



The 52nd Meeting of APEC Energy Working Group (EWG)

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8.d. Progress on Energy Intensity

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**Asia-Pacific
Economic Cooperation**



Background



Three measures of Energy Intensity are considered (only numerator varies)

- Primary Energy Supply
- Final Energy Consumption
- Final Energy Consumption excluding non-energy use

GDP is used as the denominator in all calculations

Energy Intensity Comparison (IEA vs APEC Energy Data)

Data Sources

□ Energy data

- IEA available through 2014 (with 2015 estimates);
- APEC data available up to 2013 (through ESTO)

□ GDP data from World Bank (Constant 2011 USD PPP – data available through 2015)

□ Exceptions:

- Papua New Guinea's energy data come from APEC under coordination of ESTO
- Chinese Taipei's GDP data are estimated by APERC

Data Updates

- ❑ IEA data for most economies were revised from last year, because the economies submitted updates

	2005	2006	2007	2008	2009	2010	2011	2012	2013
TPES	0.8%	0.9%	1.6%	1.9%	1.8%	2.2%	0.2%	0.5%	0.1%
TFEC	1.0%	1.3%	1.8%	2.2%	2.7%	2.8%	-0.4%	0.3%	-0.1%
TFEC-NE	1.2%	1.4%	1.9%	2.4%	2.8%	3.1%	-0.1%	0.5%	0.2%

- ❑ World Bank GDP data were revised in some economies from previous version (Nov. 2015)

	2005	2006	2007	2008	2009	2010	2011	2012	2013
GDP	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.3%



The Results



What happened to the Primary Energy Supply Intensity?

IEA Primary Energy Supply Intensity

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005-2014	Trend to 2035
Change in Primary Energy	2.8%	3.4%	0.4%	-0.4%	6.1%	2.5%	1.4%	1.9%	1.0%	20.6%	
Change in GDP (2011 US \$PPP)	5.4%	5.6%	3.0%	0.0%	5.8%	4.3%	4.3%	3.7%	3.8%	42.2%	
Change in Primary Energy Intensity	-2.5%	-2.1%	-2.6%	-0.3%	0.2%	-1.8%	-2.8%	-1.8%	-2.7%	-15.2%	-42.3%

- ❑ *Primary energy intensity in 2014 improved by 2.7% compared with 2013;*
- ❑ *Annual improvement in Primary Energy Intensity was on average 1.8% since 2006.*

APEC Primary Energy Supply Intensity

	2006	2007	2008	2009	2010	2011	2012	2013	2005-2013	Trend to 2035
Change in Primary Energy	1.6%	4.0%	1.5%	-0.4%	4.9%	4.0%	1.1%	2.0%	20.4%	
Change in GDP (2011 US \$PPP)	5.4%	5.6%	3.0%	0.0%	5.8%	4.3%	4.3%	3.7%	37.1%	
Change in Primary Energy Intensity	-3.6%	-1.5%	-1.5%	-0.4%	-0.9%	-0.3%	-3.1%	-1.6%	-12.2%	-38.5%

- ❑ *Annual improvement in Primary Energy Intensity was on average 1.6% since 2006.*

Note : Data from IEA and ESTO, energy intensity calculation by APERC

...to Final Energy Consumption Intensity?

IEA Final Energy Consumption Intensity

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005-2014	Trend to 2035
Change in Final Energy (FE)	2.6%	3.4%	-0.1%	-0.7%	5.4%	2.7%	1.0%	2.9%	2.0%	18.4%	
Change in GDP (2011 US \$PPP)	5.4%	5.6%	3.0%	0.0%	5.8%	4.3%	4.3%	3.7%	3.8%	37.1%	
Change in Final Energy Intensity	-2.7%	-2.1%	-3.0%	-0.7%	-0.4%	-1.6%	-3.2%	-0.8%	-1.7%	-15.1%	-42.1%

- ❑ Final energy intensity improved by 1.7% in 2014 as compared with 2013;
- ❑ Annual improvement in Final Energy Intensity was on average 1.8% since 2006.

