Asia-Pacific Economic Cooperation

APERC Asia Pacific Energy Research Centre

APEC Energy Intensity Reduction Goal

EGEEC 59th
7 October 2022 (GMT+7)

Glen SWEETNAM,

Senior Vice President, APERC

APEC Final Energy Intensity change

Annual change in APEC final energy intensity, 2006-20

	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	2005-20
Δ in FEC*	2.7%	3.6%	0.6%	-1.3%	5.5%	4.4%	1.8%	1.5%	-0.2%	0.5%	0.5%	1.6%	3.4%	0.2%	-3.9%	22.6%
Δ in GDP (PPP, constant 2018 USD)	5.4%	5.5%	2.9%	-0.2%	5.7%	4.2%	4.2%	3.8%	3.8%	3.6%	3.4%	4.1%	4.1%	3.4%	-1.8%	66.5%
Δ in final energy intensity	-2.5%	-1.8%	-2.2%	-1.1%	-0.2%	0.2%	-2.3%	-2.2%	-3.9%	-3.0%	-2.8%	-2.4%	-0.7%	-3.0%	-2.1%	**-26.4%**

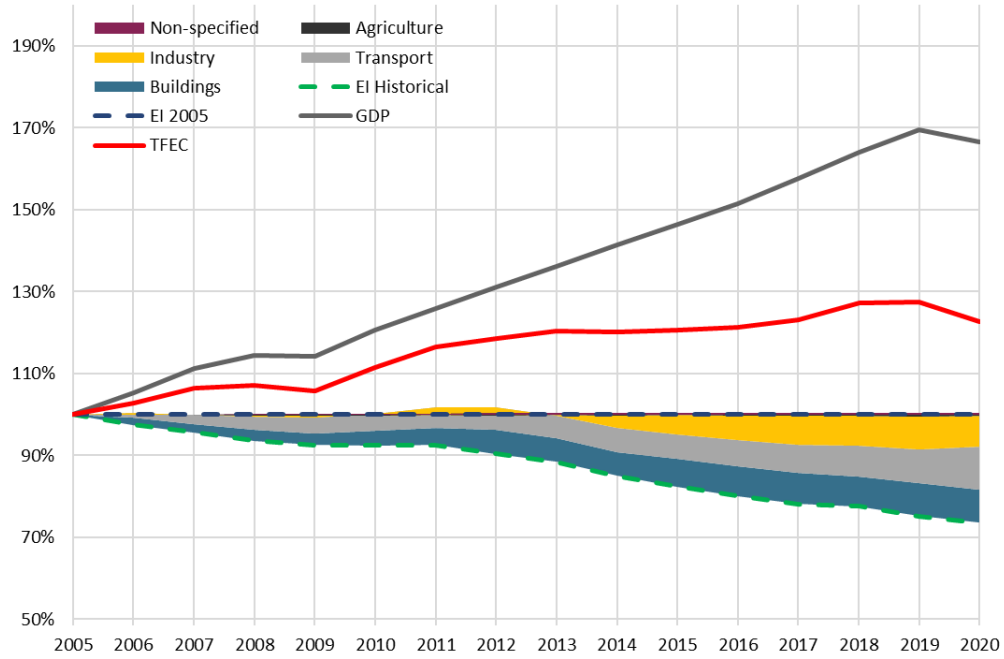
** **FEC** – final energy consumption (excluding non-energy)*
Δ = change

