



**Asia-Pacific
Economic Cooperation**

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Agenda Item: 11ci

Progress Towards Energy Intensity Reduction Goal

Purpose: Information
Submitted by: APERC



57th Energy Working Group Meeting
Manila, Philippines
23-24 May 2019

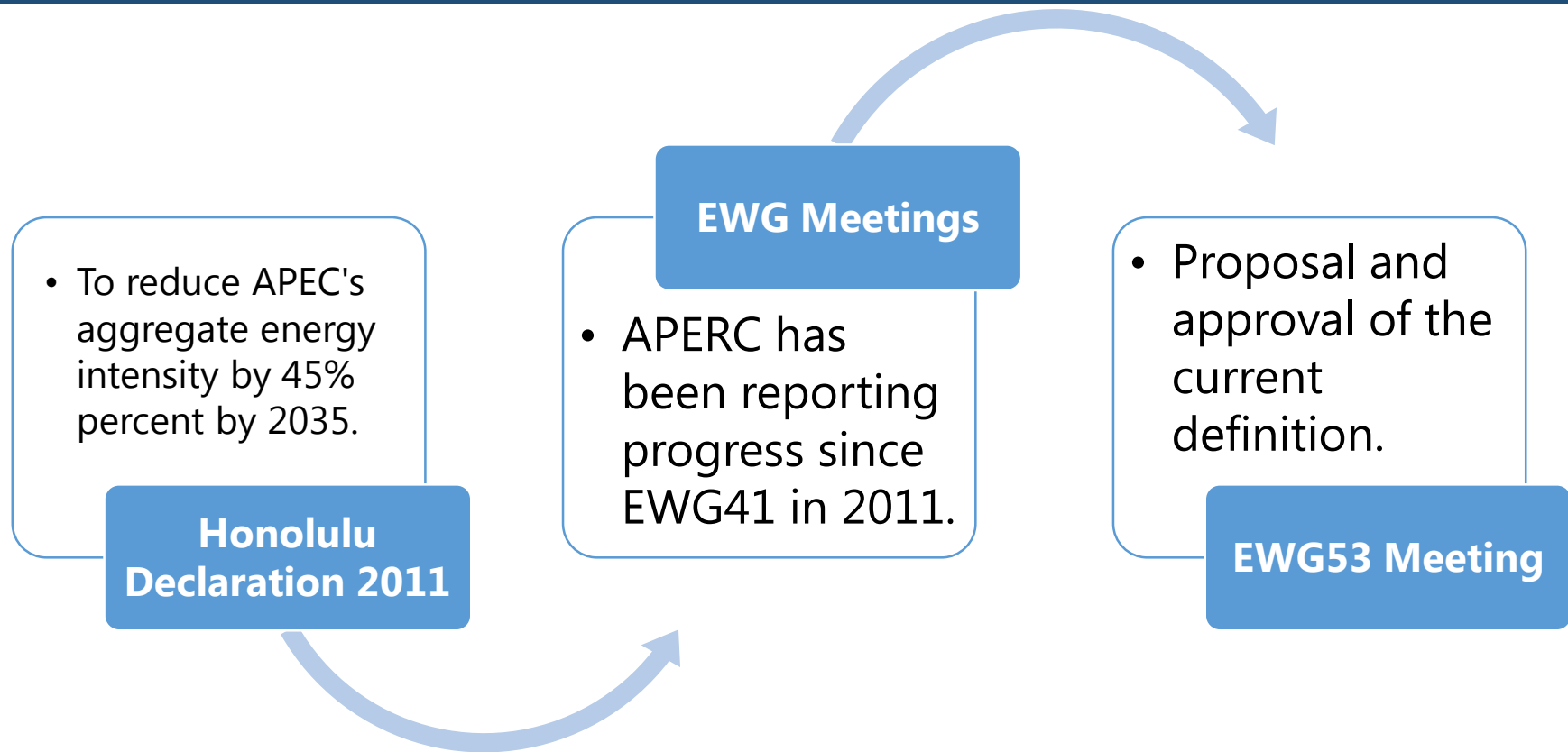
11.c.i. Progress toward Energy Intensity Reduction Goal