APEC Final Energy Consumption Intensity

	2006	2007	2008	2009	2010	2011	2012	2013	2005-2013	Trend to 2035
Change in Final Energy (FE)	2.3%	4.3%	0.2%	-1.2%	6.2%	3.6%	1.7%	2.2%	20.8%	
Change in GDP (2011 US \$PPP)	5.4%	5.6%	3.0%	0.0%	5.8%	4.3%	4.3%	3.7%	37.1%	
Change in Final Energy Intensity	-2.9%	-1.3%	-2.7%	-1.2%	0.4%	-0.7%	-2.5%	-1.4%	-11.9%	-37.8%

- ❑ Annual improvement in Final Energy Intensity was on average 1.6% since 2006.

Note : Data from IEA and ESTO, energy intensity calculation by APERC

...and Final Energy Consumption Intensity excluding non-energy?

IEA Final Energy Consumption Intensity excluding non-energy

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2005-2014	Trend to 2035
Change in Final Energy excluding Non Energy	2.6%	3.4%	0.5%	-1.2%	5.4%	2.8%	1.0%	2.7%	2.0%	18.3%	
Change in GDP (2011 US \$PPP)	5.4%	5.6%	3.0%	0.0%	5.8%	4.3%	4.3%	3.7%	3.8%	37.1%	
Change in Final Energy excluding Non Energy Intensity	-2.5%	-2.0%	-7.5%	3.8%	-0.2%	-2.8%	-3.9%	0.9%	-1.7%	-15.0%	-41.9%

- ❑ *Final energy consumption intensity excluding non-energy is 1.7% lower than Final Energy Consumption Intensity in 2014 with 2005 as base;*
- ❑ *Some years show more improvement than Final Energy Consumption Intensity.*

APEC Final Energy Consumption Intensity excluding non-energy

	2006	2007	2008	2009	2010	2011	2012	2013	2005-2013	Trend to 2035
Change in Final Energy excluding Non Energy	4.7%	5.1%	-2.9%	0.9%	8.6%	-1.9%	-1.4%	6.7%	15.8%	
Change in GDP (2011 US \$PPP)	5.4%	5.6%	3.0%	0.0%	5.8%	4.3%	4.3%	3.7%	37.1%	
Change in Final Energy excluding Non Energy Intensity	-3.1%	-1.3%	-2.5%	-1.4%	0.1%	-0.2%	-2.3%	-1.8%	-11.9%	-37.8%

- ❑ *The reduction in final energy consumption intensity excluding non-energy is about the same as final energy consumption intensity in 2013 with 2005 as base;*
- ❑ *Some years show more improvement than Final Energy Consumption Intensity.*

Note : Data from IEA and ESTO, energy intensity calculation by APERC

How Do These Results Compare with Last Year's Progress Report?

IEA Data

	2005-2014 (EWG 52)	2005-2013 (EWG 50)
Primary Energy Supply Intensity	-15.2%	-12.6%
Final Energy Consumption Intensity	-15.1%	-13.0%
Final Energy Consumption Intensity (excluding non-energy)	-15.0%	-11.9%

- Energy intensity reduction has improved significantly since last reported in EWG 50;
- Biggest intensity improvement was in final energy consumption excluding non-energy with a 3.1 percentage point increase

Note : Data from IEA and ESTO, energy intensity calculation by APERC

How Do The Trends in IEA Data Compare with APEC Data?

Trend to 2035

	IEA (updated in Aug. 2016)		APEC
	2005-2014 (EWG 52)	2005-2013 (EWG 52)	2005-2013 (EWG 52)
Primary Energy Supply Intensity	-42.3%	-40.4%	-38.5%
Final Energy Consumption Intensity	-42.1%	-42.3%	-37.8%
Final Energy Consumption Intensity (excluding non-energy)	-41.9%	-42.1%	-37.8%

Note : Data from IEA and ESTO, energy intensity calculation by APERC

What can we tell from the numbers? (1)

- Energy intensity reduction since 2005 is improving in both datasets;
- Based on current trend, using IEA data, in both Primary Supply and Final Energy Consumption intensities, the 45% reduction goal will be achieved in 2037 and by 2041 for final excluding non-energy.
- Using APEC data, the reduction goal in Primary Supply intensity will be achieved in 2042, and in 2043 for both Final consumption and final excluding non-energy.
- Note that APEC data are yet to be updated for 2014 numbers, and the IEA data has been updated since last year.

