



# APEC Energy Demand and Supply Outlook 6<sup>th</sup> Edition 2-2 Improved Efficiency Scenario (IES)

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# 1. Scenario Introduction

# Improved Efficiency Scenario – Rationale

- Energy efficiency is the most effective tool APEC economies have to curve energy demand and realize associated benefits.
  - The international Energy Agency calls energy efficiency the “first fuel”
- APEC has a 45% energy intensity reduction target compared to 2005
- IES explores a more aggressive approach to energy efficiency compared to BAU to enable APEC to meet its target and maybe more?
- The IES assumes energy efficiency opportunities and policies in each sector that are available and are cost effective today:
  - In fact most of these policies are in place in some way somewhere

## Estimated potential savings in the industrial subsector from adoption of BATs

Sub-sector	Assumed improvement potential (%)	
	Developed economies	Developing economies
<b>Iron and steel</b>	10 - 15	25 - 35
<b>Chemical and petrochemicals</b>	10 - 25	15 - 30
<b>Non-metallic mineral</b>	20 - 25	20 - 30
<b>Food and tobacco</b>	25 - 40	25 - 40
<b>Paper, pulp and printing</b>	20 - 30	15 - 30
<b>Non-ferrous metals</b>	5 - 40	5 - 55

Source: Saygin et al. (2010).

***Industrial subsectors still have efficiency potentials of up to 55% in APEC economies.***

# Buildings energy efficiency assumptions

## Key efficiency assumptions in buildings in the BAU and IES by sub-sector

Sector	Appliances	Measure	Range of efficiency	
			Highest in IES	Lowest in BAU
<b>Residential</b>	Fridges	Yearly consumption	216 kWh/y	644 kWh/y
	Air conditioners	Efficiency ratio	5.81	2.55
	Water heaters – fuel	Percentage	91%	76%
	Lighting	Watts	10 W LED	60 W Inc.
	TV	Yearly consumption	102 kWh/y	261 kWh/y
	Washing machines	Yearly consumption	6 kWh/y	194 kWh/y
	Standby	Watts per device	1 W	5 W
<b>Commercial and residential</b>	Space heating – fuel	Percentage	96%	71%
	Space heating – heat pump	Coefficient of performance	5.81	2.6
<b>Commercial</b>	Lighting	% Improvement	30%	
	Cooling	% Improvement	40%	
	Ventilation	% Improvement	20%	
	Refrigeration	% Improvement	34%	

Source: McNeil et al. (2008)

***Appliances and buildings have significant energy efficiency potentials, especially in space conditioning options.***

# Transport energy efficiency assumptions

## Transport efficiency annual improvement assumptions in BAU and IES, 2013-40

Scenario	Labelling scheme	Group of economies	2013-30	2030-40
<b>BAU</b>	No	Brunei Darussalam, Indonesia, Malaysia, Mexico, Papua New Guinea, Peru, Philippines, Russia, Thailand	1%	1%
	Yes	Australia, Canada, Chile, China, Hong Kong, Japan, Korea, New Zealand, Singapore, United States, Viet Nam, Chinese Taipei	2%	1%
<b>Improved Efficiency</b>	No	Brunei Darussalam, Indonesia, Malaysia, Mexico, Papua New Guinea, Peru, Philippines, Russia, Thailand	2%	2%
	Yes	Australia, Canada, Chile, China, Hong Kong, Japan, Korea, New Zealand, Singapore, United States, Viet Nam, Chinese Taipei	2.7%	2%

Source: APEC (2015).

