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China Energy Demand Perspective

EIA presentation

July 2014

McKinsey&Company

Key Points On Asian Energy Demand

We have developed a granular view of the global economy with reference scenarios around technology and geology

Asia source of most energy demand growth, primarily from China

China demand growth undergoing a transition from industrial to consumption-driven

Productivity and efficiency could have significant impact of energy demand trajectory (e.g., vertical urban development)

Supply response could drive gas demand by 2-3x from today's levels by 2030

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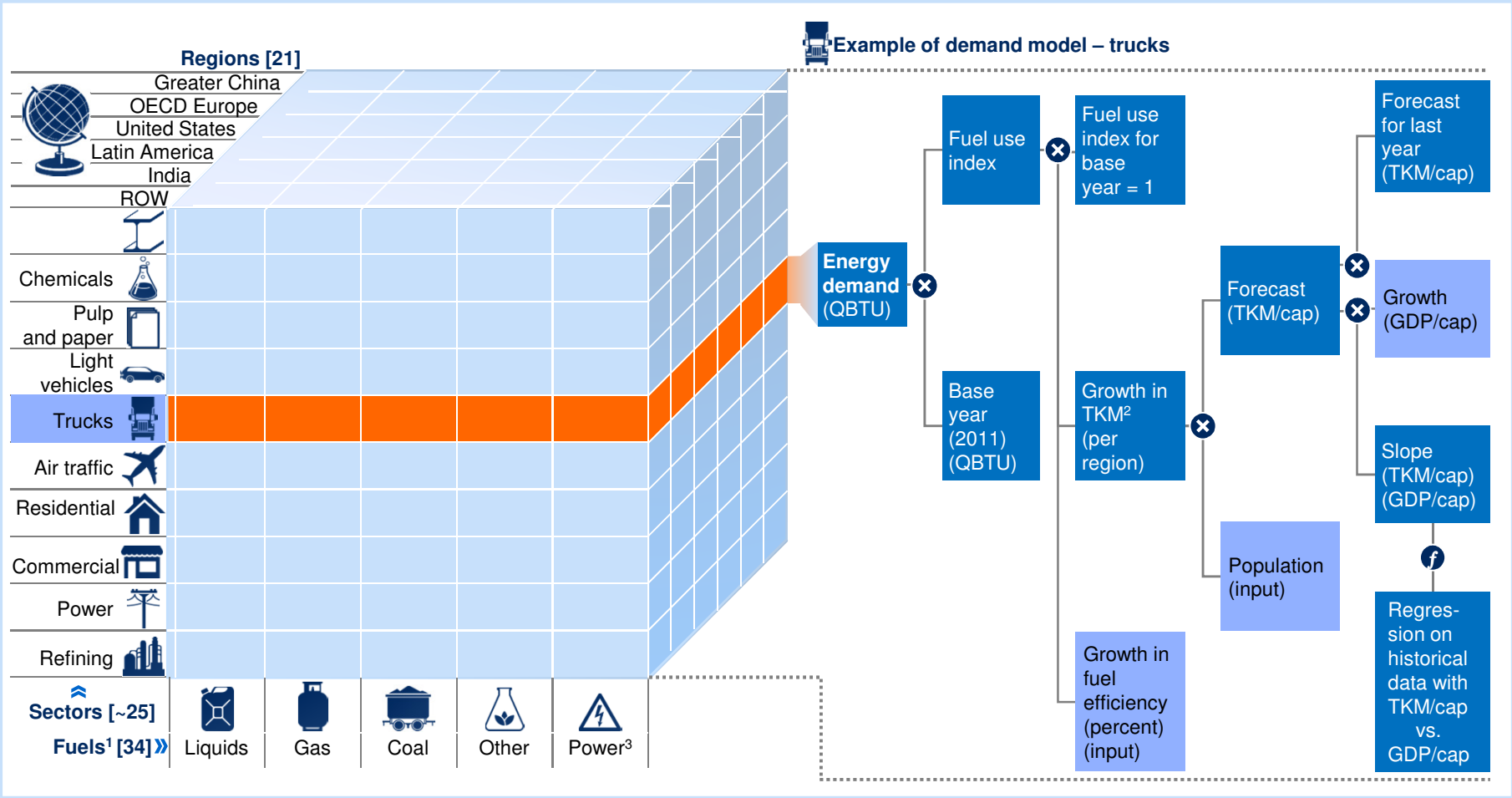
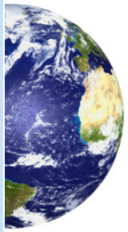
GEP forecasts energy demand by region, fuel type, and sector



1 Fuel types at granular level, e.g., Ethane, LPG, Bitumen, Kerosene (as part of liquids)
2 TKM = Tonne kilometers
3 Separate global granular model

SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

GEP uses 3 scenarios to illustrate and analyze different development paths for the future energy system



Reference Case (RC)

Continuation of current trends regarding economic growth, technological progress, GHG regulation, and fossil fuel resource availability

Technology Breakthrough (TB)

Accelerated technological development driven by economic competition and increased R&D investment

Grey World

Large shale gas and LTO production levels result in fossil fuel availability abundance

Governing thought	Main drivers: Energy Efficiency	Main drivers: GHG regulation	Main drivers: Fossil fuel supply
Reference Case (RC)	Historical trends, EE improves ~1% p.a.		
Technology Breakthrough (TB)	Accelerated progress, EE improves by 1.7% p.a.	Mandatory targets only for selected OECD countries and China	Small increase in shale gas and LTO production
Grey World	Reduced progress, EE improves by ~0.7% p.a.		Large increase in shale gas and LTO production

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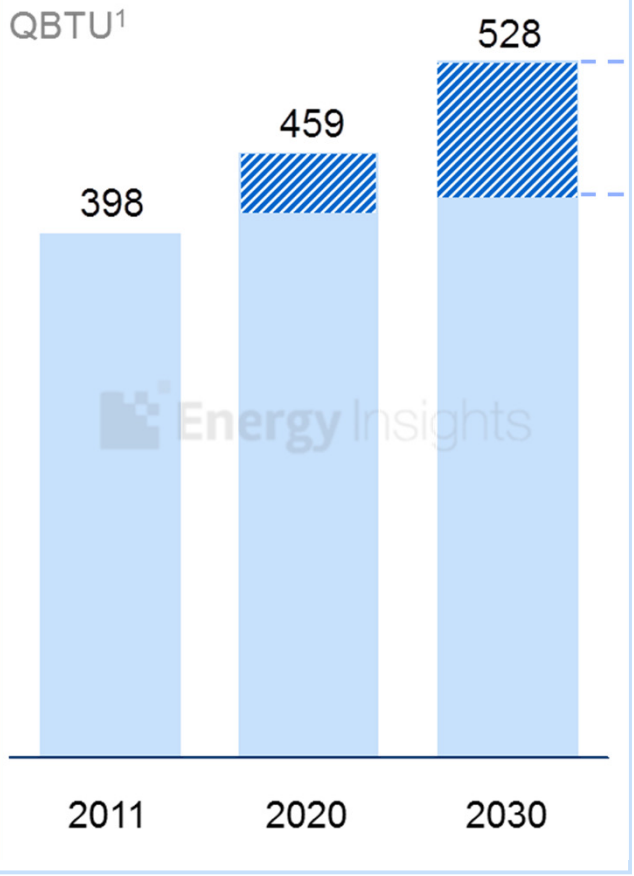
SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

