

Global Energy Perspective: CAREC energy outlook

CAREC ESSC technical session | 14 March 2018

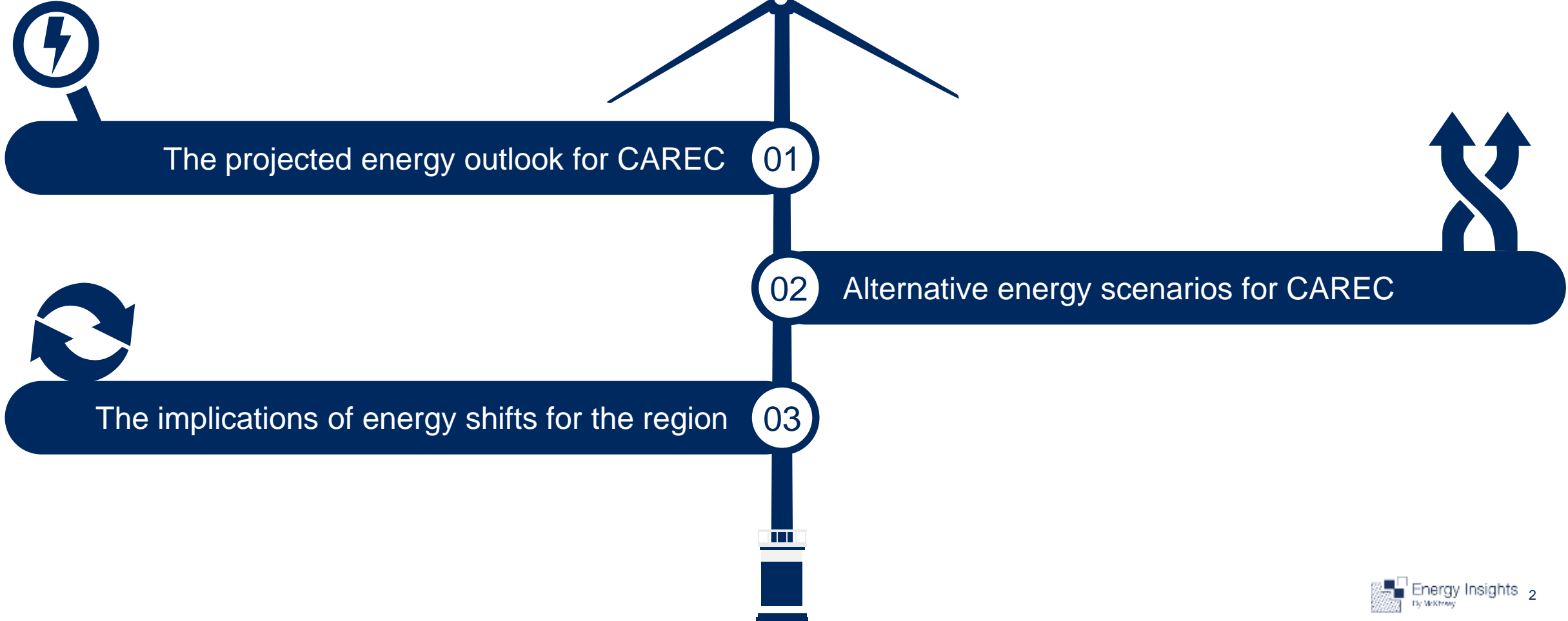
ADB ASIAN DEVELOPMENT BANK



Energy Insights
By McKinsey

Goals & objectives of this session

Establish a common perspective from which we can work together to best position CAREC's energy future. As such, we will discuss:



McKinsey Energy Insights

4

Hubs in Houston, London, Amsterdam, South & East Asia (ASEAN, China, India, Korea)

75%

Of hires with energy backgrounds

170+

Practitioners



McKinsey's Global Energy Practice

#1

Ranked energy consultancy

90%

of global energy majors served

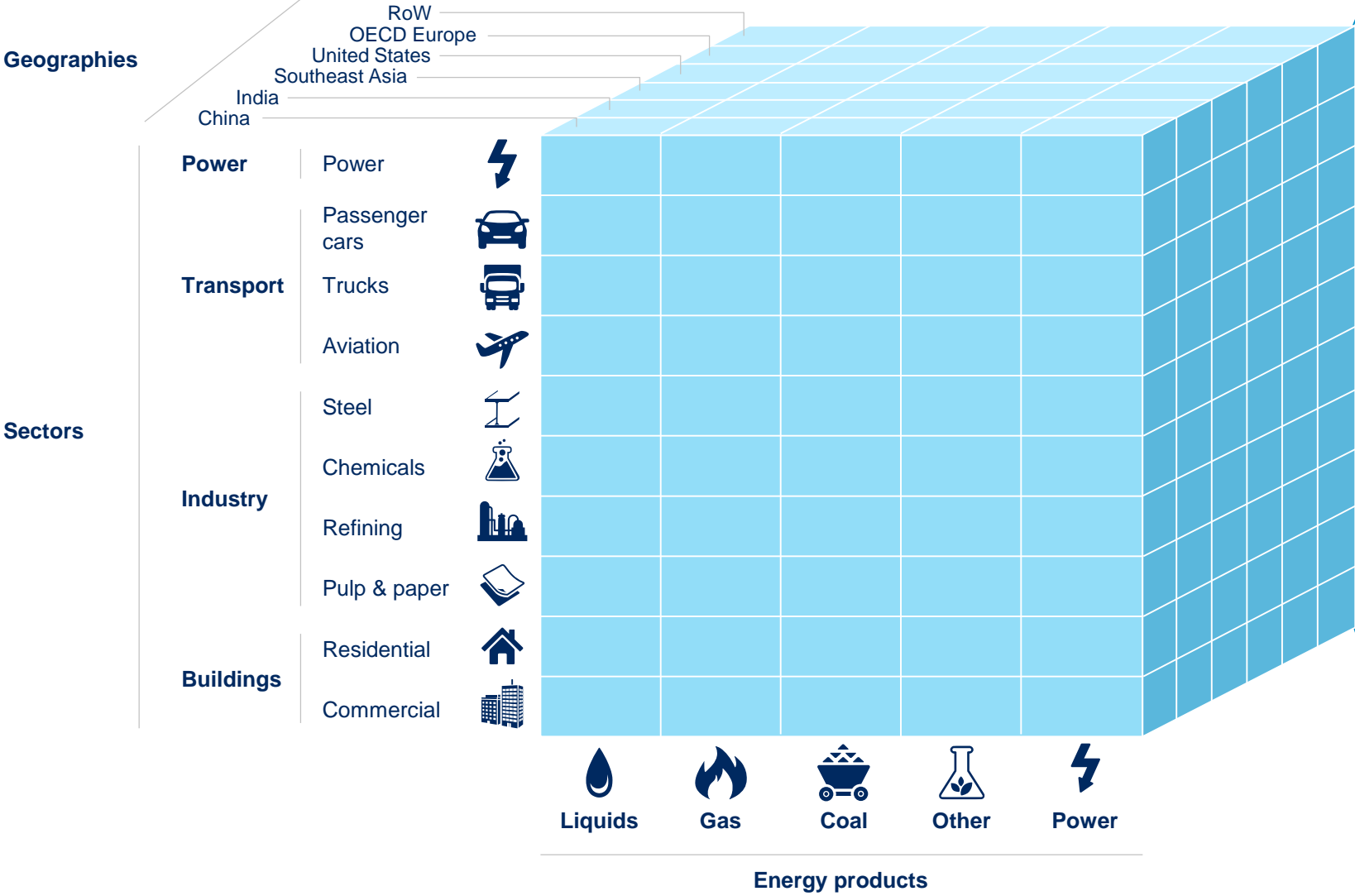
1.300+

Practitioners

1 Energy Consulting ranking, Vault survey (annual survey of consultants on the best consulting firms), McKinsey ranked no. 1 since 2006

SOURCE: McKinsey Energy Insights

Global Energy Perspective: a fundamental energy demand outlook



Granular coverage

Long-term projections to 2050 across 145 countries, 28 sectors and 57 energy products



Full transparency & flexibility

Access to all the detail of the demand drivers and ability to customize bespoke scenarios



Global reach, local expertise

Access to McKinsey's expertise from across >100 local offices, > 400 energy experts globally and >20 industry practices

The Global Energy Perspective 2018 in summary..

1



Global energy demand growth decelerates, following a structural decline in energy intensity

2



Electricity demand grows 4 times faster than all other fuels

3



Renewables' cost decline accelerates further, out-competing new-built fossil capacity today and existing capacity in 5-10 years

4



Coal demand peaks in next decade, oil in the next two; in contrast, gas continues to grow modestly

5



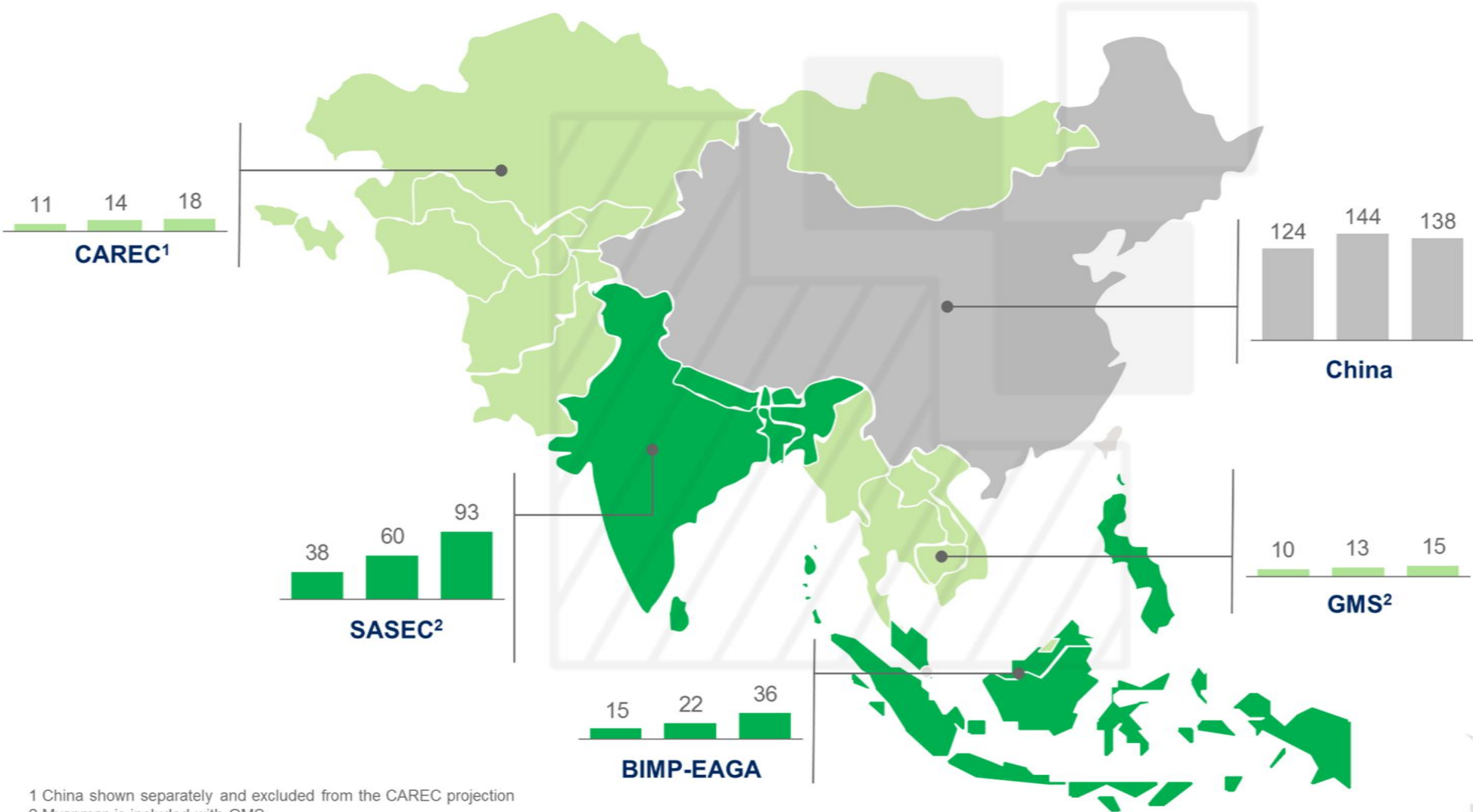
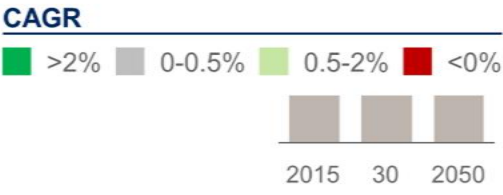
Plateau in CO₂ emissions by 2030 is insufficient to meet a 2 degrees Celsius pathway

