Global Energy Perspective: CAREC energy outlook

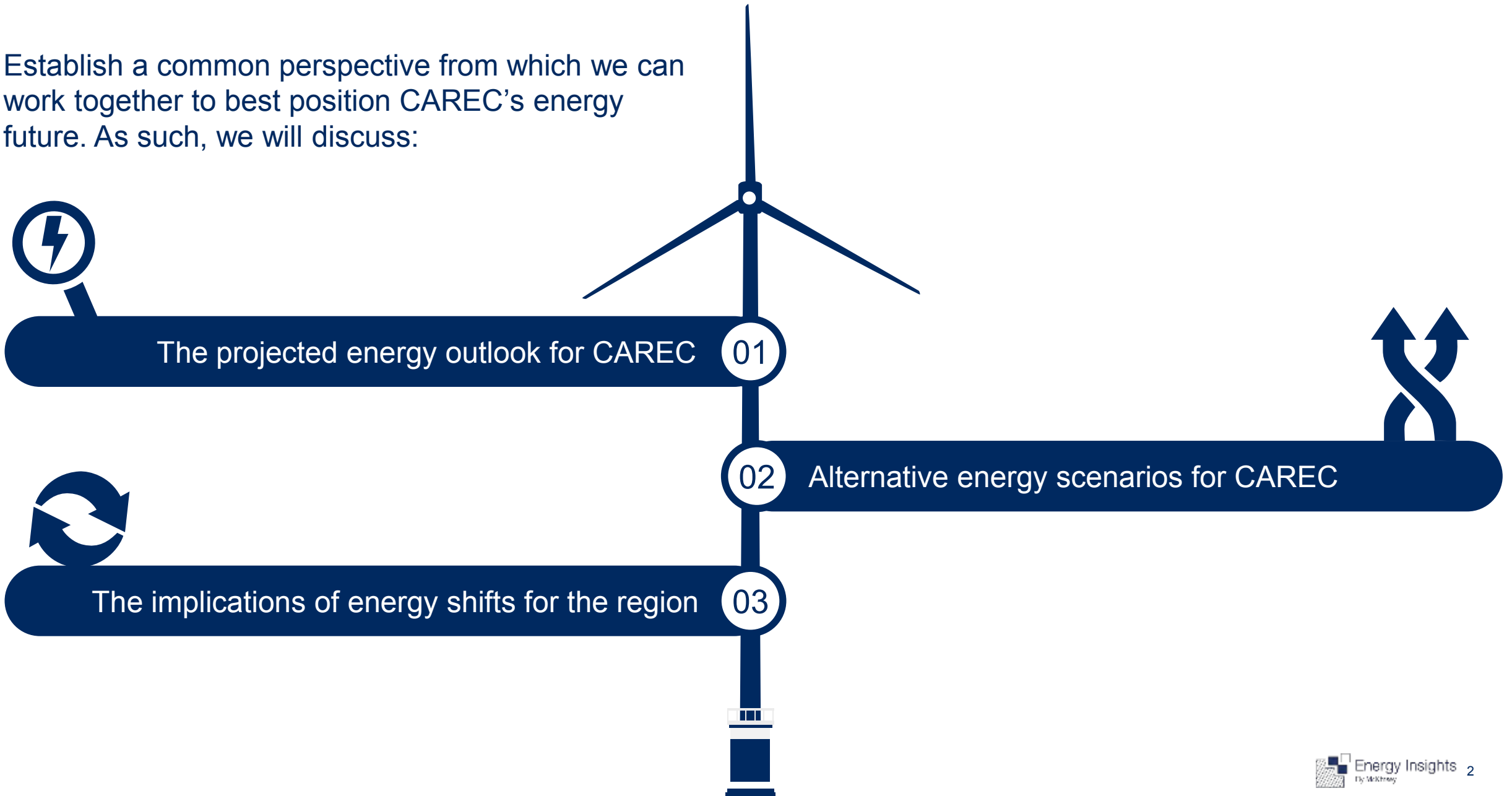
CAREC ESSC technical session | 14 March 2018

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

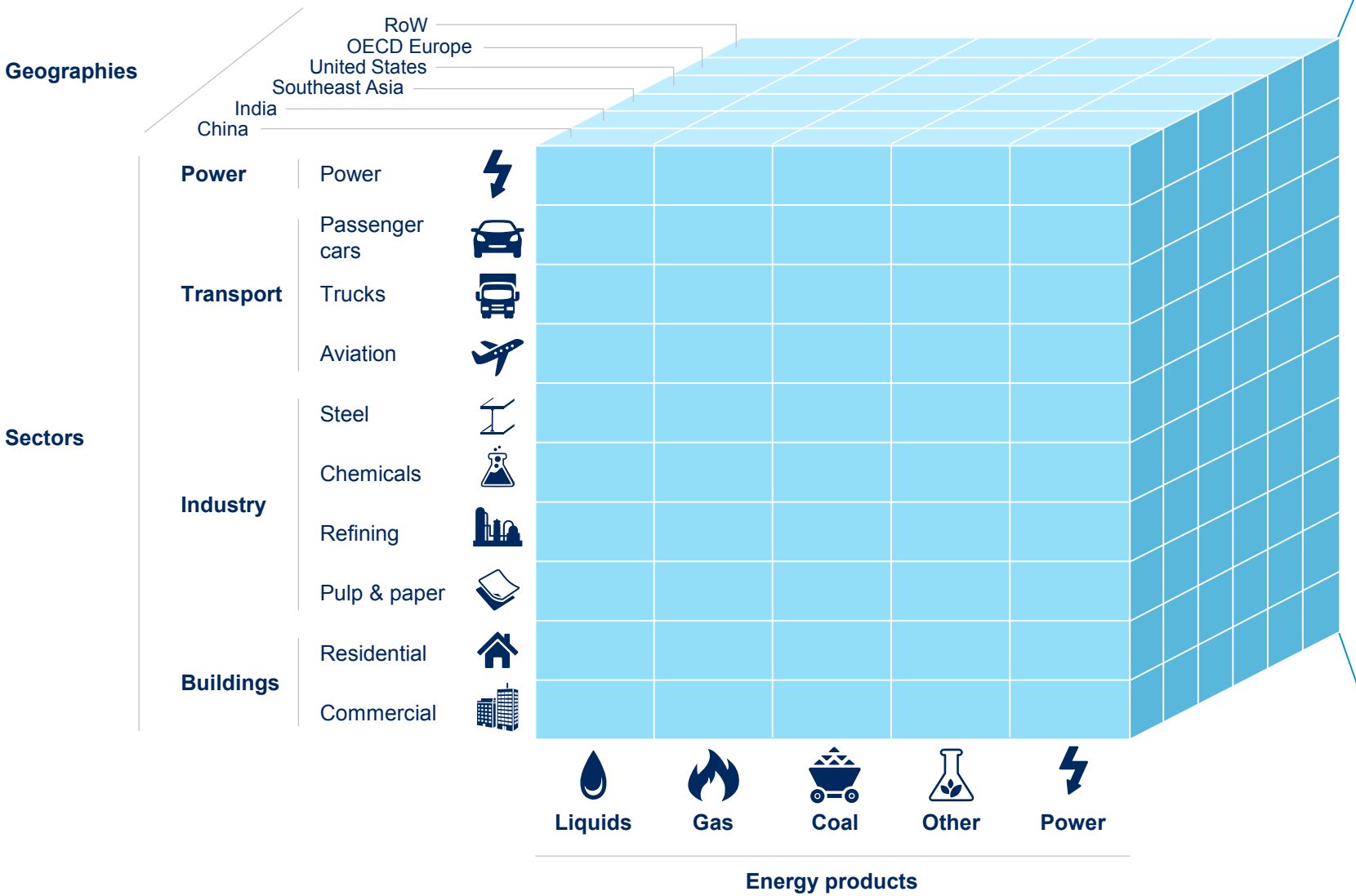
1.300+

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 CO_2 emissions by 2030 is insufficient** to meet a 2 degrees Celsius pathway