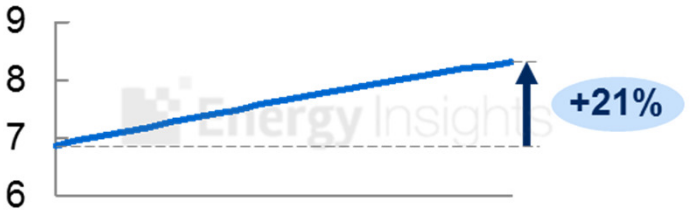
Strong growth of global energy demand driven by GDP and population growth, despite energy efficiency improvements

Global final energy demand

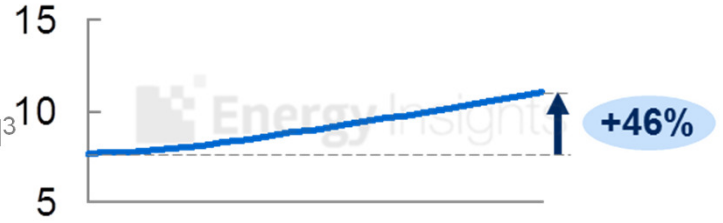


Key drivers

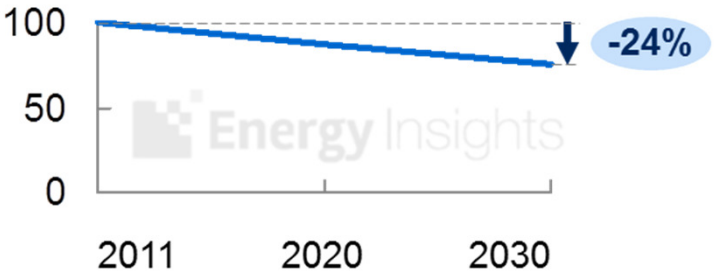
Global population
Billion



GDP[2] per capita
USD thousand[3]



Energy-efficiency effect[4]
Percent



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1 Quadrillion British thermal units
2 Gross domestic product
3 Real 2005 USD
4 Comparison of industry-specific energy efficiency improvement in Reference Case to no energy efficiency effect scenario

SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

GLOBAL

Demand for all types of energy growing, with 90% of growth coming from emerging markets

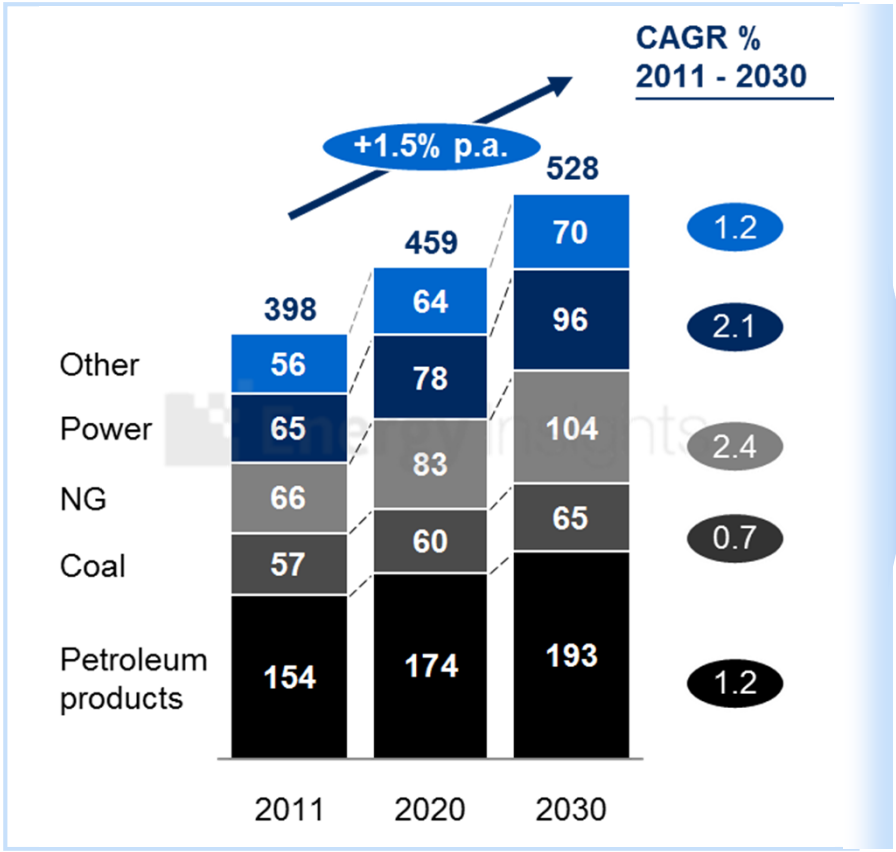
QBTU

Energy Insights

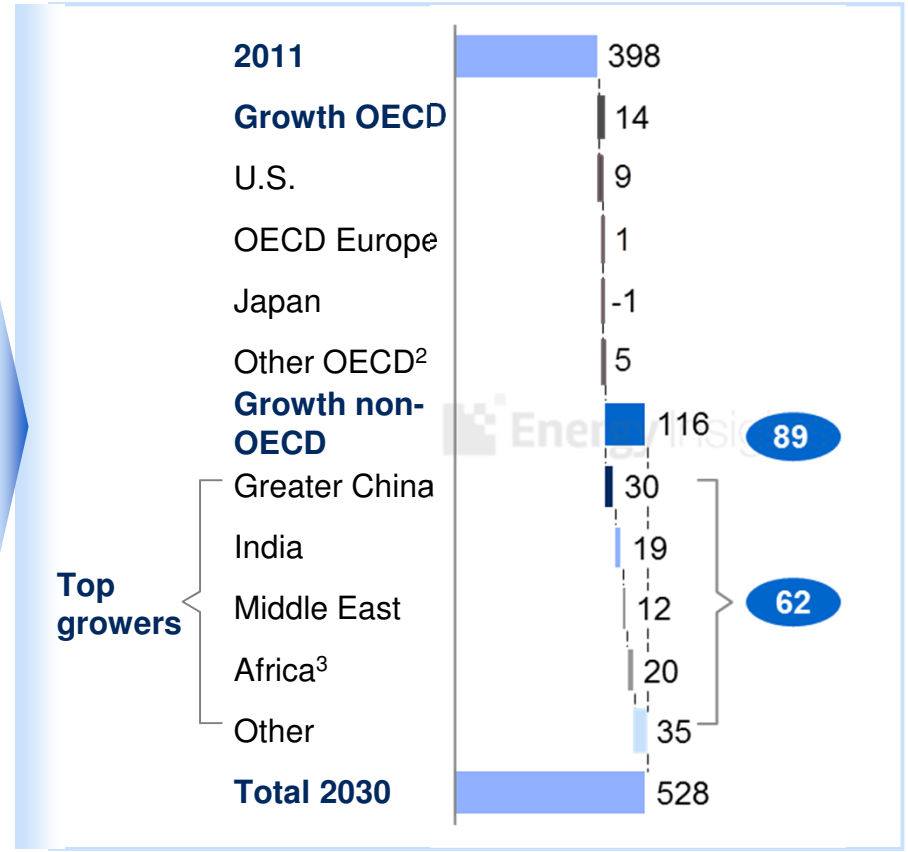
X% Global growth rate

X% Share of global growth

Final energy demand[1]



