Progress toward energy intensity reduction goal and EGEDA updates

The 54th Meeting of EGEEC
Mandaue City, Philippines, 23-25 September 2019

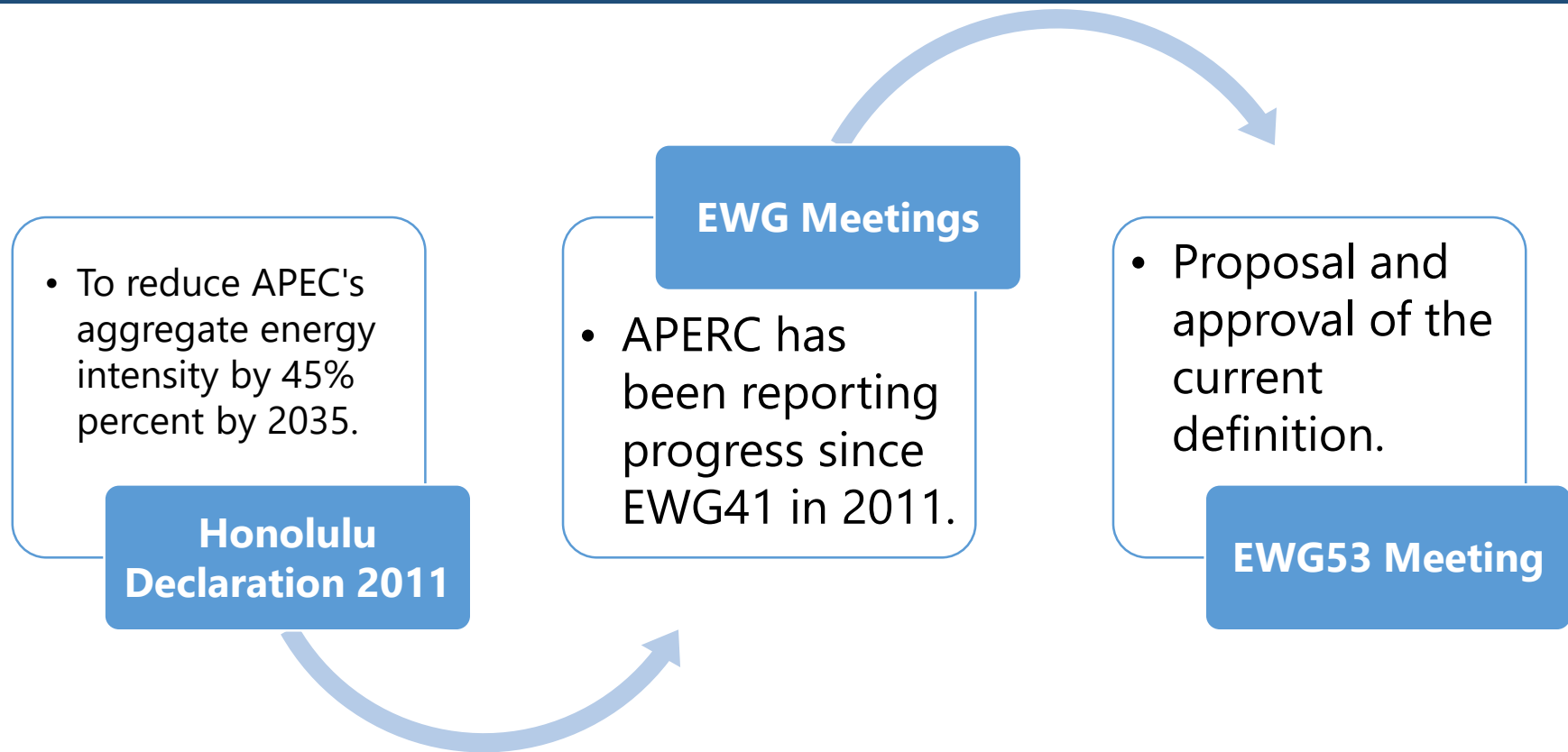Elvira Torres Gelindon, Senior Researcher, APERC

Outline

1. Progress on APEC intensity goal
2. Decomposition analysis
3. EGEDA Updates

1. Progress on APEC intensity goal

APEC energy intensity indicator milestones

Honolulu Declaration 2011
- To reduce APEC's aggregate energy intensity by 45% percent by 2035.