The 57th Meeting of APEC Energy Working Group (EWG)
Taguig City, Philippines, 23-24 May 2019

James Kendell, EGEDA Chair; Senior Vice President, APERC



APEC energy intensity indicator milestones



- ❑ Agreement was reached at EWG53 to analyse final energy consumption intensity (excluding non-energy), using APEC data.
- ❑ At EGEEC53, presented a plan to develop energy efficiency indicators by using decomposition

Notes on updated data sources

- ❑ All energy data collected by ESTO are as of October 2018.
 - Data improvements were made to historical data for some economies [(INA-1990-2015), (AUS, CAN, CHL, ROK, MEX, NZ, USA using IEA data from 2005 to 2015)]; Russia and Singapore were also revised from 2005 to 2015. As a result, there were slight changes on annual growth rates
- ❑ GDP data from the World Bank (PPP, constant 2011 US dollars)
- ❑ Exceptions:
 - APERC/ESTO estimates Papua New Guinea energy consumption.
 - APERC estimates Chinese Taipei GDP data.



The Results

Energy intensity continued to decline in 2016

APEC final energy consumption intensity (excluding non-energy), 2006-2016

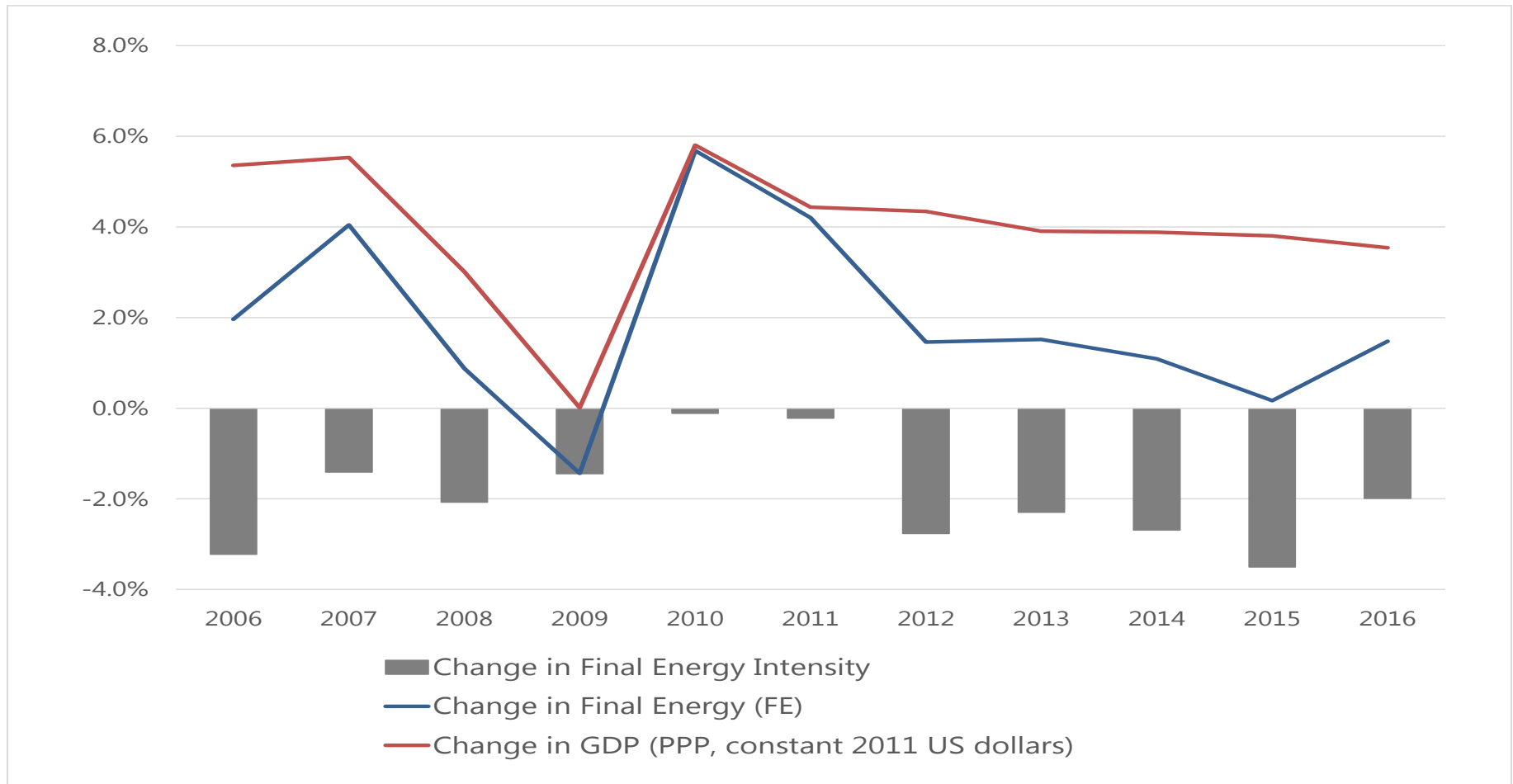
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Trend to 2035
Change in Final Energy (FE)	2.0%	4.0%	0.9%	-1.4%	5.7%	4.2%	1.5%	1.5%	1.1%	0.2%	1.5%	
Change in GDP (PPP, constant 2011 US dollars)	5.4%	5.5%	3.0%	0.0%	5.8%	4.4%	4.3%	3.9%	3.9%	3.8%	3.5%	
Change in Final Energy Intensity	-3.2%	-1.4%	-2.1%	-1.4%	-0.1%	-0.2%	-2.8%	-2.3%	-2.7%	-3.5%	-2.0%	-45.1%