How do the trends for IEA (EWG 50) and APEC (EWG 52) compare?

Trend to 2035 with 2005 as base

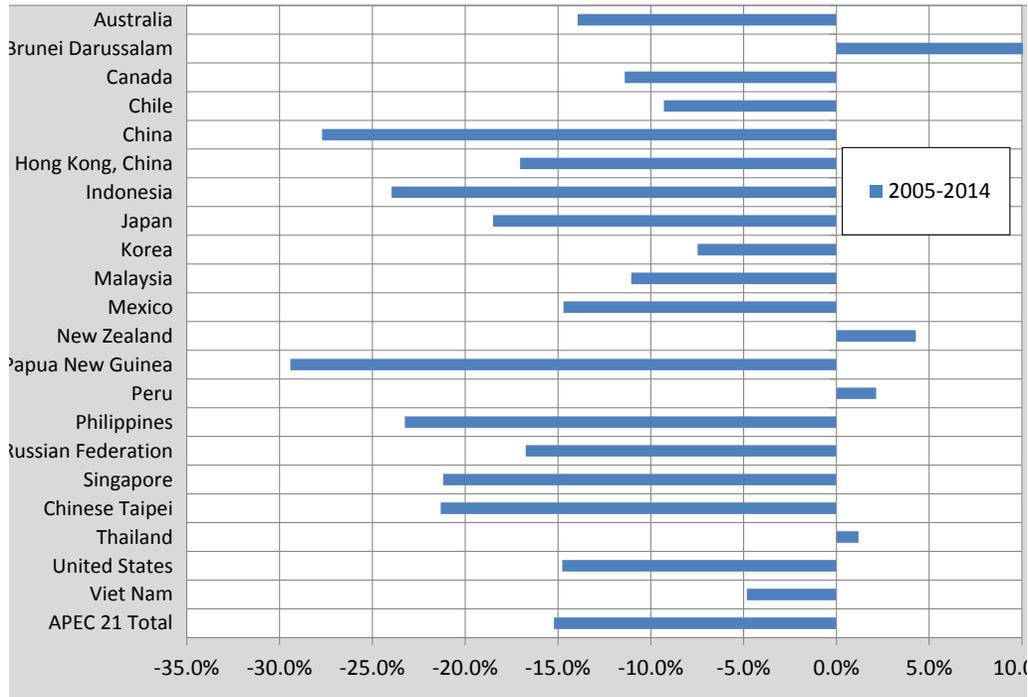
	IEA	APEC
	2005-2013 (EWG 50)	2005-2013 (EWG 52)
Primary Energy Supply Intensity	-39.6%	-38.5%
Final Energy Consumption Intensity	-40.6%	-37.8%
Final Energy Consumption Intensity (excluding non-energy)	-37.8%	-37.8%