1. Projected energy outlook for CAREC

2. Alternative energy scenarios for CAREC

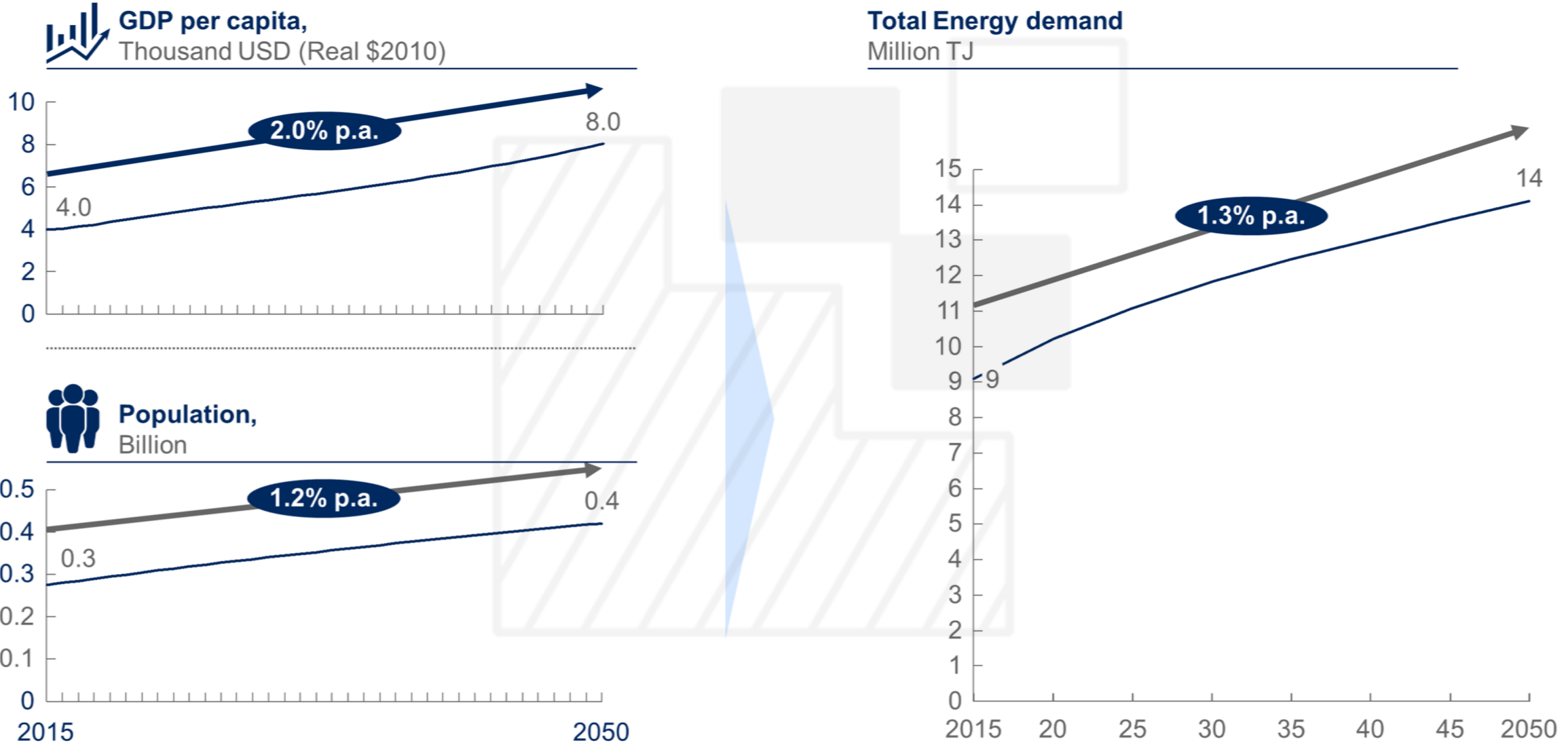
3. Implications for the region

Primary energy demand by region, 2015-50



1 China shown separately and excluded from the CAREC projection
2 Myanmar is included with GMS

The main drivers of the energy demand growth in CAREC¹



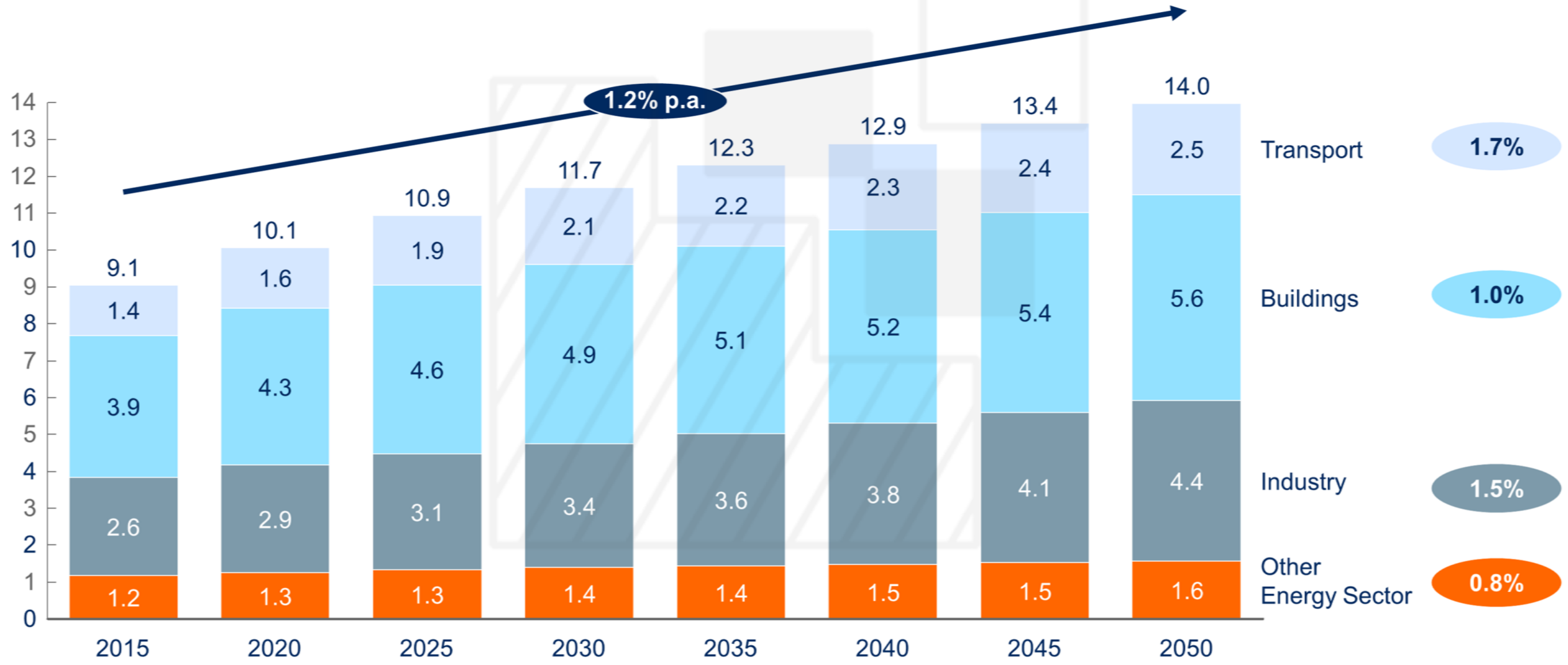
¹ China is excluded from the analysis performed on CAREC

How the various segments drive CAREC’s energy demand growth

X% CAGR

**CAGR
2015-50**

Energy Demand, total final consumption, million TJ



SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017

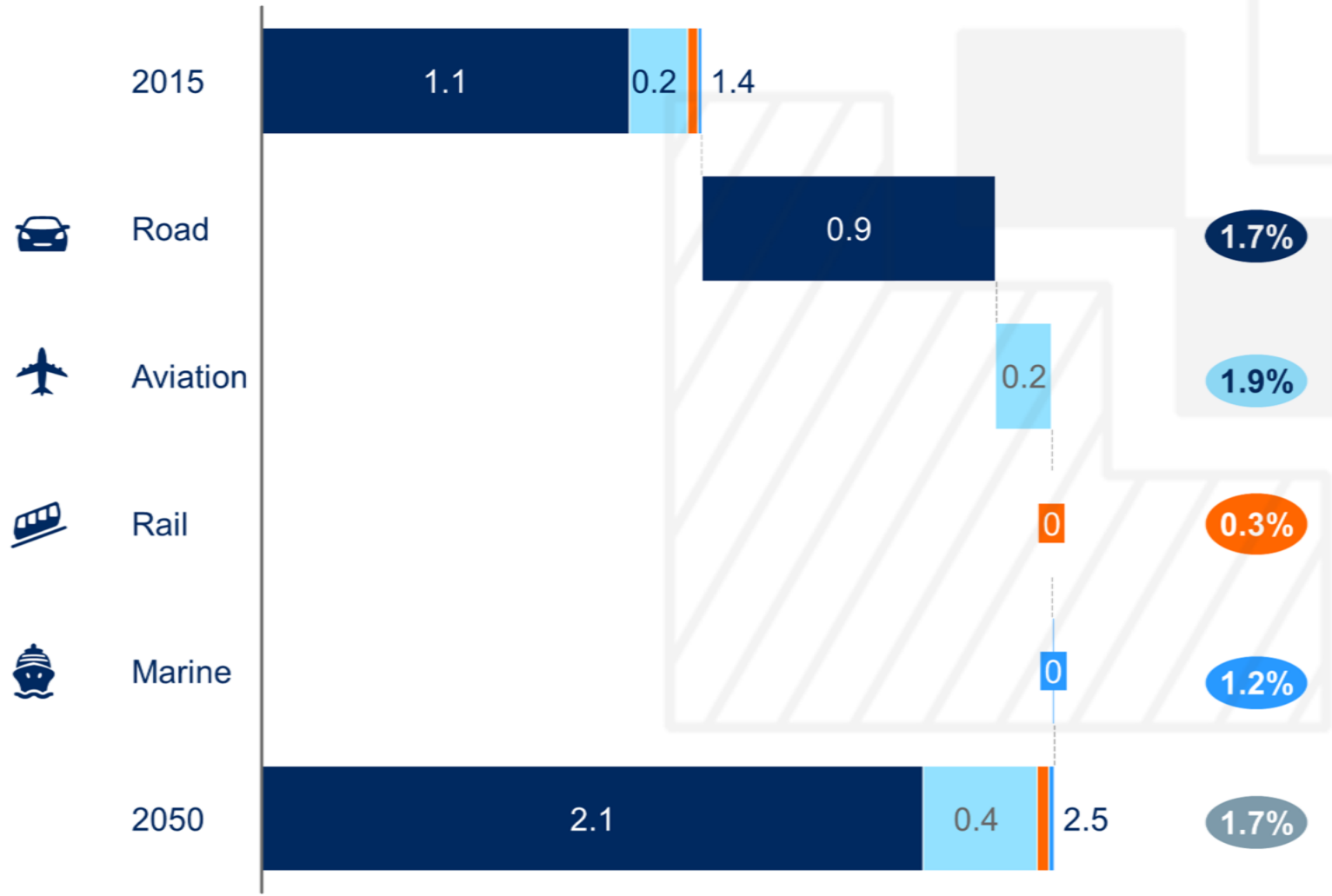
CAREC transport energy demand growth

■ Road
 ■ Aviation
 ■ Rail
 ■ Marine
 X% CAGR

Transport Energy Demand, total final consumption, million TJ

**CAGR
2015-50**

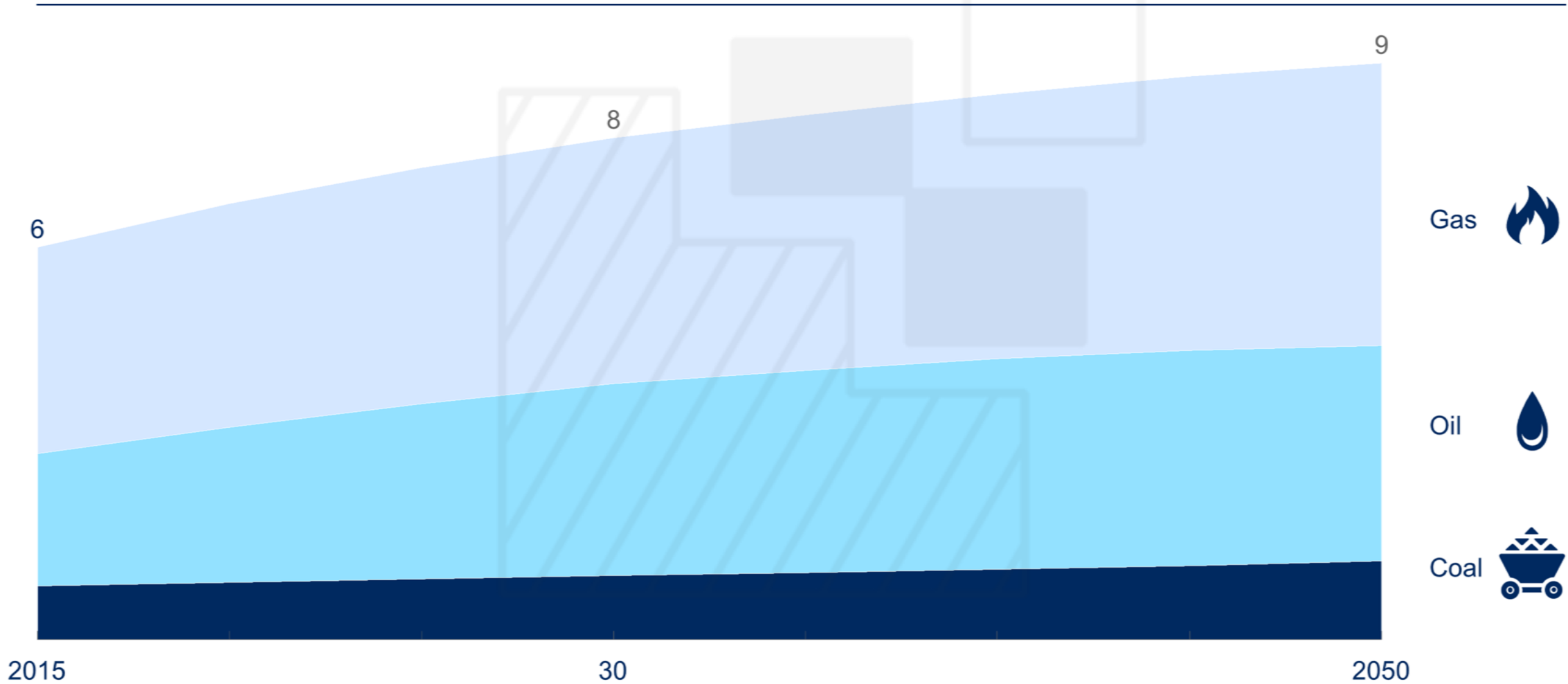
Drivers



- **GDP projected to grow 2.5 times**
- **Air passenger activity is projected to triple**
- **Increase in number of vehicles**
 - 3% annual increase in overall **car ownership rates**
 - **Population growth** from 300 to 420 million in 2050
- **Efficiency in fuel consumption**