***Fuel efficiency standards can double the rate of fuel economy improvements between 2030 and 2040.***

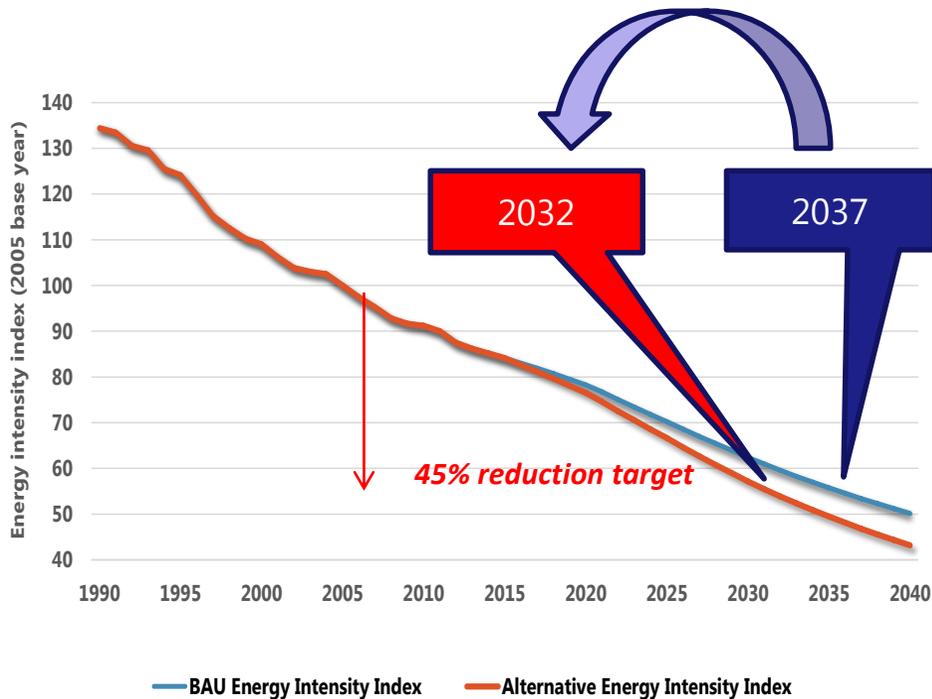


# IES: Results

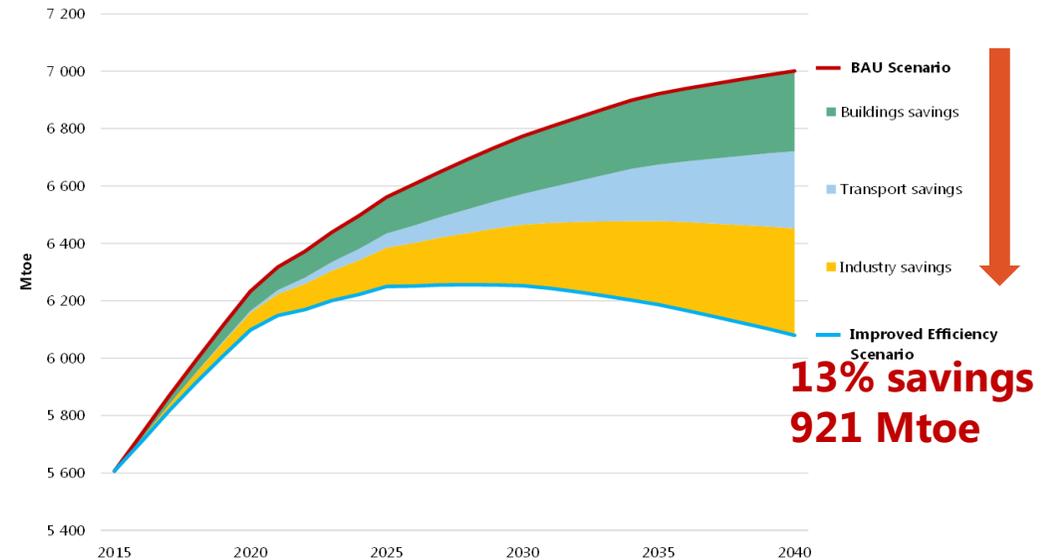
# Total savings of 13% or 921 Mtoe

## APEC's target can be met by 