Sources: APEC statistics (EGEDA), APERC analysis

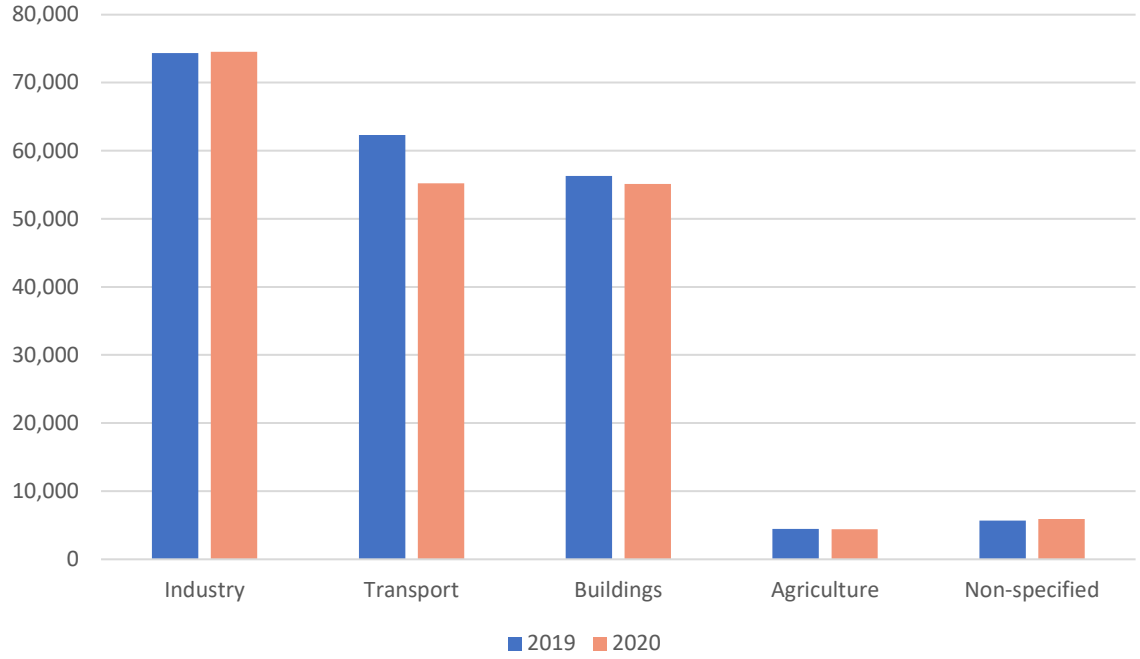
- In 2020, COVID 19 caused a decline in GDP and final energy consumption.
- The result is similar what we saw in the 2009 during the financial crisis.
- Final energy intensity fell 26.4% between 2005 and 2020.