By region

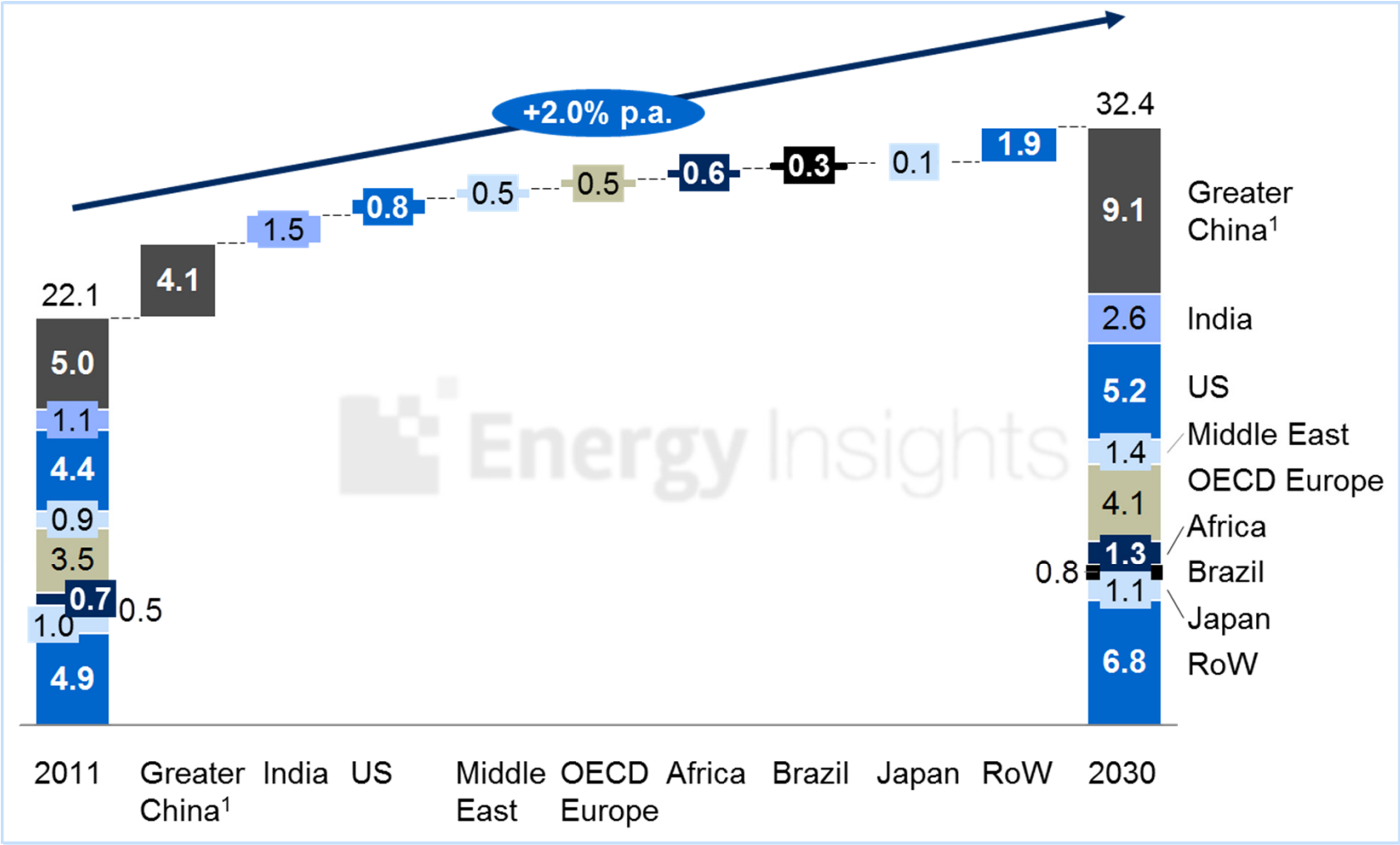


1 Differs from primary demand due to exclusion of the conversion losses in the power generation industry
2 Incl. Australia, New Zealand, Mexico, South Korea, Canada
3 Split into three regions: North Africa, West Africa and South/East Africa

SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

Global power demand will grow by ~50% between 2011-30, with China and India accounting for more than half of the growth

Global power demand, '000TWh



1 Greater China regions includes China, Hong Kong, Macau, and Taiwan

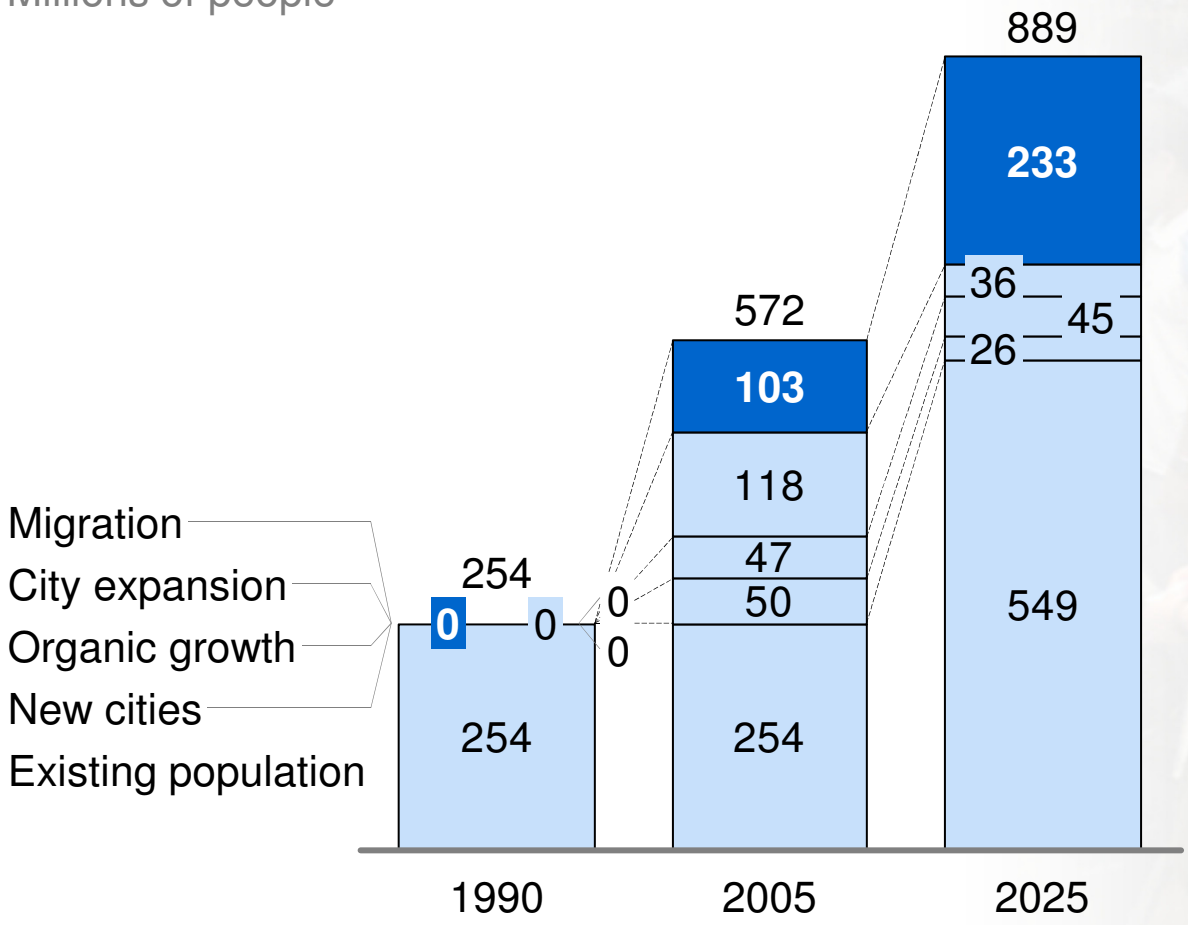
SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

