

# Outlook for Energy & Asphalt: A View to 2040

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The Outlook for Energy includes Exxon Mobil Corporation's internal estimates and forecasts of energy demand, supply, and trends through 2040 based upon internal data and analyses as well as publicly available information from external sources including the International Energy Agency. Work on the report was conducted throughout 2016. This presentation includes forward looking statements. Actual future conditions and results (including energy demand, energy supply, the relative mix of energy across sources, economic sectors and geographic regions, imports and exports of energy) could differ materially due to changes in economic conditions, technology, the development of new supply sources, political events, demographic changes, and other factors discussed herein and under the heading "Factors Affecting Future Results" in the Investors section of our website at [www.exxonmobil.com](http://www.exxonmobil.com). This material is not to be used or reproduced without the permission of Exxon Mobil Corporation. All rights reserved.

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# TOPICS

- Evolving Global and N. American Energy Outlook Trends
- Economics and Policies Impacts
- Asphalt Demand Forecasts
- Heavy Transportation Growth & Impacts

The “Outlook for Energy & Asphalt: A View to 2040” reviews Exxon Mobil Corporation’s internal estimates and forecasts of energy, supply and trends through 2040 and relates those estimates to probable impacts on asphalt paving products globally and for North America based upon internal data and analyses as well as publically available information from external sources. This presentation includes forward looking statements. Actual future conditions and results (including energy demand, energy supply, the relative mix of energy across sources, economic sectors and geographic regions, imports and exports of energy) could differ materially due to changes in economic conditions, technology, the development of new energy sources, political events, demographic changes, and other factors discussed herein and under the heading “Factors Affecting Future Results” in the Investors section of our website at [www.exxonmobil.com](http://www.exxonmobil.com). This material is not to be used or reproduced without the permission of Exxon Mobil Corporation. All rights reserved.