Fossil fuel demand growth in CAREC

CAREC fossil fuel demand, million TJ

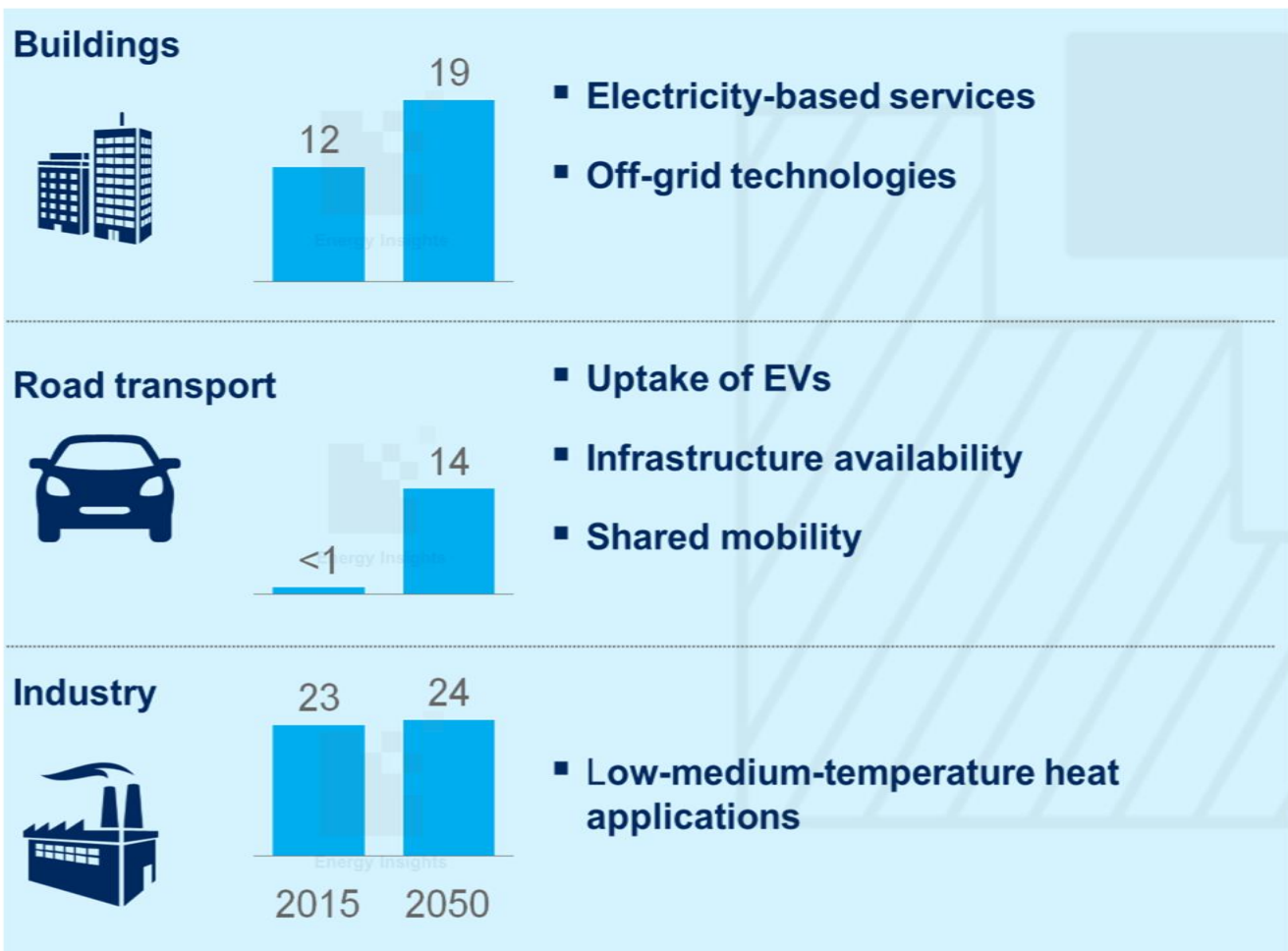


SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017; IEA Energy Balances (Historical)

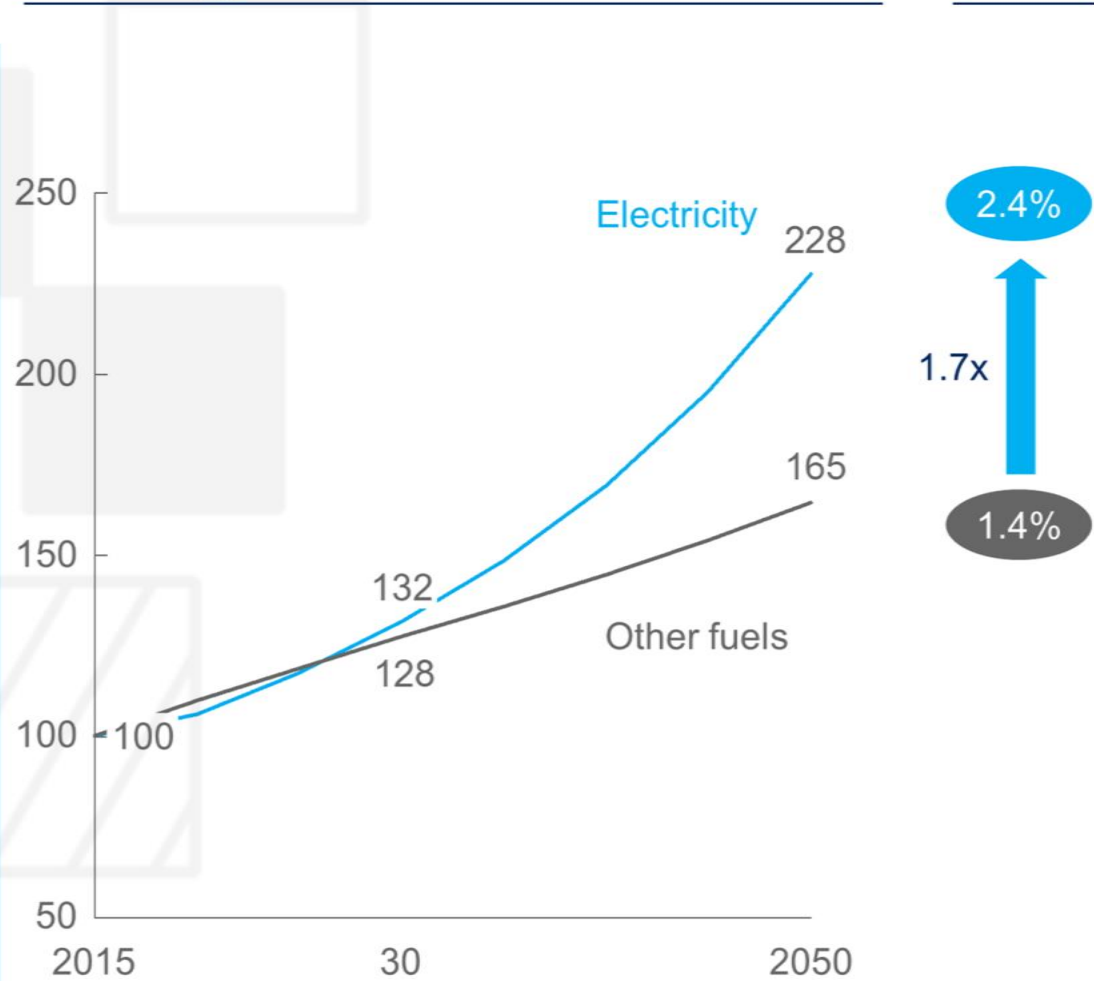


CAREC electricity demand grows much faster than other fuels

Electrification¹, Electricity % of final energy demand



Final energy demand, 2015=100



¹ Buildings includes residential buildings in CAREC; Road transport includes passenger cars, trucks, vans, buses, and two- and three-wheelers