Source: APEC statistics and APERC analysis.

- ❑ *Final energy consumption intensity (ex. non-energy) has been improving reasonably consistently with the largest reduction in 2015.*
- ❑ *Final energy consumption intensity (ex. non-energy) fell 19.8% between 2005 and 2016.*
- ❑ *If the current trend continues, final energy consumption intensity (ex. non-energy) reduction would meet the APEC goal: 45% in 2035.*

GDP and energy consumption remain decoupled

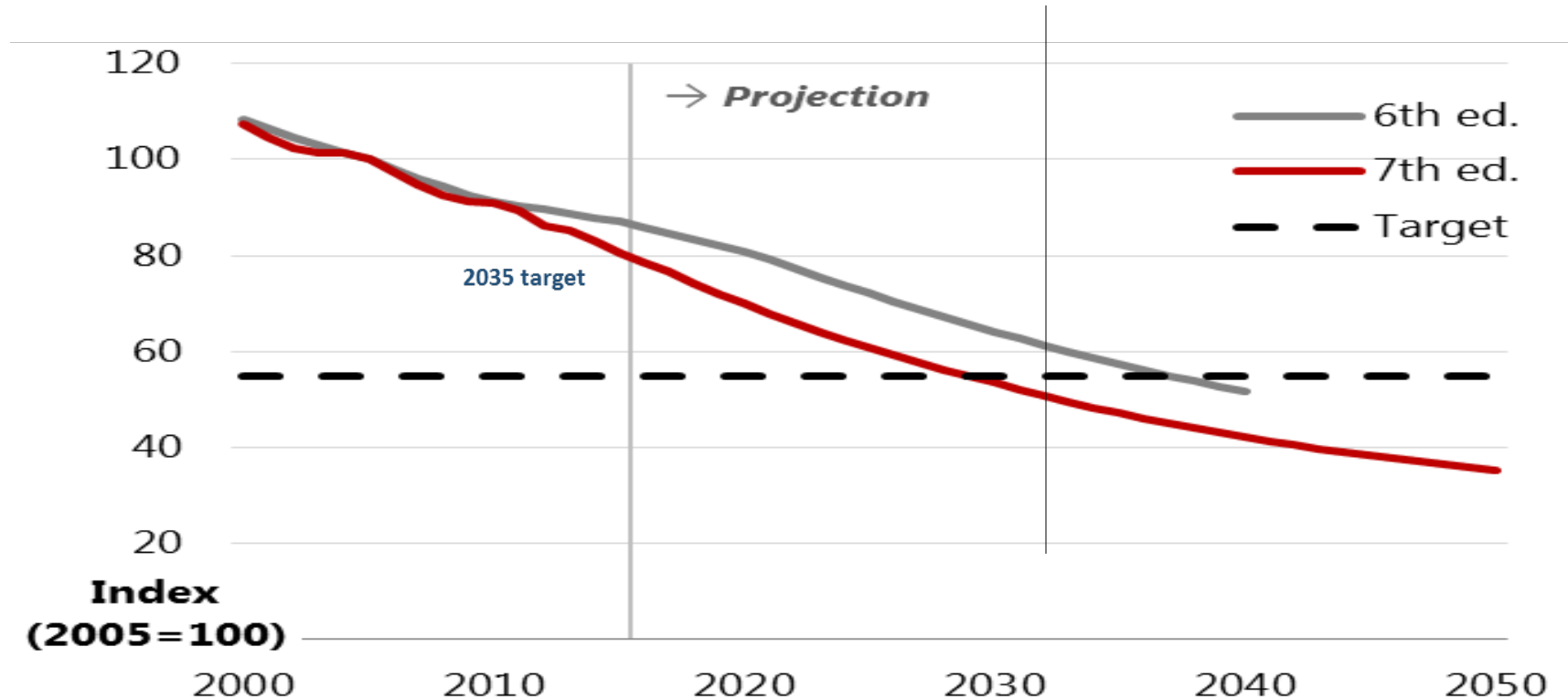
Annual changes to intensity, energy demand and GDP, 2006-2016