China's urbanization is entering a new phase

TREND LINE FORECASTS

Sources of urban population increase

Millions of people

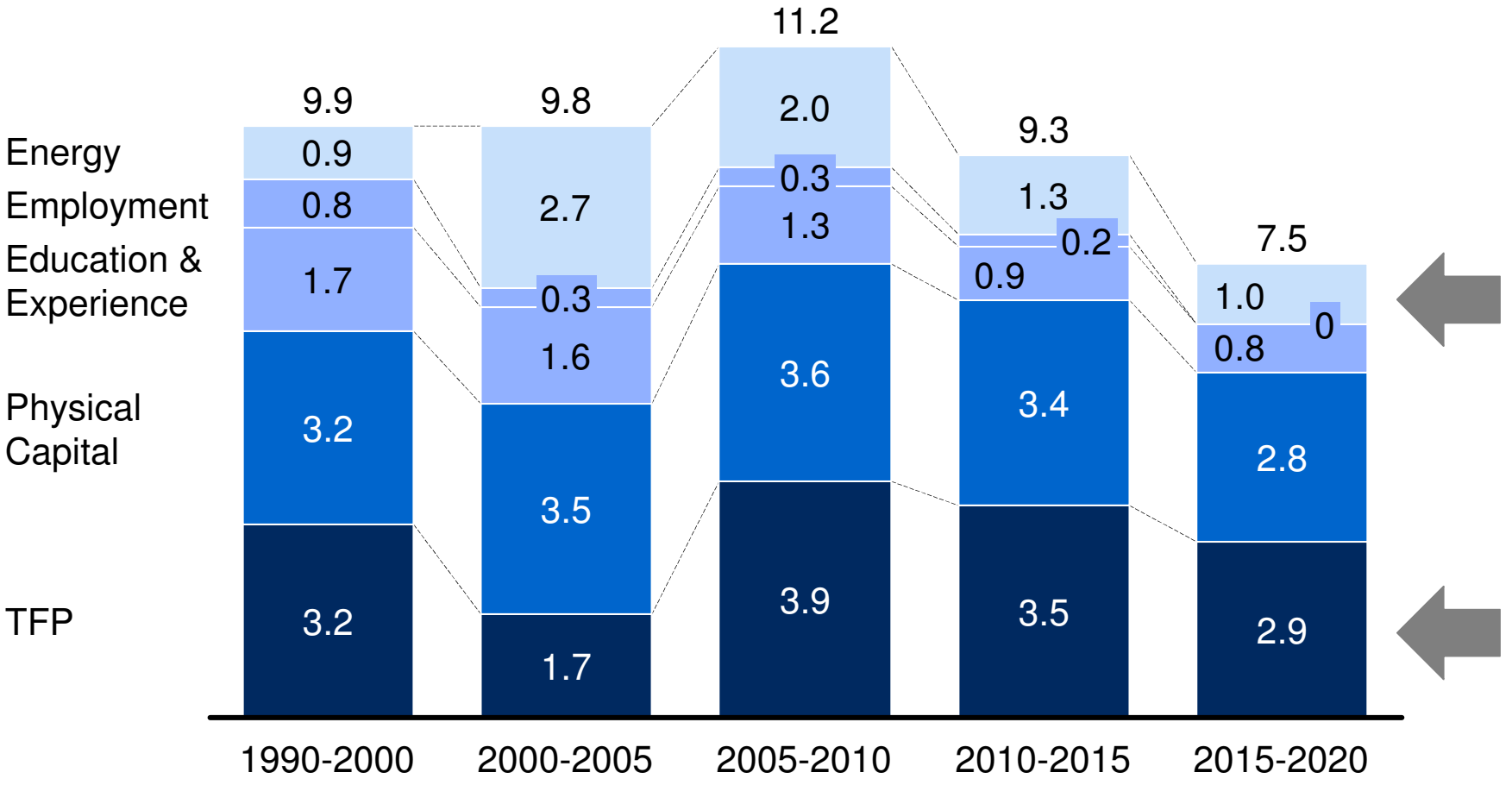


- Migration will drive almost 70 percent of urban population growth from 2005 to 2025
- By 2025, existing migrants (103 million) and new future migrants (243 million) will represent almost 40 percent of the total urban population
- Migration trends could be further boosted and accelerated if recent land reform gets fully enacted

SOURCE: McKinsey Global Institute CAC model, McKinsey Global Institute analysis

Sources of Chinese growth – energy efficiency and TFP are big levers

Decomposition of baseline China GDP growth, 1990-2020



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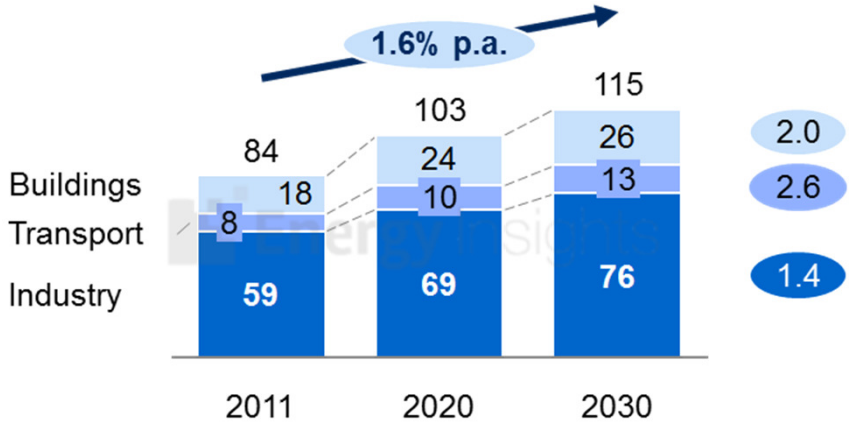
SOURCE: CMU, McKinsey Global Growth Model, v3.5