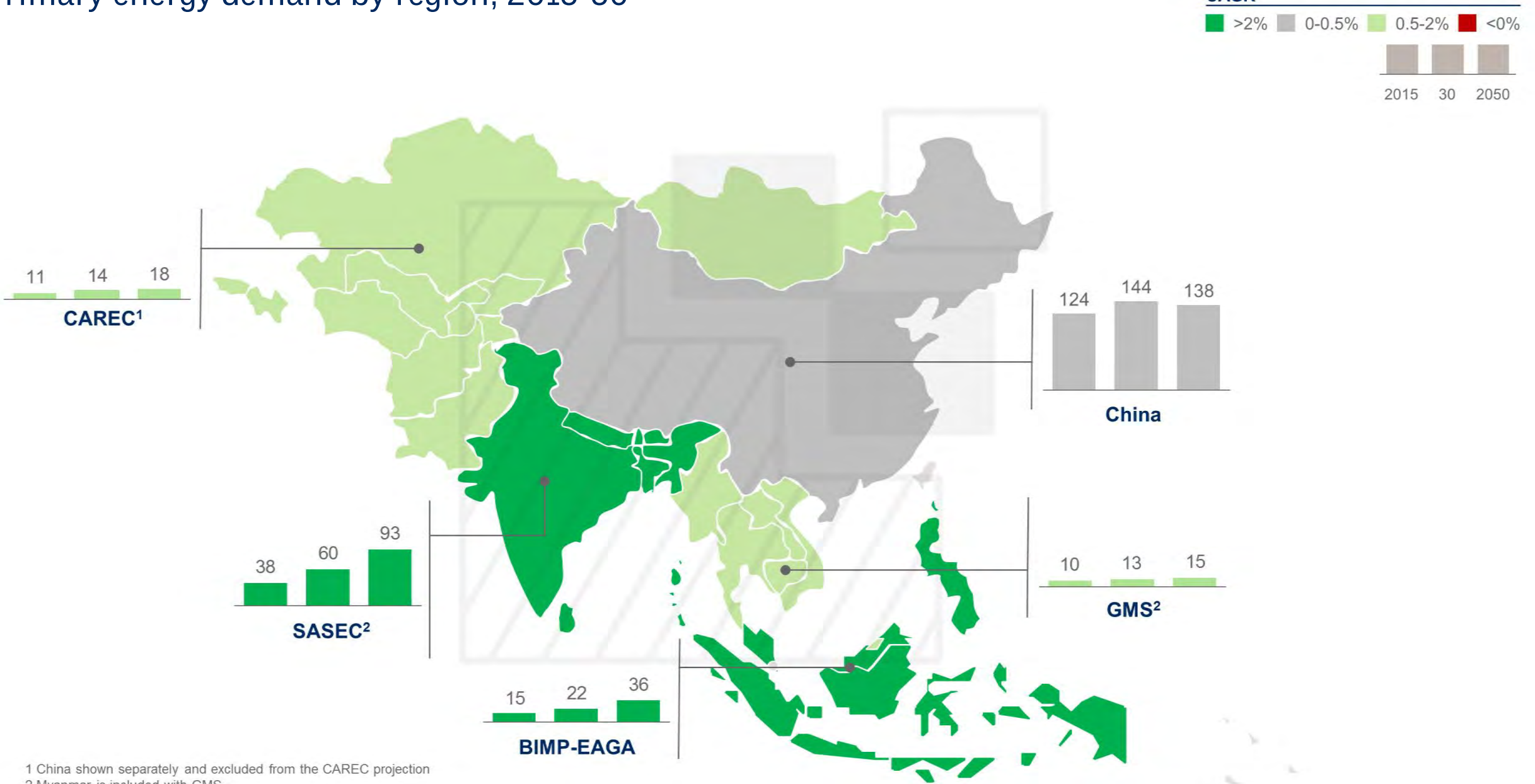
Agenda

1. Projected energy outlook for CAREC

2. Alternative energy scenarios for CAREC

3. Implications for the region

Primary energy demand by region, 2015-50

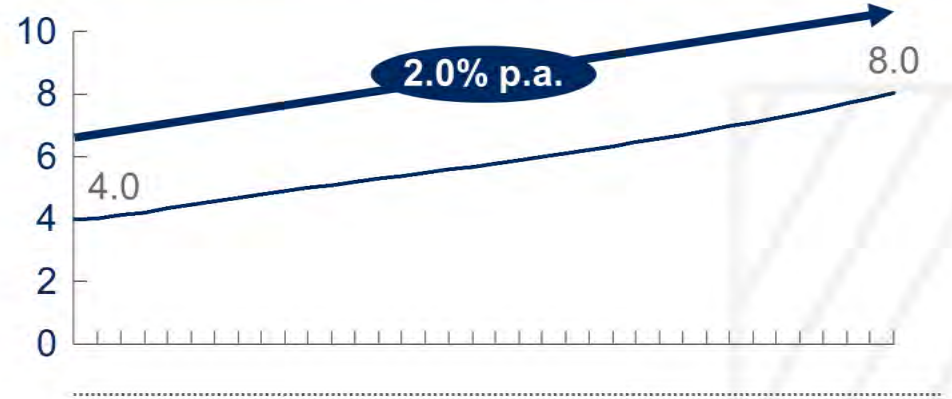


1 China shown separately and excluded from the CAREC projection
2 Myanmar is included with GMS

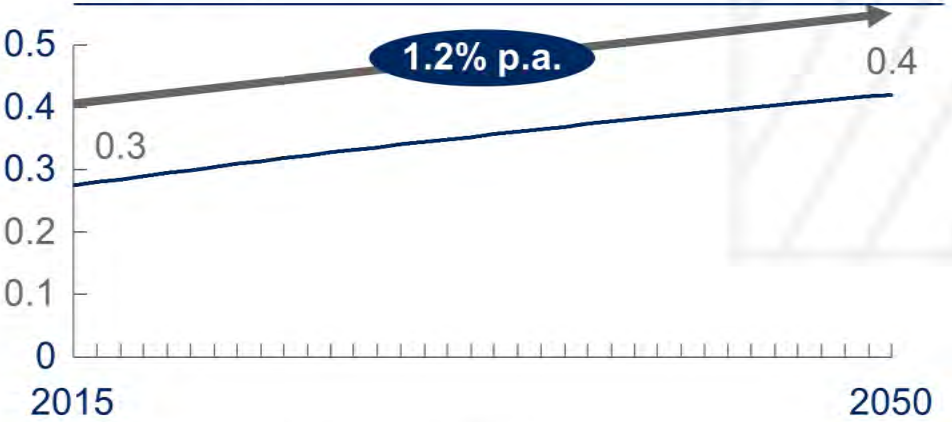
SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017

The main drivers of the energy demand growth in CAREC[1]

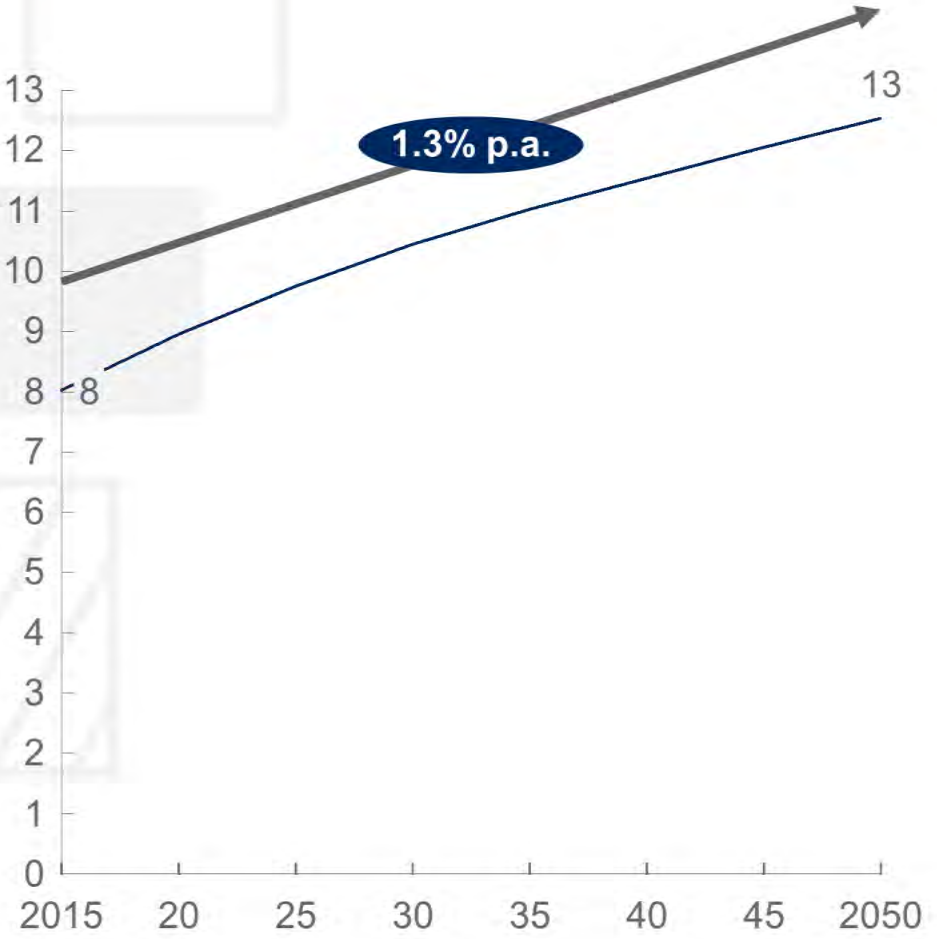
GDP per capita,
Thousand USD (Real $2010)



Population,
Billion



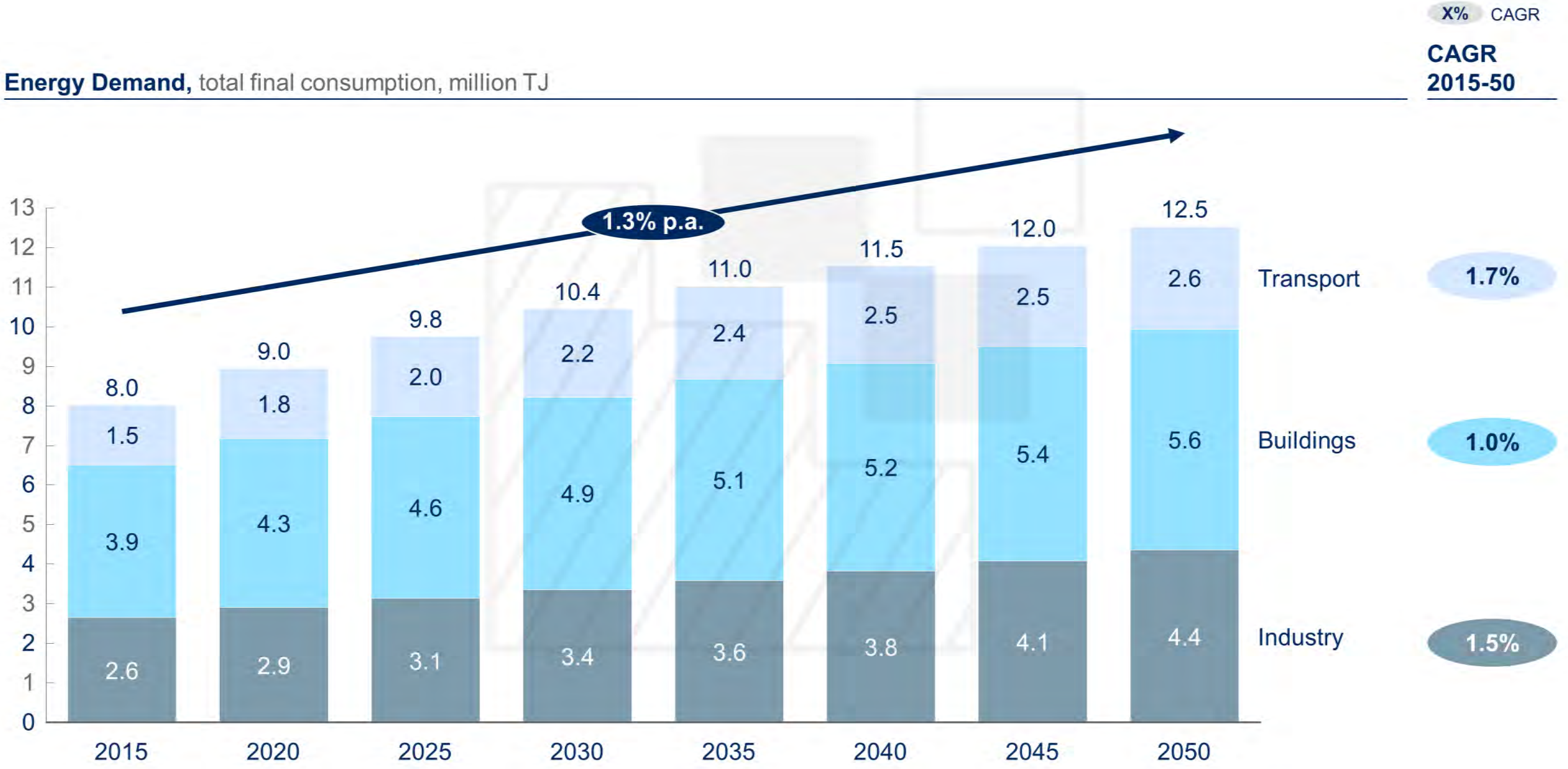
Total Energy demand
Million TJ



1 China is excluded from the analysis performed on CAREC

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

How the various segments drive CAREC's energy demand growth



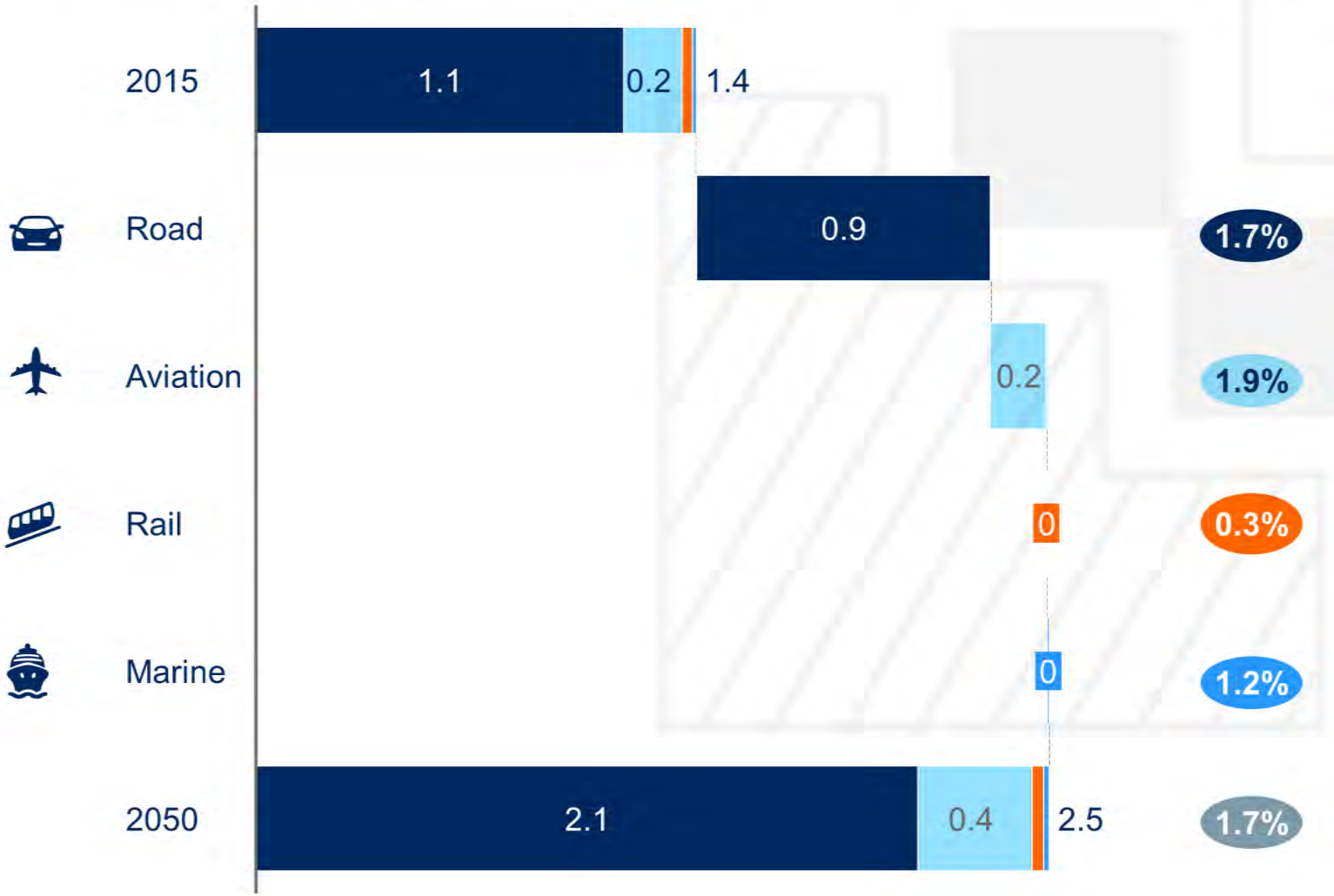
SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017

