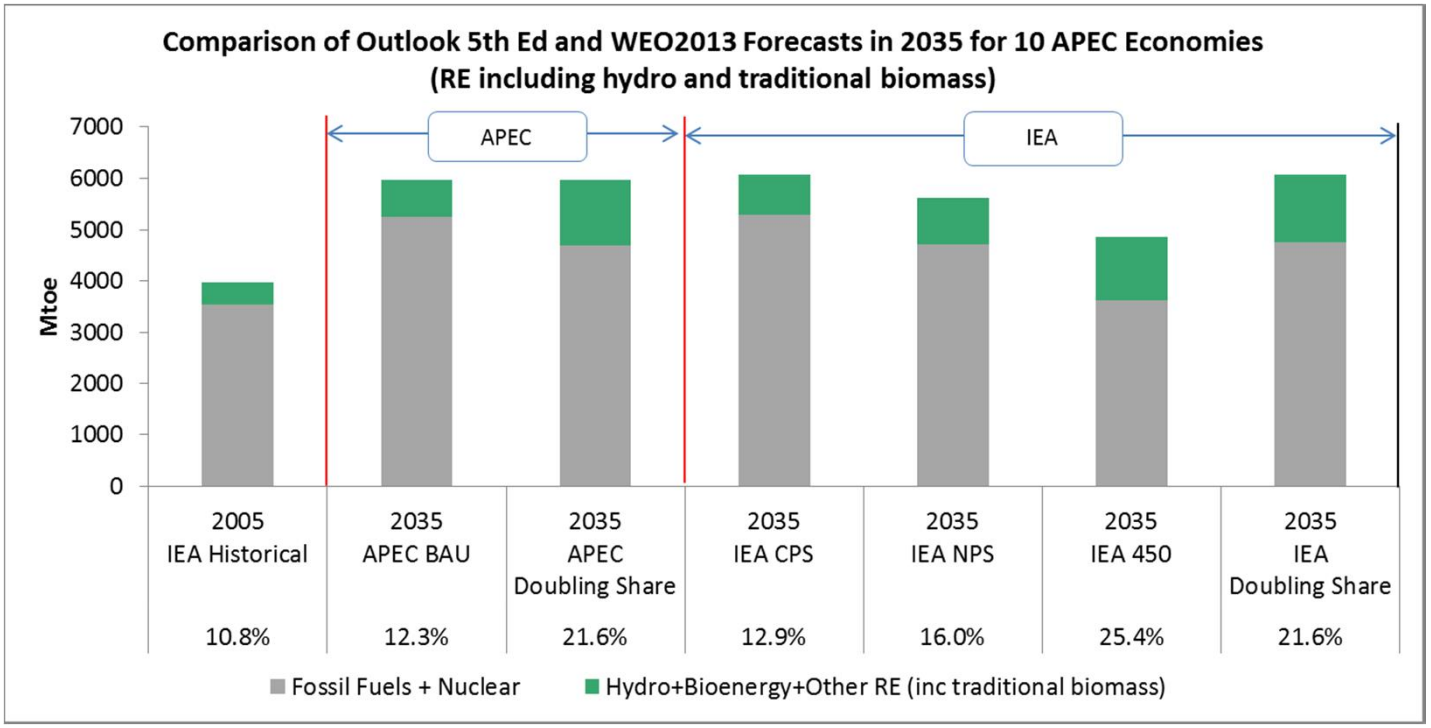
12.c. Appendix: Comparing APEC and IEA Forecasts



* Disaggregated data by economy not available
* Data for traditional biomass not available