Agenda



1. Projected energy outlook for CAREC

2. Alternative energy scenarios for CAREC

3. Implications for the region

We will discuss two alternative scenarios

Uptake of EVs



Renewables

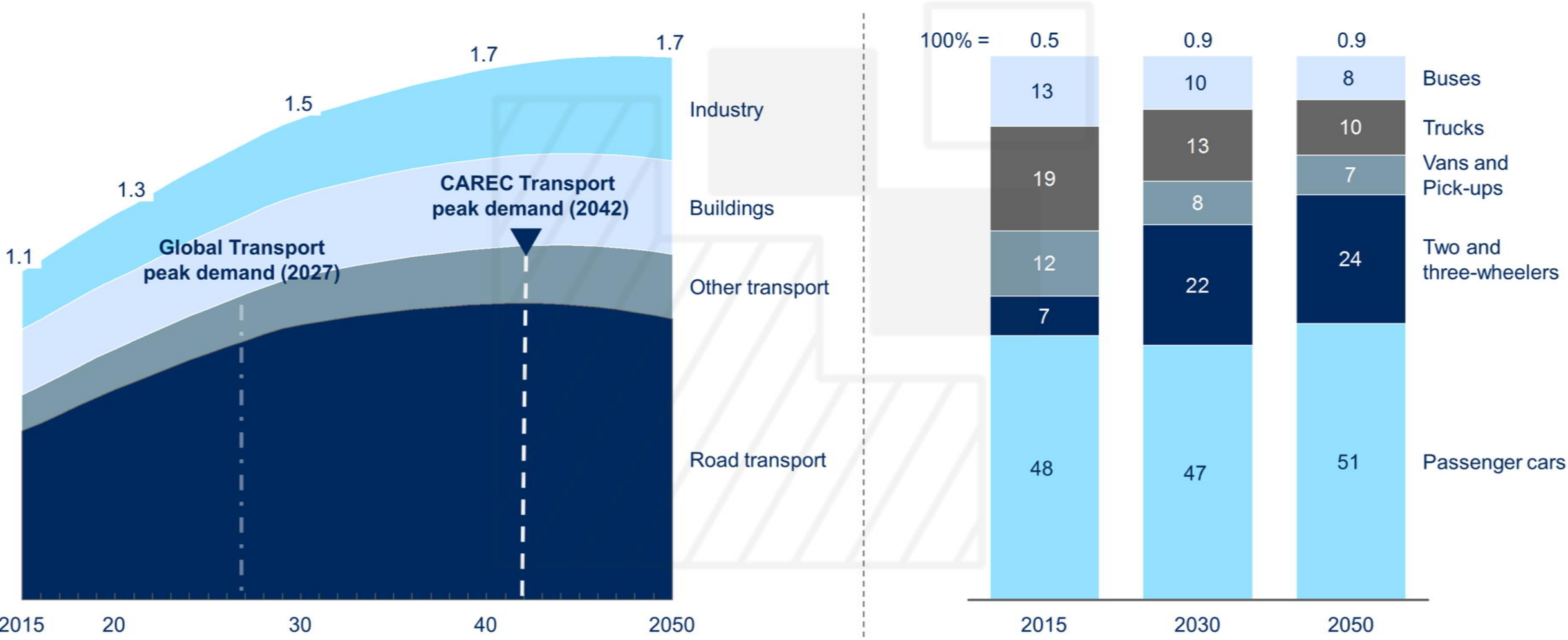




Road transport has the biggest oil demand in CAREC

Liquids demand (excluding power), Million barrels per day

Liquids demand Of Road Transport, Million barrels per day



SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017



Road transport oil demand peaks in 2042 in CAREC

Global liquids demand, Million barrels per day

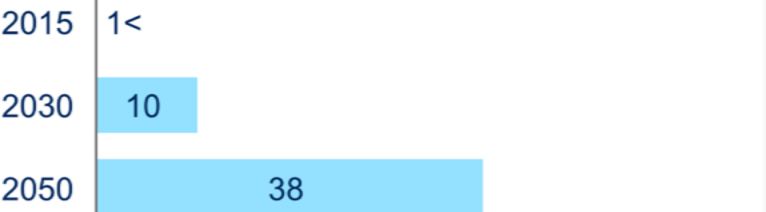
EV passenger car penetration

EVs as % of CAREC's new sales



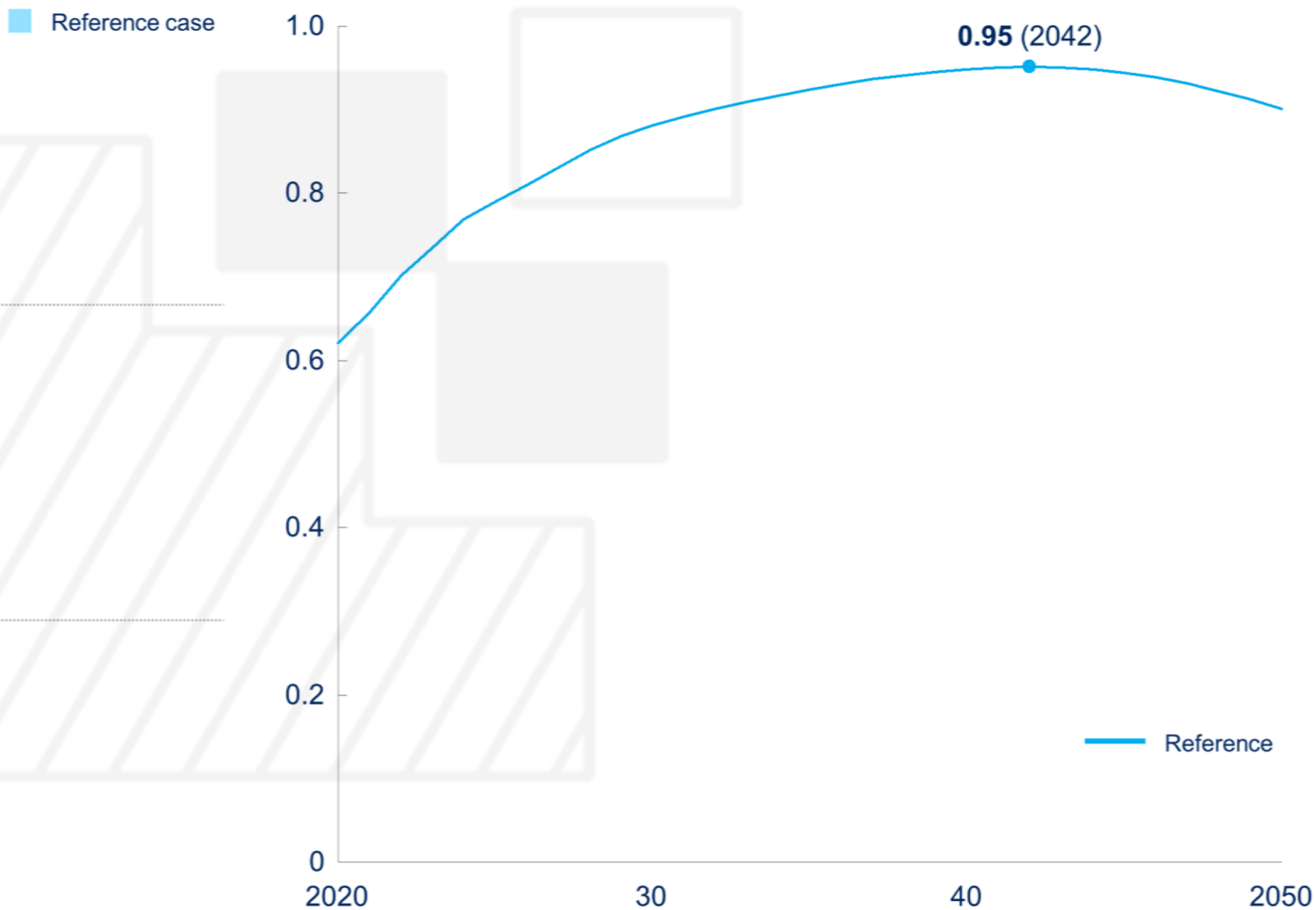
EV Two and three-wheelers penetration

EVs as % of CAREC's new sales



EV passenger truck penetration

EVs as % of CAREC's new sales





What if Electric
Vehicles follow
China's uptake rates?

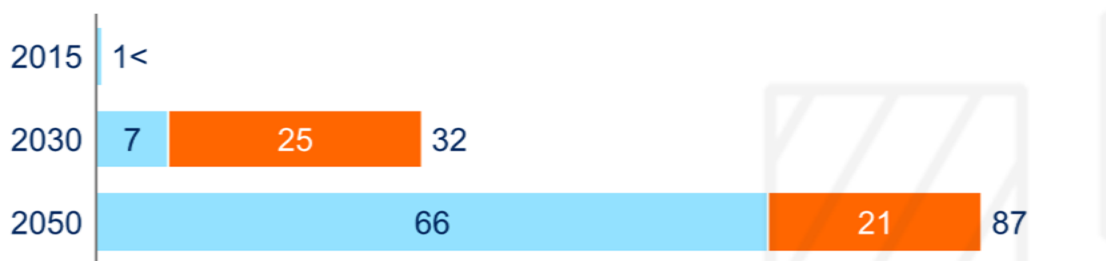


Increase in EV's uptake in CAREC based on China's uptake rates

Global liquids demand, Million barrels per day

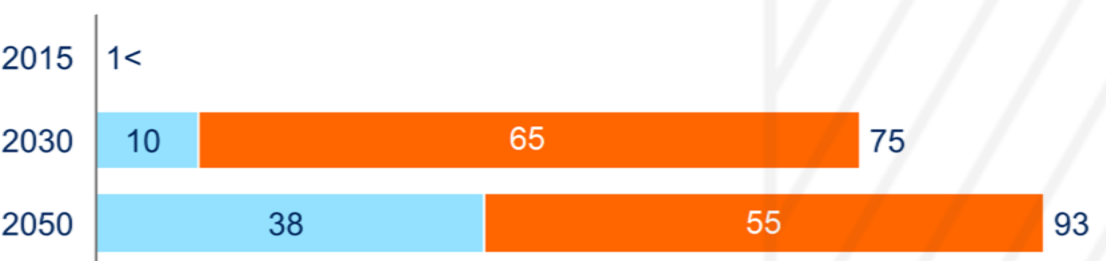
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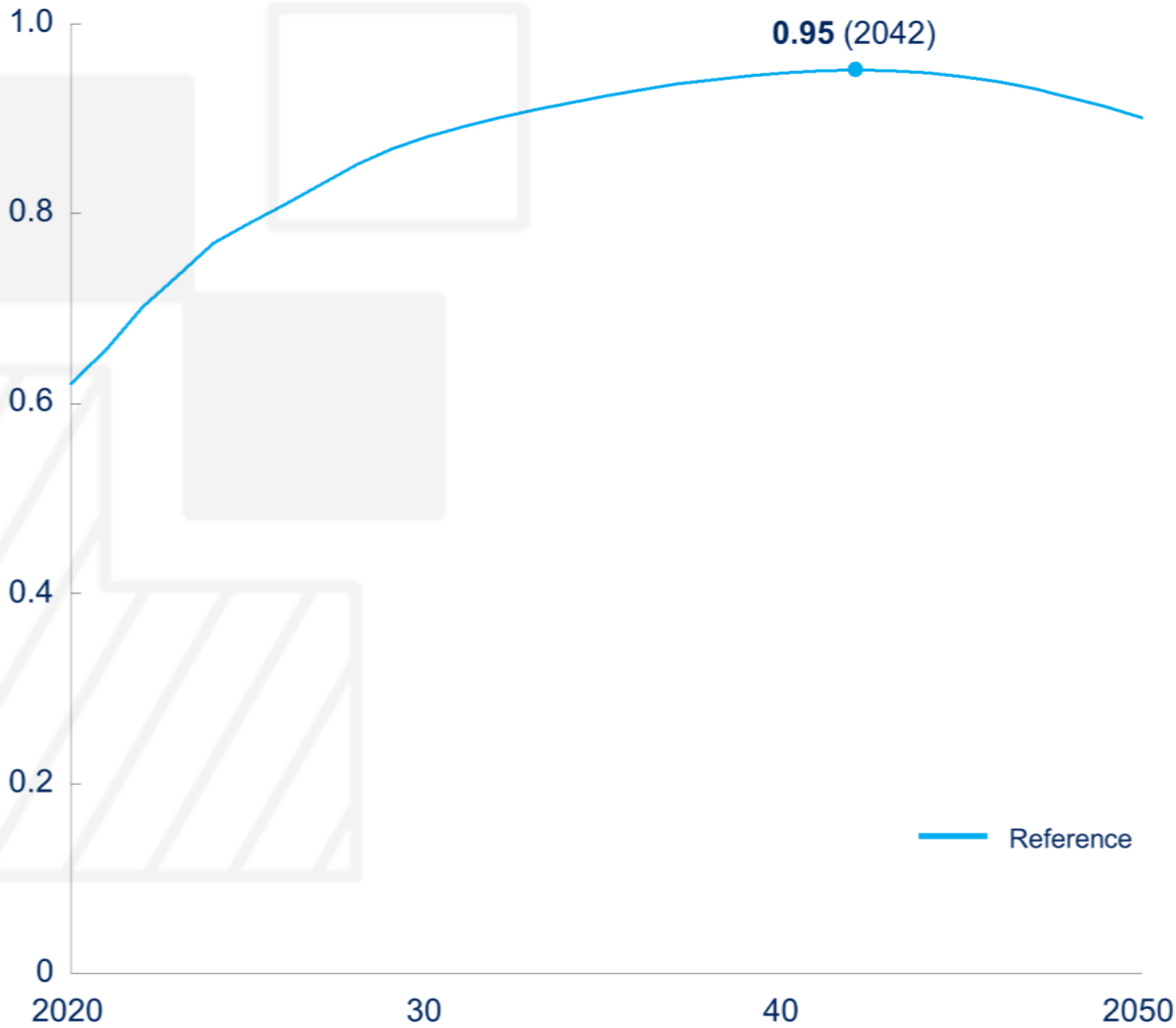
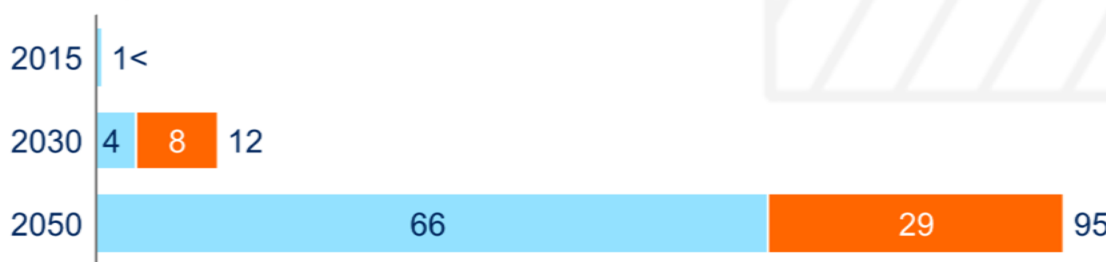
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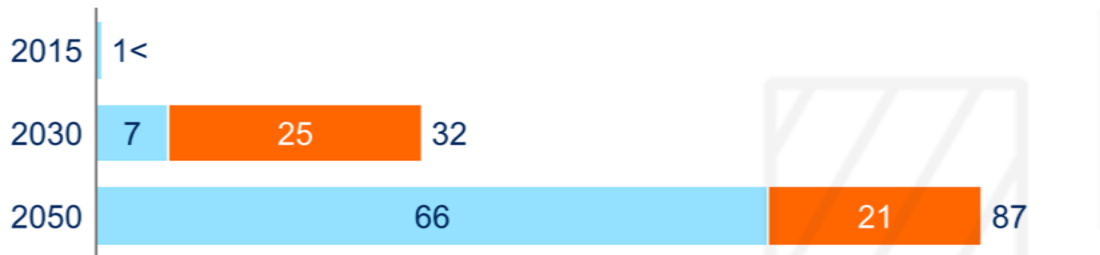