EWG Meetings
- APERC has been reporting progress since EWG41 in 2011.

EWG53 Meeting
- Proposal and approval of the current definition.

❑ 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; and EWG57 as well.

Notes on updated data sources

❑ All energy data collected by ESTO were 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.*

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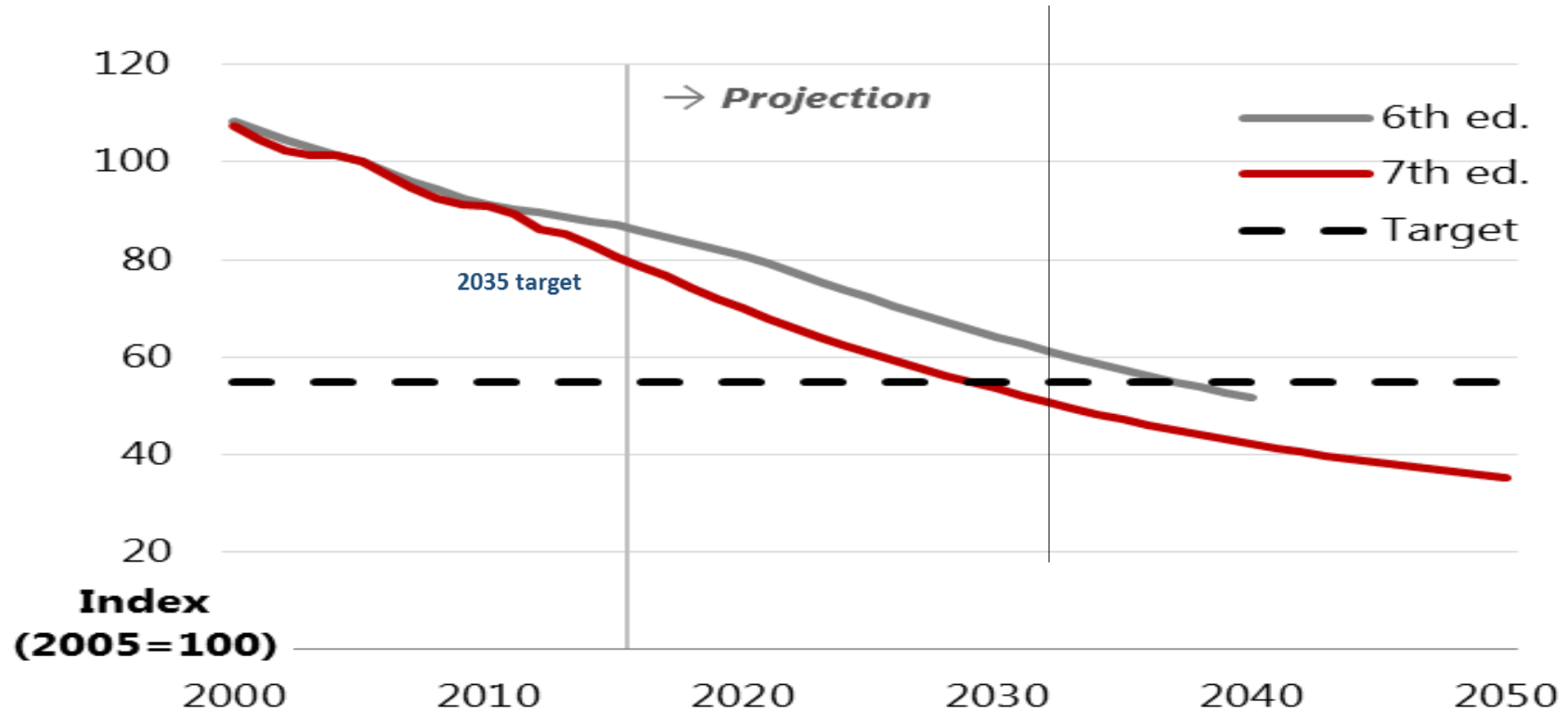# GDP and energy consumption remain decoupled