APEC Final Energy Intensity change: end-use sectors contribution

Subsector contribution on Energy Intensity from 2005-2020



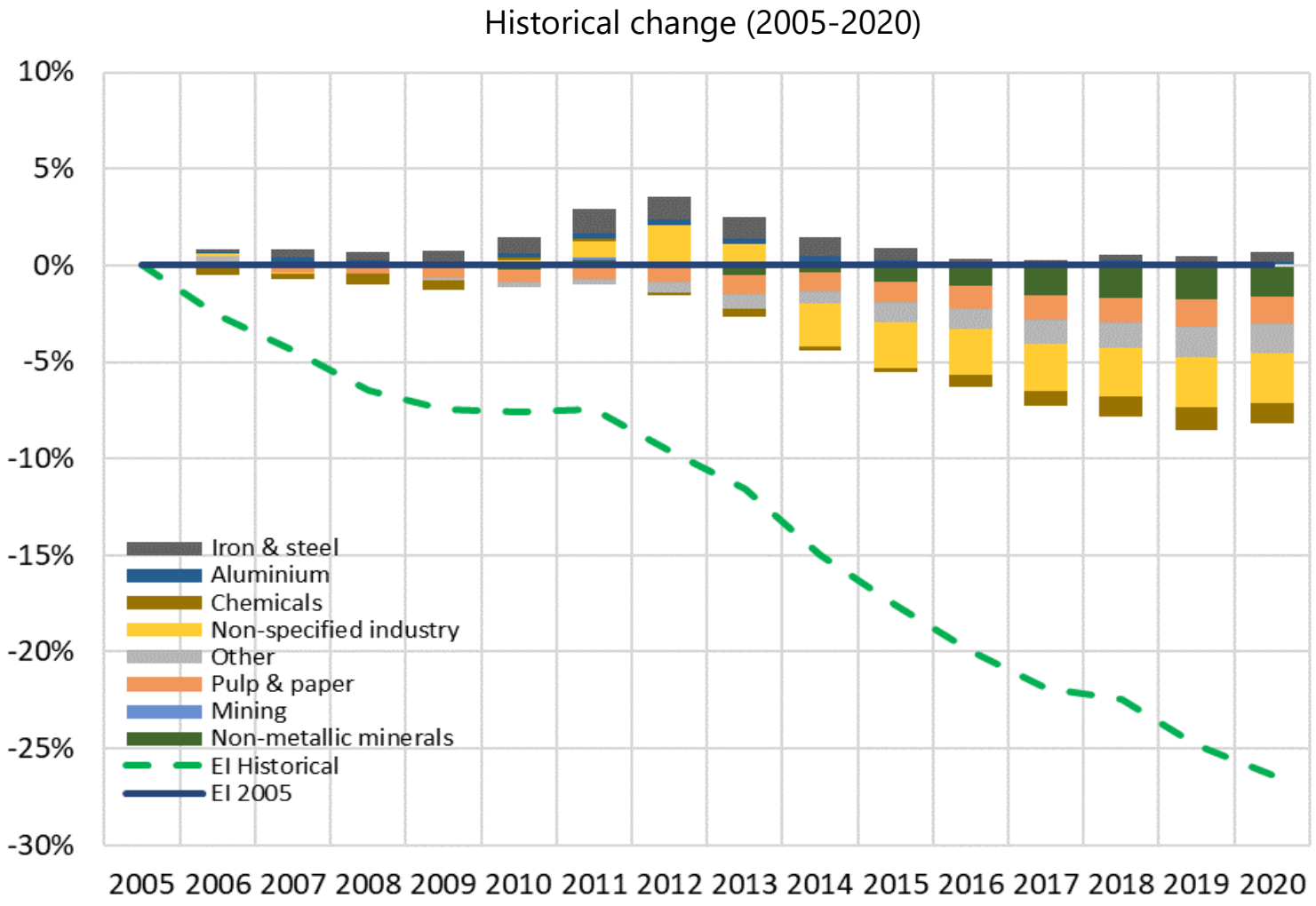
Final Energy Consumption comparison between 2019 and 2020 (PJ)



