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## Strategic Implications

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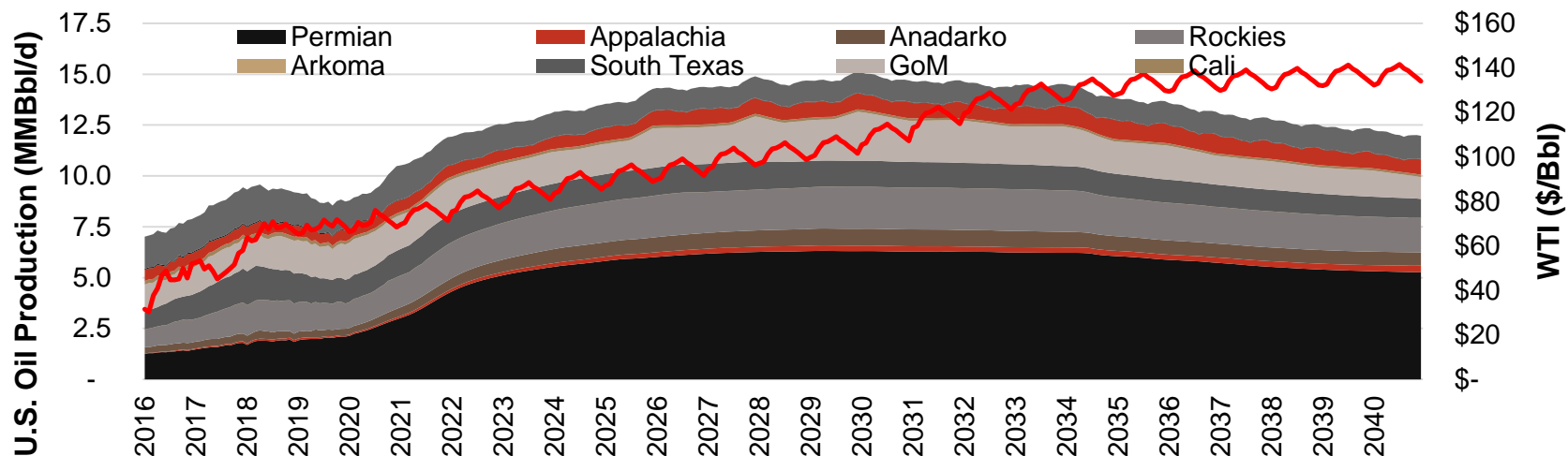


# Key Takeaways

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# In the long term, a few shale plays look to offset U.S. drop

U.S. oil reaching ~15 MMBbl/d in '27 before falling to ~11.5 MMBbl/d in '40



Source: Stratas

- While projecting far into the future is often difficult to predict, using the information and technologies of today allows us to make estimates.
- The Anadarko, Rockies and Permian look to peak in the late 2020's. The Appalachia takes a pause in the same year before regaining traction in the mid 2030's.
- Throughout our forecast period, shale is estimated to represent ~74% of U.S. oil production.

# Implications

- Shale will continue to affect future crude markets

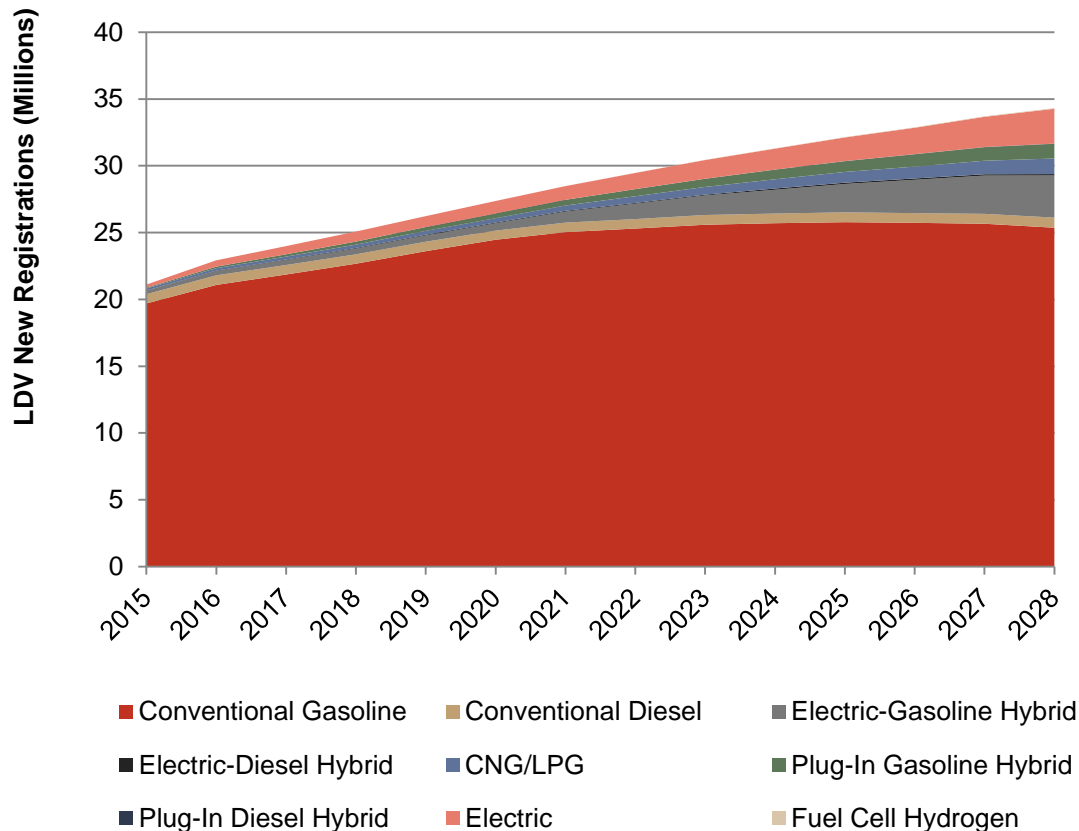


- US refineries will continue to enjoy structural advantages
- Shale could help slowdown the shift away from petroleum products