2032 under the Improved Efficiency Scenario

### APEC Energy Intensity target



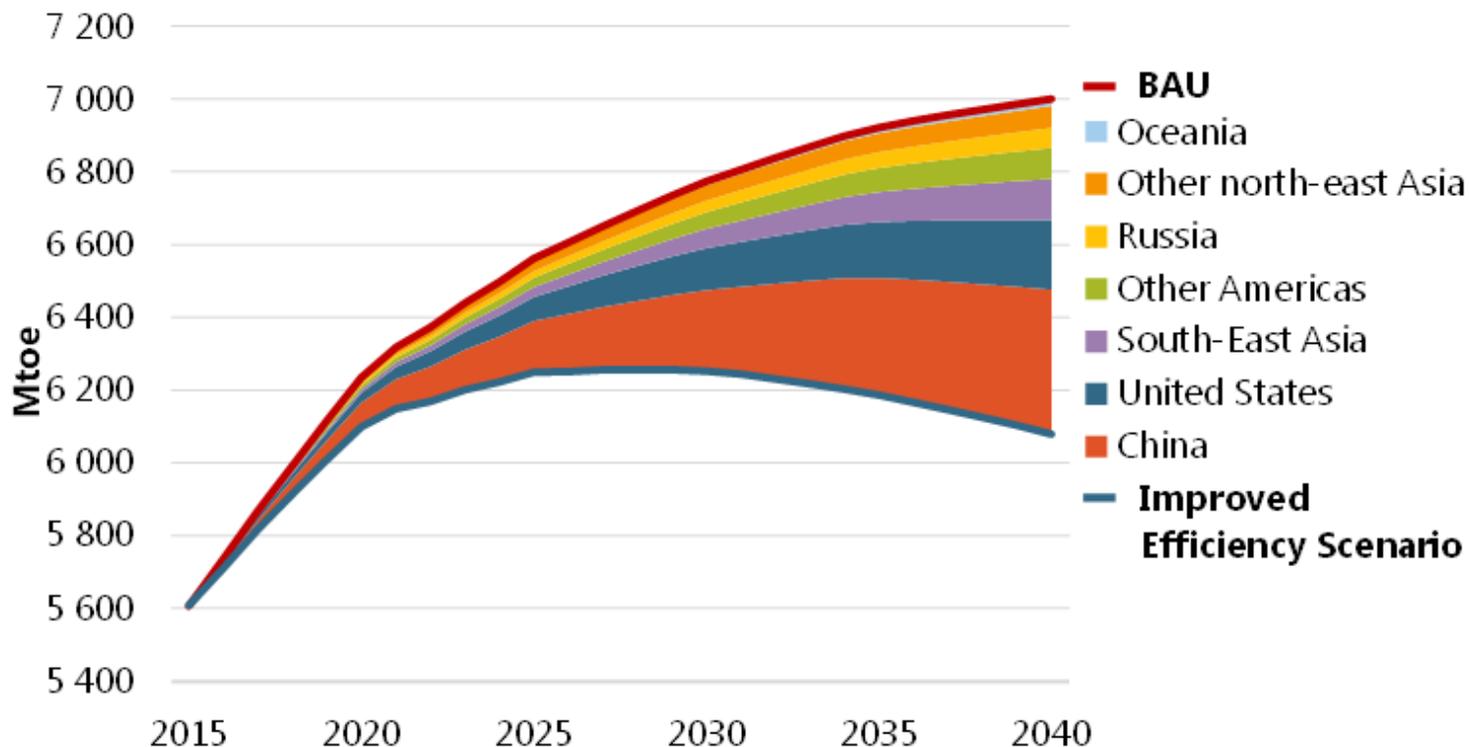
### Overall results



**Total savings of 921 Mtoe equivalent to the combined current demand of Russia, Japan and Korea. Causing demand to peak by 2025**