Note : Data from IEA and ESTO, energy intensity calculation by APERC

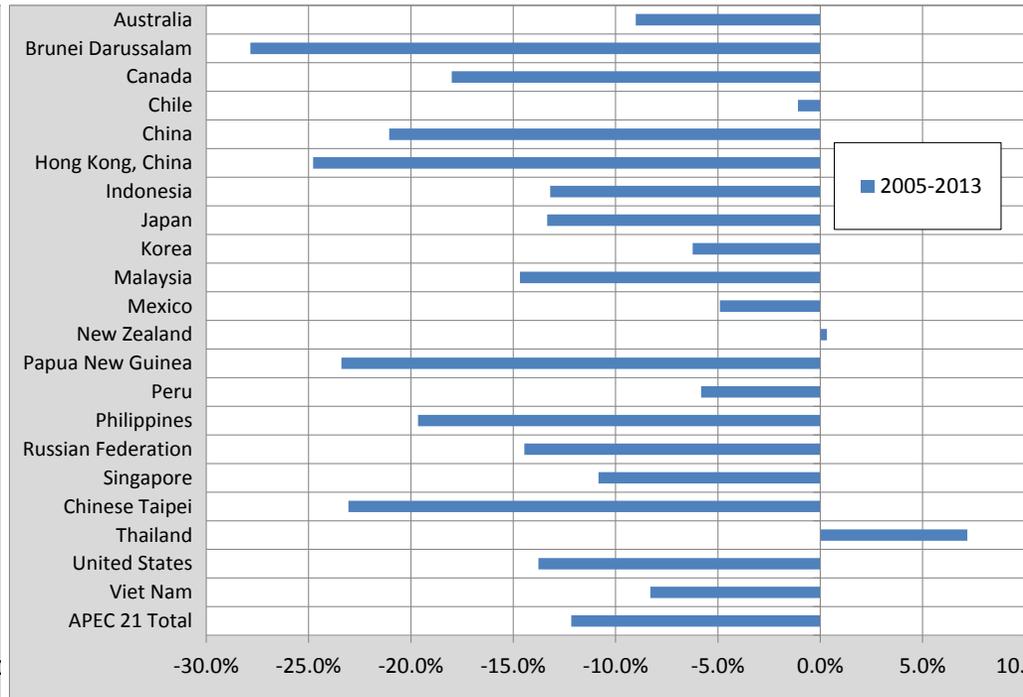
- In IEA data (2015 Nov version), Primary energy intensity achieves the 45% reduction goal in 2041, Final energy in 2040 and final excluding non-energy, in 2043.
- In APEC data, Primary energy intensity achieves the 45% reduction goal in 2042, while both Final energy and final energy excluding non-energy, in 2043.