Despite the largest growth in demand in Buildings and Transport, Industry is forecasted to remain the biggest demand in China till 2030

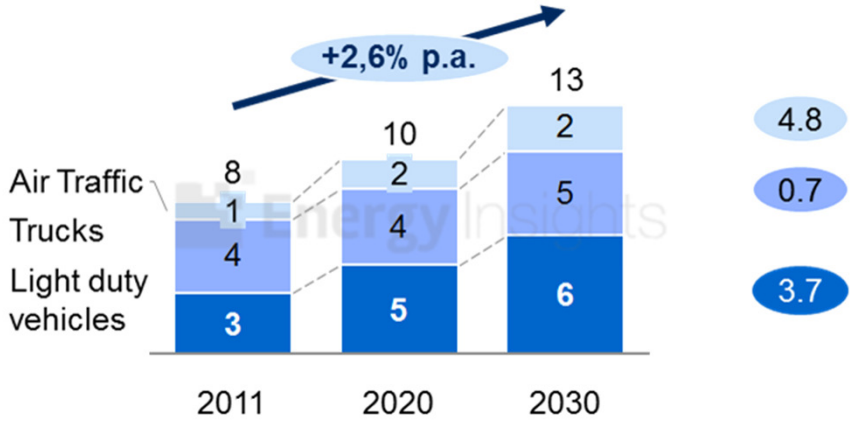
Final energy demand by sector, QBTU

XX% 2011-2030 CAGR

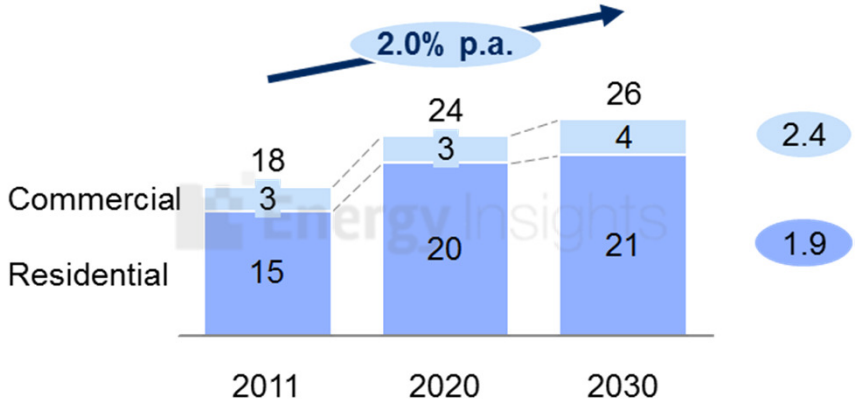
Total Final Energy Demand



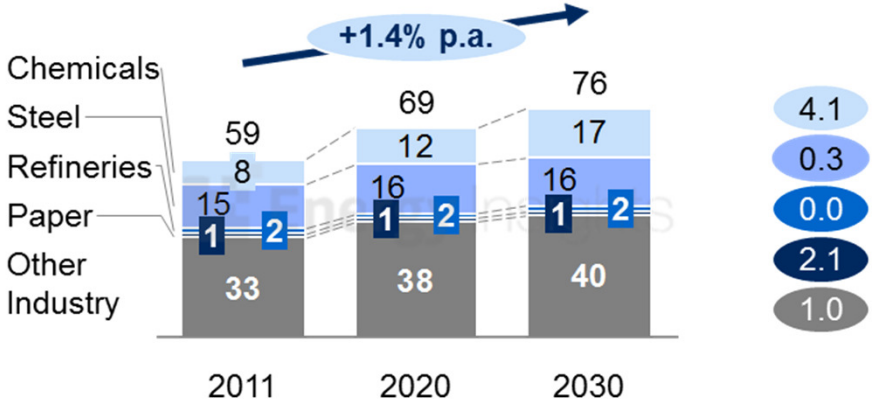
… of which Transport is



… of which Buildings is



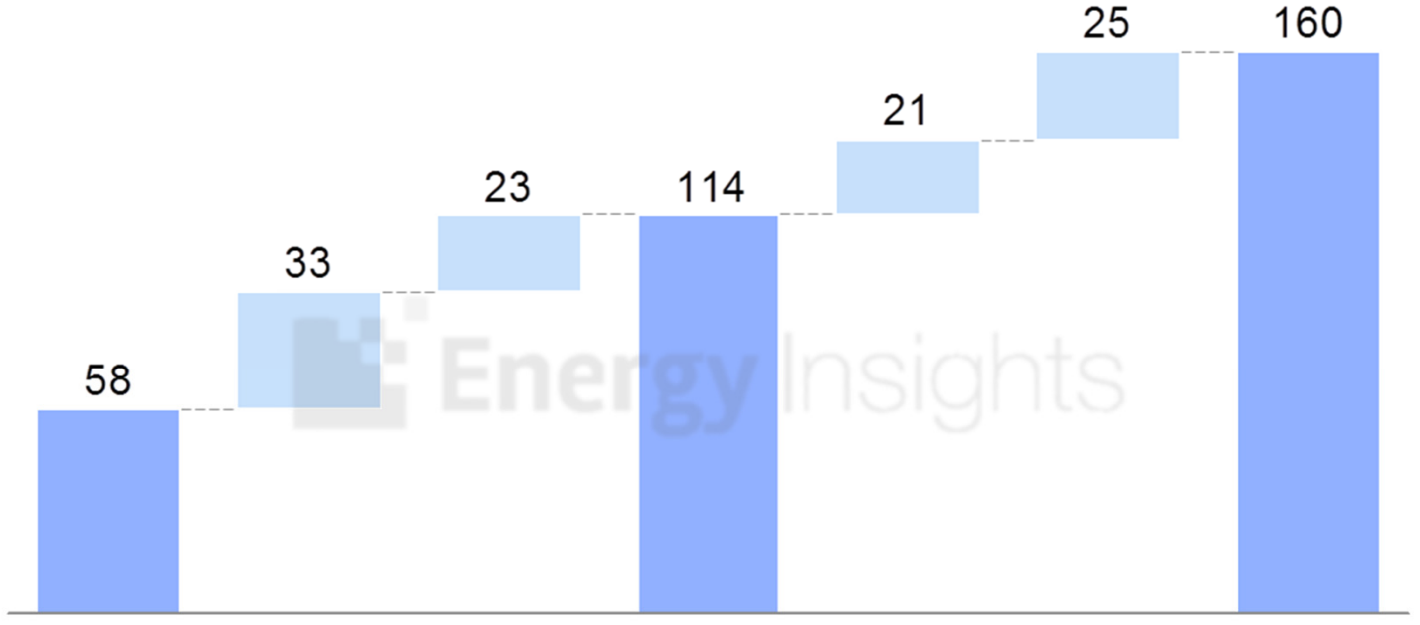
… of which Industry is



SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

In our Reference Case for China, the driver of energy demand growth is expected to shift away from heavy industry to non-industry sectors such as transport and buildings