# China and the US account for 64% of savings

## Energy savings in the IES by regional grouping, 2015-40



***China has the largest saving potential: it delivers 43% of total APEC savings. The US follows with 21%***

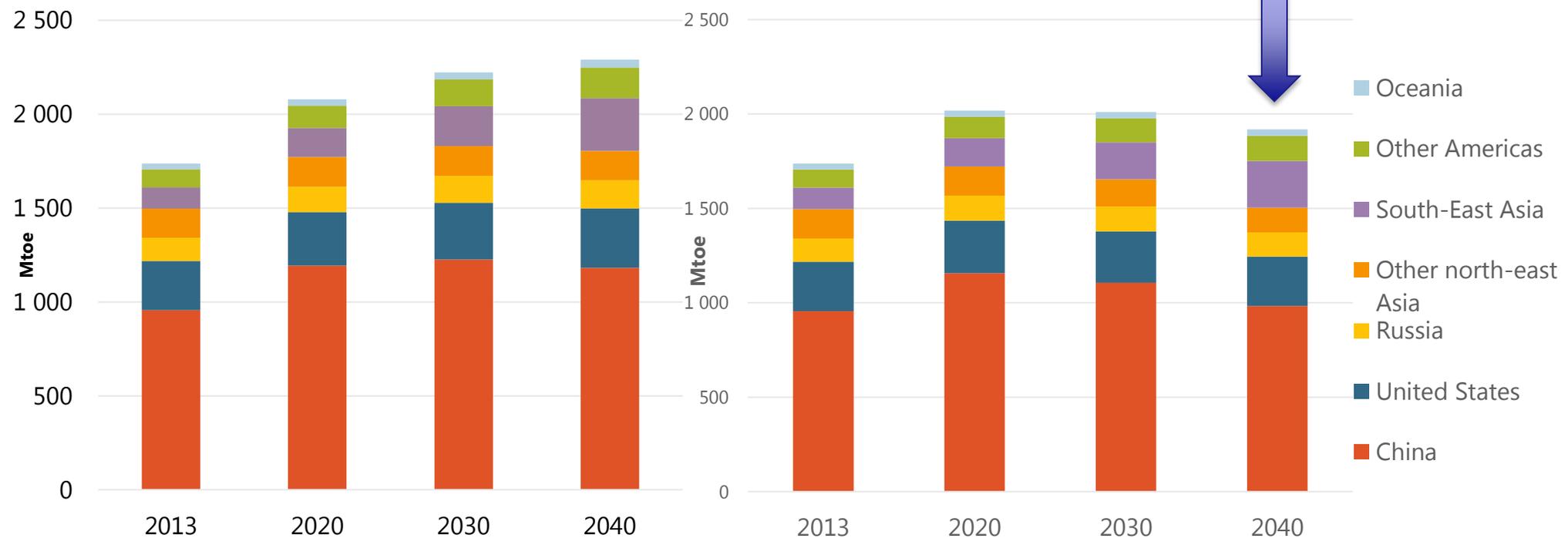
Note: **Oceania** (Australia, New Zealand and PNG), **Other Americas** (Canada, Chile, Mexico and Peru), **Other north-east Asia** (Hong Kong, Japan, Korea and Chinese Taipei), **South-East Asia** (Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, Thailand and Viet Nam).

# Industry saves 372 Mtoe or 16%

## Industry final energy demand in the BAU and IES, 2013-40

### Business as Usual

### Improved Efficiency



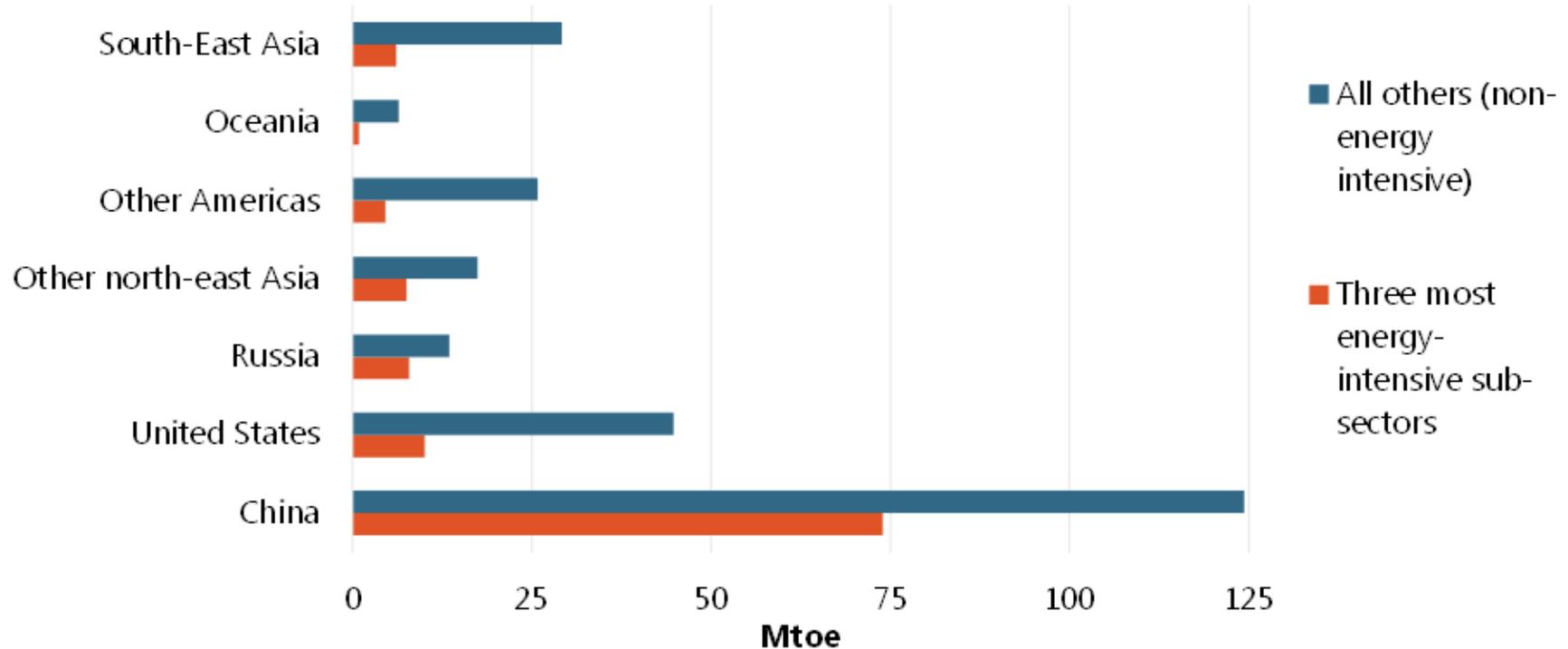
***Strong energy demand-GDP growth decoupling in industry, where 79% output growth is fuelled by only 10% energy demand growth***