12.c. Appendix: Comparing APEC and IEA Forecasts

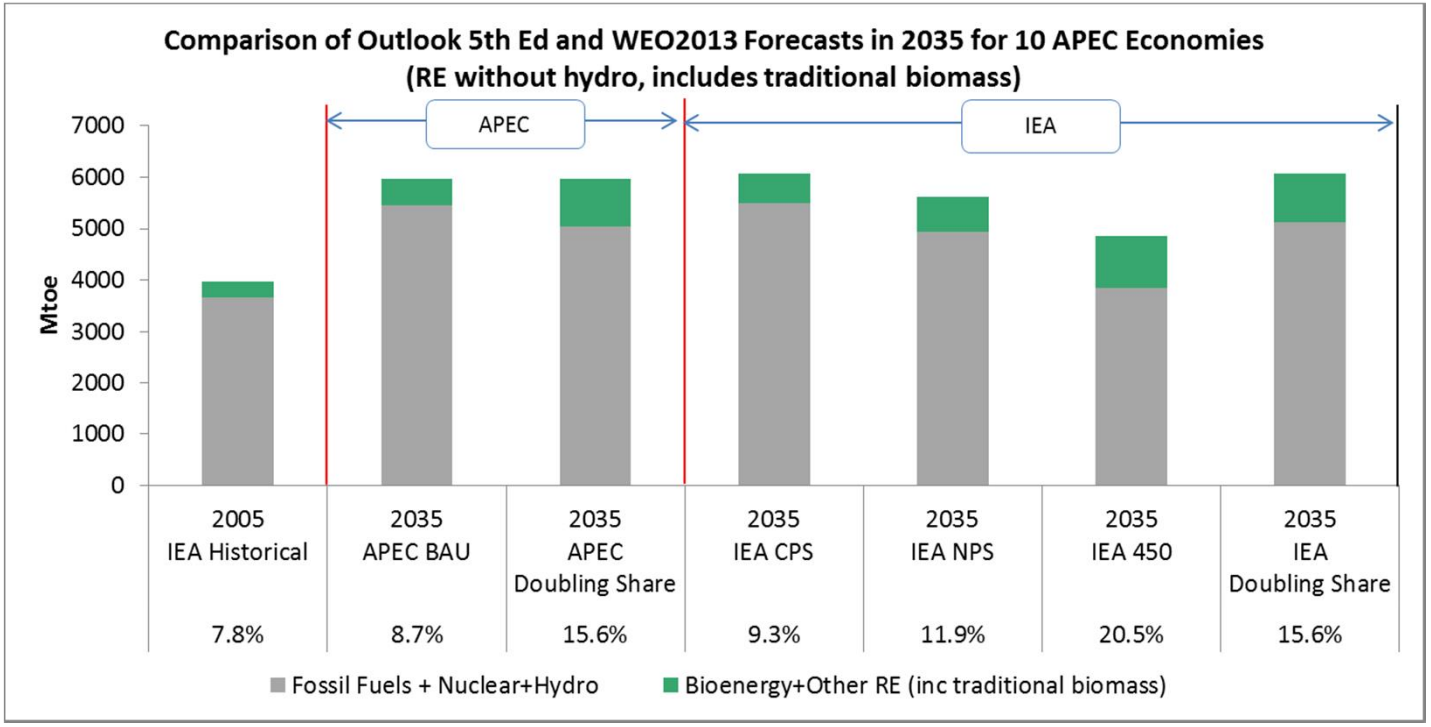
Based on available IEA data, comparison can be made for **10 out of 21 APEC economies** (> 85% of APEC TFEC). The following table includes hydropower as RE.



* The ten economies are Canada, Chile, Mexico, USA, Australia, Japan, Korea, New Zealand, Russia and China.

12.d. Appendix: Comparing APEC and IEA Forecasts

- **The following table does not include hydropower as RE.**



* The ten economies are Canada, Chile, Mexico, USA, Australia, Japan, Korea, New Zealand, Russia and China.

12.c. Appendix: Comparing APEC and IEA Forecasts

- There is small difference between APEC BAU and IEA CPS forecasts in 2035.

- Under the APEC BAU and IEA CPS scenarios, and even under the IEA NPS Scenario, if traditional biomass is included, it would be impossible for APEC economies to achieve the aim to double RE share in TFEC basis by 2035, using 2005 as base year.

- Only under IEA 450 scenario will this aim be attained, but this entails massive reduction of energy consumption as well as large increase of RE.