EV's increased uptake halves oil demand in 2050

Global liquids demand, Million barrels per day

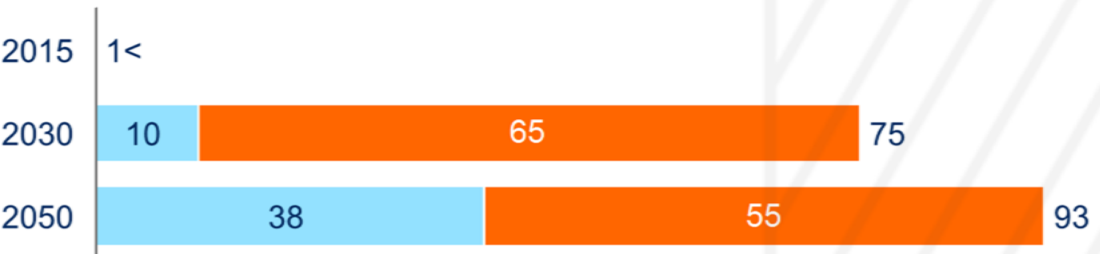
EV passenger car penetration

EVs as % of CAREC's new sales



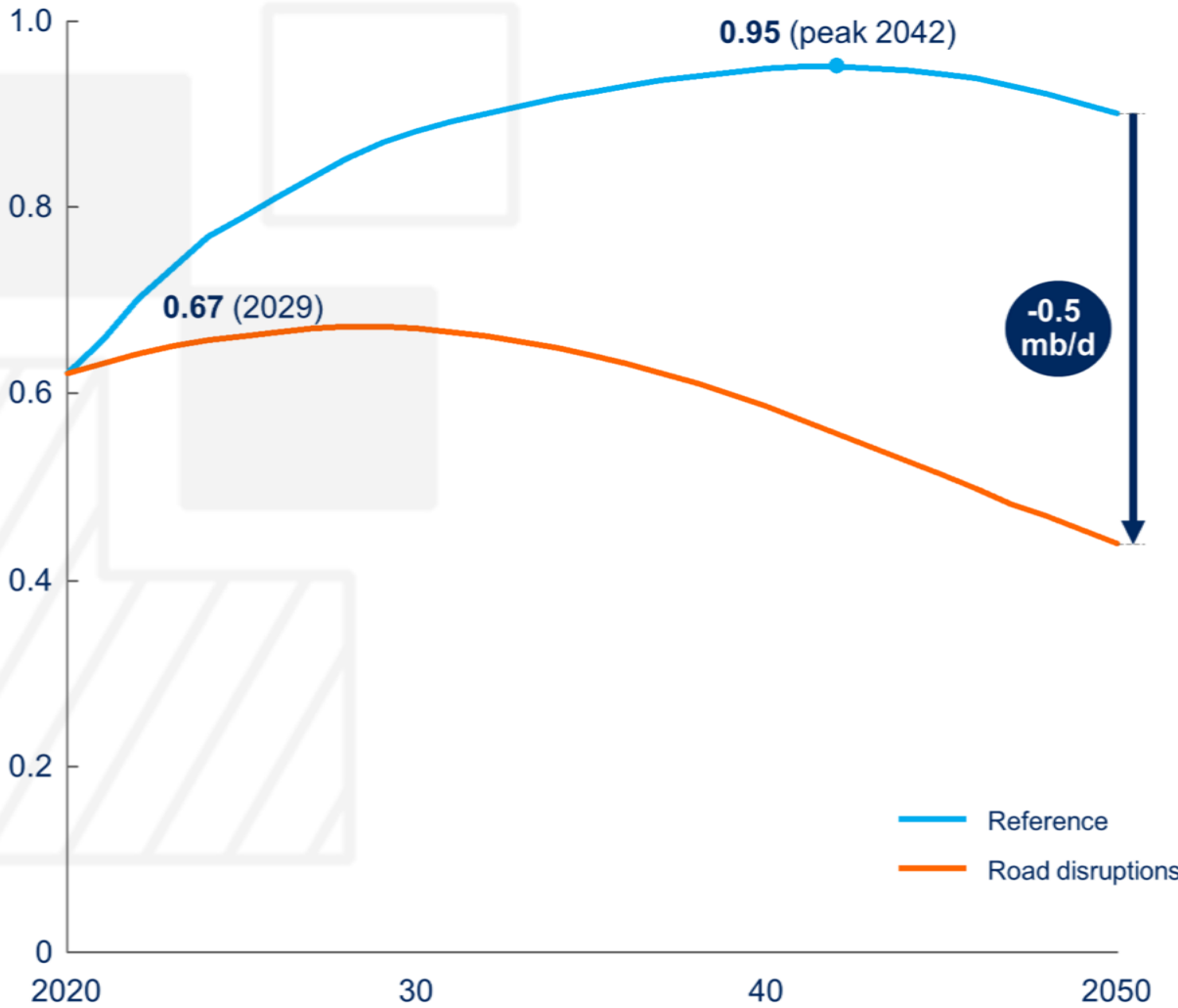
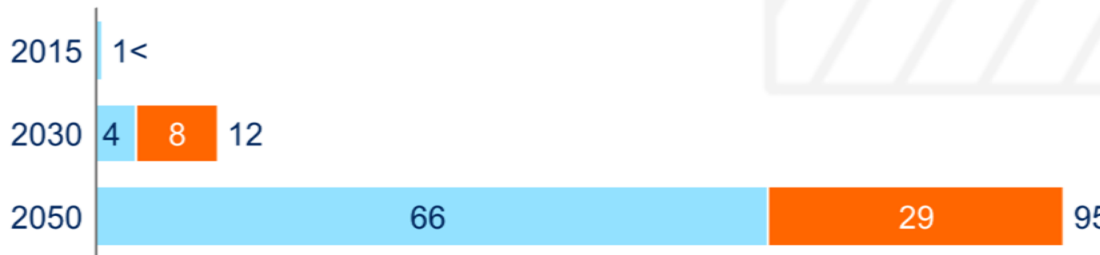
EV Two and three-wheelers penetration

EVs as % of CAREC's new sales



EV passenger truck penetration

EVs as % of CAREC's new sales



Discussion (5 min.)

On the wall, we've drawn a scale from 1 to 10, which we'd like to use to answer the following question:

How likely are we as a region to obtain the EV adoption rates set out in the alternative energy scenario?



Very unlikely


Very likely


Please indicate your opinion with a post-it. Write on it in one or two words the rationale for your answer.