Note: Excludes non-energy use.

Sources: APERC analysis and IEA (2015a)

# Largest savings potential in other less intensive industry

## Energy savings by sector and by regional grouping, 2013-40

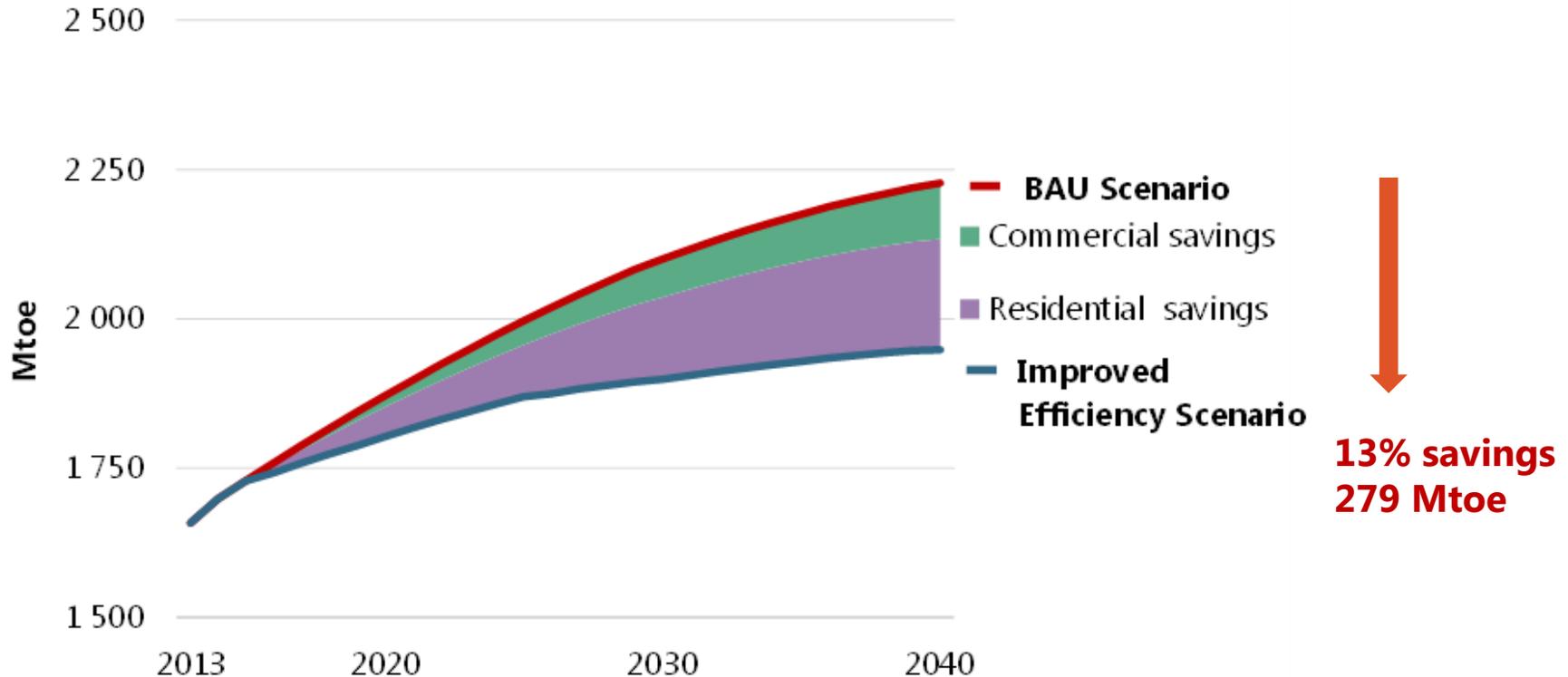


***The majority of growth and savings in the Industry sector come from the less intensive sub-sectors.