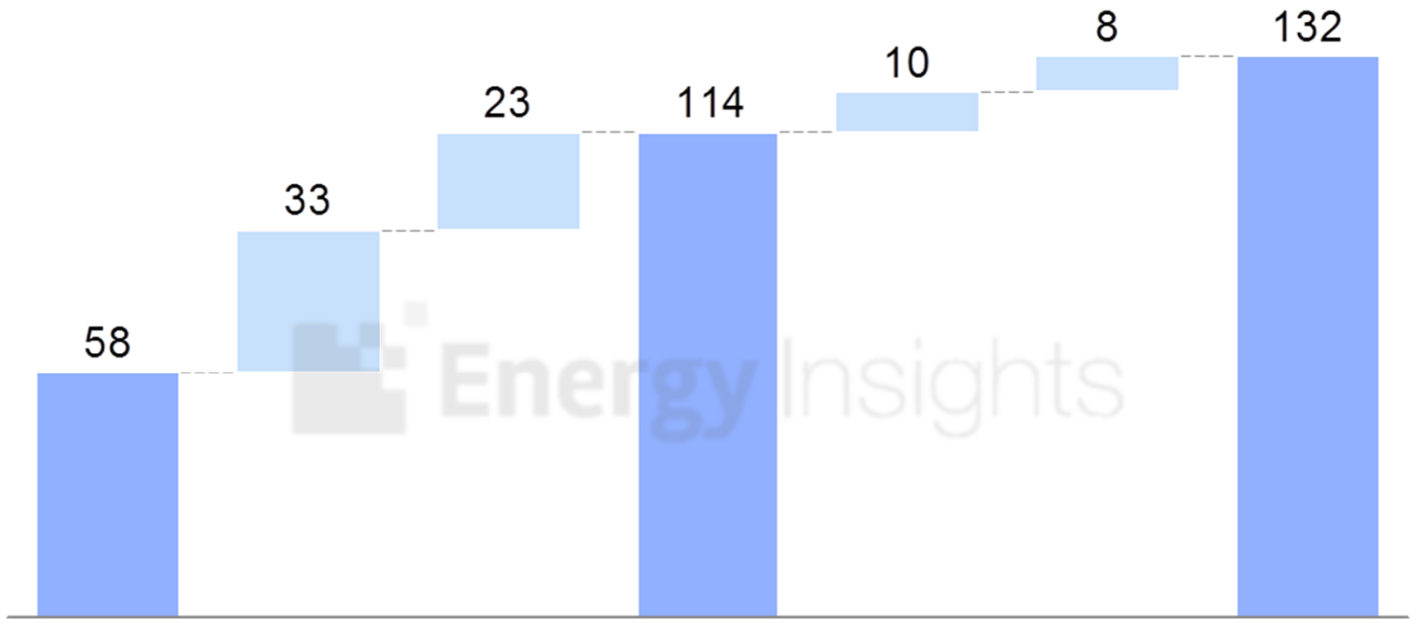
Reference Case: China energy demand growth, QBTU



SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

However in our Technology Breakthrough scenario for China, non-industry sectors are likely to experience a faster pace of EE improvement (vis-à-vis Industry sector) and hence account for less than half of the total growth

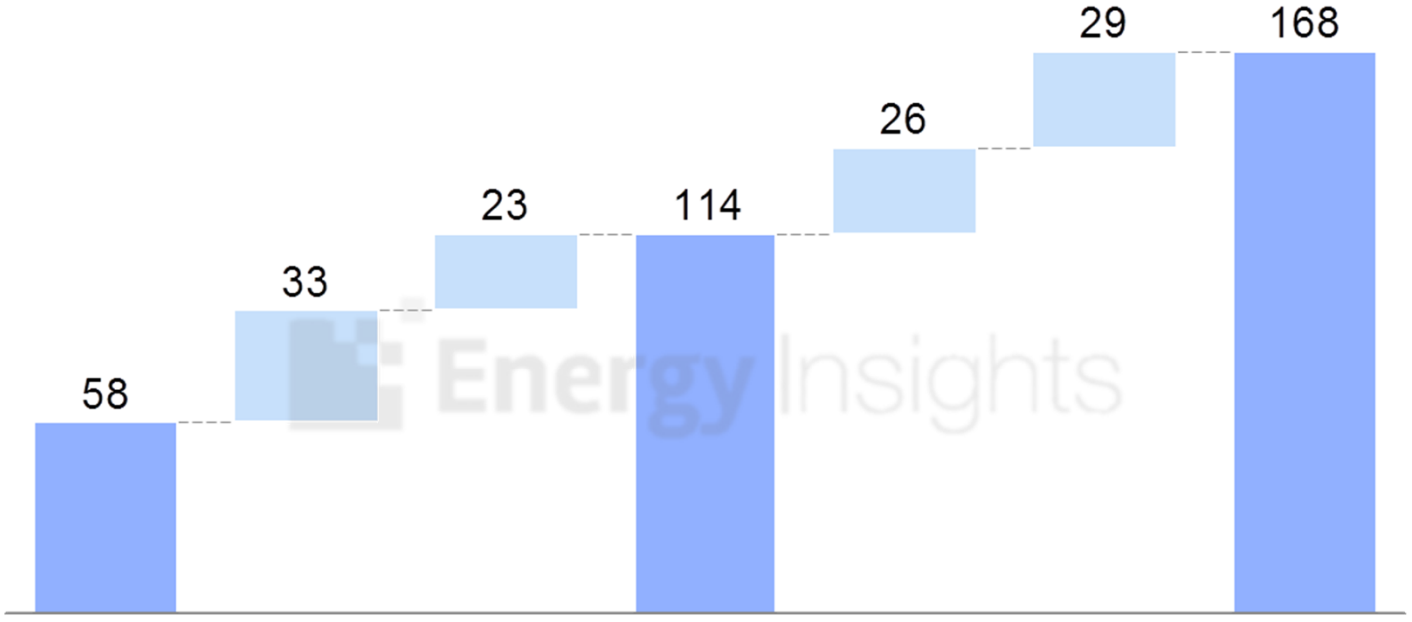
Technology Breakthrough: China energy demand growth, QBTU



SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

Similarly, in our Grey World scenario for China, lower fuel prices stimulate the growth of energy demand in industry sectors, leading to a slightly increased share as compared to Reference Case