Annual changes to intensity, energy demand and GDP, 2006-2016
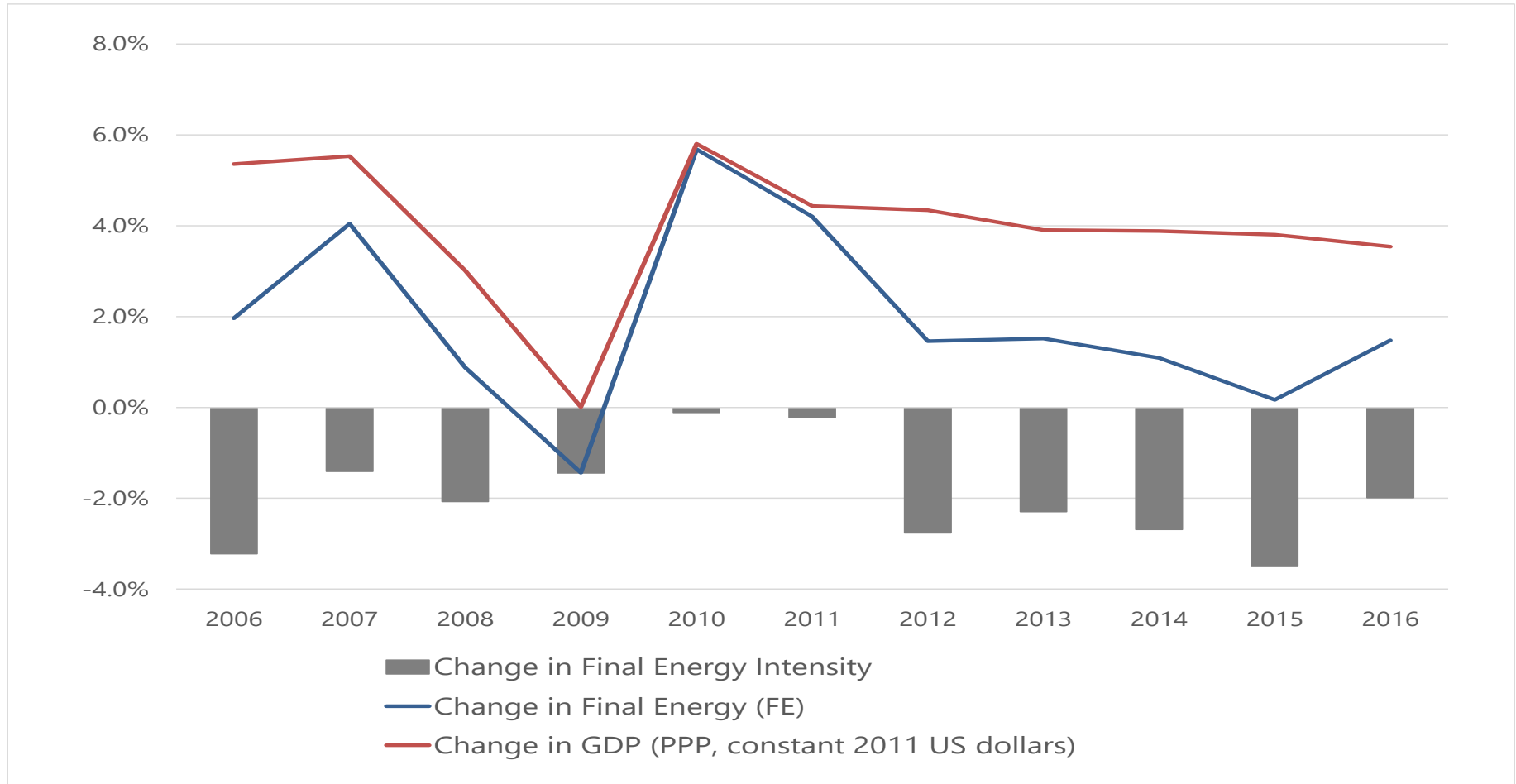
Source: APEC statistics and APERC analysis.