Sources: APEC statistics (EGEDA), APERC analysis

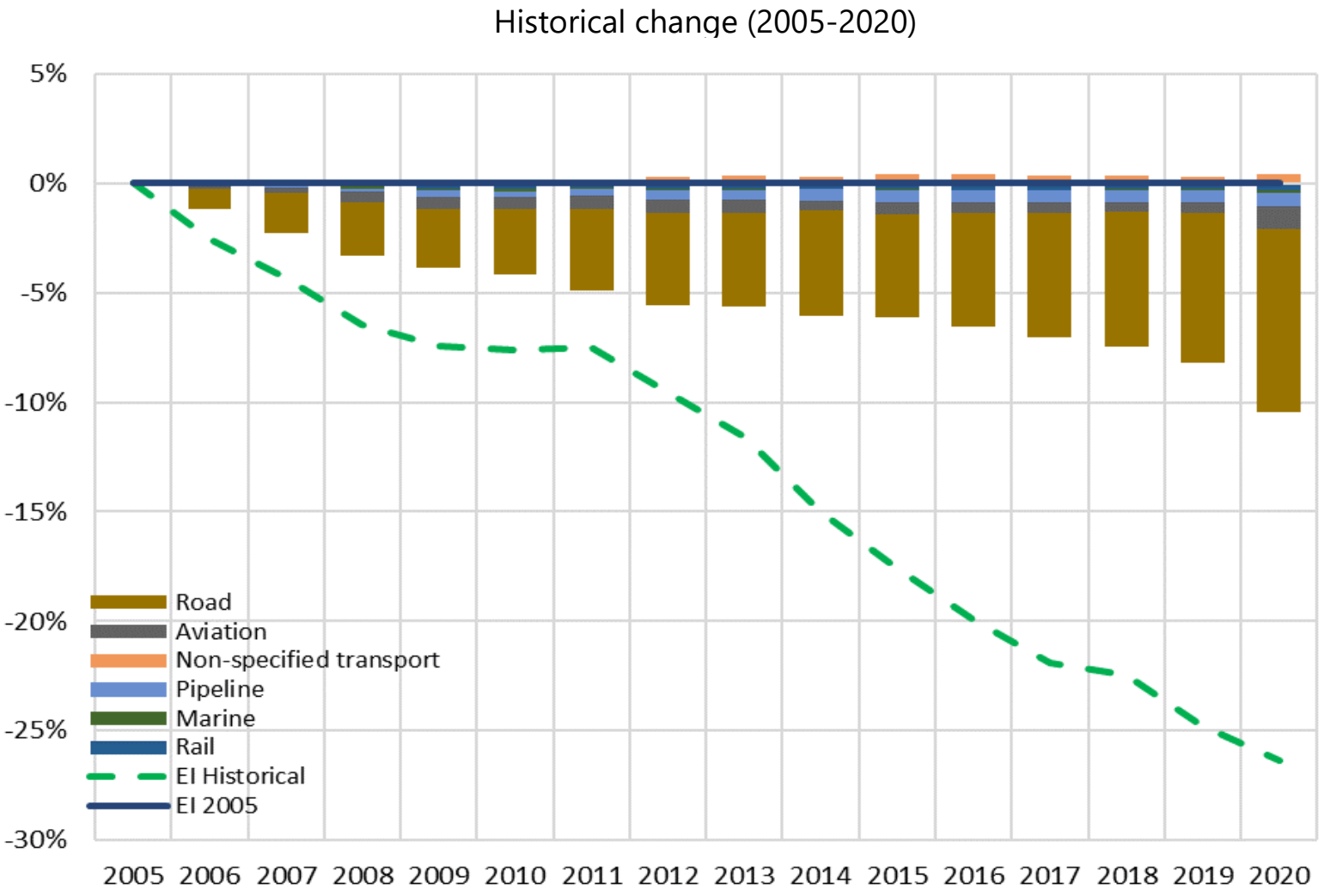
- Compared to 2019, final energy consumption in transportation fell 11.4% in 2020 under movement restrictions by the COVID-19.