We will discuss two alternative scenarios

Uptake of EVs



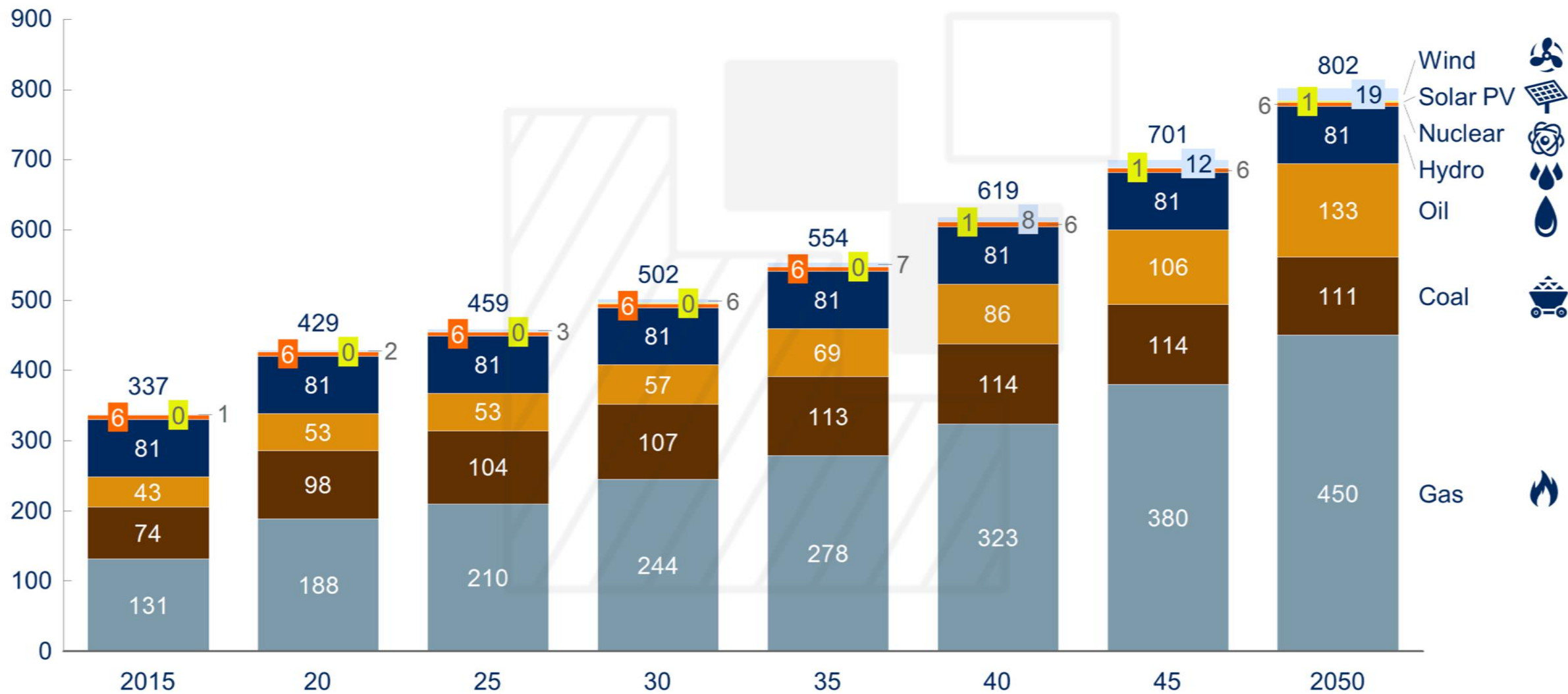
Renewables



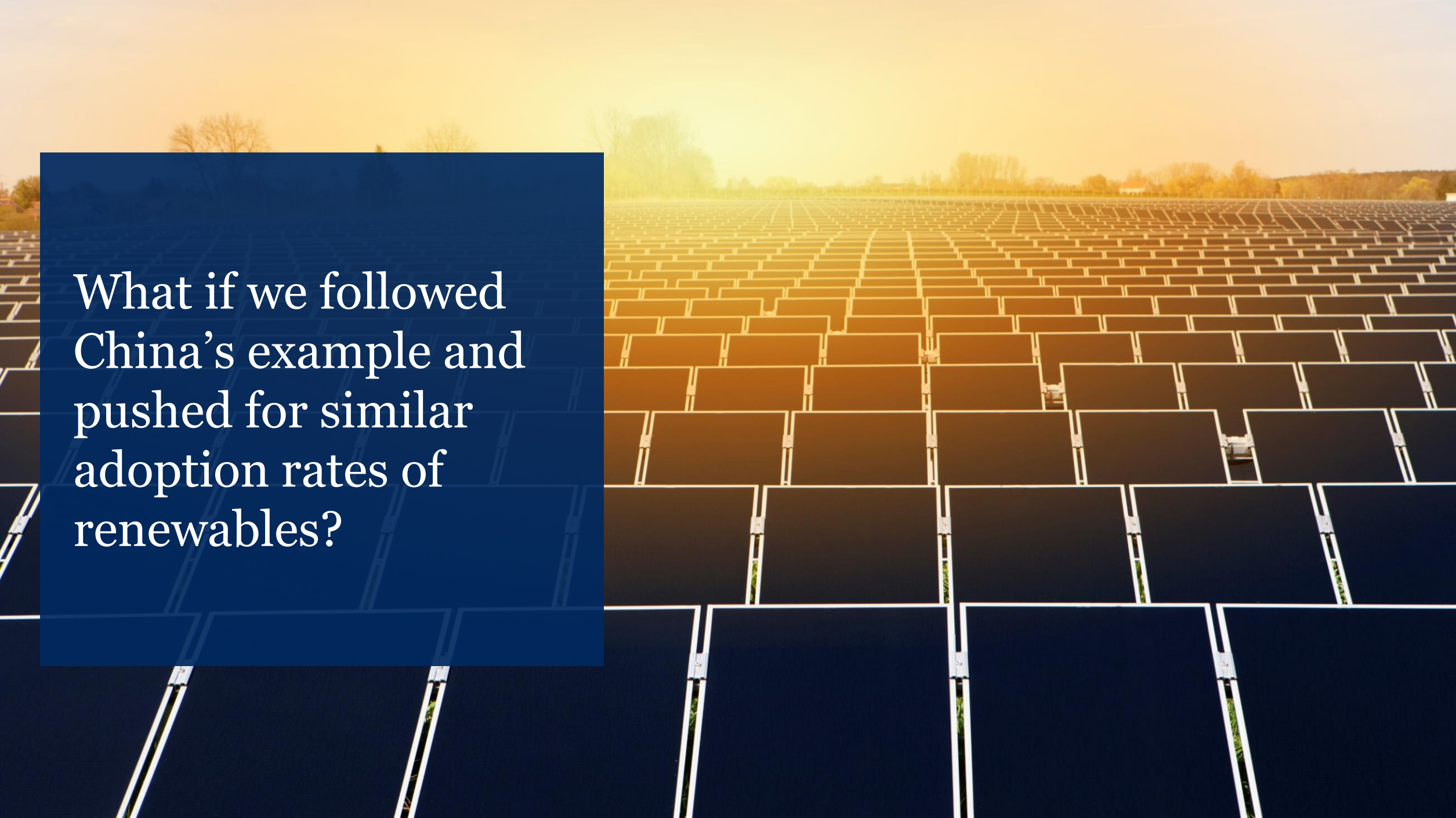


Renewables play a marginal role for CAREC in our current reference case

Generation Mix, TWh



SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017

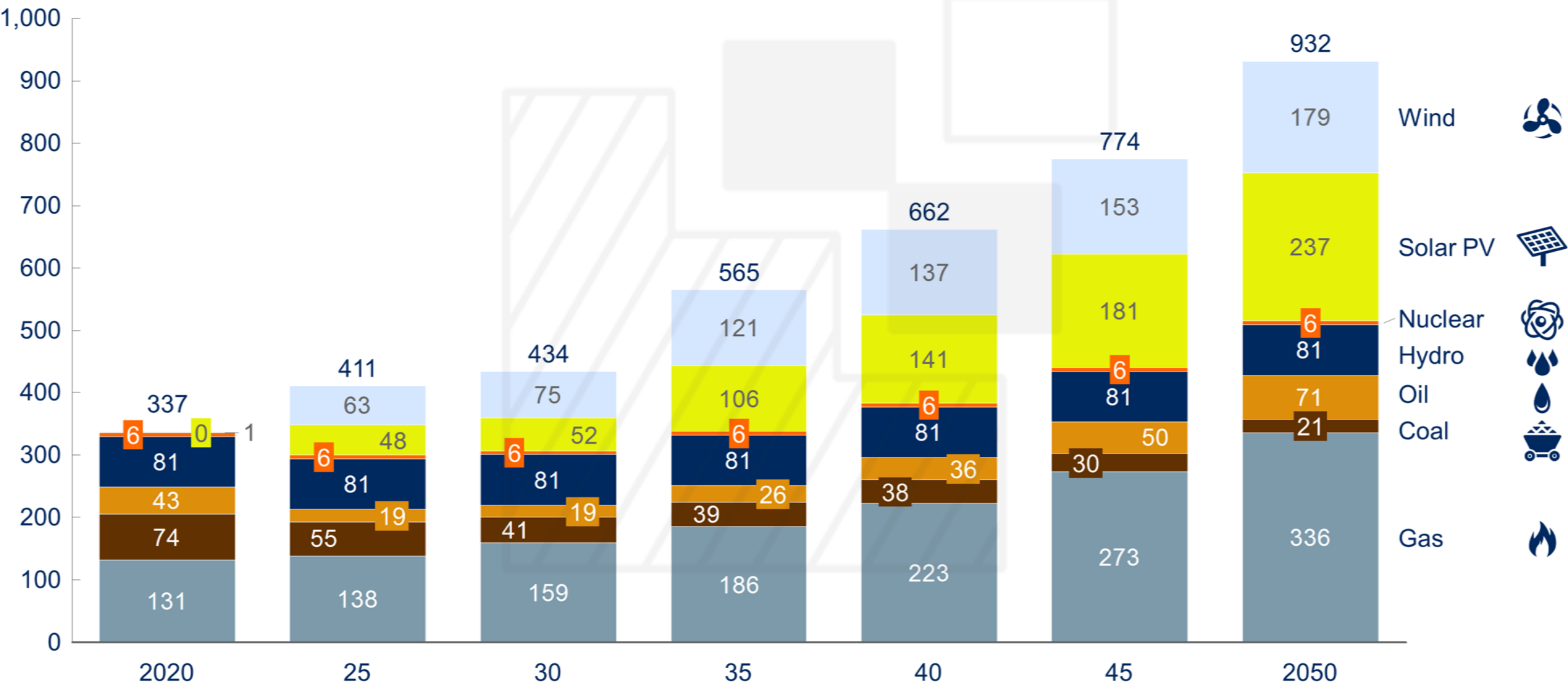
A wide-angle photograph of a vast solar farm. The solar panels are arranged in neat, parallel rows that stretch far into the distance, creating a strong sense of perspective. The sky is a pale, hazy yellow, suggesting a bright day or sunrise/sunset. The overall tone is warm and optimistic.

What if we followed
China's example and
pushed for similar
adoption rates of
renewables?



Alternative scenario in CAREC reveals the region’s renewables potential

Generation Mix CAREC, TWh

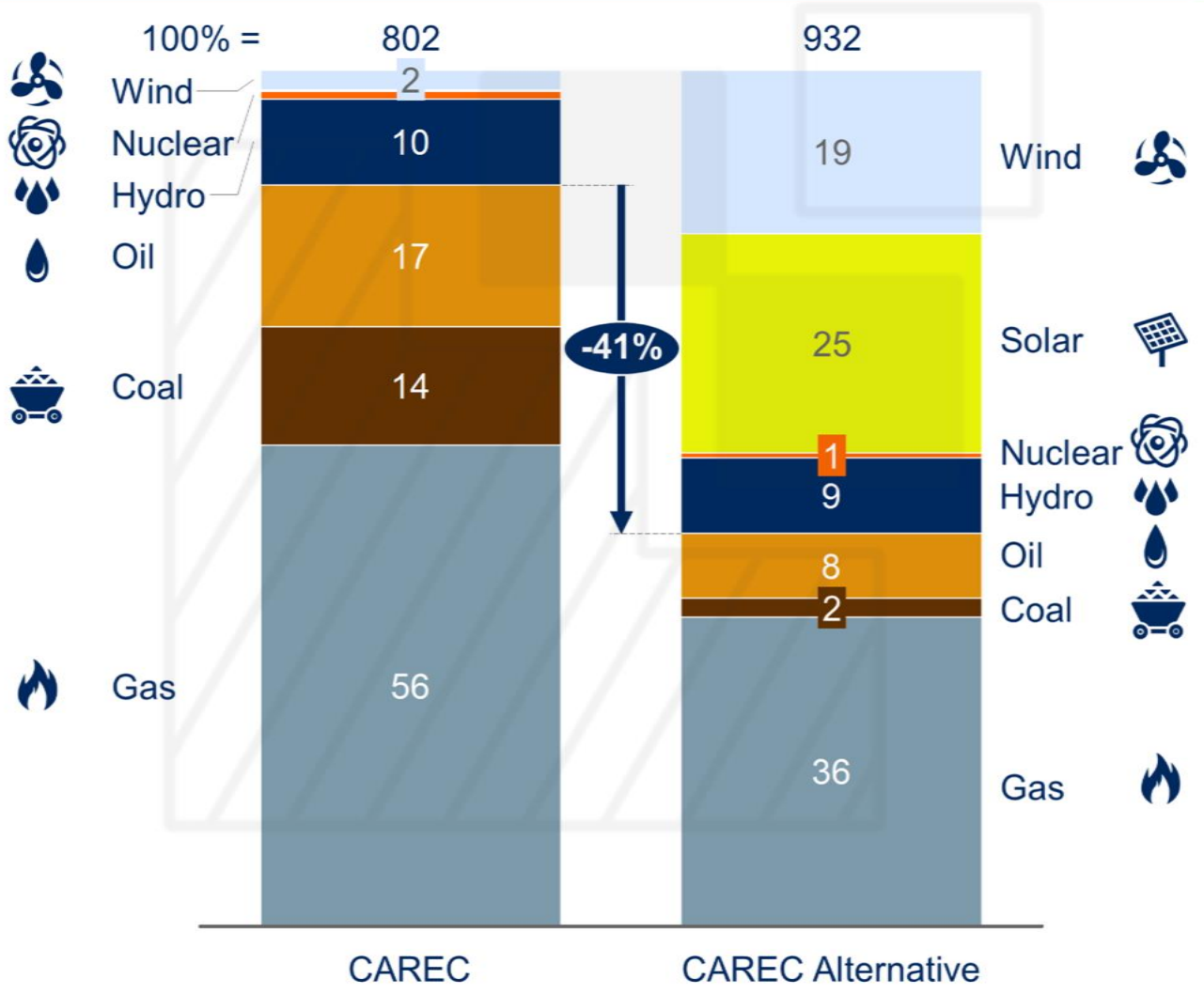


SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017



How different CAREC's power generation mix in the alternative scenario

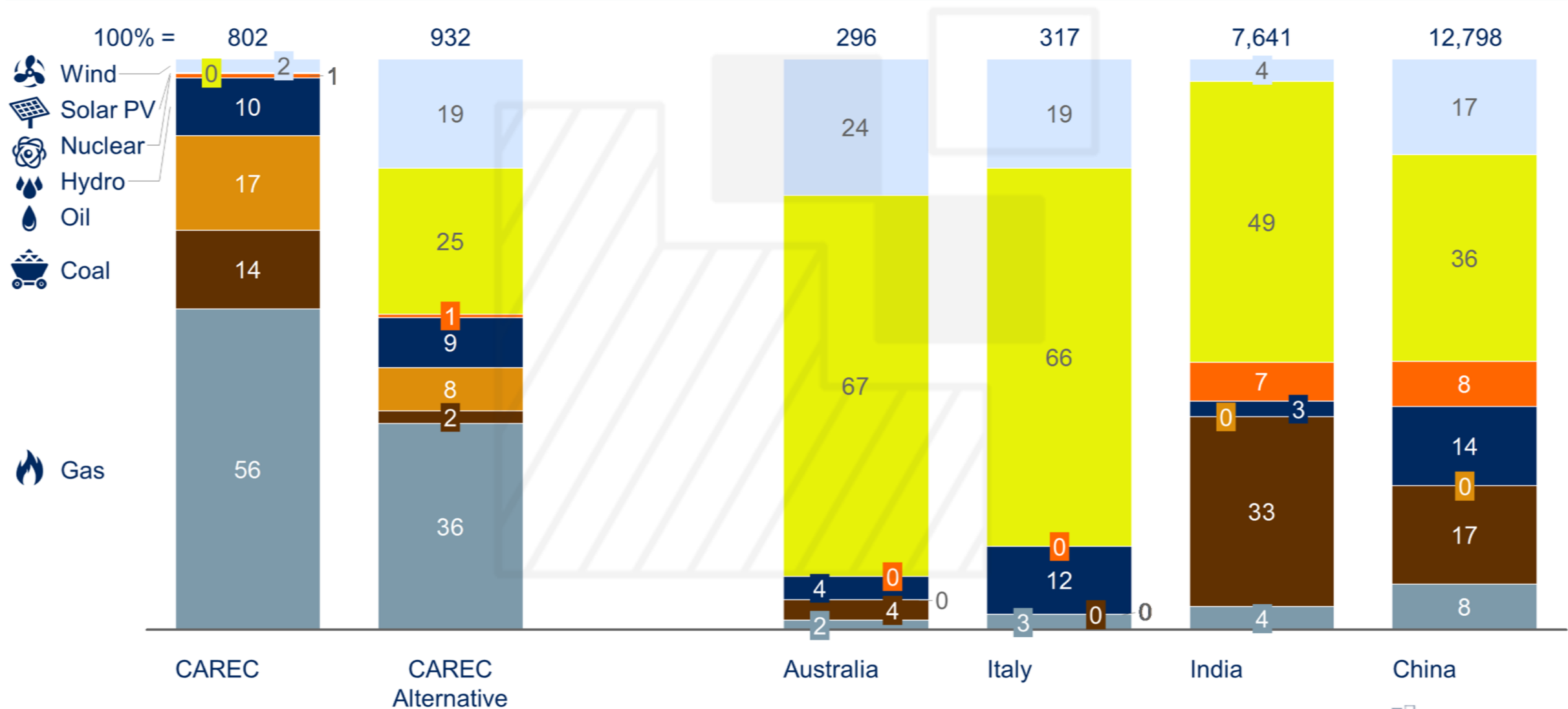
Generation Mix 2050, TWh





How CAREC would compare with other countries

Generation Mix 2050, TWh



SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017

Discussion (5 min.)

On the wall, we've drawn a scale from 1 to 10, which we'd like to use to answer the following question:

How likely are we as a region to obtain the renewables adoption rates set out in the alternative energy scenario?



Very unlikely


Very likely


Please indicate your opinion with a post-it. Write on it in one or two words the rationale for your answer.



Agenda

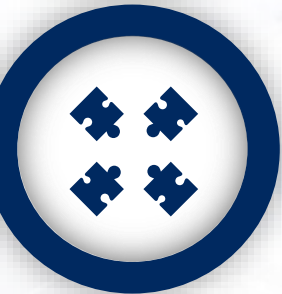
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Implications for CAREC



Opportunities

- **Increased electrification** by adopting renewable off-grid solutions - enabled by improvements in rooftop solar and battery solutions
 - Renewables can help CAREC **improve GDP and energy security** - enabling fossil exporting countries to increase availability for export and importers to increase energy independence
 - Adoption of electric vehicles can drastically **reduce costs of importing** refined products
-



Challenges

- Changes in energy mix will **disrupt existing sectors** and can lead to stranded assets
 - Global **decrease in fossil fuel** demand in next decades could disrupt CAREC's exports much sooner
 - **Holistic policy required** to navigate the different drivers and – sometimes opposing – trends that shape the energy transition
-

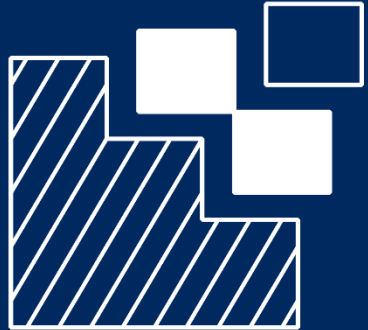


Key policy questions

- How to enable CAREC's **economic development and prosperity** from a 40% increase in renewables?
- How to achieve **GHG and sustainability targets** in the most cost-effective manner?
- How to stimulate and capitalize increased electric vehicles uptake in the **energy trade balances**?
- How to organize **regional infrastructure development** to benefit from new energy trade patterns?
- How to maximize returns from CAREC's rich **natural resources** while strategically positioning for the changes to come?