# Global Trends Continue to Evolve

Growth from 2015 Level

Percent

100%

75%

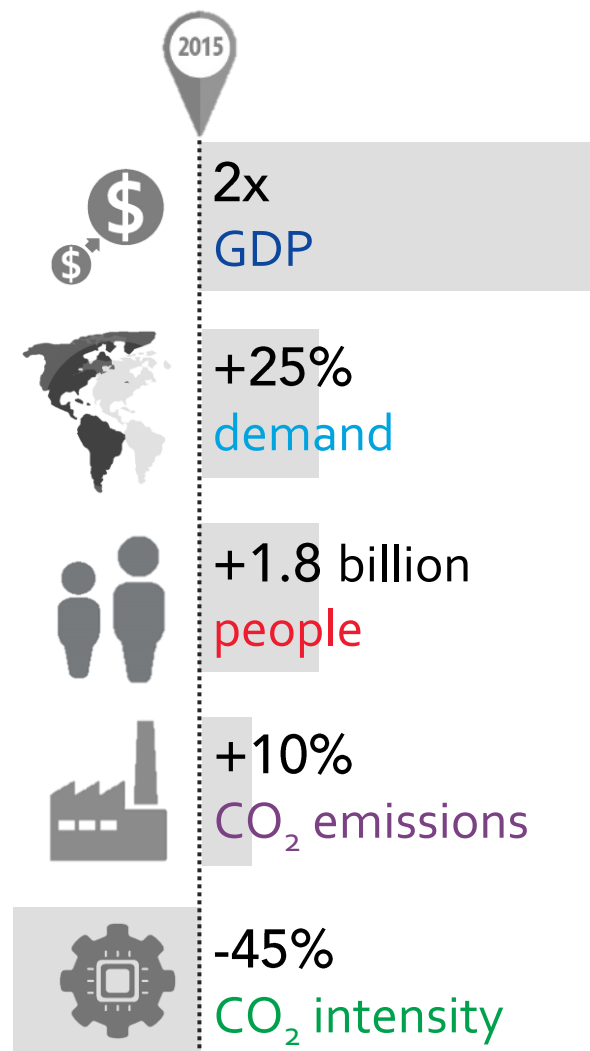
50%

25%

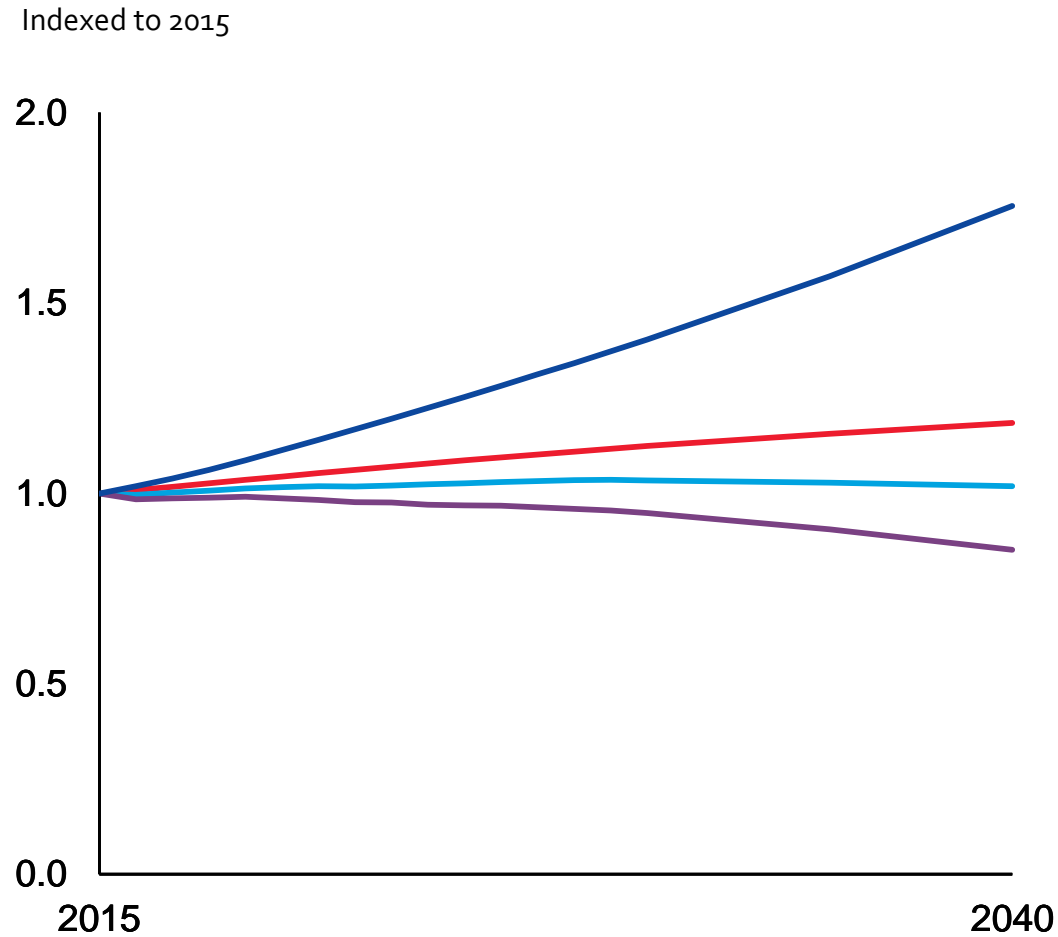
0%

2015

2040





# North America Energy Trends



 +15 trillion  
GDP

 +90 million  
people

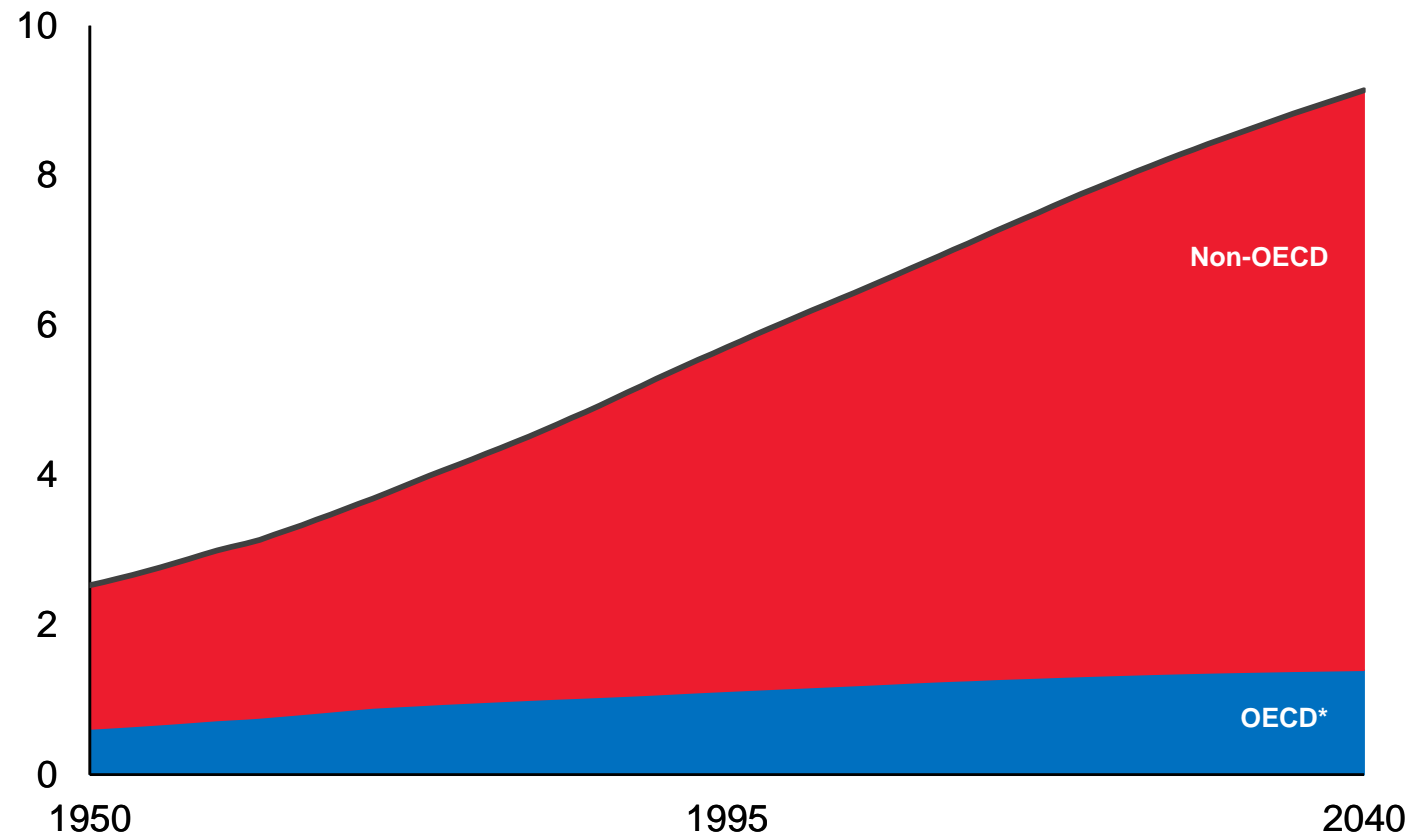