Economy Level Results Show a Mixed Picture – Primary Energy Supply

IEA Data



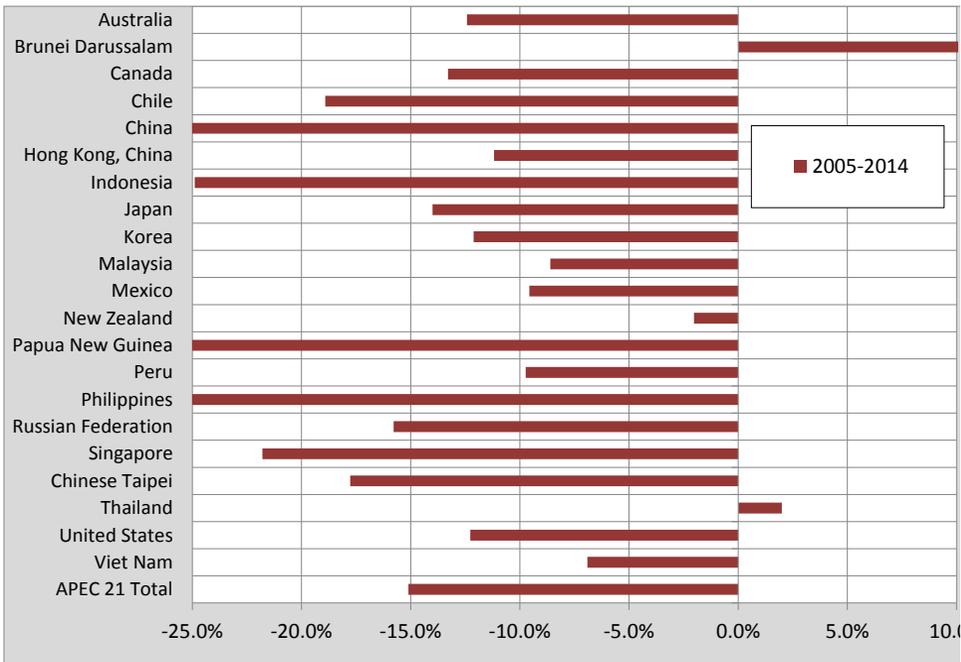
APEC Data



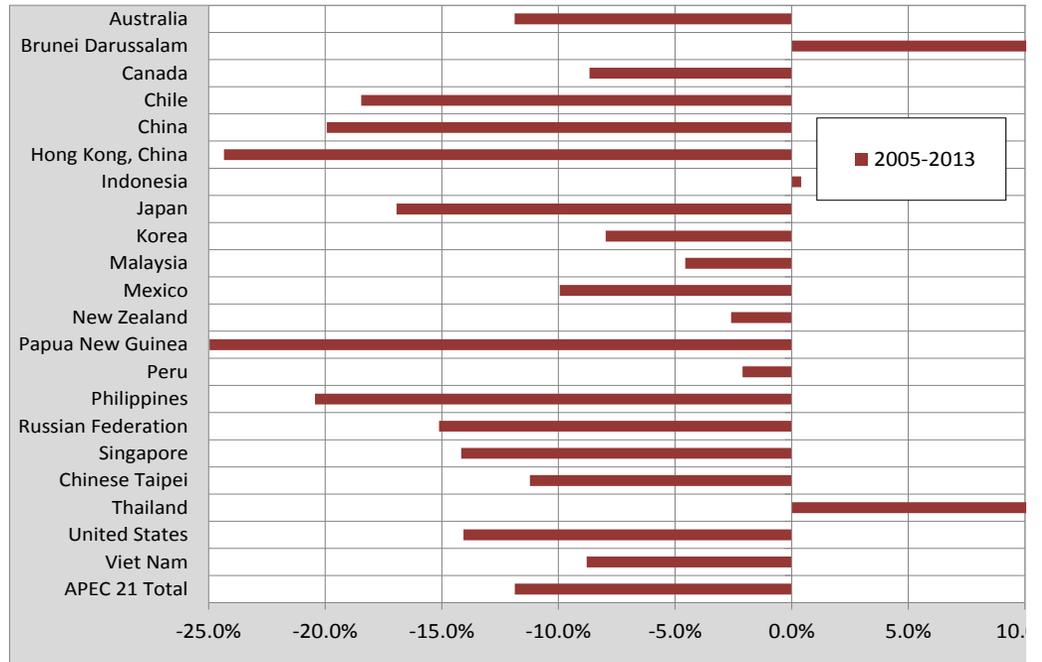
Note : Data from IEA and ESTO, energy intensity calculation by APERC