Intensity goal is met in 2029 in Outlook 7th edition

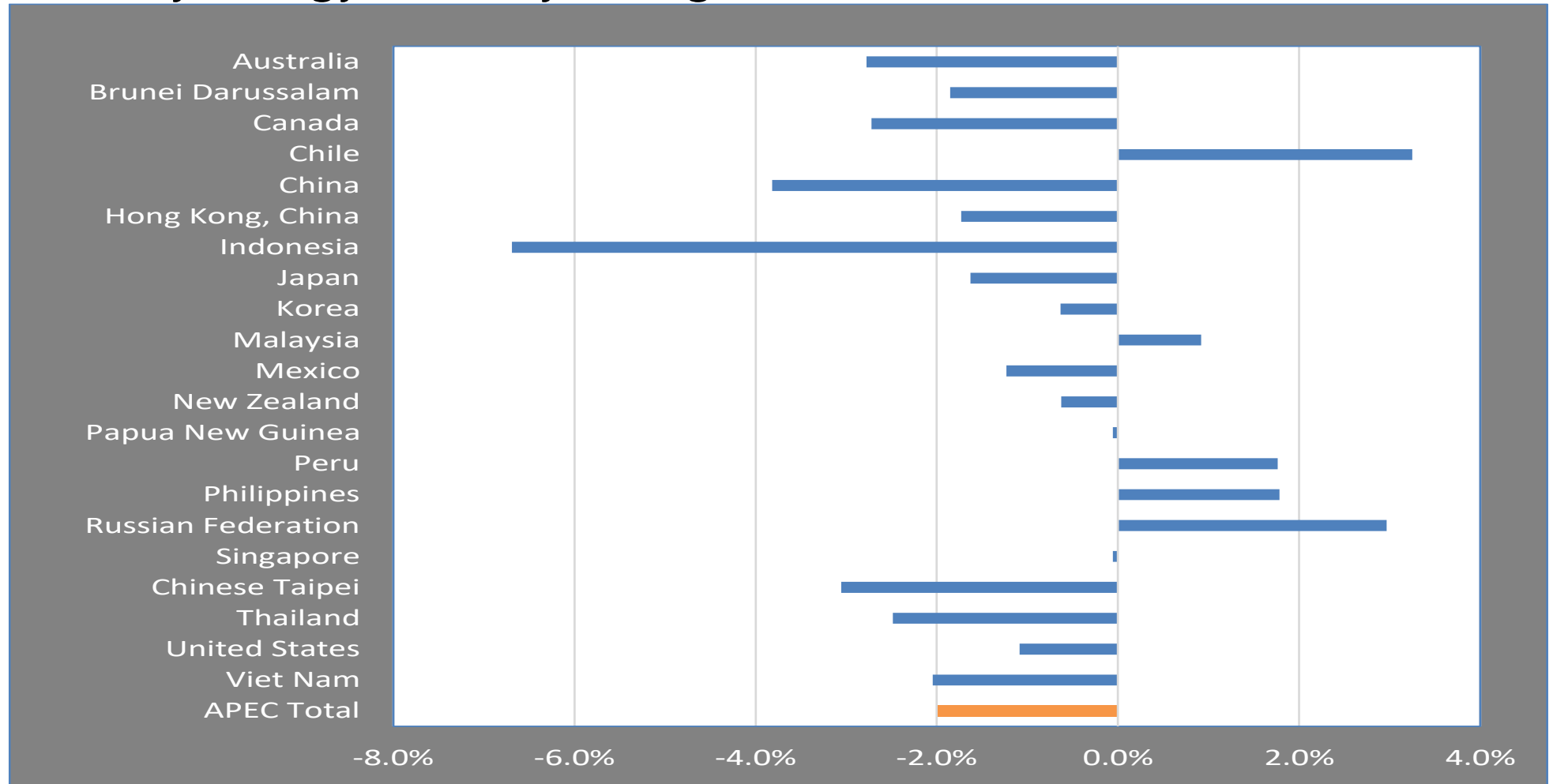APEC business-as-usual energy intensity by edition, 2000-2050

Source: IEA statistics 2017 and APERC analysis.

Goal was met in 2037 in the 6th edition.