* Industry



Sources: APEC statistics (EGEDA), APERC analysis

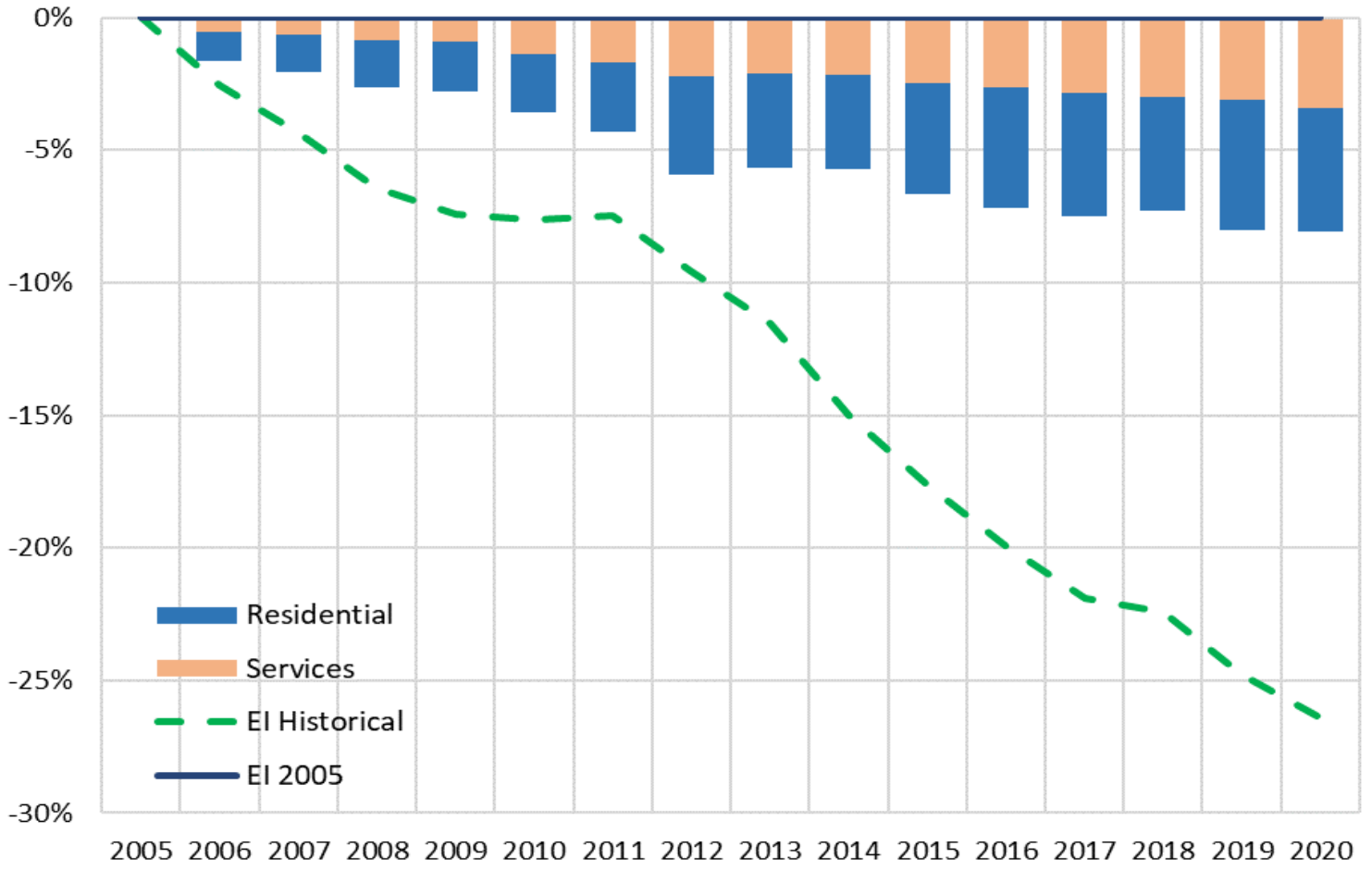
* Transport



Sources: APEC statistics (EGEDA), APERC analysis