CAREC transport energy demand growth

Road Aviation Rail Marine

X% CAGR

Transport Energy Demand, total final consumption, million TJ

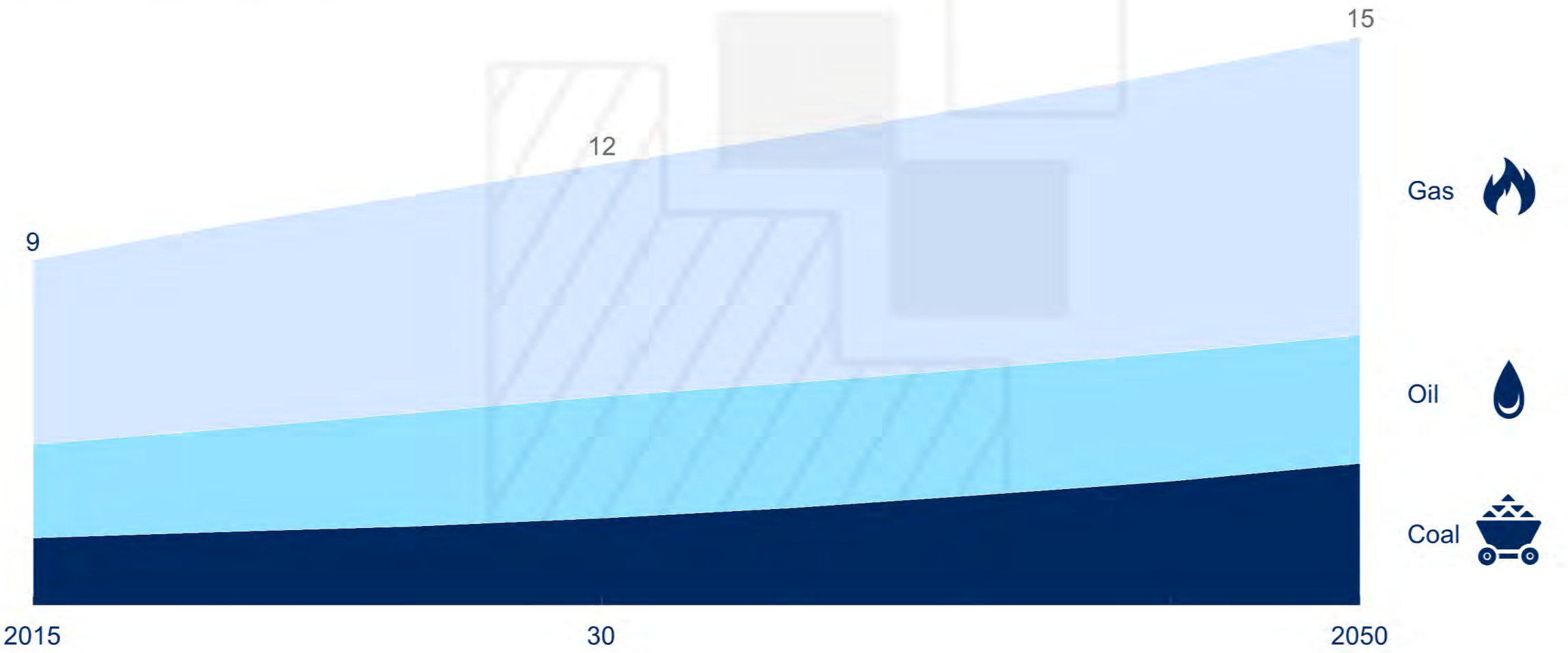


CAGR 2015-50

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

CAREC fossil fuel demand, million TJ

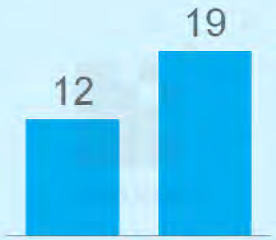


SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017; IEA Energy Balances (Historical)

CAREC electricity demand grows much faster than other fuels

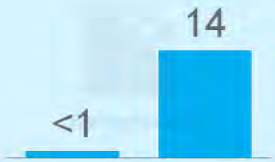
Electrification[1], Electricity % of final energy demand

Buildings



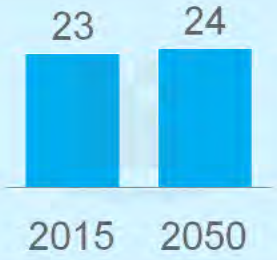
- **Electricity-based services**
- **Off-grid technologies**

Road transport



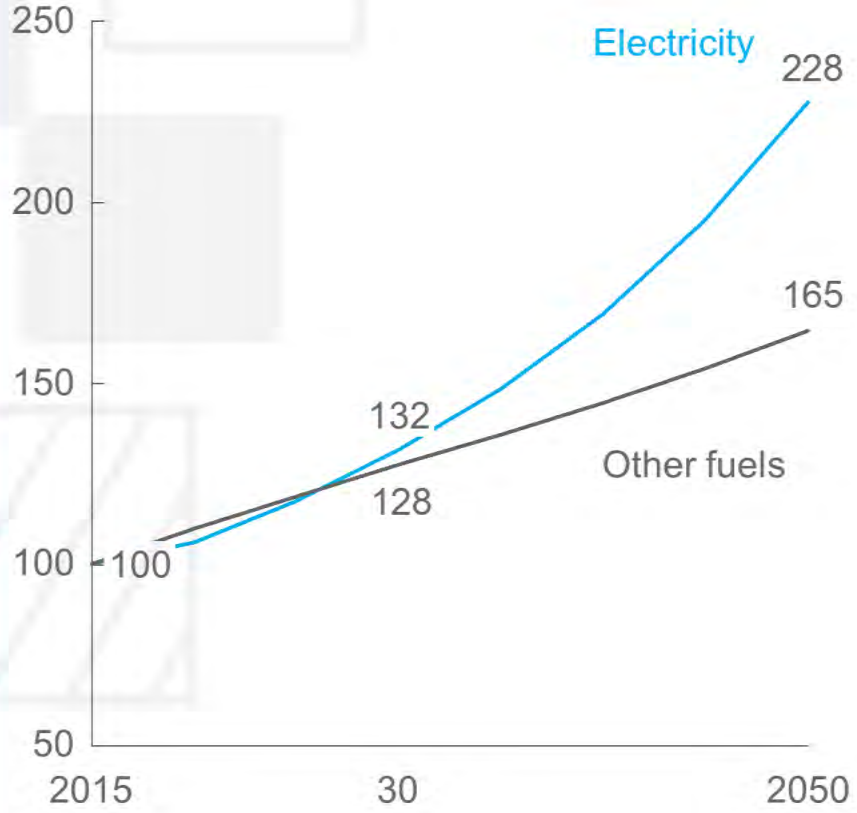
- **Uptake of EVs**
- **Infrastructure availability**
- **Shared mobility**

Industry



- **Low-medium-temperature heat applications**

Final energy demand, 2015=100



CAGR

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

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

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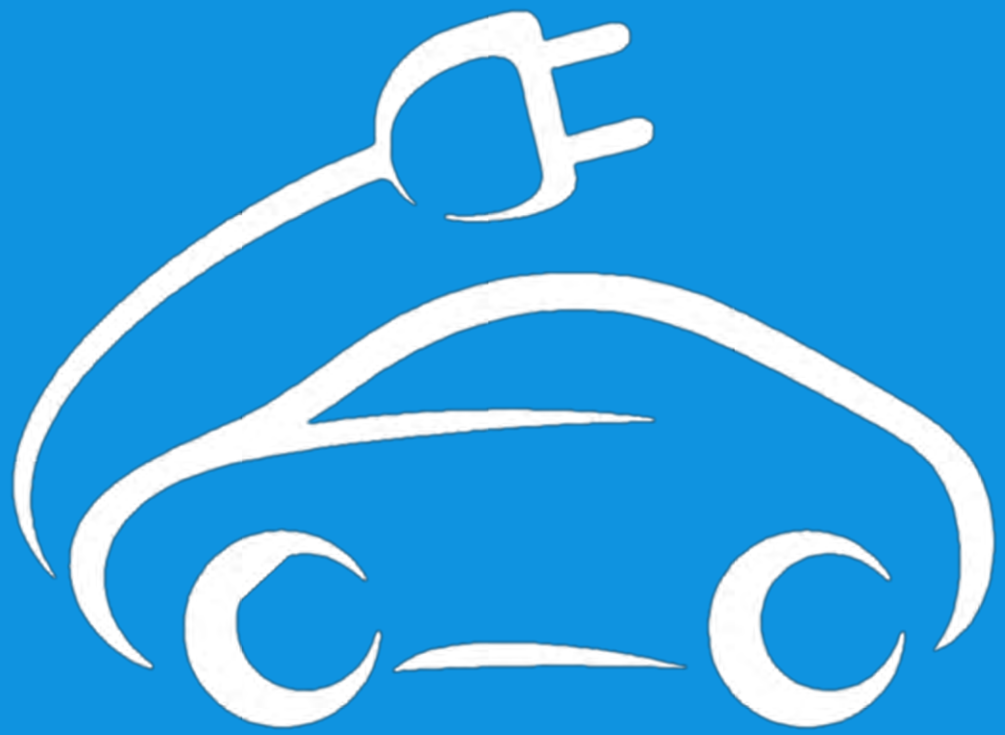
We will discuss two alternative scenarios