 flat  
demand

 -14 percent  
carbon emissions

# Developing Nations Lead Population Growth

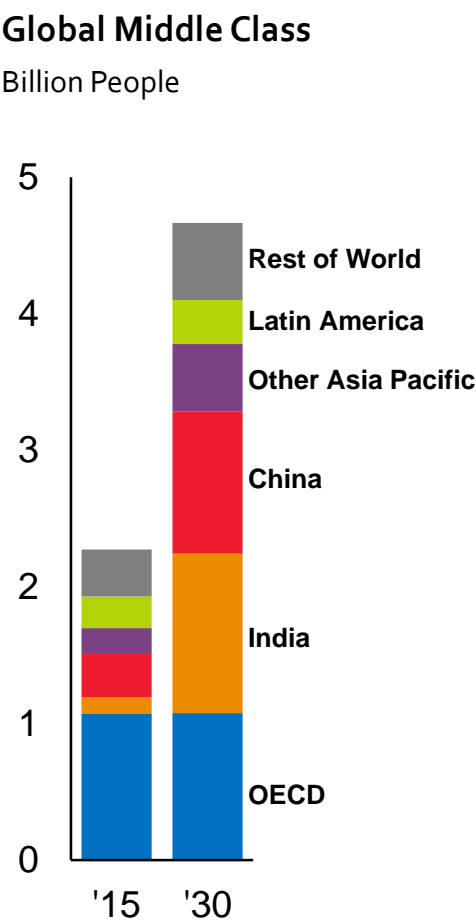
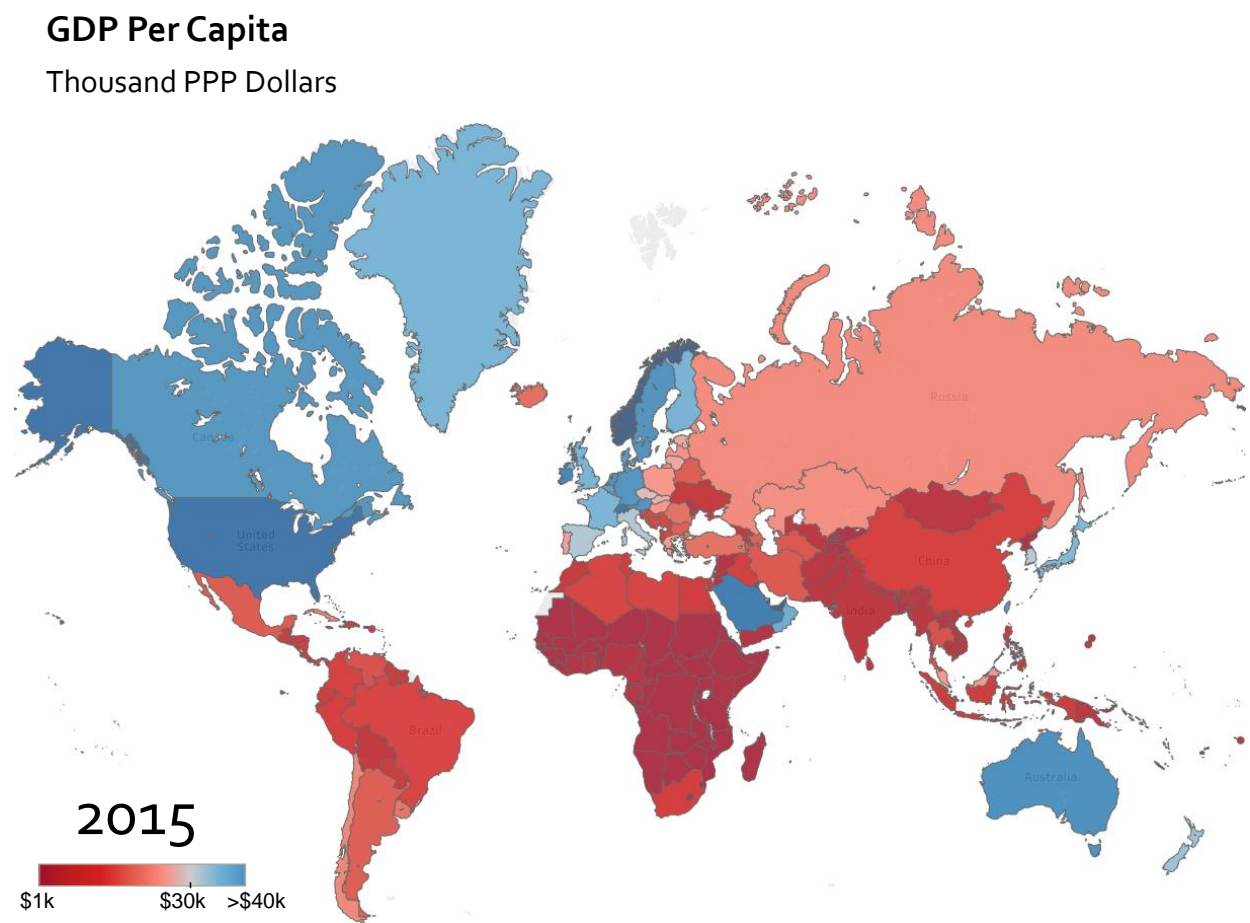
## Global Population

Billion People



\* Organization for Economic Co-operation and Development (OECD)