Source: APEC statistics and APERC analysis.

Intensity goal is met in 2029 in Outlook 7th edition

APEC business-as-usual energy intensity by edition, 2000-2050

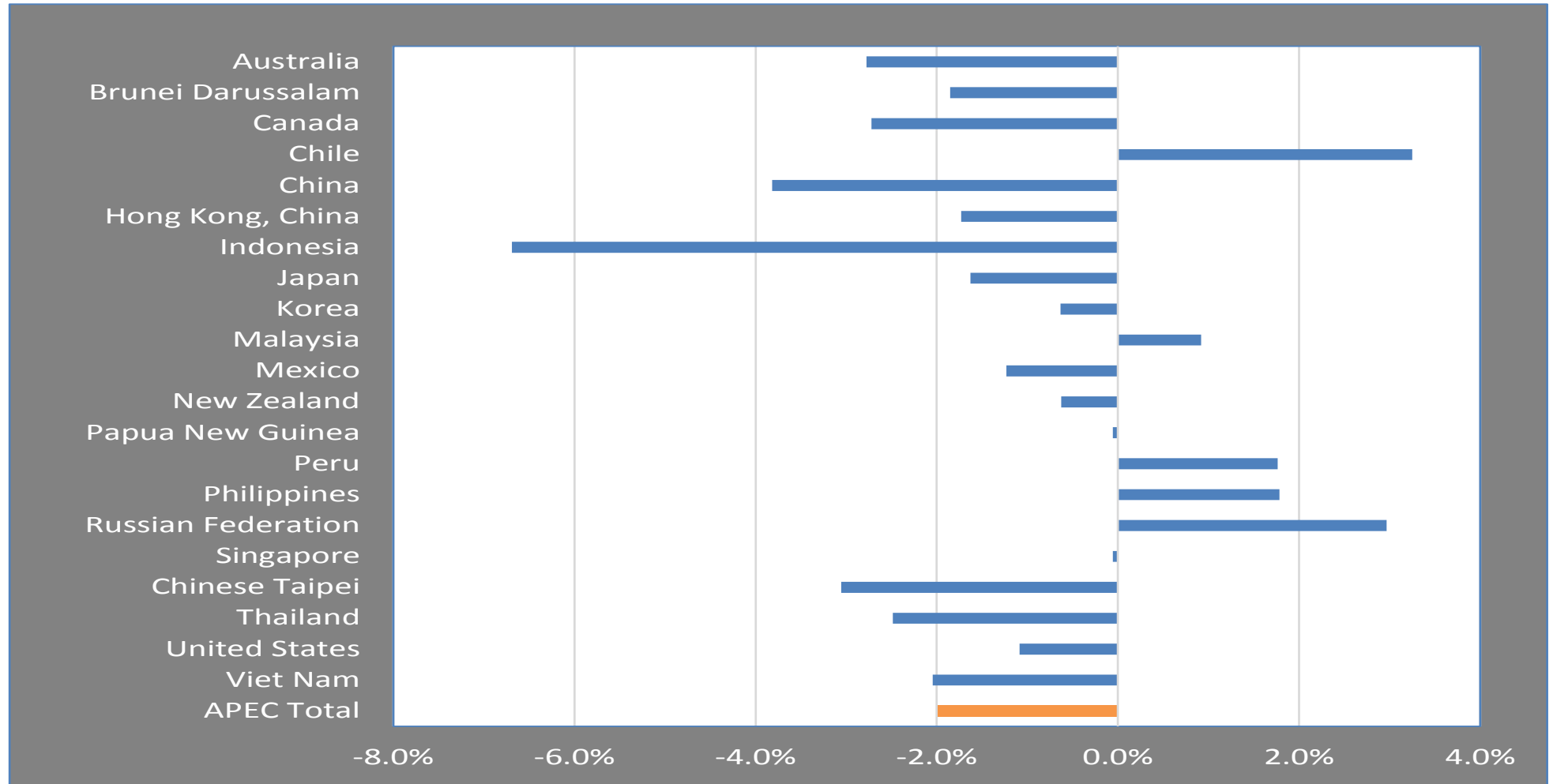