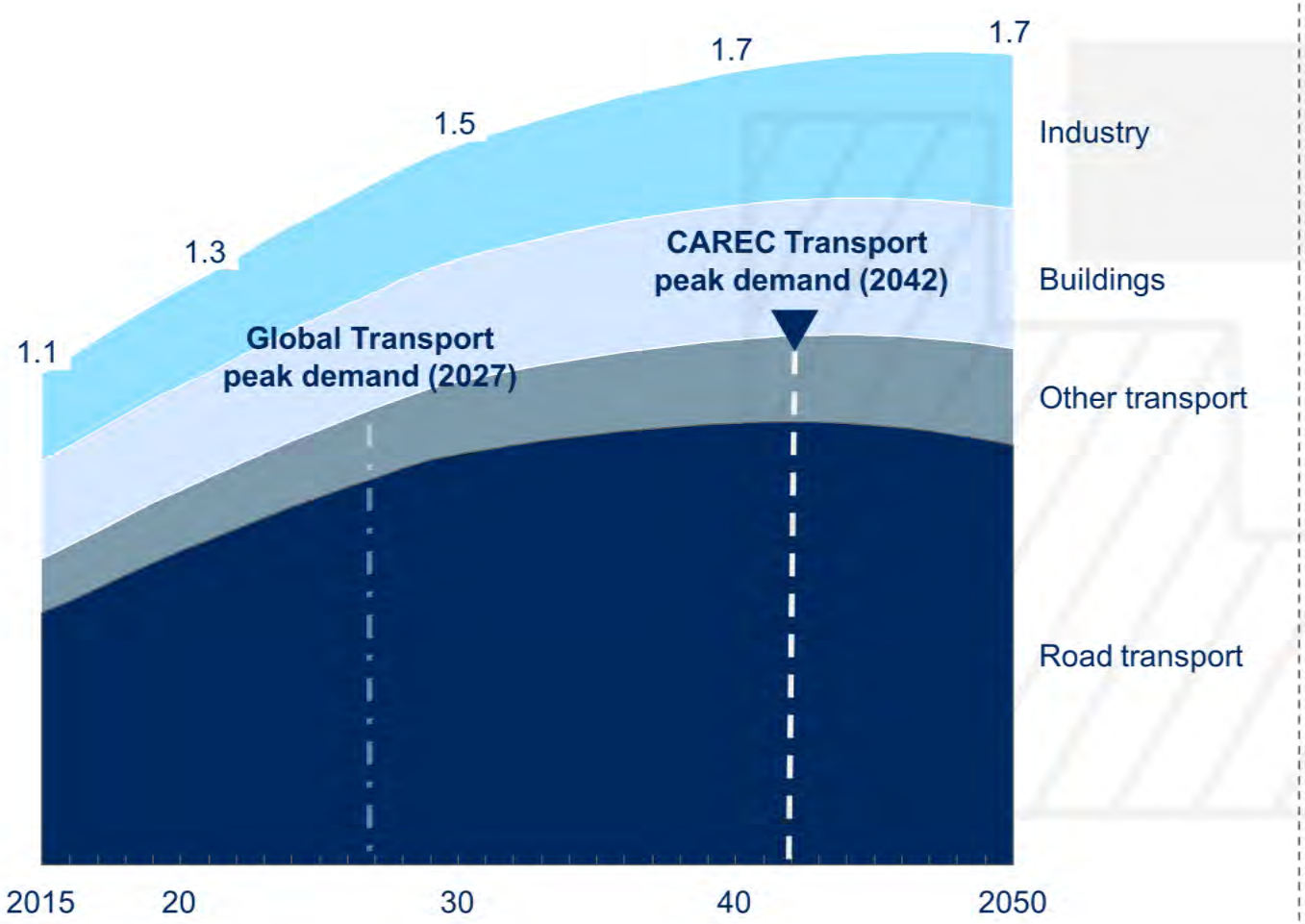
Uptake of EVs



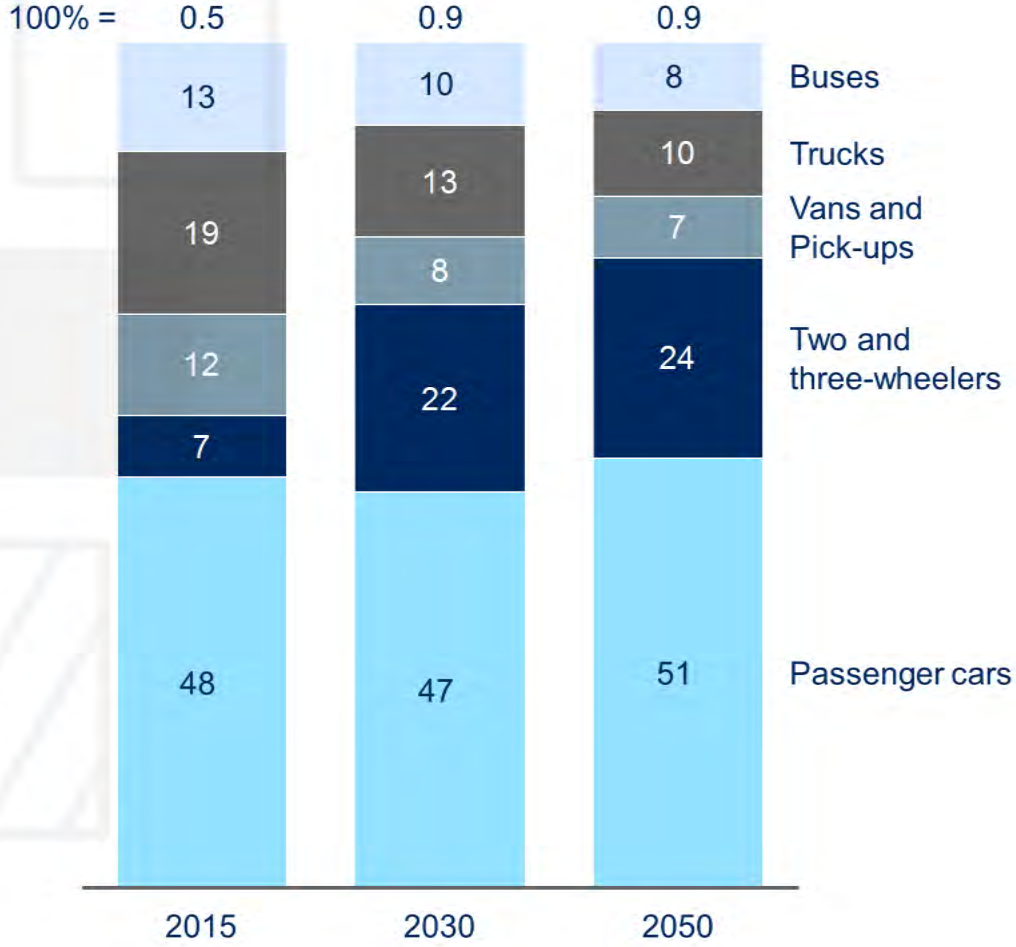
Renewables

Road transport has the biggest oil demand in CAREC

Liquids demand (excluding power), Million barrels per day

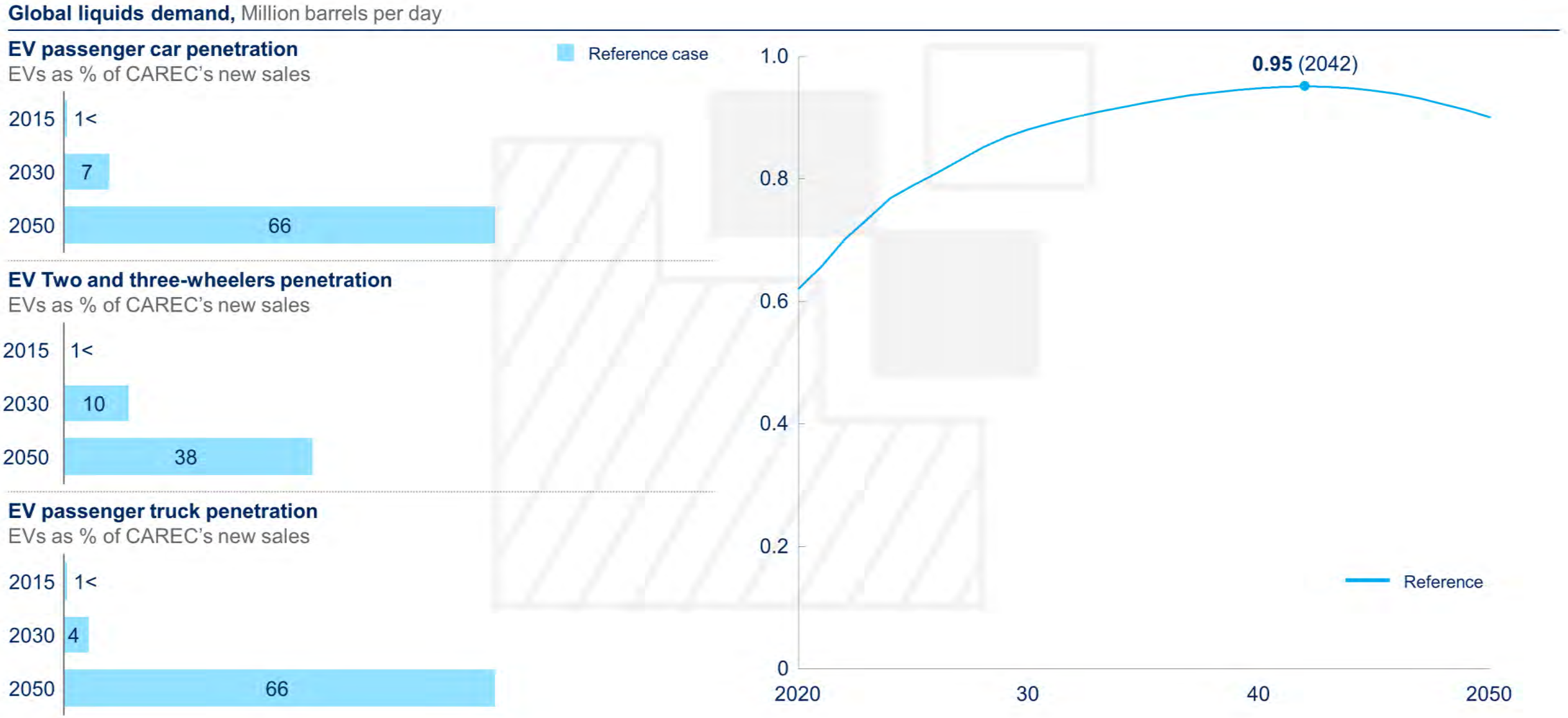


Liquids demand Of Road Transport, Million barrels per day



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

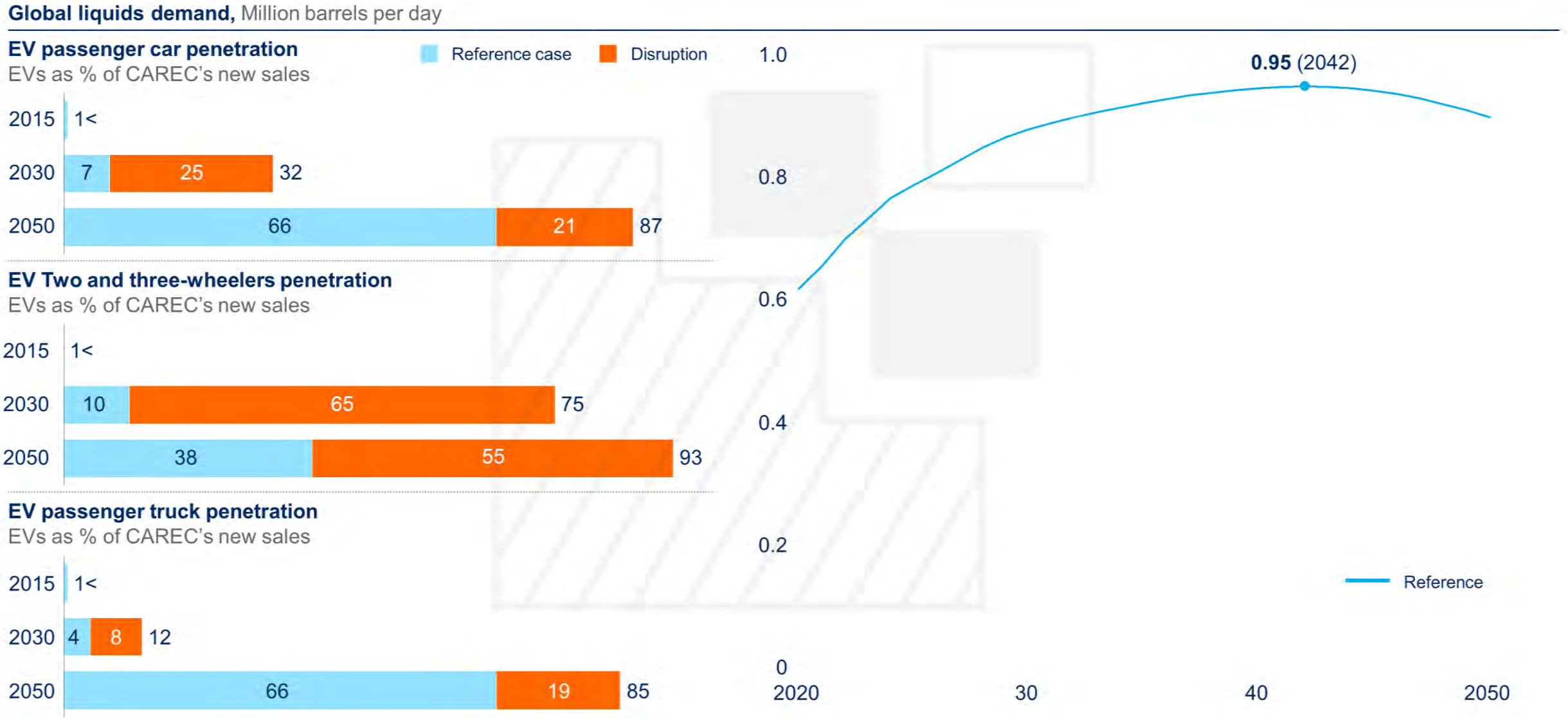
Road transport oil demand peaks in 2042 in CAREC



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

What if Electric Vehicles follow China’s uptake rates?