# Purchasing Power and Middle Class Grow

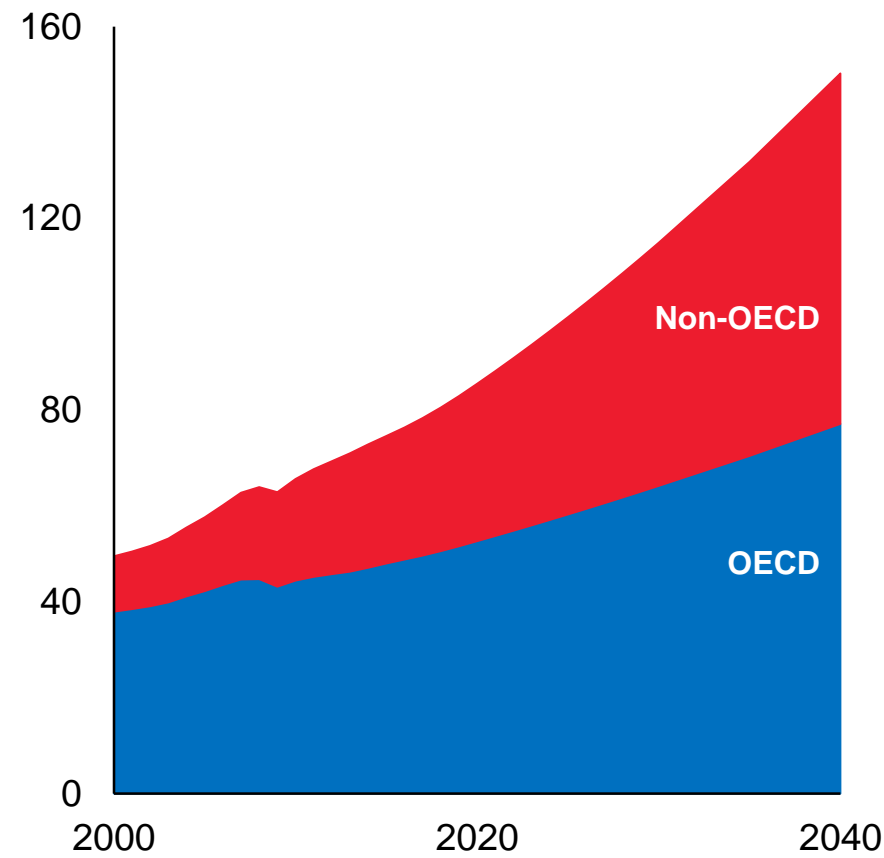


Source: The Brookings Institution

# Non-OECD Leads Economic Growth

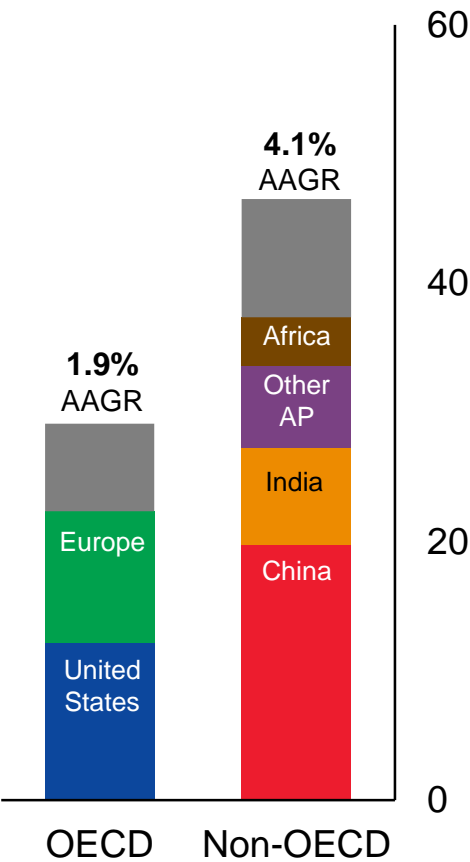
World GDP

Trillion 2010\$

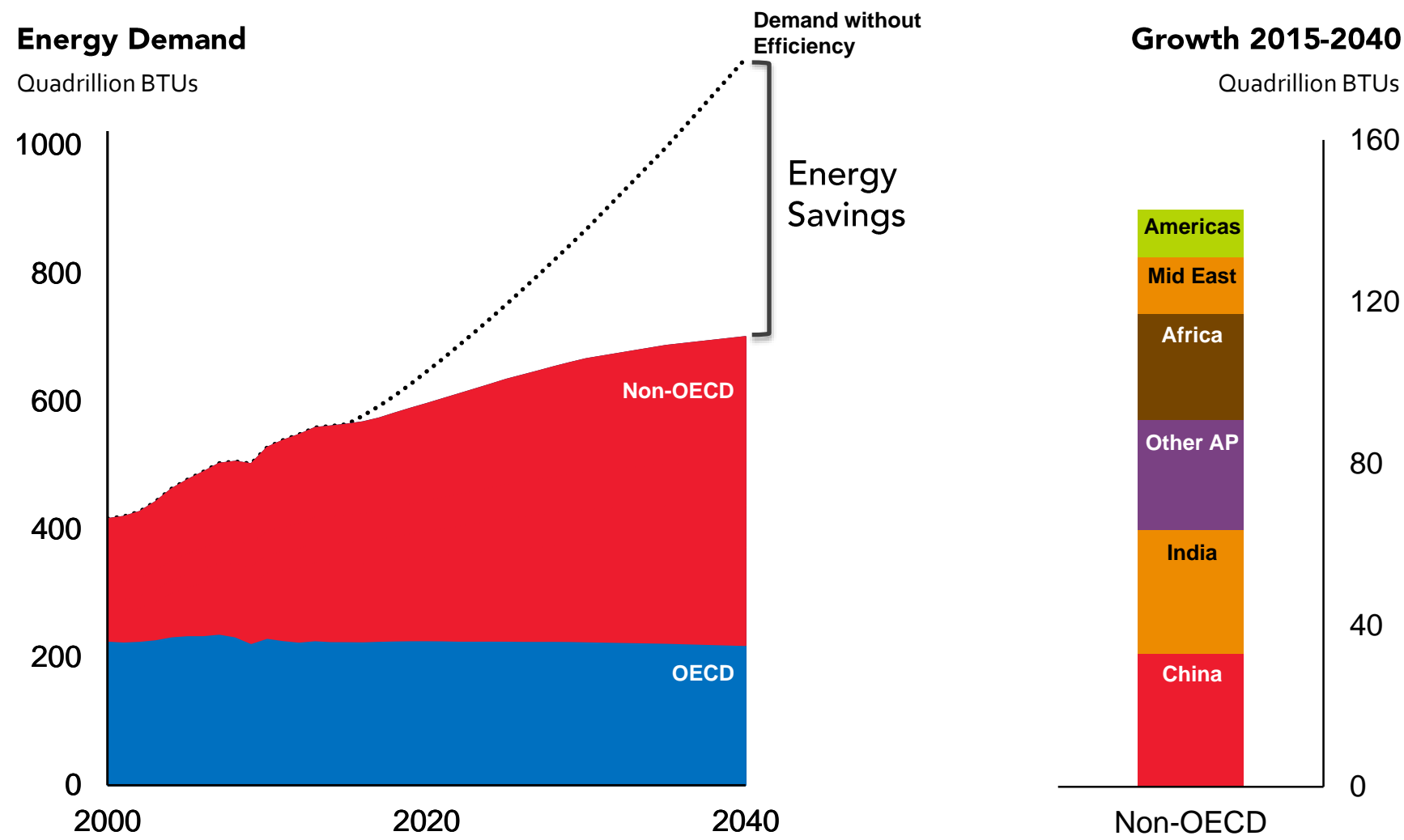