Economy Level Results Show a Mixed Picture – Final Energy Consumption

IEA Data



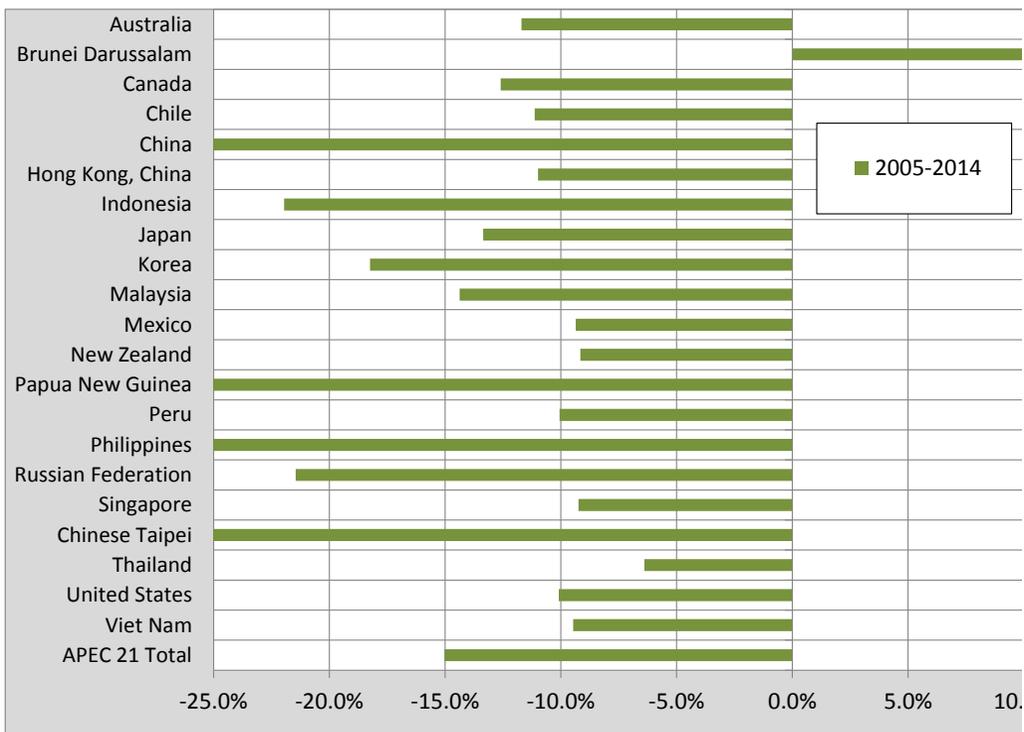
APEC Data



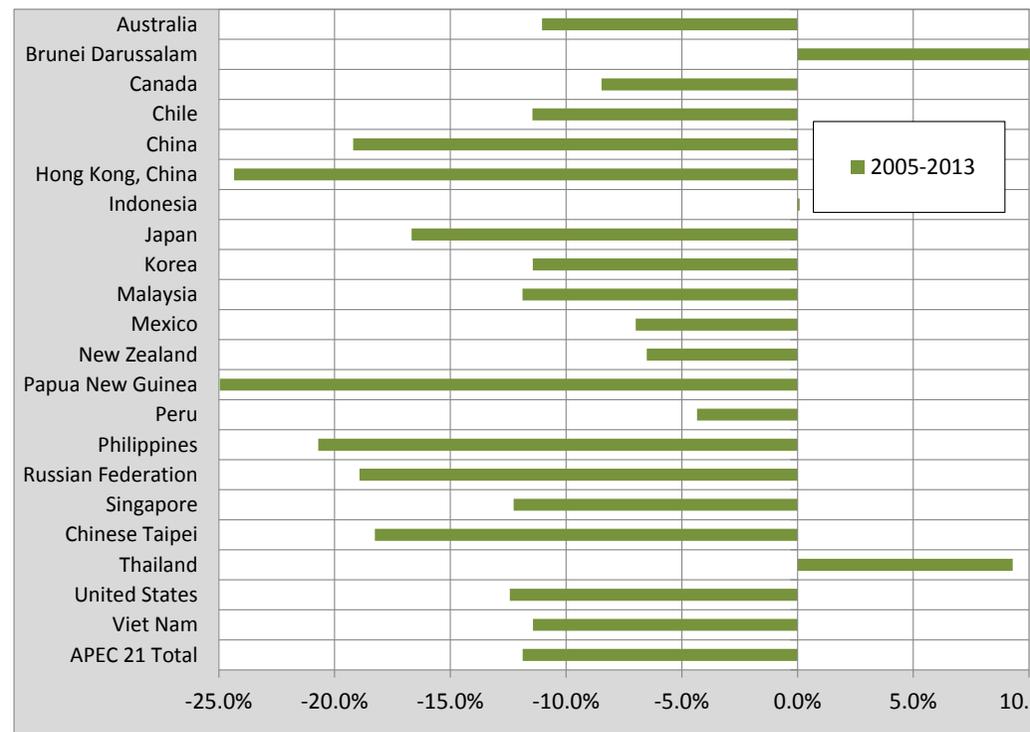
Note : Data from IEA and ESTO, energy intensity calculation by APERC

Economy Level Results Show a Mixed Picture – Final Energy Consumption Excluding Non Energy

IEA Data



APEC Data



Note : Data from IEA and ESTO, energy intensity calculation by APERC

Closing Thoughts

- ❑ Trends are more important than year-to-year changes
- ❑ If APEC data are to be used in the future, complete data and additional analysis are needed;
- ❑ Energy intensity is not a measure of energy efficiency;
- ❑ Timely and accurate data are a challenge/opportunity for EGEDA members.



Thank you for your kind attention

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