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

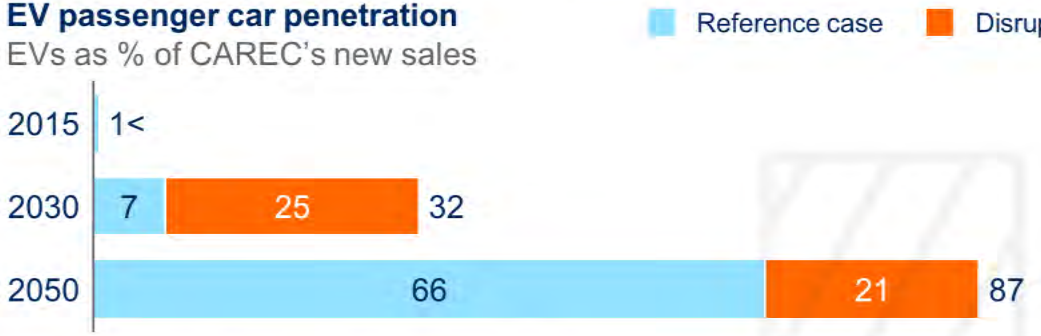


SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017

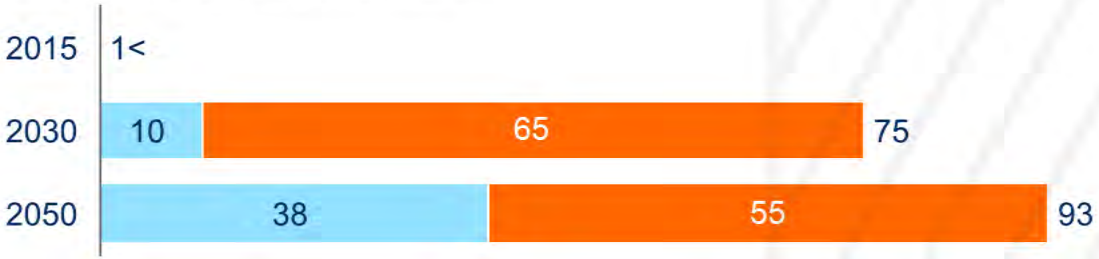
EV's increased uptake halves oil demand in 2050

Global liquids demand, Million barrels per day

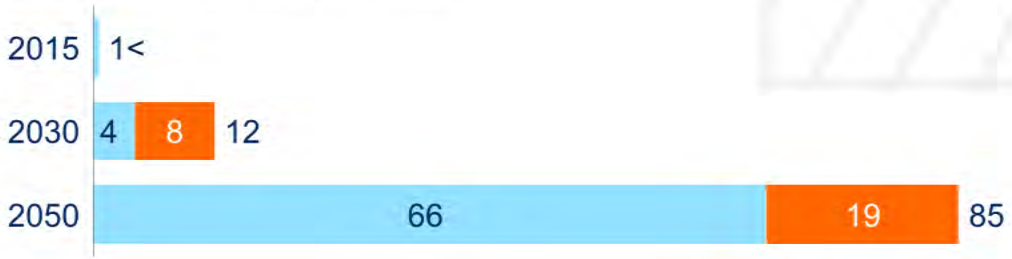
EV passenger car penetration
EVs as % of CAREC's new sales

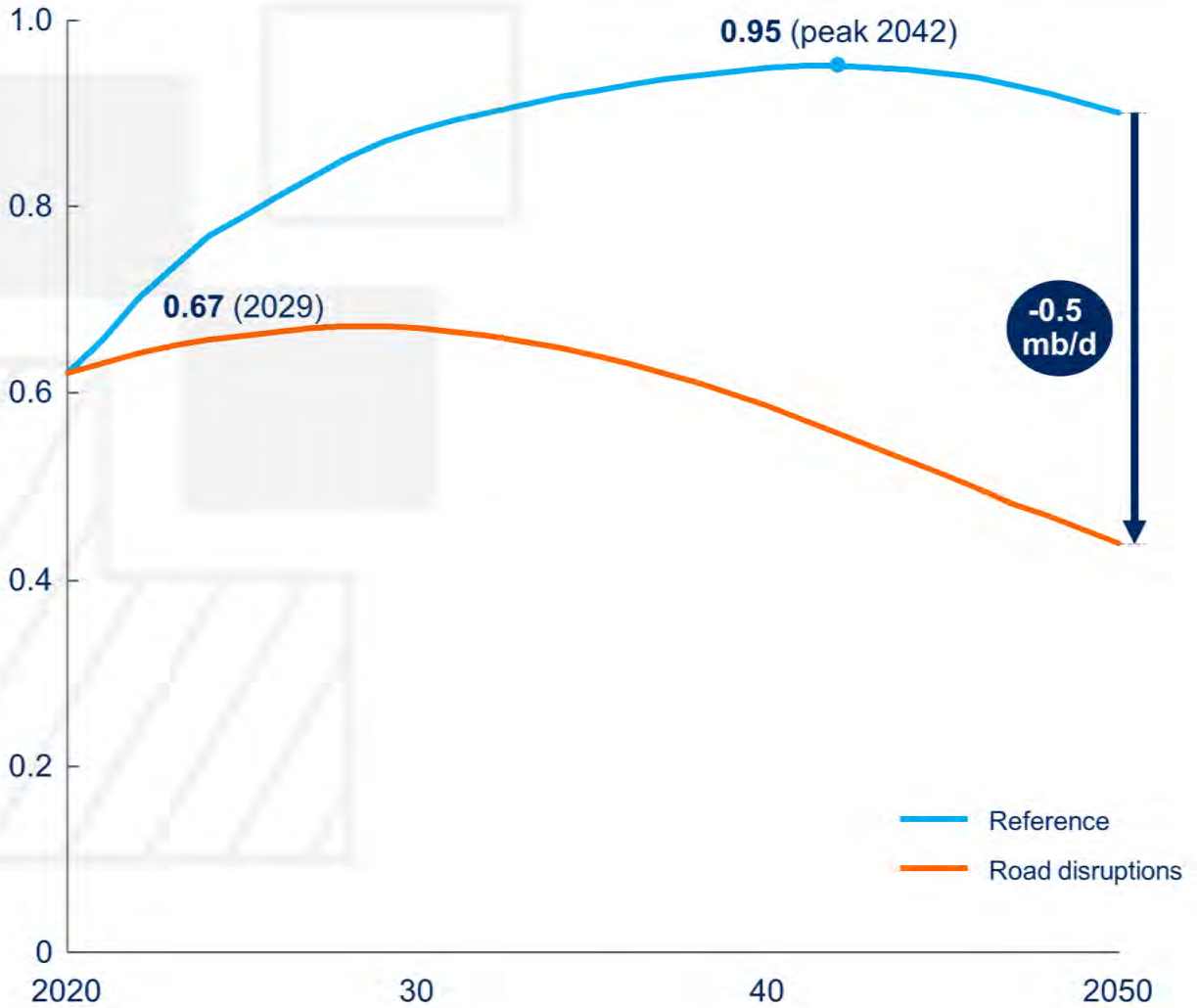


EV Two and three-wheelers penetration
EVs as % of CAREC's new sales



EV passenger truck penetration
EVs as % of CAREC's new sales





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 EV adoption rates set out in the alternative energy scenario?

1	2	3	4	5	6	7	8	9	10

Very unlikely

Very likely

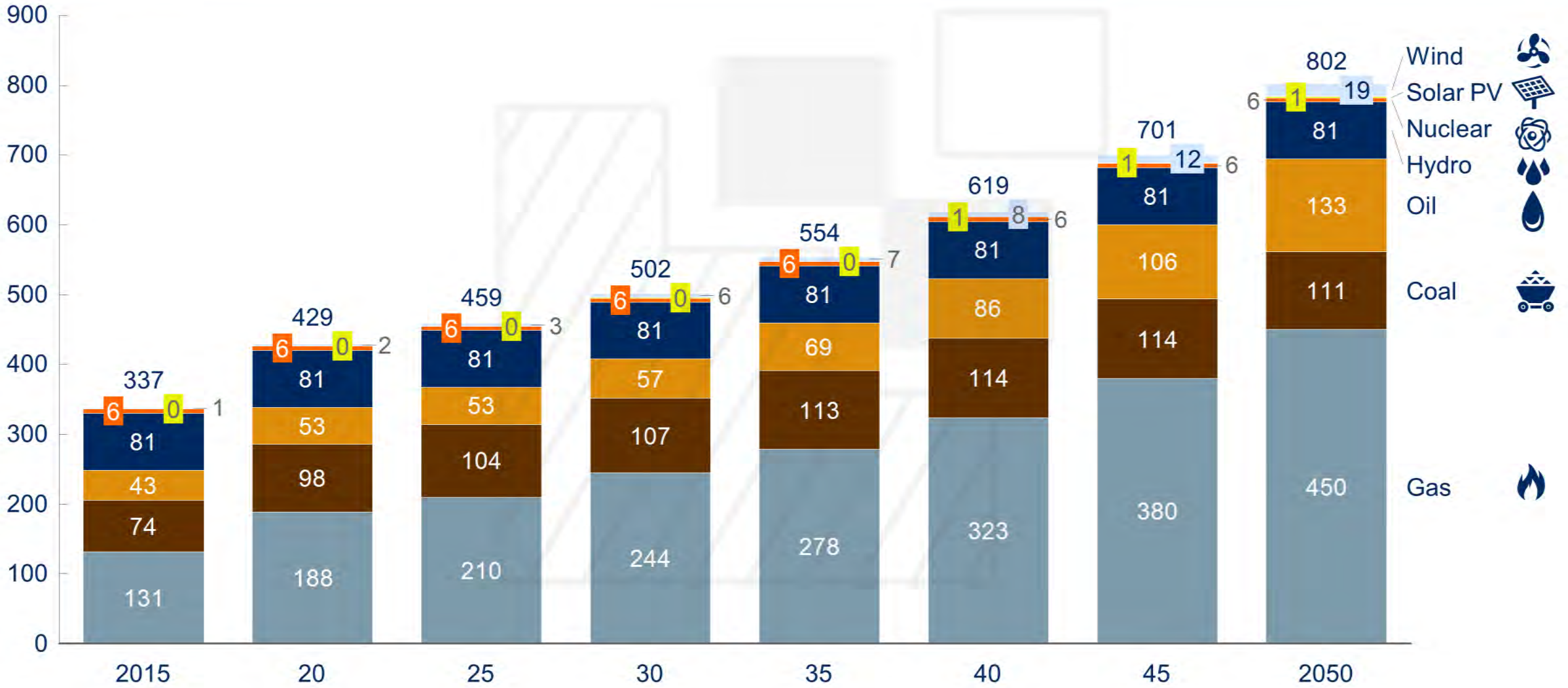
Please indicate your opinion with a post-it. Write on it in one or two words the rationale for your answer.