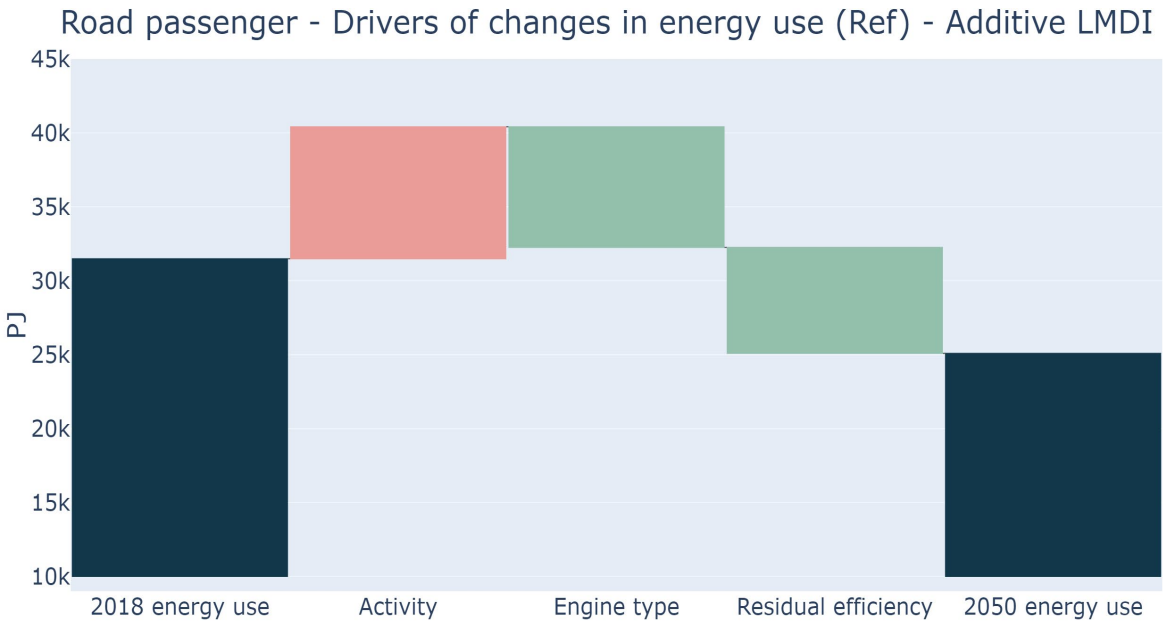
* Buildings

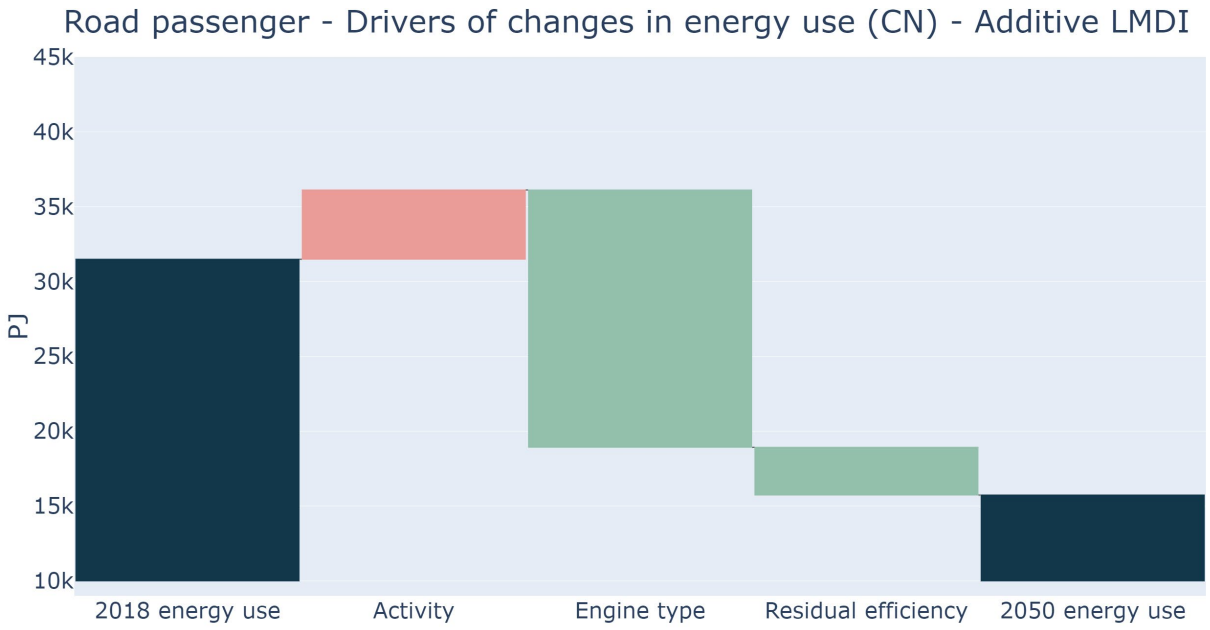
Historical change (2005-2020)