Growth 2015-2040

Trillion 2010\$

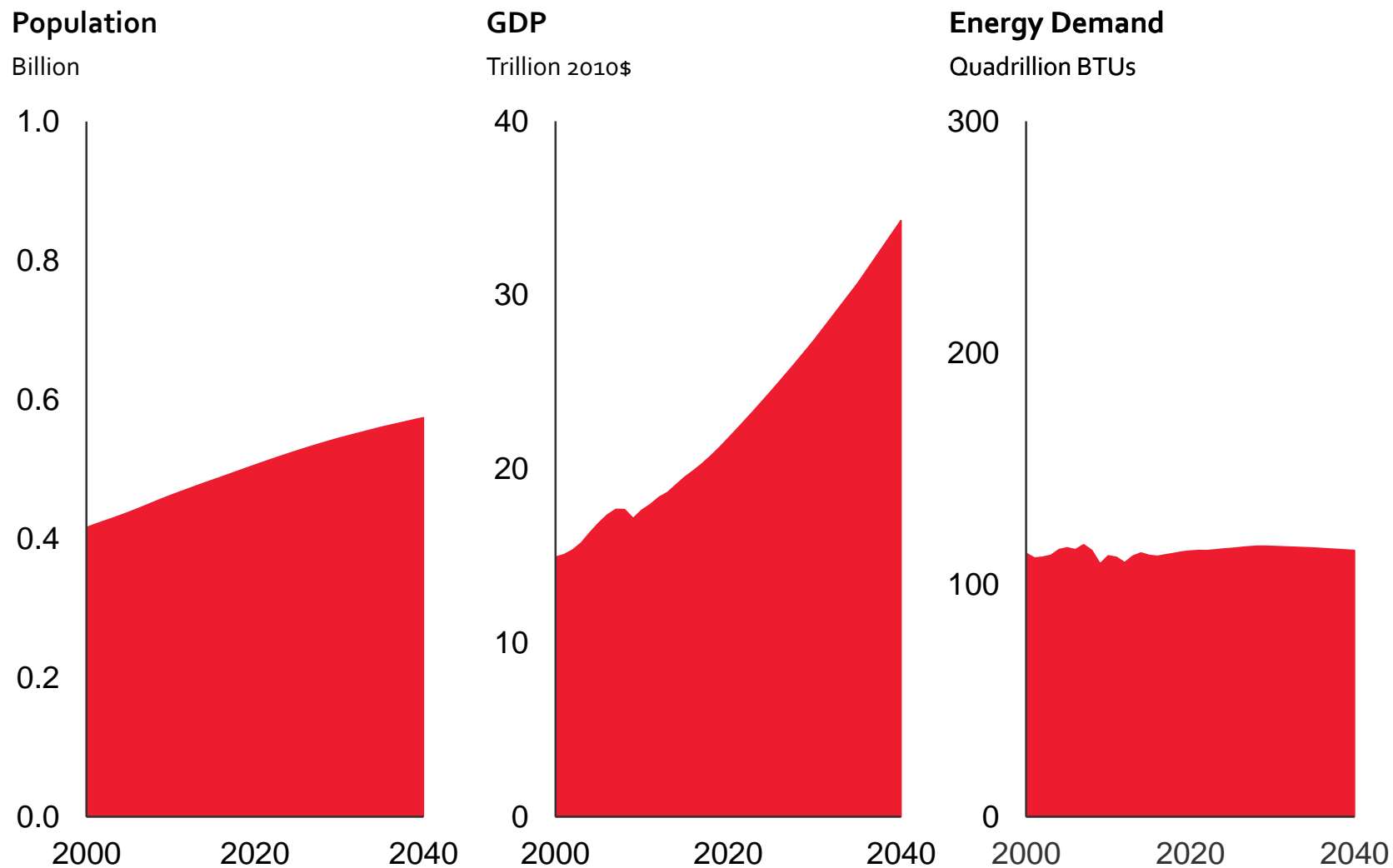


# Energy Demand Growth From Developing Nations





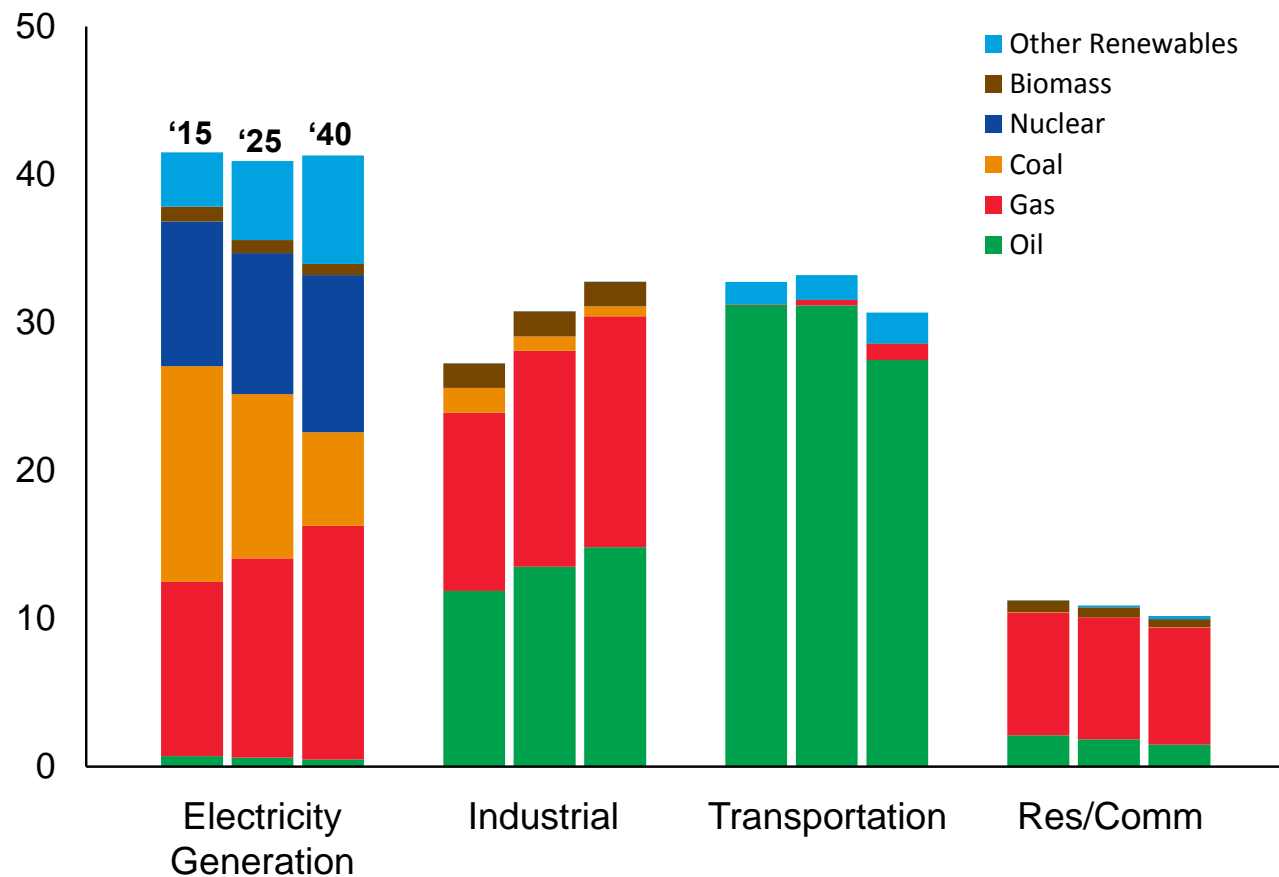
# North America Energy Trends



# North America Energy Demand

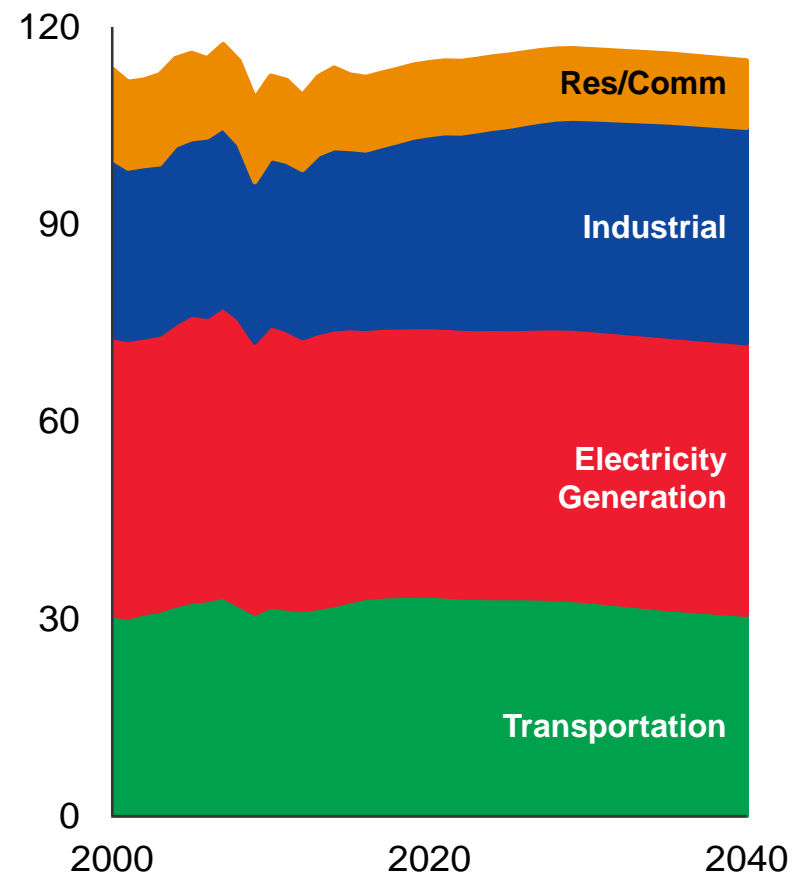