***

Note: The three most energy-intensive sub-sectors in the APEC region are iron and steel, chemical and petrochemicals, and non-metallic minerals

# Buildings provides 30% of the savings

## Buildings sector energy savings by sub-sector, 2013-40

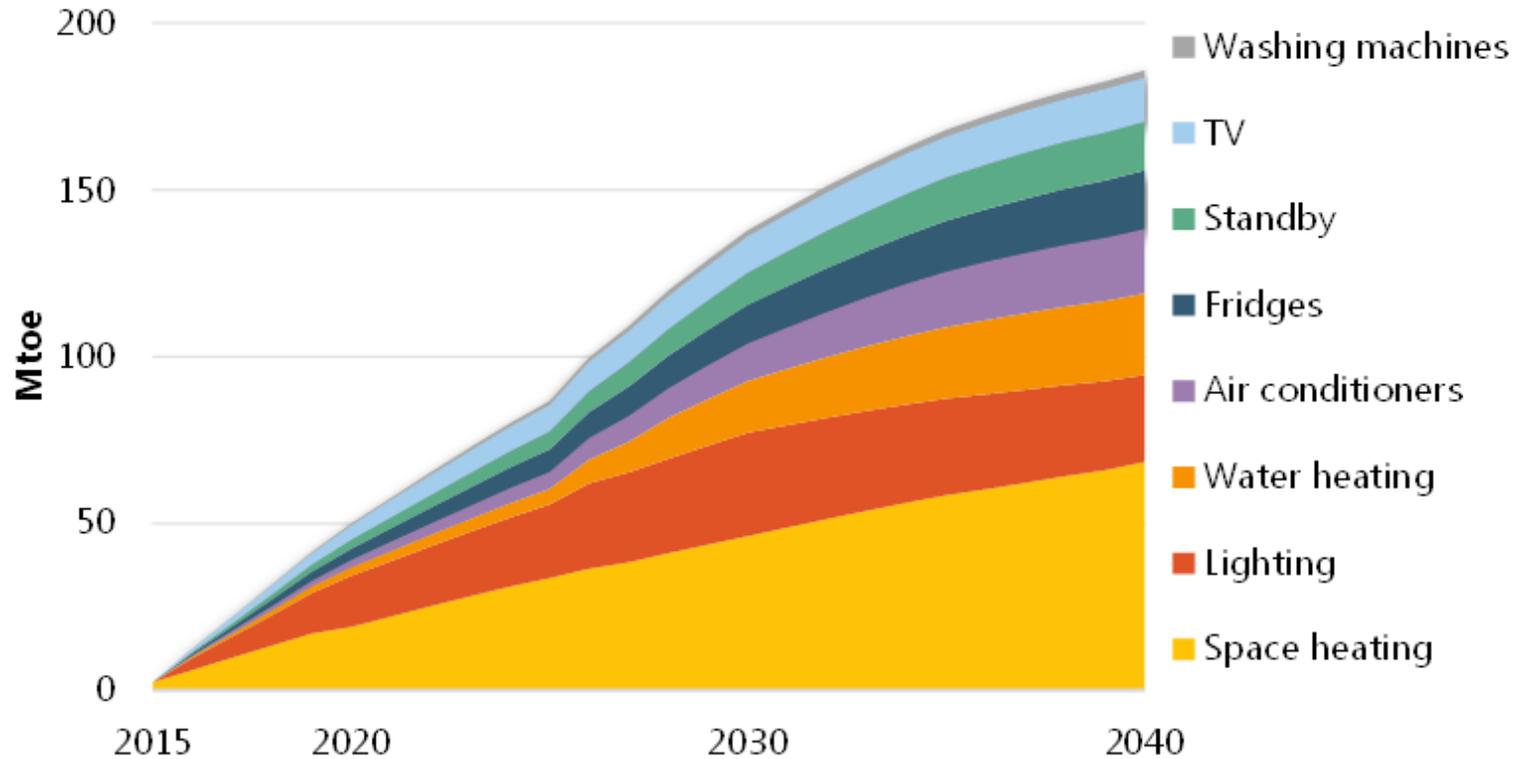


***Unlike industry and transport, buildings energy demand does not peak in the IES, although growth is very small at end of the period***