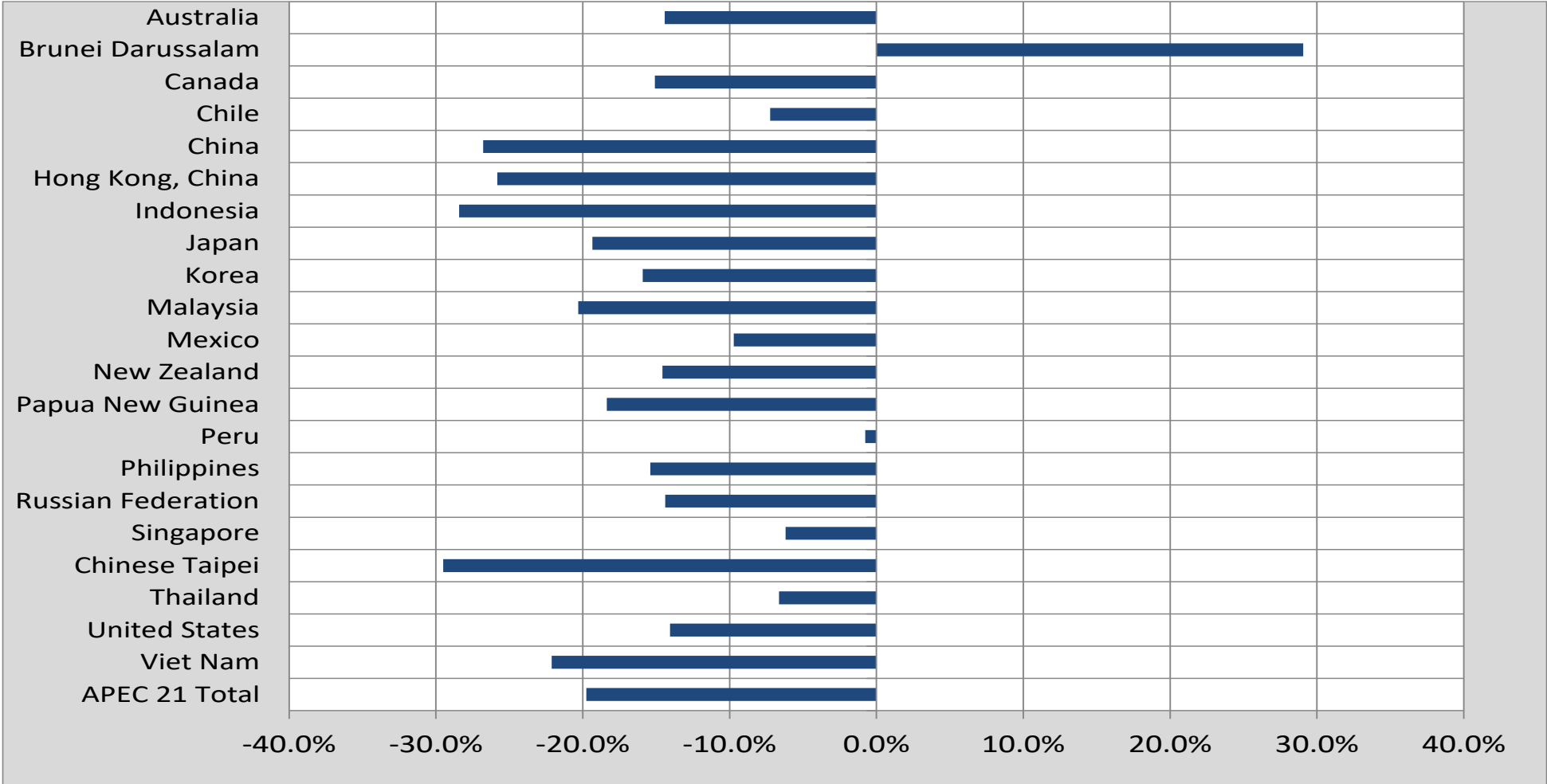# In the short run, not all economies have decoupled

Economy energy intensity changes, 2015 to 2016

In the long run, most economies have decoupled

Economy energy intensity changes, 2005 to 2016

Source: APEC statistics and APERC analysis.