## Primary Energy Demand by Sector

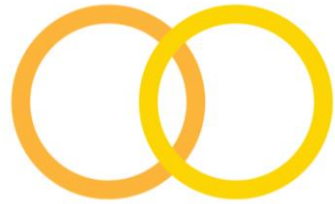
Quadrillion BTUs



## By Sector

Quadrillion BTUs



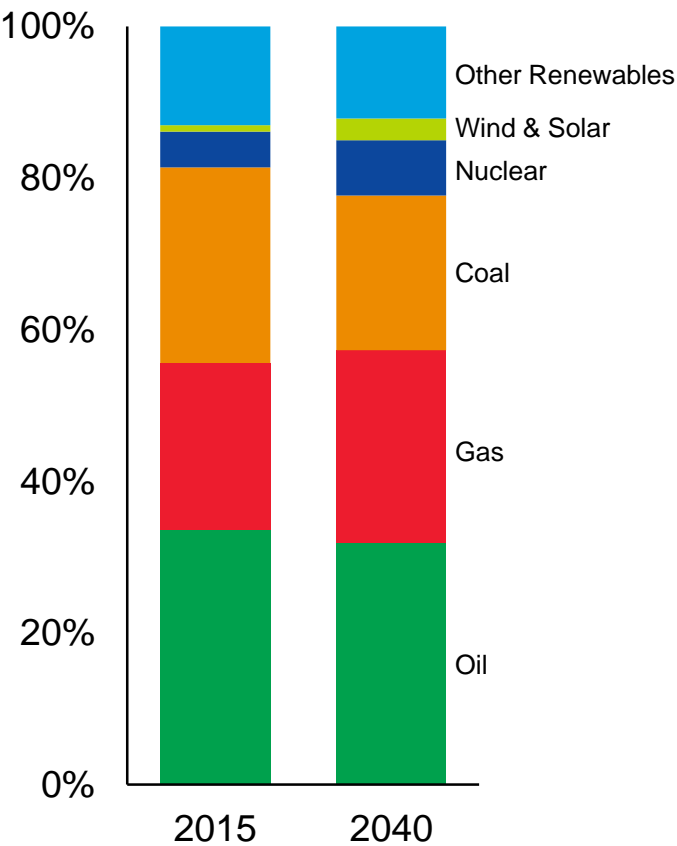


Economics and  
policies impact the  
energy mix and  
possibly asphalt  
markets