Sources: APERC analysis and IEA (2015a)

# Efficiency potential in many appliances

## Residential energy savings by end-use, 2015-40

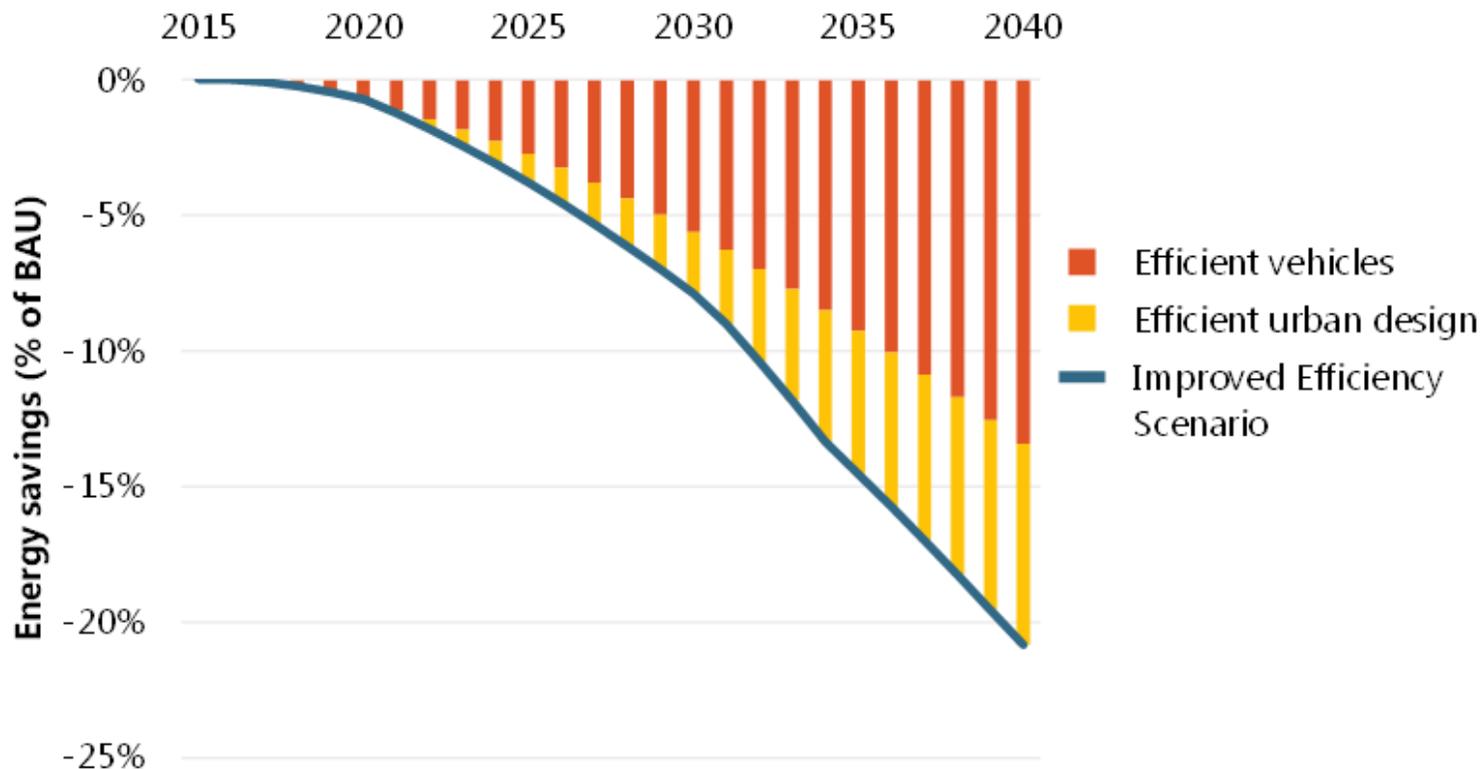


***Space and water heating and lighting have the largest potential in the residential subsector***

Note: Space heating includes building improvements as well as appliances.