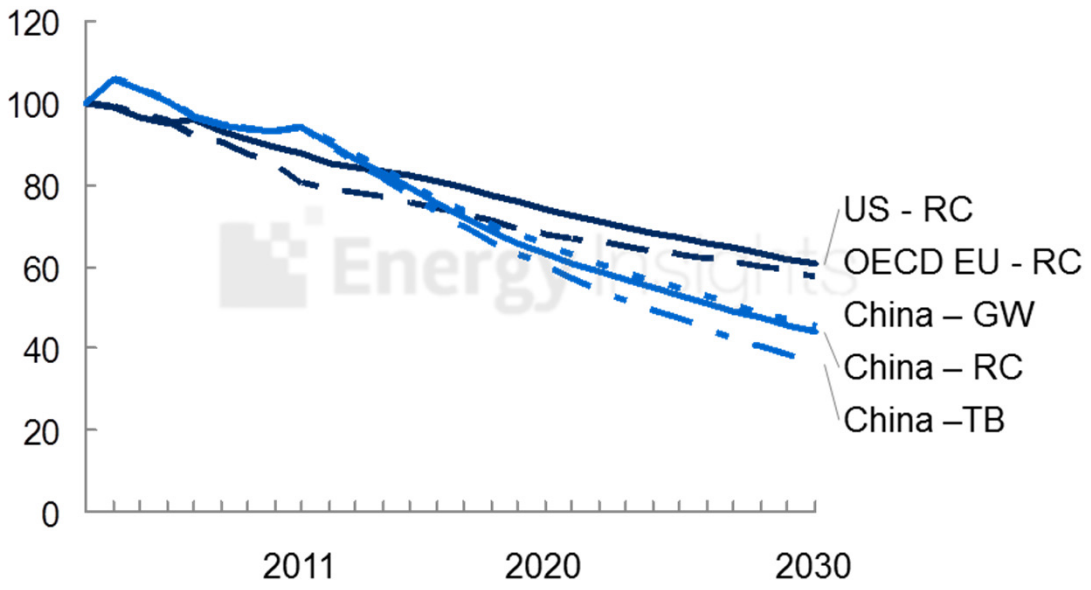
Grey World: China energy demand growth, QBTU



SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

China's energy intensity is expected to register a sharp decline across all scenarios, as compared to developed markets, driven by large scale energy efficiency improvements across all sectors

Energy intensity (Indexed at 2003 = 100)



Energy Intensity (QBTU/GDP in USD trillion)

	Reference Case		
	2011	**2020**	**2030**
US	6.8	5.7	4.7
OECD-EU	4.3	3.6	3.1
Greater China	23.1	15.5	10.8

- China's Energy Intensity is expected to decrease at a faster rate as compared to US/EU, due to a larger improvement potential which is expected to be met till 2030
- In the GW scenario, lower fuel prices are predicted to reduce the rate of energy efficiency improvements, leading to higher Energy intensity in 2030.
- In the TB scenario, strong policy measures and technological advancements are predicted to result in a higher rate of energy efficiency improvement and hence lower energy intensity by 2030.

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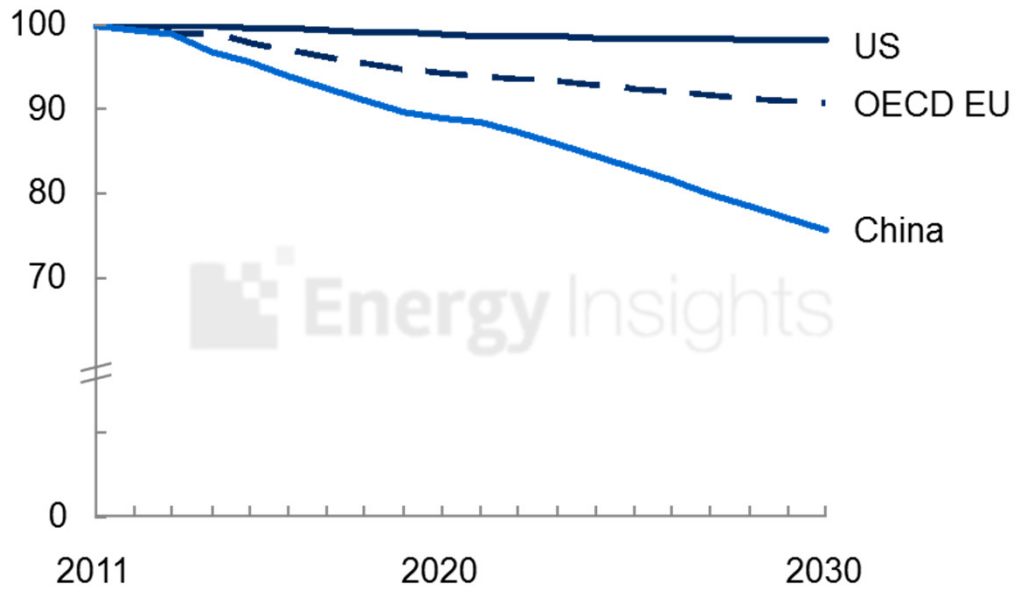
SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

China's Energy intensity in buildings is expected to decrease sharply driven by higher electrification rate and shift away from primary renewables

Reference Case: Energy intensity in buildings sector

Energy intensity (Indexed at 2011 = 100)



Energy Intensity (QBTU /floor space in billion sq mts)

	Reference Case		
	2011	**2020**	**2030**
US	0.60	0.60	0.59
OECD-EU	0.72	0.68	0.65
Greater China	0.49	0.44	0.37

- Developed economies like US/EU have higher Energy Intensity in Buildings sector driven by higher GDP/capita and higher standards of living.
- China's Energy Intensity in Buildings sector is expected to decrease sharply, driven by substitution of low efficiency primary renewables by electricity in residential sector and adoption of higher energy efficiency building systems.
- Unlike emerging economies like China, developed regions are "ahead of the curve" in usage of higher energy efficiency building system, leading to be a plateaued rate of decline.