# Energy Mix Shifts to Lower-Carbon Fuels

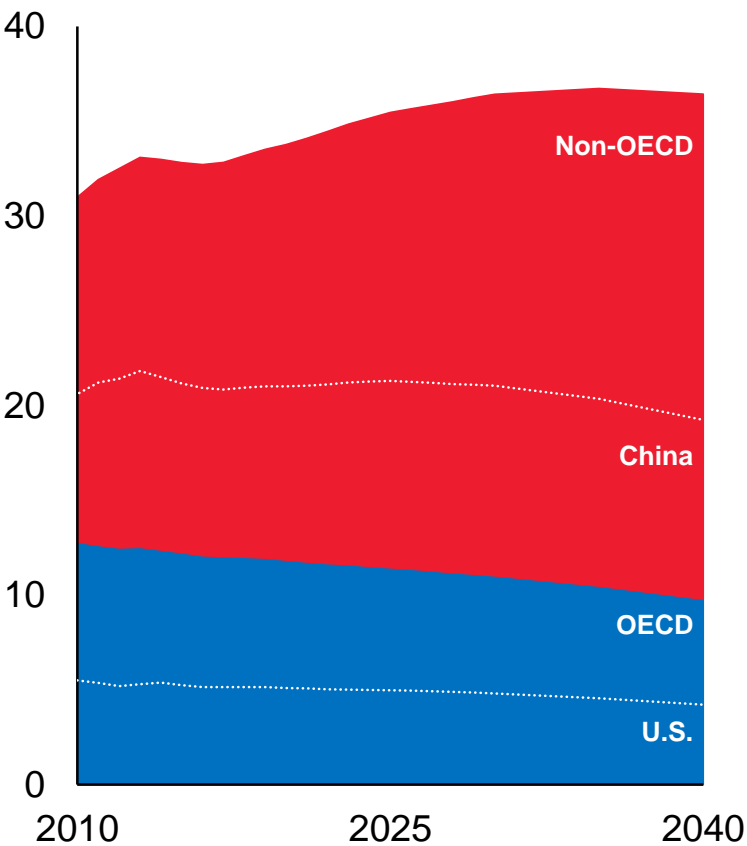
Global Energy Mix

Percent



Energy-Related CO<sub>2</sub> Emissions by Region

Billion Tonnes





# IMO 2020 Fuel Oil Specification Trend



The International Maritime Organization (IMO) has announced that a 0.5% global sulphur cap on marine fuel emissions will be implemented in 2020 vs. the current limit 3.5%.

- IMO's decision will trigger a change in fuel selection
- Possible significant problem for the refiners that produce high sulphur fuel for marine bunkers
  - Estimated 45,000 vessels currently consume HSFO
- Likely dislocation in bunker fuel use during a transition period until markets adjust

## Potential Impact on Asphalt Markets

- Normal asphalt demand increase insufficient to absorb potential stranded resid
- Market volatility possible in some regions
- Crude slate changes and/or reduction in crude runs likely
- Global conversion capability will eventually close gap





Asphalt remains the world's road construction material of choice through 2040.

# Energy Outlook Asphalt Demand Forecasts

- Global asphalt demand increases at a moderate pace through 2030
  - 1.9 – 2.8% / year 2015 to 2030
- Americas asphalt demand increases at a modest pace through 2030
  - 1.5 – 2.2% / year 2015 to 2030

## However:

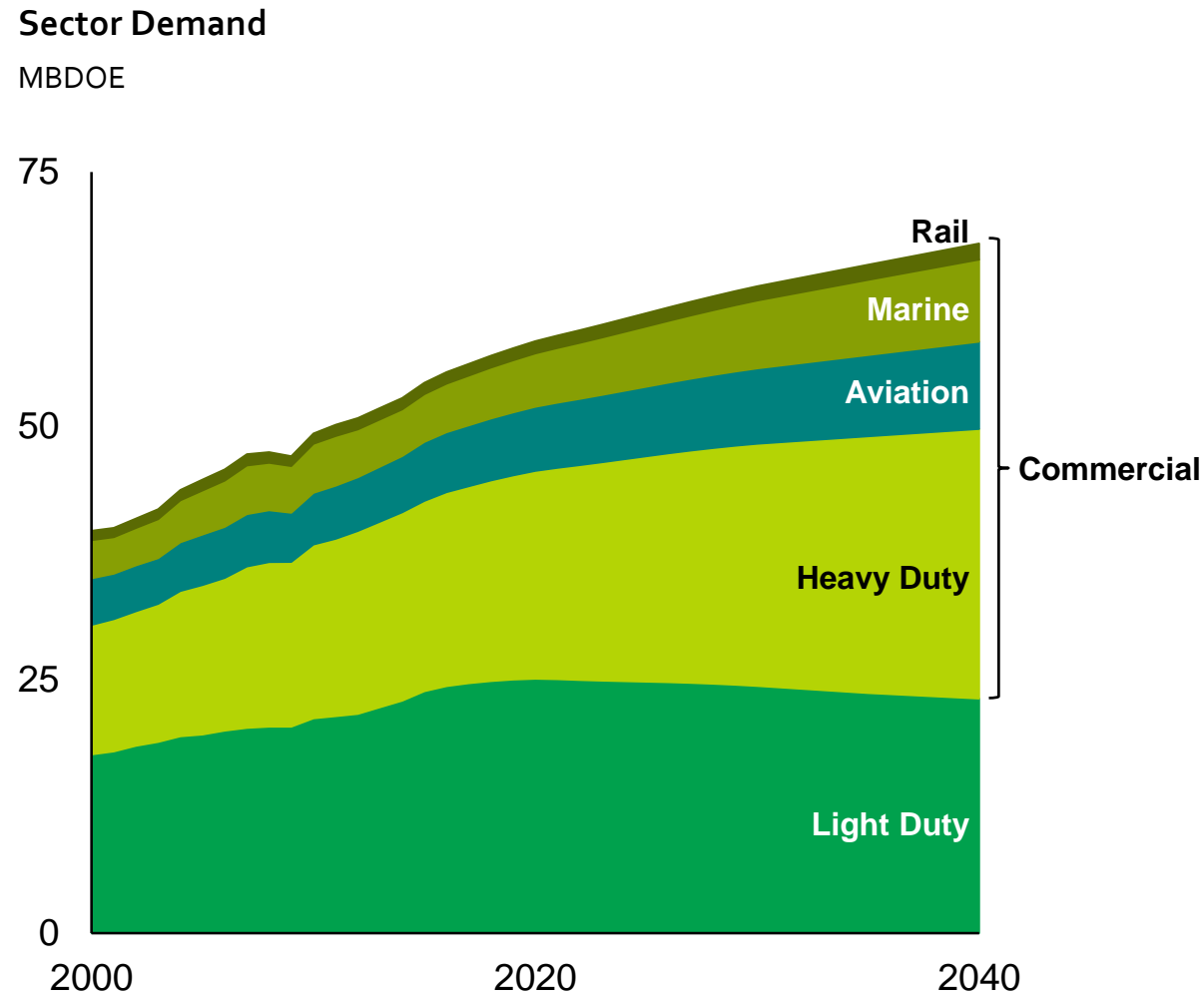
- Bloomberg Intelligence forecasts a more robust Americas asphalt demand increase
  - 7.8% / year 2017 to 2027