Sources: APEC statistics (EGEDA), APERC analysis

Decomposing the structural drivers of energy use in transport



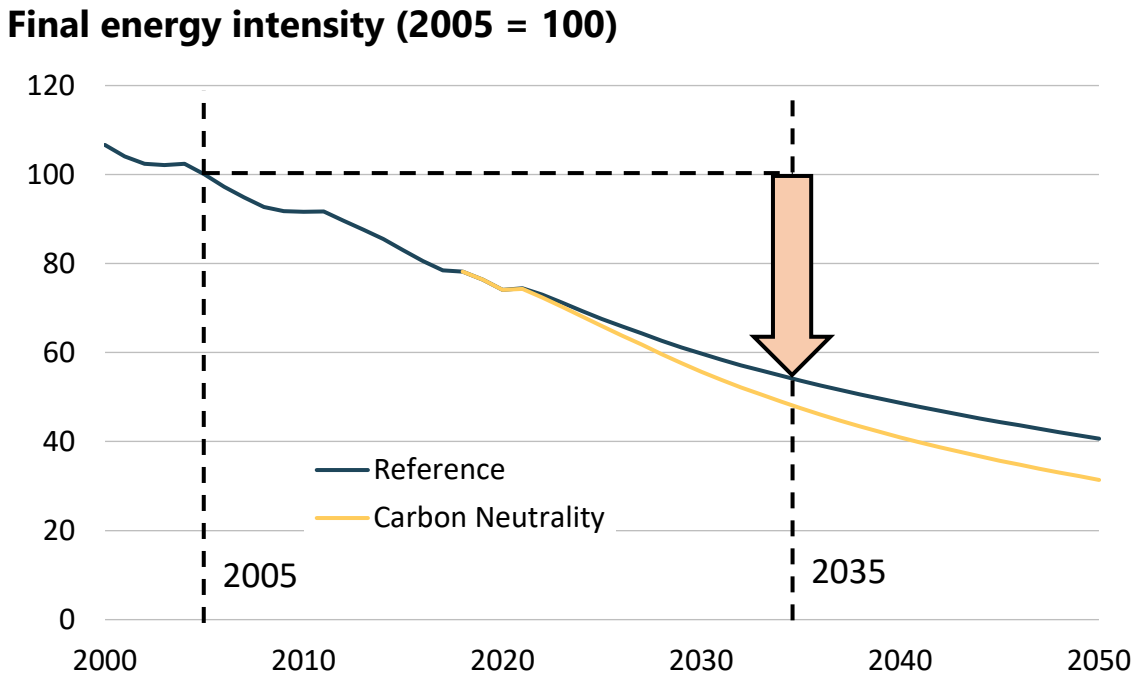


△PJ = △Activity + △Engine Type + △Residual Efficiency
This is based on the log mean divisia index method.

Sources: APERC analysis

- Engine Type column shows that the effect of switching to EVs (and other powertrains) in the CN causes energy use to drop by almost 50%.
- Other results show that mode switching has a much smaller effect.

APEC Final Energy Intensity Reduction Goal in 8th edition



Sources: APEC statistics (EGEDA), APERC analysis, excludes non-energy.

- **In 2035**, final energy intensity improves by 46.3% (REF) and 52.5% (CN).
- The goal could be achieved before the target year 2035 in both scenarios (REF: 2034, CN: 2031).
- In REF, final energy intensity improves by almost 60% (2005-2050).
- In CN, final energy intensity improves by 70% (2005-2050).

Energy Intensity and CO2 emissions

1. Lowering energy intensity can be generally beneficial for reducing carbon emissions to achieve sustainable growth.
   - Kaya identity typically shows the relationship between energy intensity and CO_2 emissions.

2. Kaya identity separates CO_2 emissions into four factors* including energy intensity.

* population, GDP per capita, energy intensity, and carbon intensity

- Defined as below:

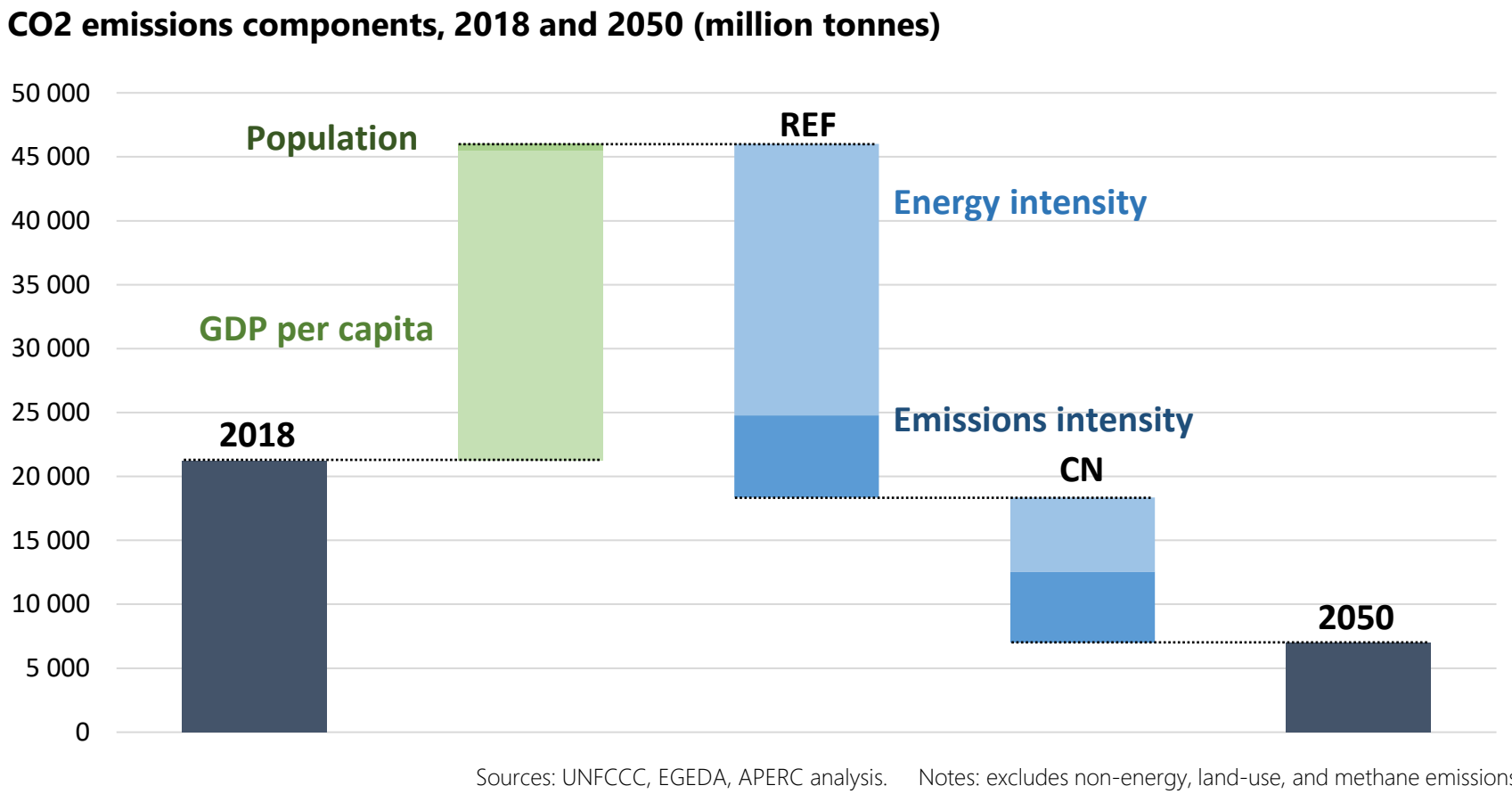
$$CO_2\ emissions = Population * \frac{GDP}{Population} * \frac{Energy\ supply}{GDP} * \frac{CO_2\ emissions}{Energy\ supply}$$

(GDP per capita) (Energy Intensity) (Emissions intensity)

Macroeconomic | Technologies and Policies

- Final energy intensity goal is similar to "energy intensity" shown above.

Energy and emissions intensity improvements in 8th edition



Sources: UNFCCC, EGEDA, APERC analysis. Notes: excludes non-energy, land-use, and methane emissions.

- Lower energy intensity delivers approximately three-quarters of the emissions reductions in REF and CN.
- In CN, energy and emissions intensity reductions provide roughly equal incremental benefits.

Asia-Pacific
Economic Cooperation

APERC
Asia Pacific Energy Research Centre

Thank you.

https://aperc.or.jp