Your reflections





Energy Insights

By McKinsey

ADB regional programs and countries

BIMP-East Asian Growth Area (BIMP-EAGA)	Central Asian Regional Economic Cooperation (CAREC)	IMT-Growth Triangle (IMT-GT)	South Asia Subregional Economic Cooperation (SASEC)	Greater Mekong Subregion (GMS)
<ul style="list-style-type: none"> ▪ Brunei Darussalam ▪ Indonesia ▪ Malaysia ▪ Philippines 	<ul style="list-style-type: none"> ▪ Afghanistan ▪ Azerbaijan ▪ People's Republic of China ▪ Georgia ▪ Kazakhstan ▪ Kyrgyz Republic ▪ Mongolia ▪ Pakistan ▪ Tajikistan ▪ Turkmenistan ▪ Uzbekistan 	<ul style="list-style-type: none"> ▪ Indonesia ▪ Malaysia ▪ Thailand 	<ul style="list-style-type: none"> ▪ Bangladesh ▪ Bhutan ▪ India ▪ Maldives ▪ Myanmar ▪ Nepal ▪ Sri Lanka 	<ul style="list-style-type: none"> ▪ Cambodia ▪ People's Republic of China¹ ▪ Lao People's Democratic Republic ▪ Myanmar ▪ Thailand ▪ Viet Nam

³ Specifically Yunnan Province and Guangxi Zhuang Autonomous Region

SOURCE: ADB, Team analysis

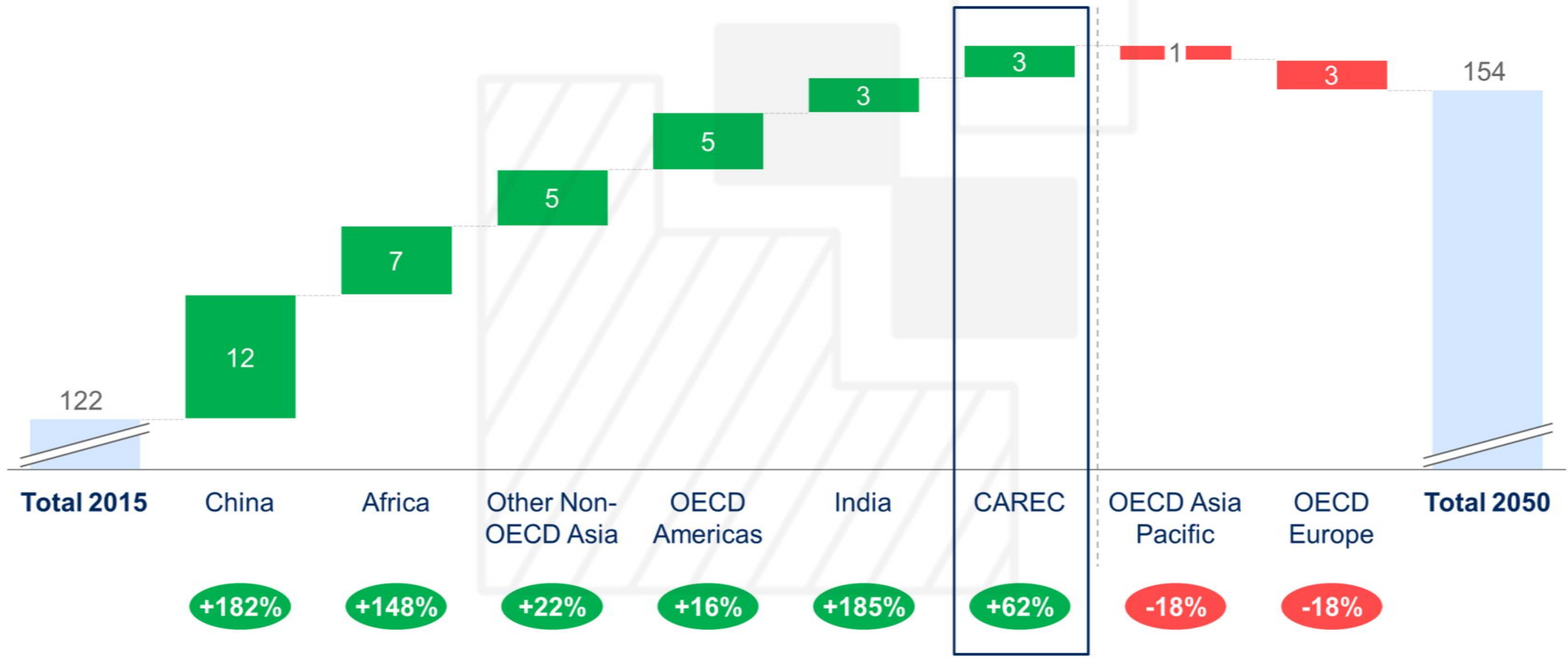


Global growth in gas demand

CAREC excluding China

Gas demand by region, million TJ

X% Net change relative to 2015



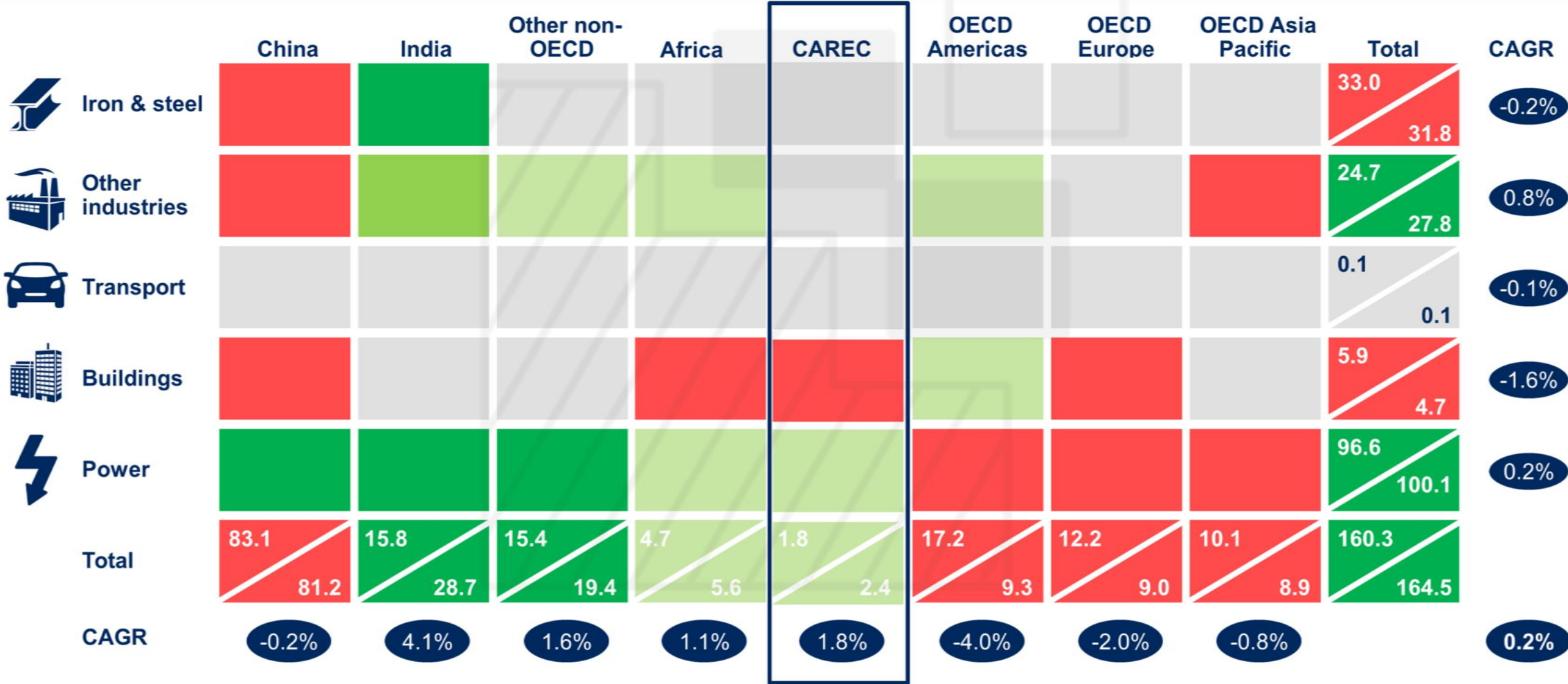
Global growth in coal demand



CAREC excluding China

Global coal demand, 2015-30, million TJ

2015 2030 2015-30 delta, Million TJ
 > 2 1-2 0.2-1 0-0.2 < 0



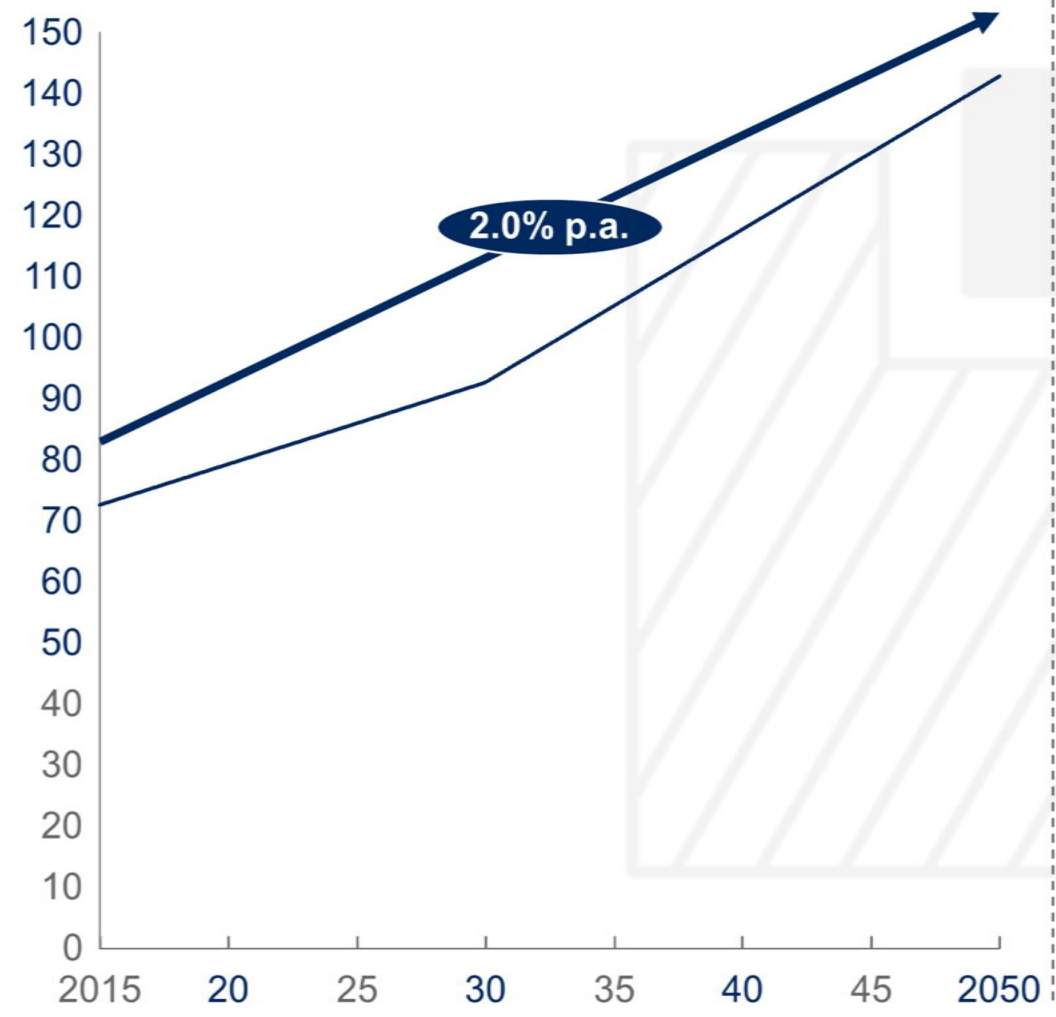
SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017