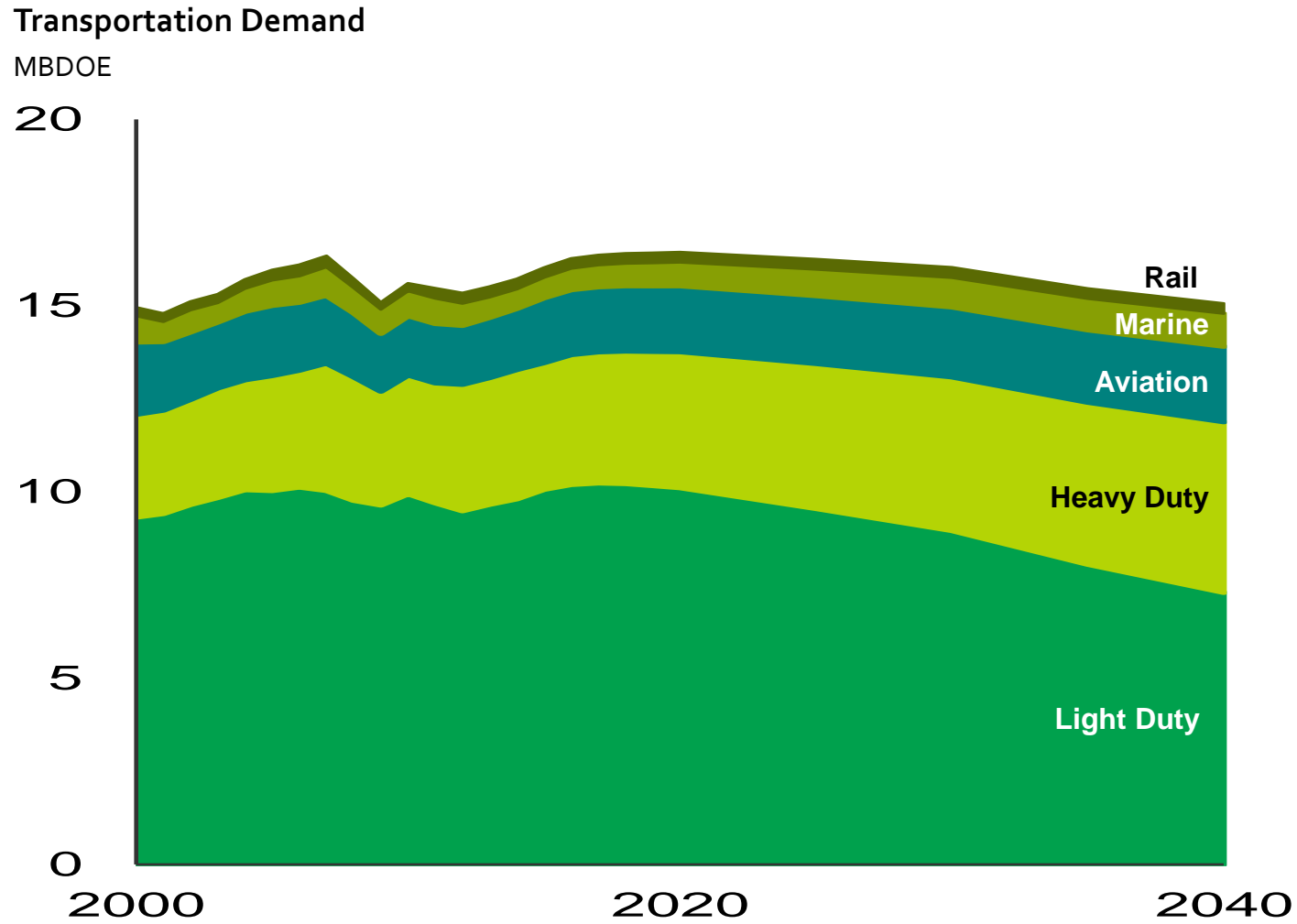
Heavy Transportation Growth.



# Global Transportation Demand Driven by Commerce



# N. America Transportation Demand & Fleet Shift





Heavy Transportation Growth has the highest potential impact on road construction and choice of asphalt binder grades .

# Factors that could Impact Polymer Modified Asphalt

- Global fuel demand for heavy-duty vehicles is expected to rise by ~40%
- North American fuel demand for heavy-duty vehicles is expected to rise by ~15%
- However technology will drive energy efficiencies in heavy duty vehicles
  - Actual increase in vehicle miles exceeds fuel demand growth by an additional ~ 10 to 15%
- Estimated total US heavy-duty (combo axle) vehicle miles driven increase by 29.6%<sup>(1)</sup>
  - ...While available highway lane miles increase at a much slower rate
- Net result:
  - Heavy-duty vehicle impacts on highway pavement performance increases
  - Increased need for higher quality binders and highway pavement design

(1) Source: FHWA Forecasts of Vehicle Miles Traveled (VMT): Spring 2017



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