2. Decomposition 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.*

- *EWG57 supports decomposition analysis*

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

$$= \sum_i \frac{E_i^T - E_i^0}{\ln E_i^T - \ln E_i^0} \ln\left(\frac{Q^T}{Q^0}\right) + \sum_i \frac{E_i^T - E_i^0}{\ln E_i^T - \ln E_i^0} \ln\left(\frac{S_i^T}{S_i^0}\right) + \sum_i \frac{E_i^T - E_i^0}{\ln E_i^T - \ln E_i^0} \ln\left(\frac{I_i^T}{I_i^0}\right)$$

Change in activity   **Share (change in structure)**   **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   *T* = current year

Q_i = Activity level of sector i   *0* = base year

S_i = Activity share of sector i

I_i = Energy intensity of sector i

Data used for decomposition

- Energy (ktoe)
  - ESTO data (industry, services, agriculture)

- Activity data (constant 2010 USD)
  - World Bank GVA (industry, services, agriculture)
  - National Statistics (DGBAS)

- *GVA (of the three sectors indicated) is the measure of the level of activity of energy consumption associated with each sector.*

- *It is not a good proxy to measure activity in other sectors such as the transport or the residential.*

- *Transport consumption is not comparable to the GVA of the transport sector since the energy use attributed to transportation is part of the companies and activities included in all economic sectors.*

- *We did not consider the energy consumption in the domestic sector apart from transportation, since it is not directly related to any concrete production process.*

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Intensity effect was the strongest factor
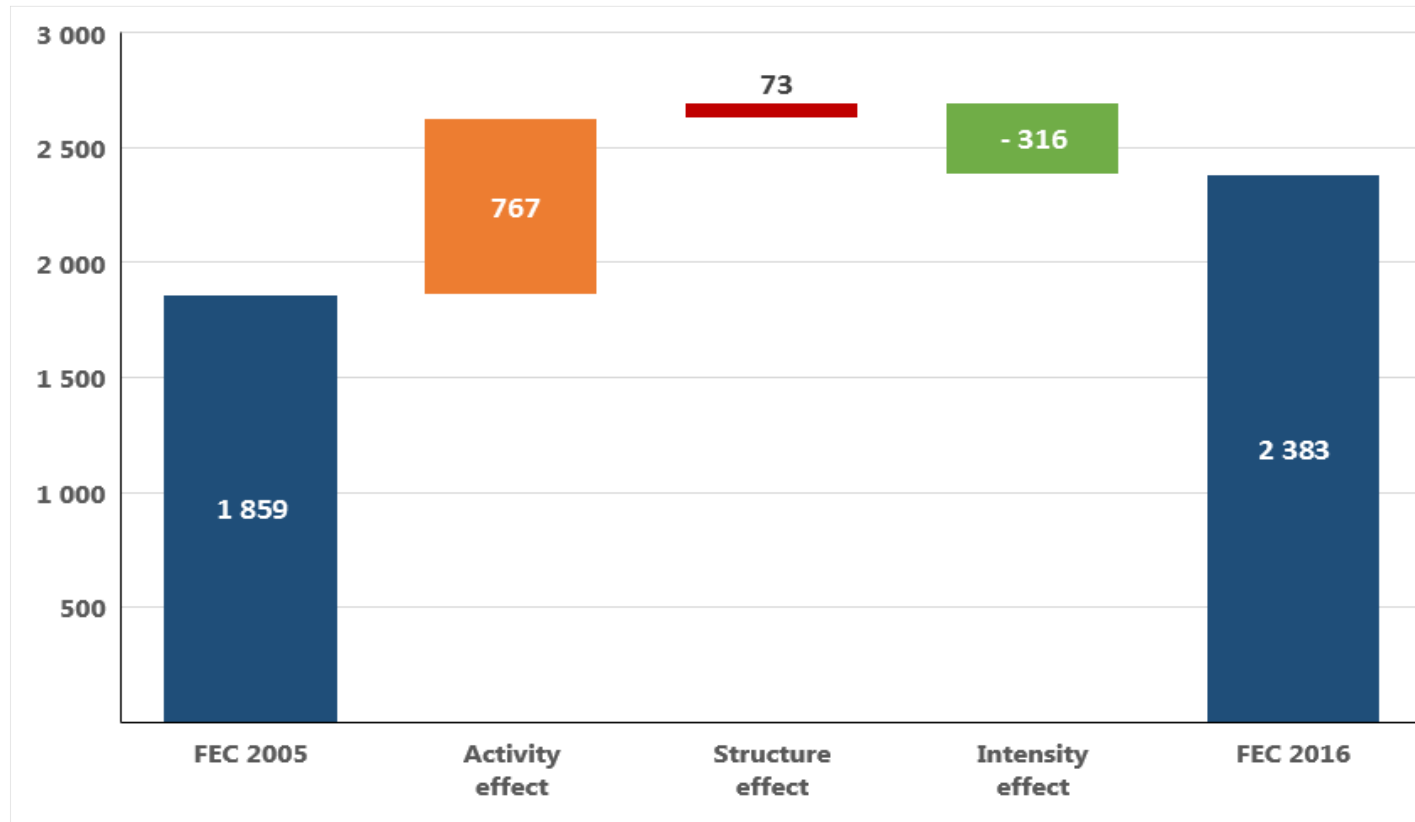
Sources, FEC (EGEDA) and GVA (WB and DGBAS)