We will discuss two alternative scenarios

Uptake of EVs

Renewables

Generation Mix, TWh

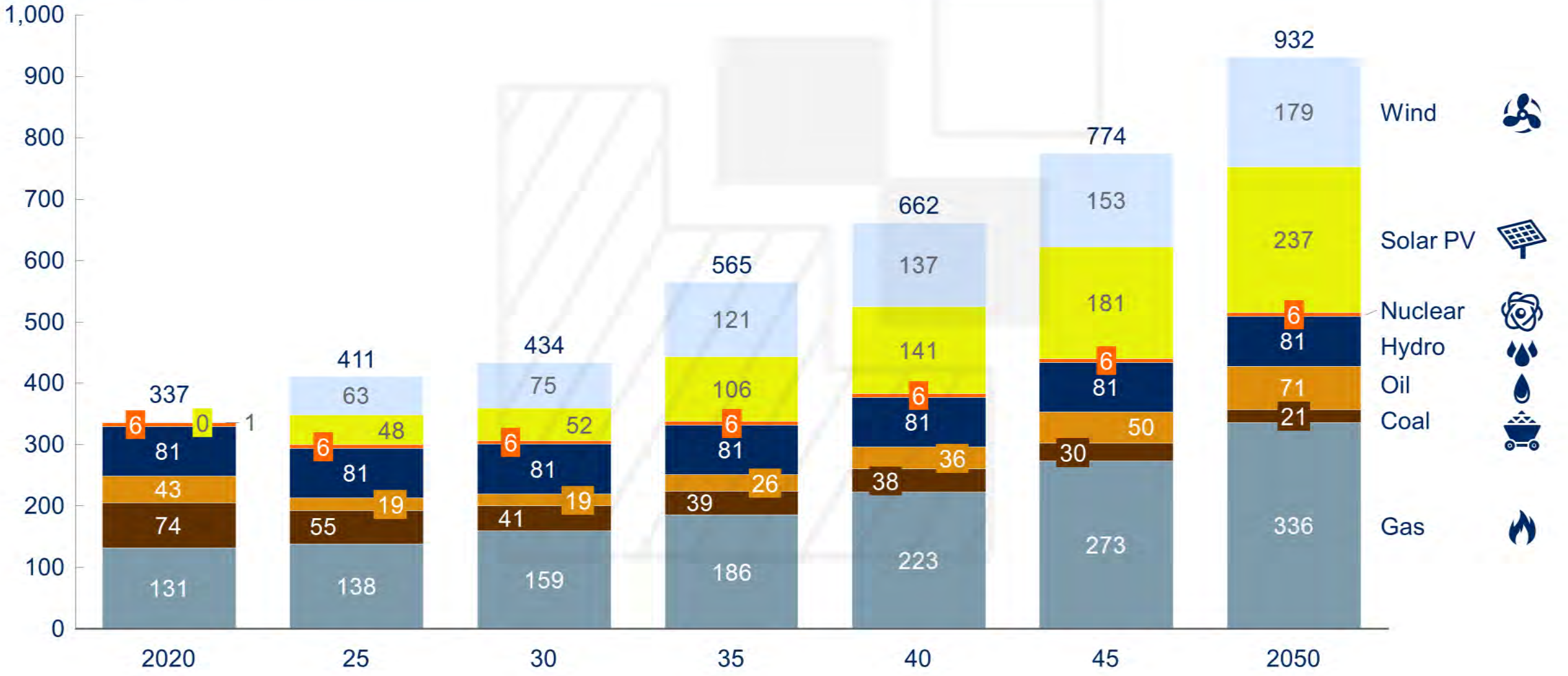


SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017


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

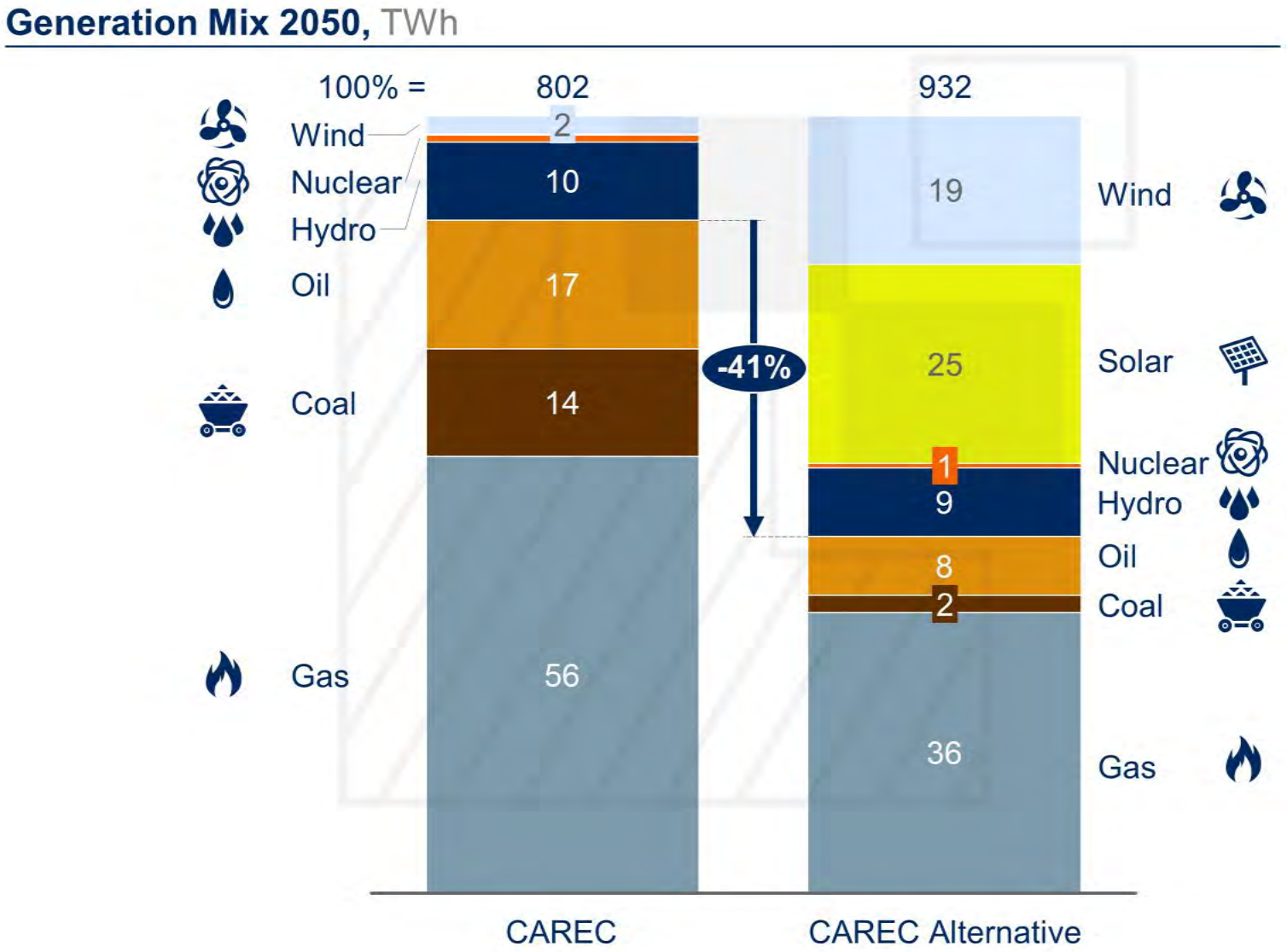
Alternative scenario in CAREC reveals the region's renewables potential

Generation Mix CAREC, TWh



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

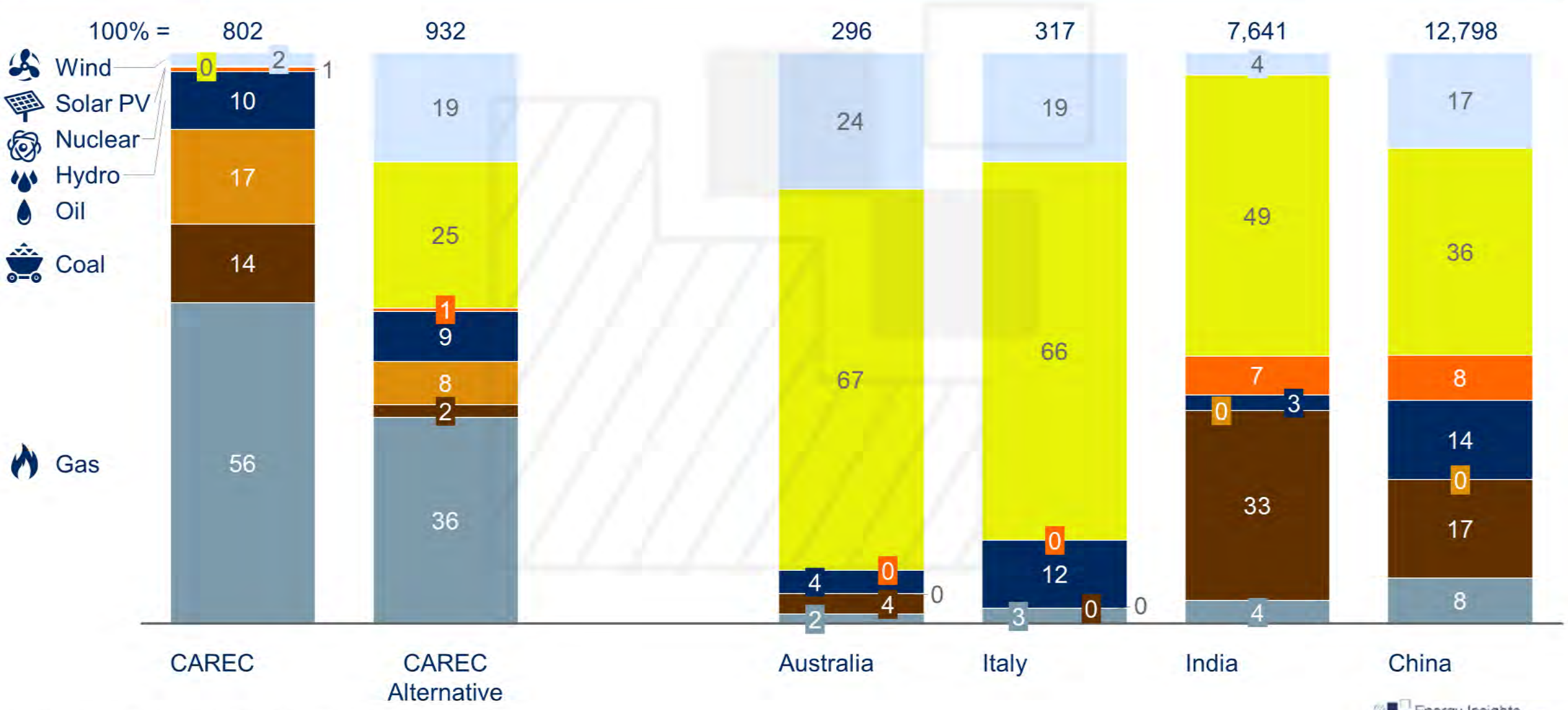
How different CAREC's power generation mix in the alternative scenario



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

How CAREC would compare with other countries

Generation Mix 2050, TWh



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

Discussion (5 min.)

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1	2	3	4	5	6	7	8	9	10

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.

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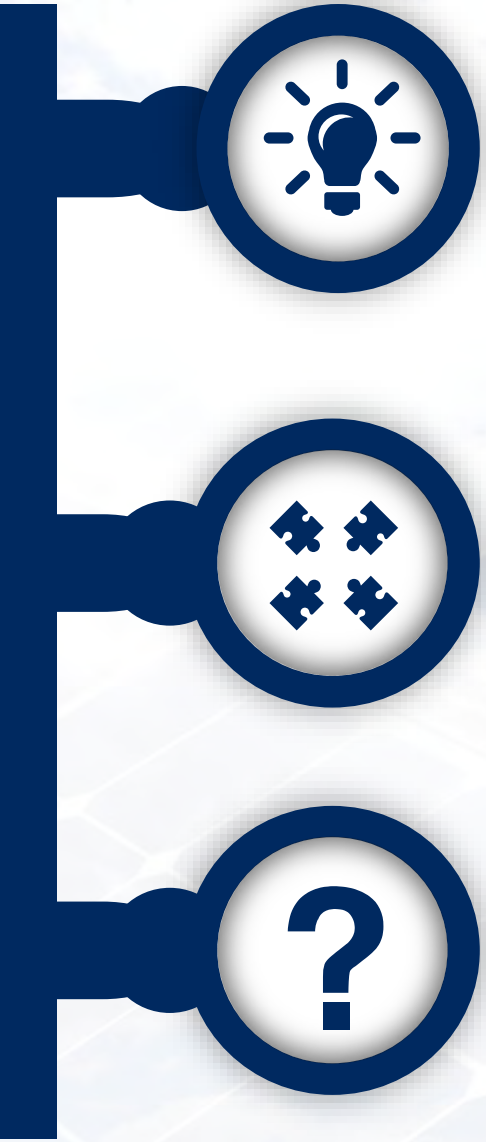
2. Alternative energy scenarios for CAREC
3. **Implications for the region**

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

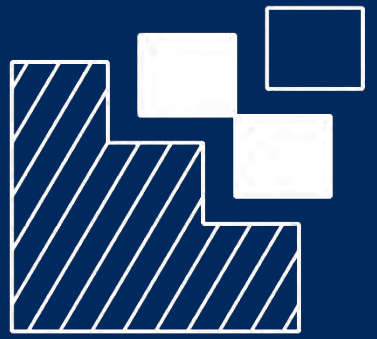
Challenges

- 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 country overview

XX Countries individually modelled in GEP

XX Countries not separately modelled in GEP

ADB regional programs and countries

BIMP-East Asian Growth Area (BIMP-EAGA)

- Brunei Darussalam
- Indonesia
- Malaysia
- Philippines

Central Asian Regional Economic Cooperation (CAREC)

- Afghanistan
- Azerbaijan
- People's Republic of China
- Georgia
- Kazakhstan
- Kyrgyz Republic
- Mongolia
- Pakistan
- Tajikistan
- Turkmenistan
- Uzbekistan

IMT-Growth Triangle (IMT-GT)

- Indonesia
- Malaysia
- Thailand

South Asia Subregional Economic Cooperation (SASEC)

- Bangladesh
- Bhutan
- India
- Maldives
- Myanmar
- Nepal
- Sri Lanka

Greater Mekong Subregion (GMS)

- Cambodia
- People's Republic of China[1]
- 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