# Transport provides 29% of the savings

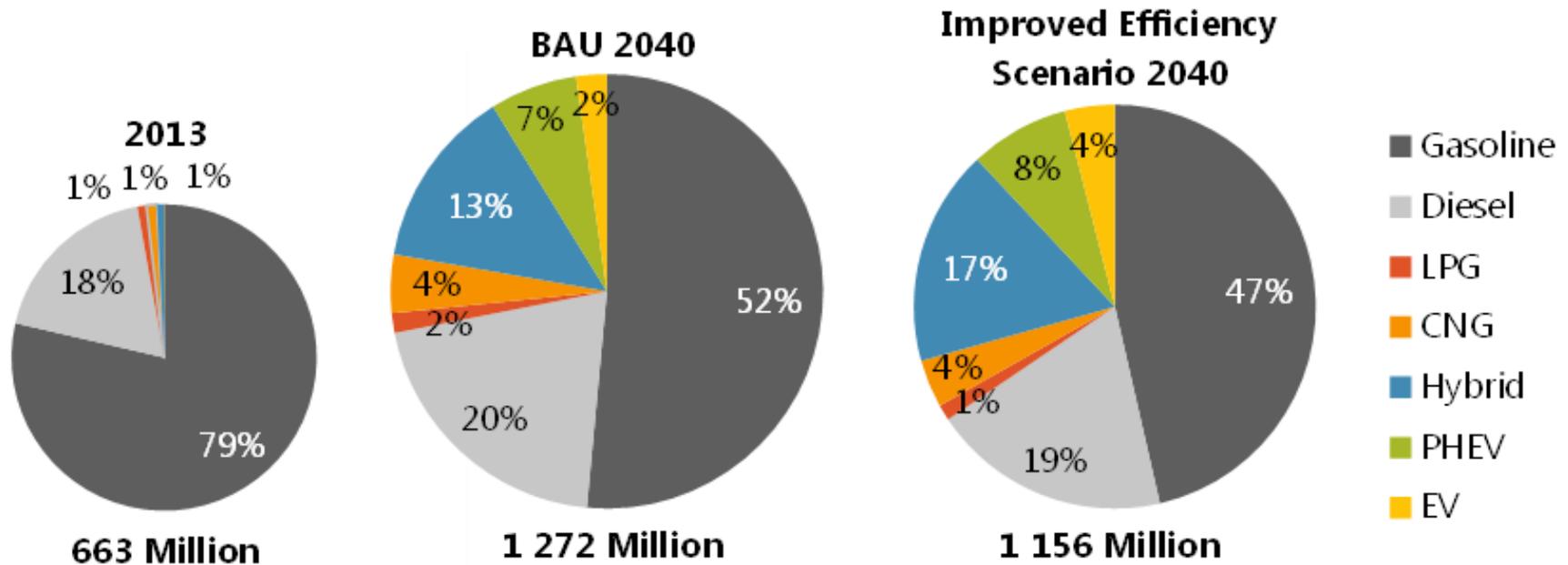
## Road transport energy savings, 2015-40



***Transport energy demand peaks in 2025 at 1 695 Mtoe.***

# Urban design reduces vehicle stock by 9%

## Shares of vehicle stock by technology in the BAU and Improved Efficiency Scenarios, 2013 and 2040



***New technology vehicles increases by 70 million units (increasing its share to 29%)***

Notes: LNG = liquefied natural gas; CNG = compressed natural gas.  
The size of the circle reflects overall growth of transport energy demand.  
Sources: APERC analysis and IEA (2015a).

# Key messages

- The IES shows 13% energy savings compared to BAU and demand peaks by 2029. Saving 921 Mtoe.
- China provides the largest savings, accounting for 43% of the total.
- Industry provides the largest sector share—40% or 372 Mtoe—of savings through promoting best available technologies (BATs).
- Fuel efficiency standards for vehicles are key to achieve the 15% reduction in demand in the transport sector.
- Buildings save 279 Mtoe (13%) from appliance and building envelope improvements. Heating and cooling are particularly important.
- APEC achieves its 45% energy intensity target by 2032 in this scenario, and is 49% lower than 2005 by 2035.
- Is a more ambitious target possible?



**Thank you for your kind attention**

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