Energy intensity has led to offsetting the increase in FEC (28% compared with 2005) brought about by activity and structural effects.

Closing thoughts: better data = better analysis

- On intensity reduction goal: trends look good; decoupling seems likely to continue.

- Decomposition method allows us to separate structural shifts or activity shifts, understanding better true trends in energy consumption as well as trends in economic activity that influence energy consumption in APEC.

- However, more useful analysis requires more detailed data, e.g. as passenger-km travel and number of vehicles (transport*), floor area and weather effect (residential), etc.

- This can be a challenge (or opportunity...) for EGEDA members, EGEEC or even EWG members.

*Initially tried with 3-OECD APEC economies

1. EGEDA updates

Regular APEC energy data collection

❑ Annual energy supply and demand data for 2017 were collected and ESTO is currently checking for consistency.

❑ Preparation for APEC Energy Statistics and Handbook 2017 publication is underway.

❑ Regular quarterly and monthly data collection continues.

❑ Low response rate on the energy efficiency indicators template
- No available end-use energy consumption (heating, cooling, lighting, etc.) data in many economies
- Need for training on how to estimate these data

17th APEC workshop on energy statistics

❑ A joint workshop with JODI, was held in Tokyo on 11-13 June 2019

- Focused on oil and gas statistics with the objective of improving reporting of monthly (JODI) and annual oil and gas data

- JODI partners joined the workshop, GECF, IEA, IEF, OPEC and UNSD

- Participants from **15 APEC** members: Australia; Brunei Darussalam; People's Republic of China; Hong Kong, China; Indonesia; Republic of Korea; Malaysia; New Zealand; Papua New Guinea; the Philippines; Russia; Chinese Taipei; Thailand; the United States and Viet Nam

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EGEDA's short- and middle-term training (2019)

- Short-term conducted on 19-30 August 2019 (2 weeks)
  - Brunei Darussalam; Chile; China; Indonesia; Malaysia; PNG; the Philippines; Viet Nam
- Middle-term: 19 August to 11 October 2019 (8 weeks)
  - No nomination

New energy data

- District cooling
  - At least 11 of the 21 APEC member economies have district cooling facilities
  - The EGEDA secretariat recommends the inclusion of district cooling in the energy balance

- Hydrogen
  - IEA summarized its discussions on hydrogen-based fuels
  - Hydrogen is not considered an energy product; inclusion of hydrogen in the energy balance is complicated

- There is a need to discuss with the United Nations Statistics Division (UNSD) how district cooling and hydrogen data should be treated

Future activities

- 31st EGEDA meeting will be held in Hong Kong, China on 25-27 February 2020.

- APEC (EGEDA) data will be utilised for the first time in APEC Outlook 8th edition.

- 18th EGEDA Workshop in July 2020 and short- and mid-term training courses will continue and tentatively scheduled in October 2020.

Daghang salamat!
Thank you for your kind attention.

https://aperc.ieej.or.jp/

https://www.egeda.ewg.apec.org/