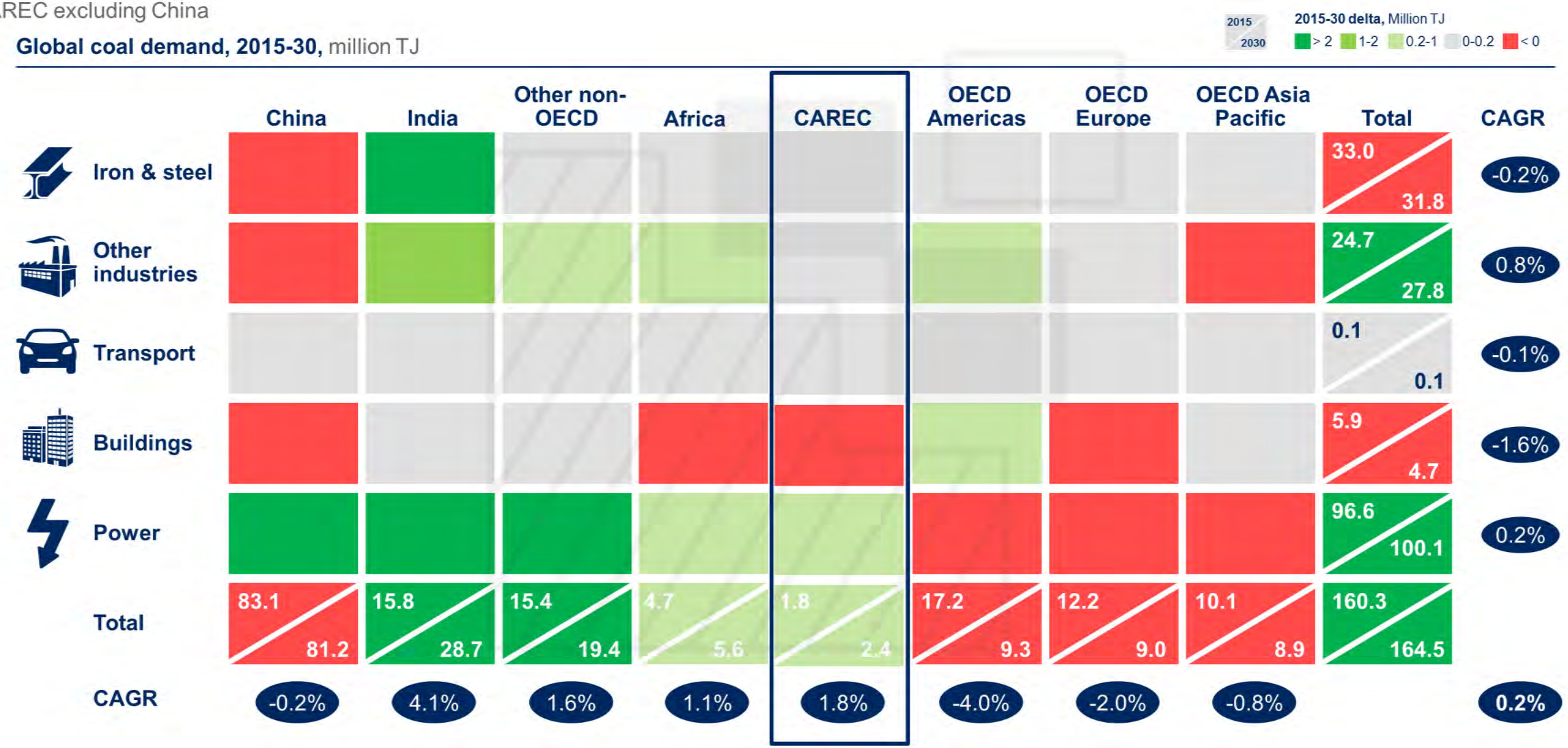
CAREC excluding China

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

Global growth in coal demand

CAREC excluding China

Global coal demand, 2015-30, million TJ

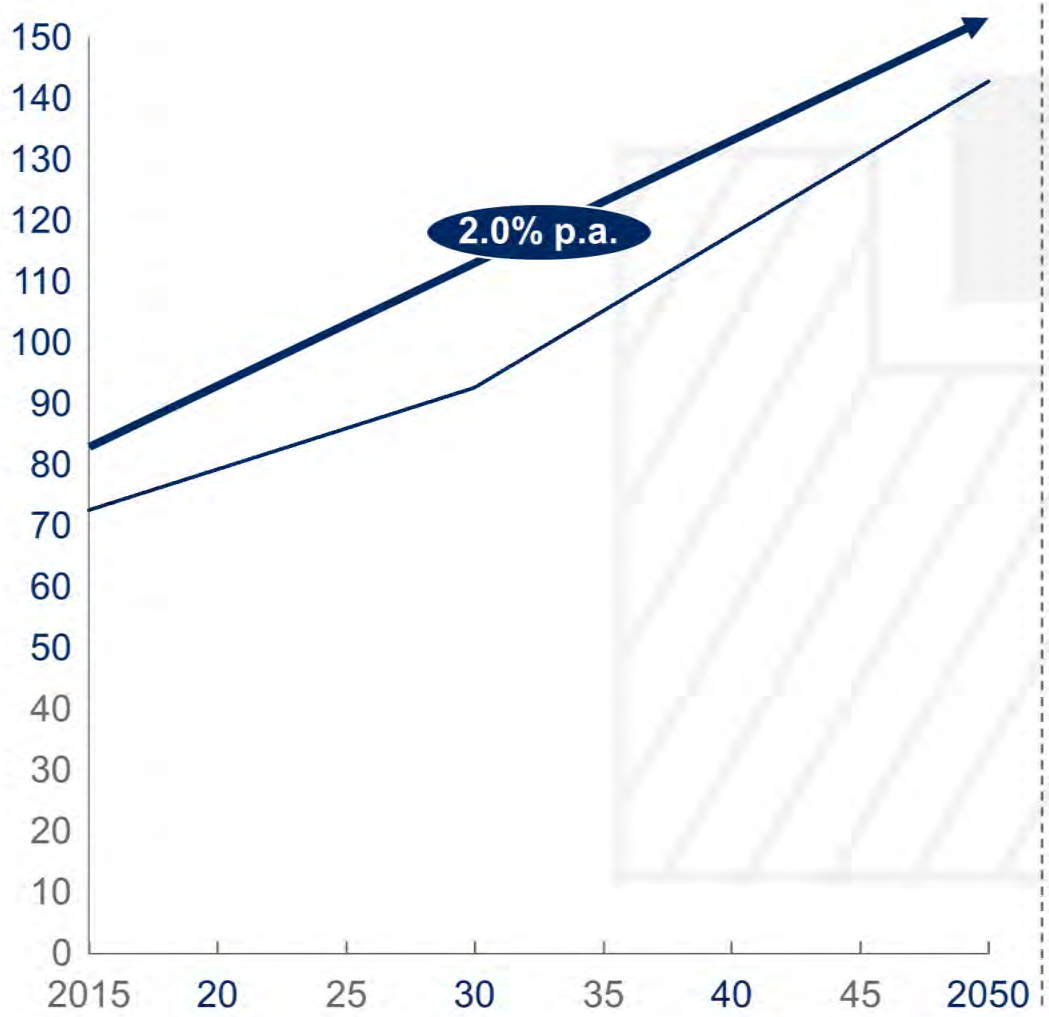


SOURCE: McKinsey Energy Insights' Global Energy Perspective, December 2017

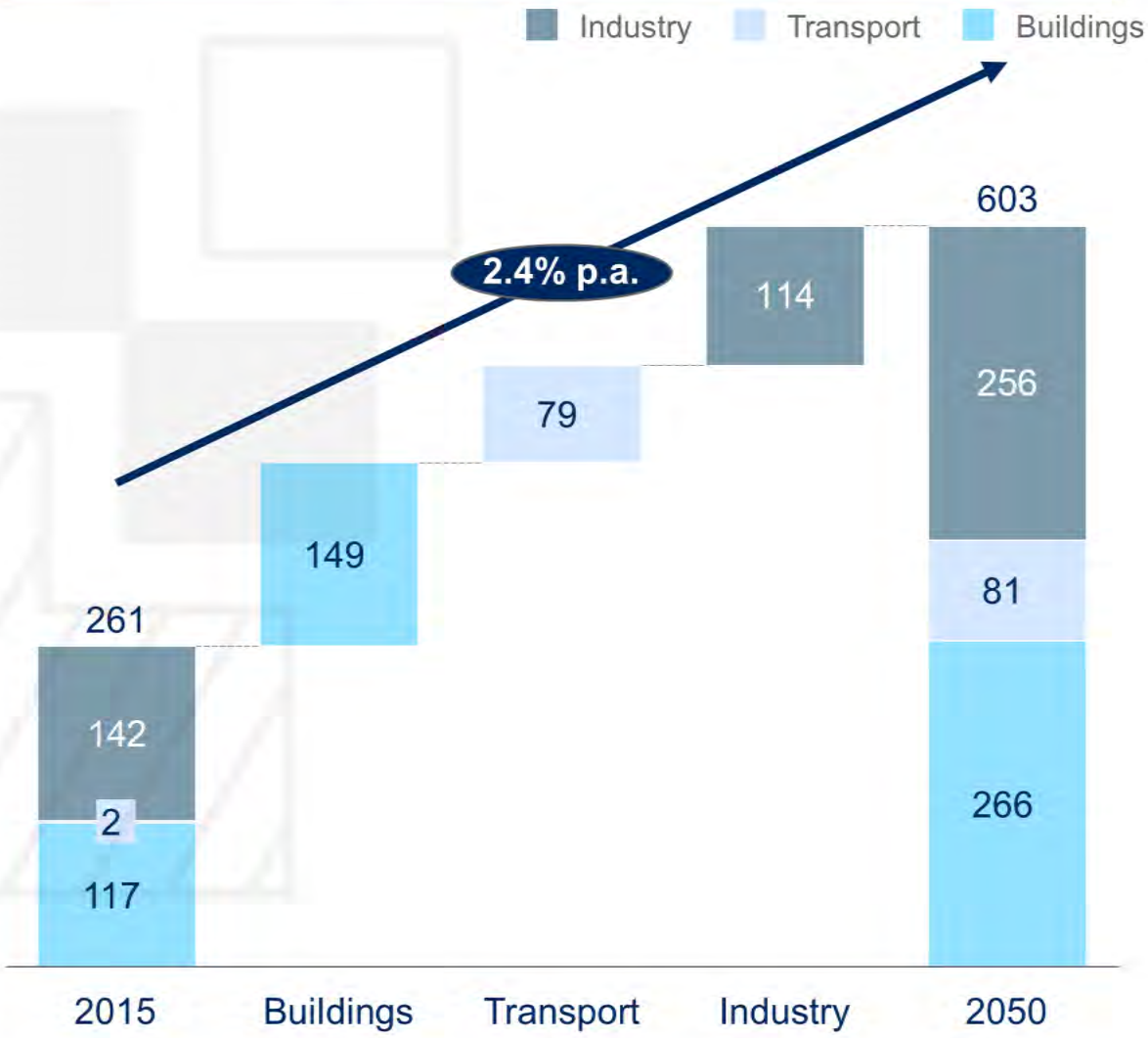
CAREC electricity demand growth is outpacing global demand growth