Source: IEA statistics 2017 and APERC analysis.

Goal was met in 2037 in the 6th edition.

In the short run, not all economies have decoupled

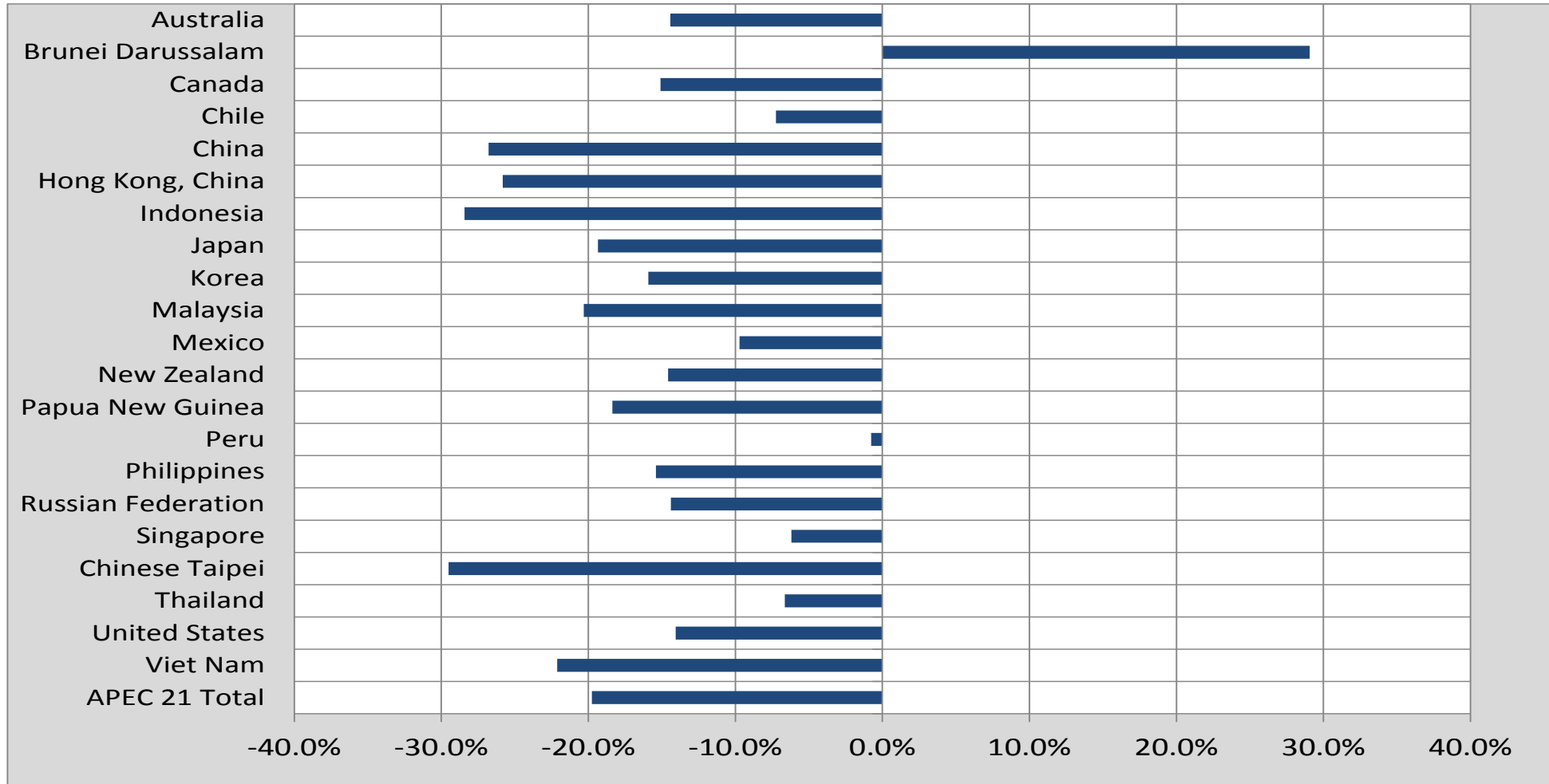
Economy energy intensity changes, 2015 to 2016