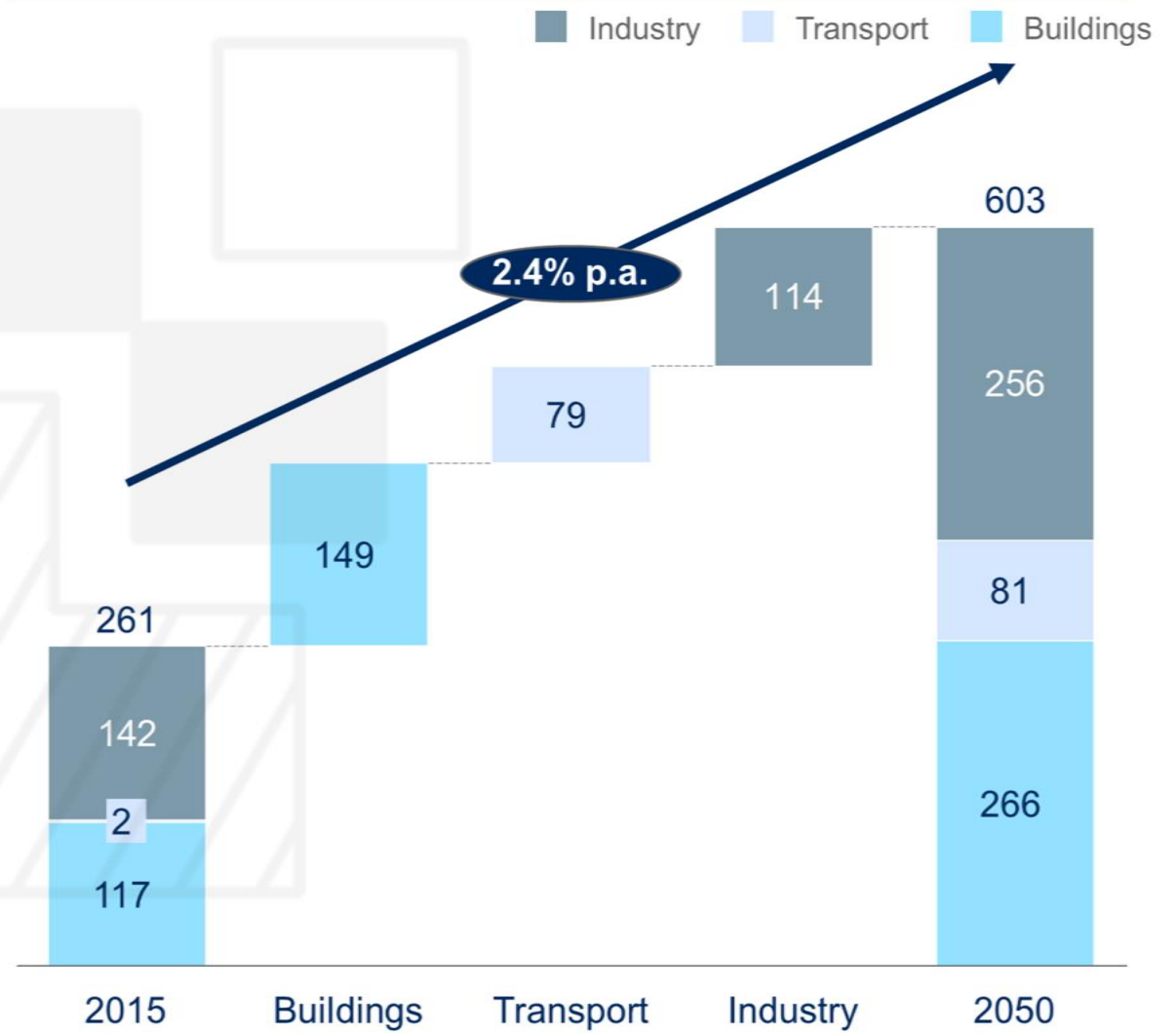
CAREC electricity demand growth is outpacing global demand growth

CAREC excluding China

World Total electricity demand, million TWh



CAREC Total electricity demand, TWh

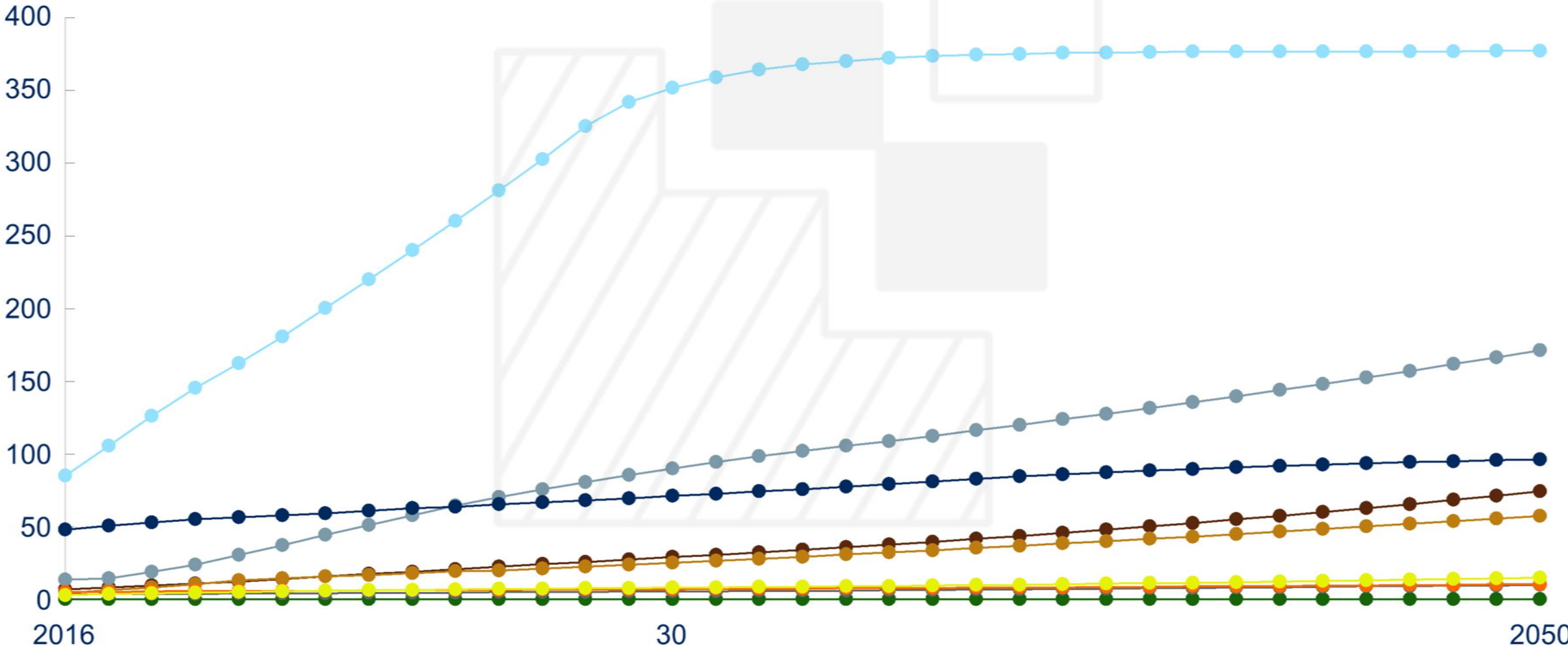


CAREC's Two and Three Wheelers ownership growth is mainly driven by Pakistan

CAREC excluding China

- Azerbaijan
- Georgia
- Kazakhstan
- Kyrgyzstan
- Mongolia
- Pakistan
- Tajikistan
- Turkmenistan
- Uzbekistan

Two and Three Wheelers ownership rate, per 1000 inhabitants

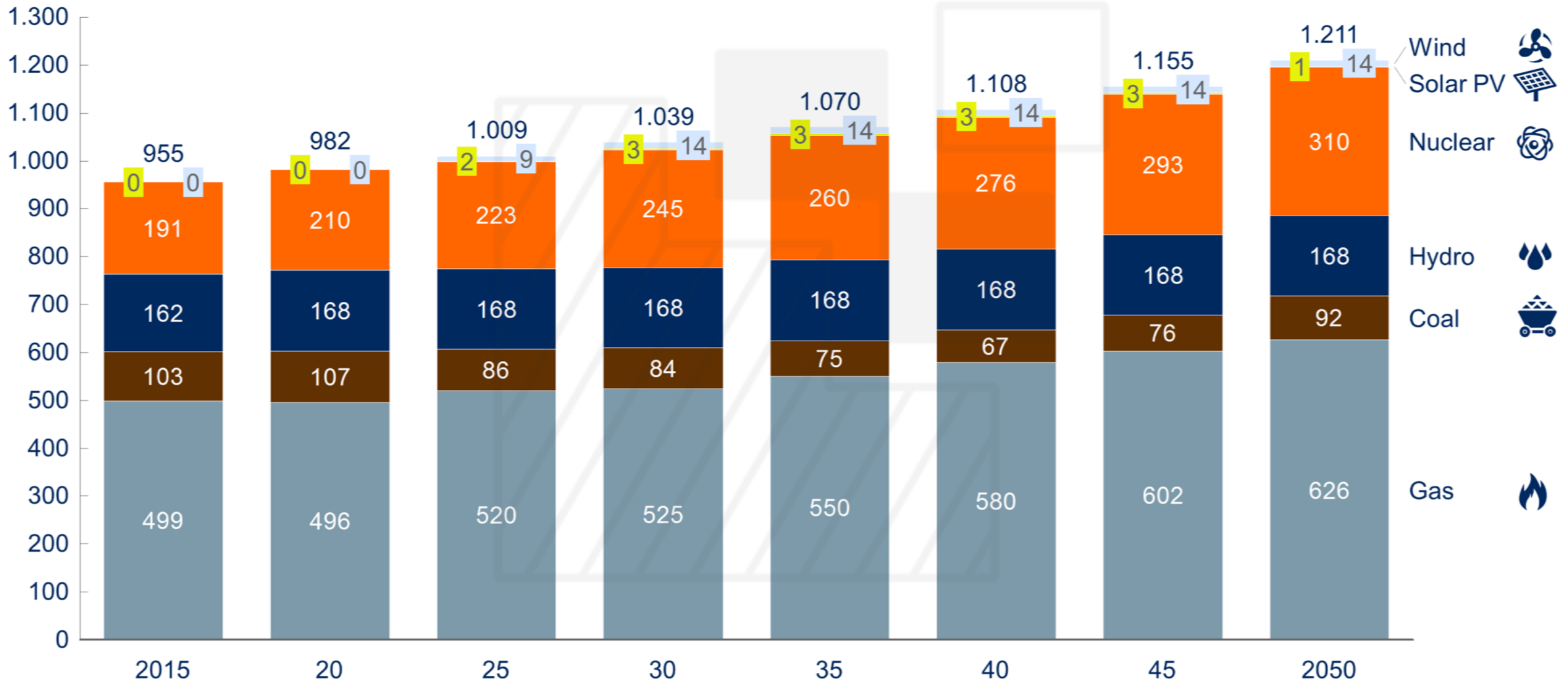


SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017



Generation Mix Russia Reference Case

Generation Mix, TWh

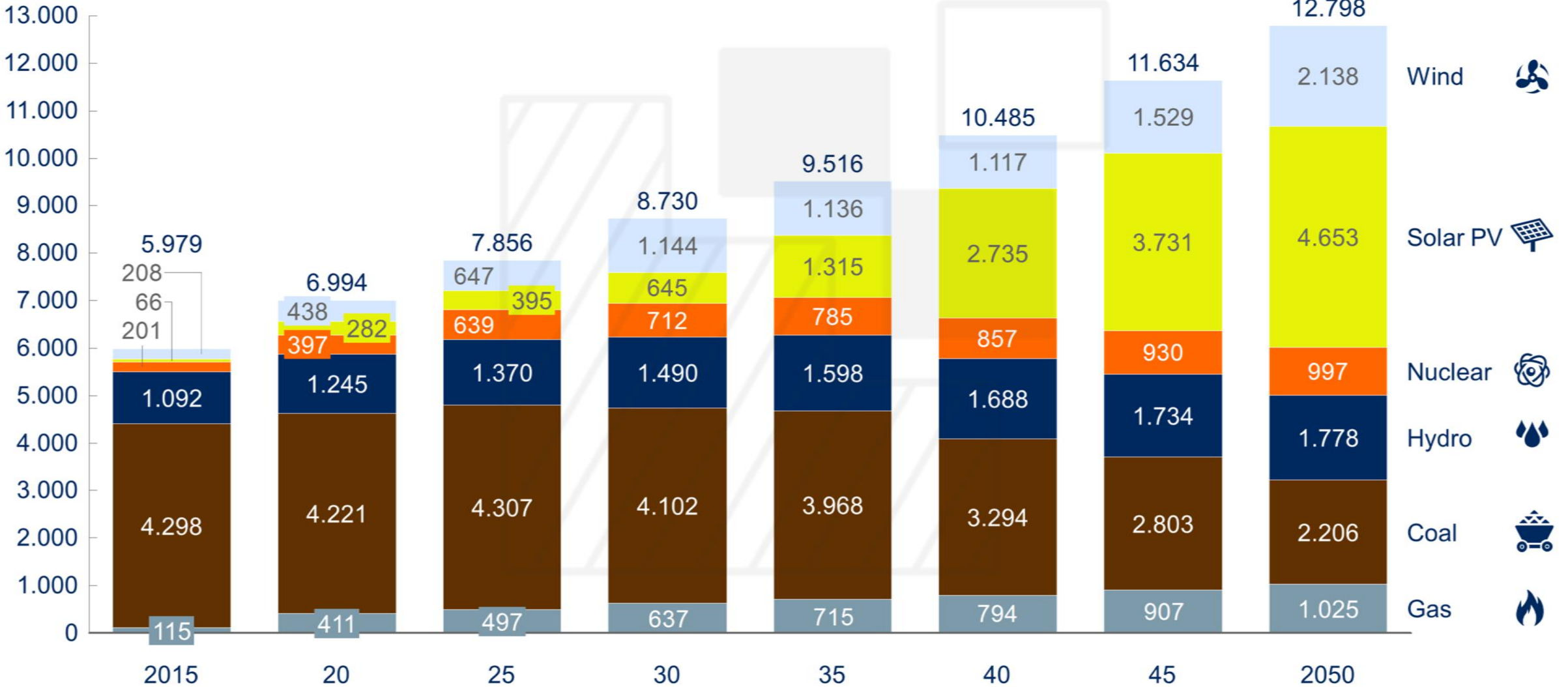


SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017

Generation Mix China Reference Case



Generation Mix, TWh





Generation Mix China Auctions As Reality Case

Generation Mix, TWh