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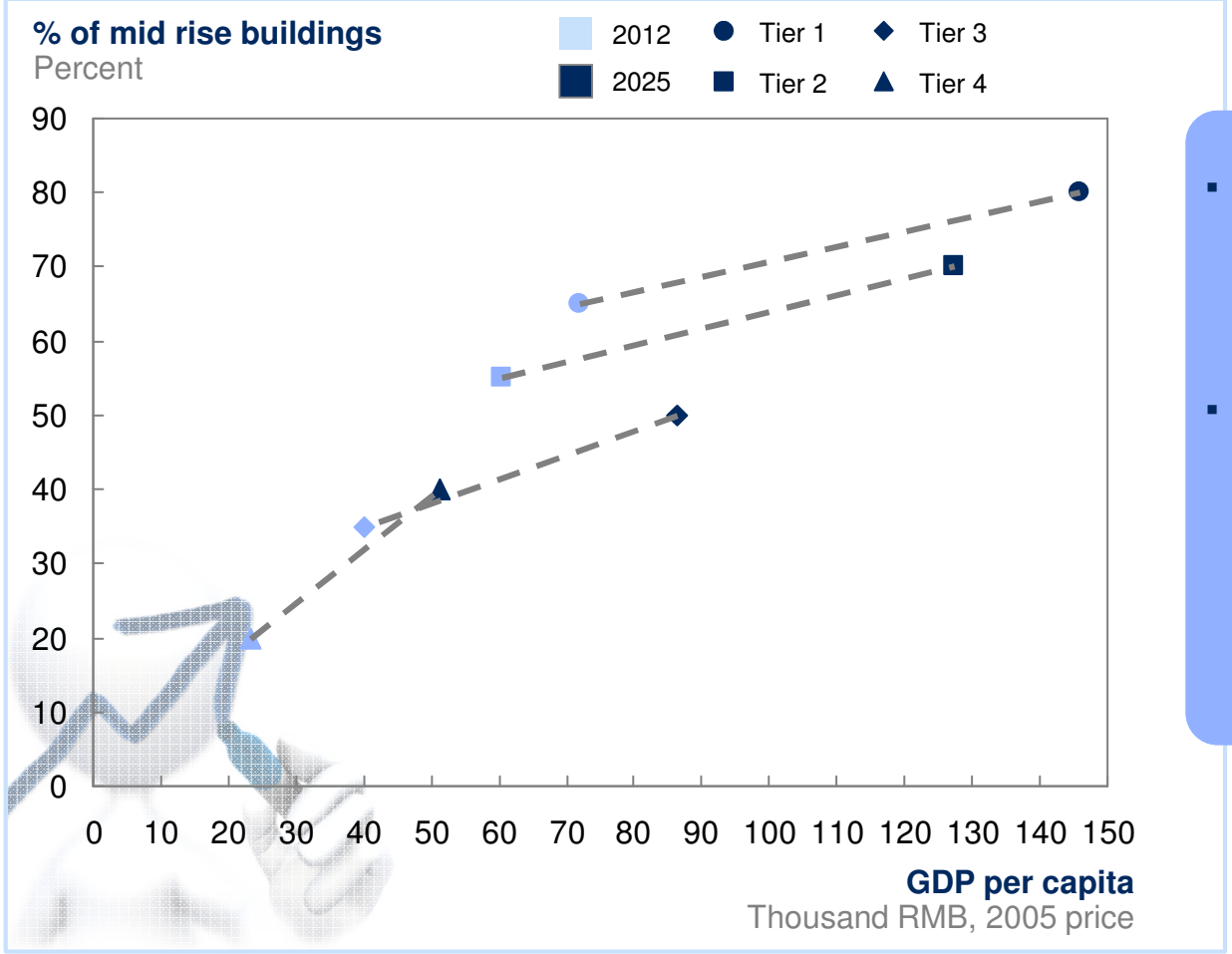
SOURCE: Global Energy Perspective; Energy Insights, a McKinsey Solution

When cities grow richer, the share of mid-rise buildings increases significantly

CONSTANT TIER

GDP per capita vs % of mid-rise buildings by tier



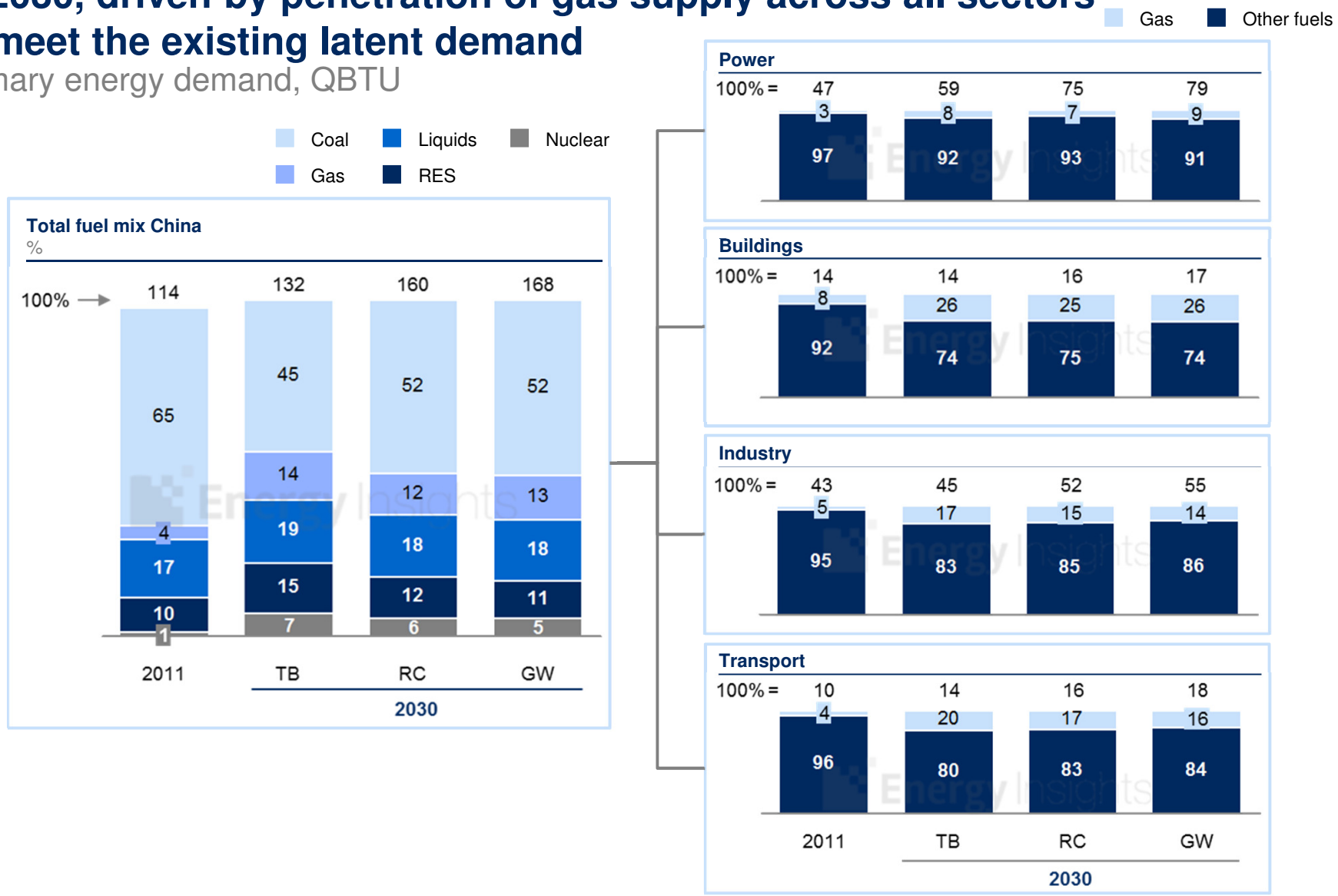
- Lower tier cities are following the building profile evolution track of higher tier cities
- Tier 3 and Tier 4 cities, though grow significantly in GDP per capita in 2025, would have less land constraint so that people could still live in low rise buildings

1 City tier classification : in 2010, T1 cities GDP >932 bn RMB, T2 cities GDP > 120 bn RMB, T3 cities GDP > 22 bn RMB. The number of cities by tier does not change over time

SOURCE: McKinsey Global Institute

Gas' share of energy demand in China will grow from 5% in 2011 to 12-14% in 2030, driven by penetration of gas supply across all sectors to meet the existing latent demand

Primary energy demand, QBTU



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