Source: APEC statistics and APERC analysis.

In the long run, most economies have decoupled

Economy energy intensity changes, 2005 to 2016



Source: APEC statistics and APERC analysis.

Decomposition will illuminate intensity measure

...but data intensive

Energy data - APEC data through ESTO

GDP (PPP)–World Bank Indicators. As oftentimes disaggregated GDP or gross value added (GVA) are not available in World Bank database, GVA may need to be sourced from each economy.

Other data–activity data; physical production output; sectoral end use from each economy; and other international sources such as IEA, WB, IMF, UN, ADB and OECD.

- *EGEEC supports decomposition of energy demand and development of energy efficiency measures to better understand the underlying causes of changes in energy intensity.*
- *EGEEC had preliminary discussions about updating the intensity goal.*

Activity, structure, and intensity effects are key

Decomposition represented by Logarithmic Mean Divisia Index (LMDI)-I Formula by B.W. Ang

$$\Delta E_{tot} = E^T - E^0 = \Delta E_{act} + \Delta E_{str} + \Delta E_{int}$$

Change in energy

$$= \underbrace{\sum_i \frac{E_i^T - E_i^0}{\ln E_i^T - \ln E_i^0} \ln \left(\frac{Q^T}{Q^0} \right)}_{\text{Change in activity}} + \underbrace{\sum_i \frac{E_i^T - E_i^0}{\ln E_i^T - \ln E_i^0} \ln \left(\frac{S_i^T}{S_i^0} \right)}_{\text{Share (change in structure)}} + \underbrace{\sum_i \frac{E_i^T - E_i^0}{\ln E_i^T - \ln E_i^0} \ln \left(\frac{I_i^T}{I_i^0} \right)}_{\text{Change in intensity}}$$

Where:

E = Total energy consumption (for all sectors)

Q = Overall activity level (for all sectors)

E_i = Energy consumption of sector i

Q_i = Activity level of sector i

S_i = Activity share of sector i

I_i = Energy intensity of sector i

T = current year

0 = base year

Closing thoughts: better data = better analysis

- Trends look good; decoupling seems likely to continue.
- Decomposition and energy efficiency measures are needed to tell us about the underlying causes of changes in energy intensity.
- More useful analysis requires more detailed data, which can be a challenge (or opportunity...) for EGEDA members.



Thank you for your kind attention.

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