CAREC excluding China

World Total electricity demand, million TWh



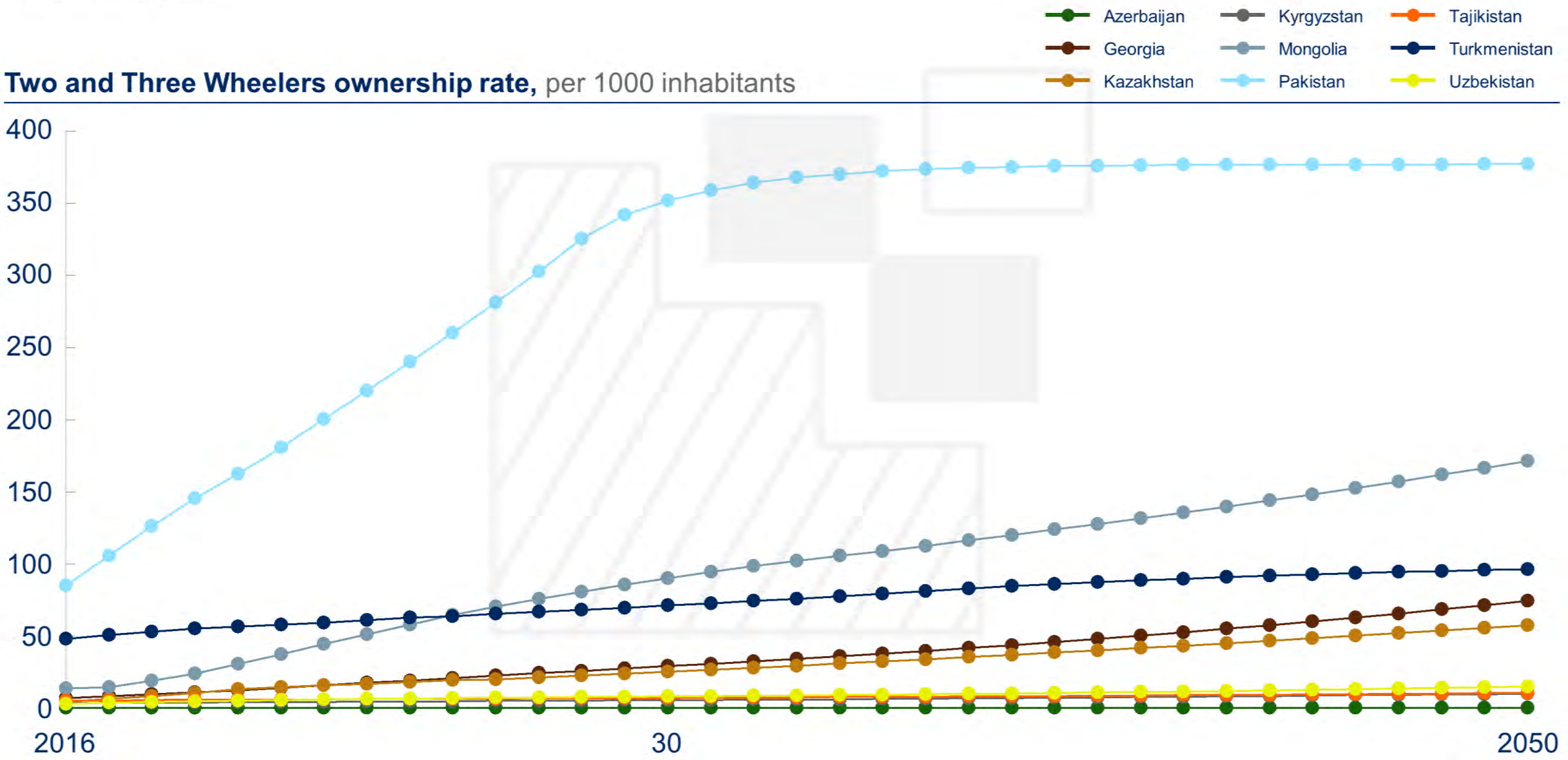
CAREC Total electricity demand, TWh



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

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

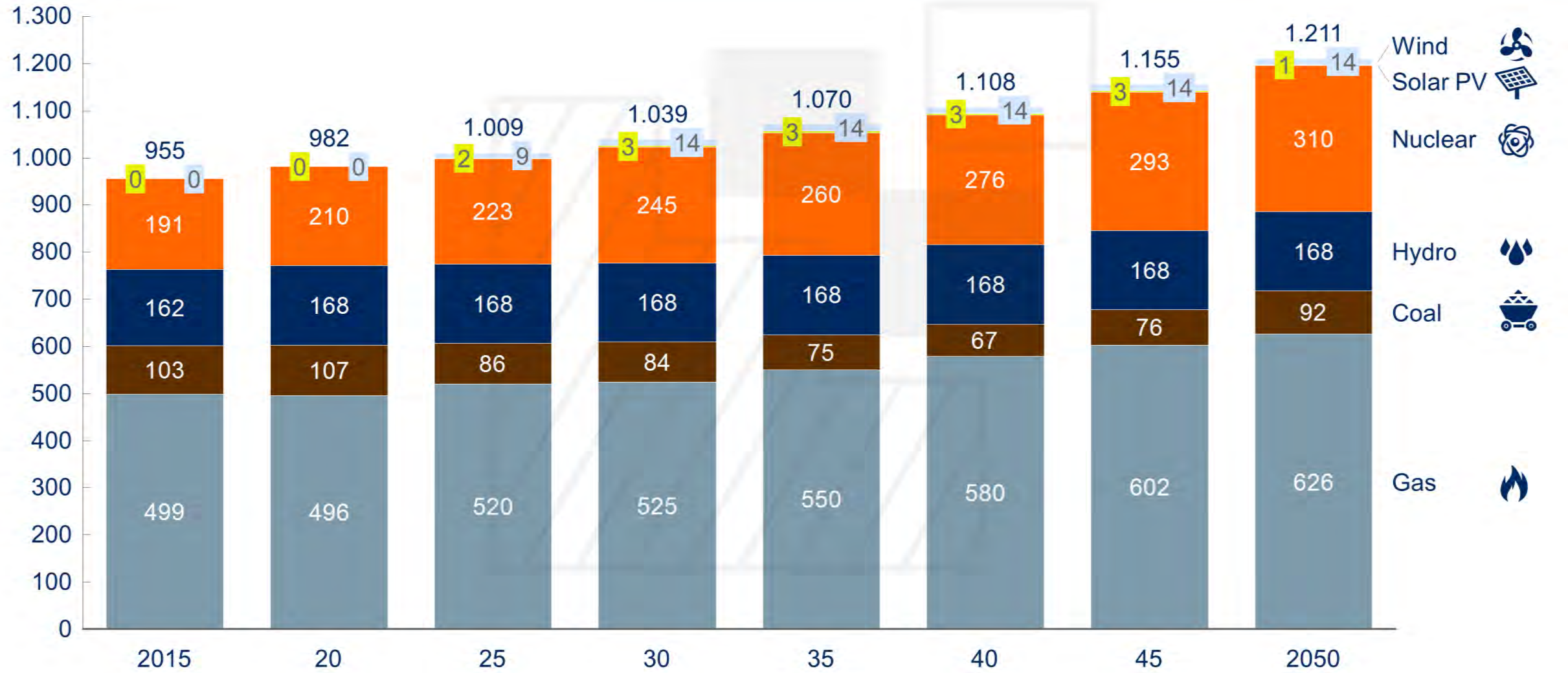
CAREC excluding China



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

Generation Mix Russia Reference Case

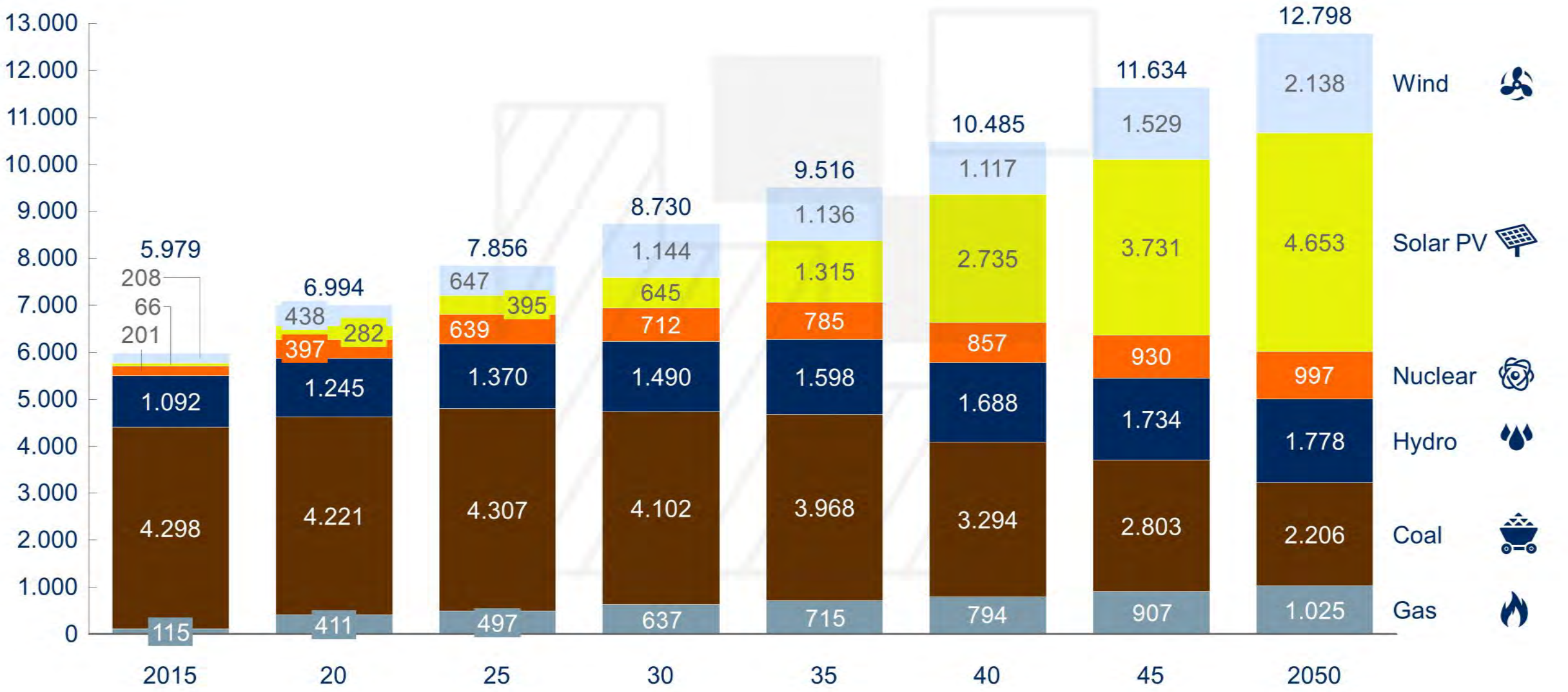
Generation Mix, TWh



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

Generation Mix China Reference Case

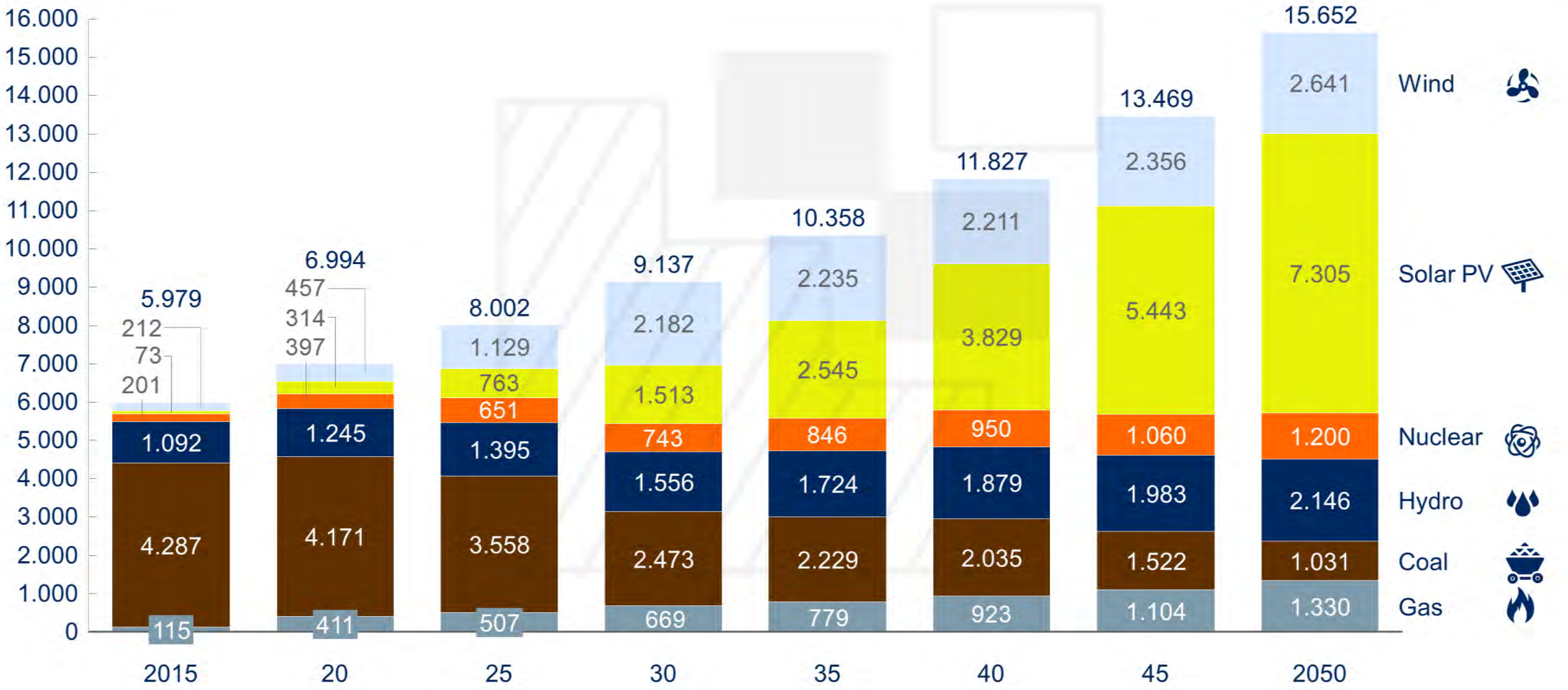
Generation Mix, TWh



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

Generation Mix China Auctions As Reality Case

Generation Mix, TWh



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