# China LDV New Registrations (2018 – 2028)

China's LDV Registrations are projected to have growth through 2028

**China: Light-Duty Vehicle New Registrations**



## China's Light-Vehicle New Registrations

- **2018** – 25.0 Million New LDV Registrations
  - Gasoline will continue to lead the way
  - NEVs will become the 2<sup>nd</sup> largest cluster of new registrations
- **2028** – 34.4 Million New LDV Registrations
  - Gasoline will continue to grow but at a slower pace
  - Gasoline hybrids and xEVs will rapidly expand market share

New Registrations – Powertrain %s			
Type	2020	2025	2028
Gasoline	89.4%	80.2%	73.9%
Diesel	2.5%	2.3%	2.2%
HEV	2.2%	6.9%	9.5%
BEV	3.4%	5.5%	7.6%
PHEV	1.3%	2.5%	3.3%
CNG/LPG	1.2%	2.5%	3.4%
FCV	0.01%	0.1%	0.1%

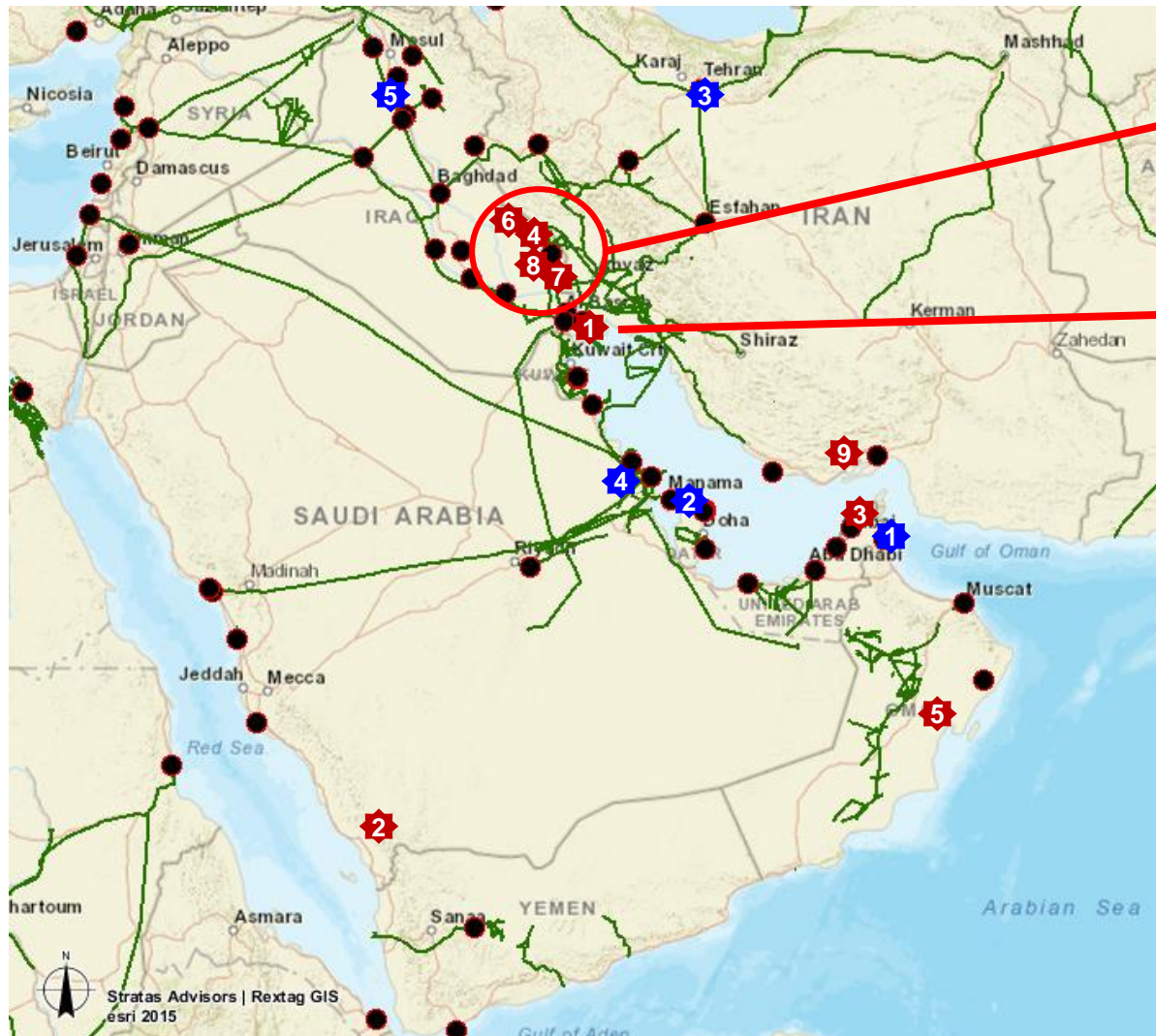
# Implications

- China is the largest vehicle market
- What happens in China will affect the entire sector including the...
- ...speed of the shift away from petroleum products



- The demand growth for gasoline and diesel could stagnated and then start declining

# Grassroots Refinery Projects - Middle East



Iraq

0.66 MMBPD of capacity of 4 Projects

Kuwait

0.62 MMBPD of single project

Total

- 2.9 MMBPD of capacity addition

★ Grassroots Projects

★ Expansion or Modernization Projects

Source: Stratas Advisors



# Implications

- The Middle East has had significant investment in refineries and...
- ...has many additional refining projects planned

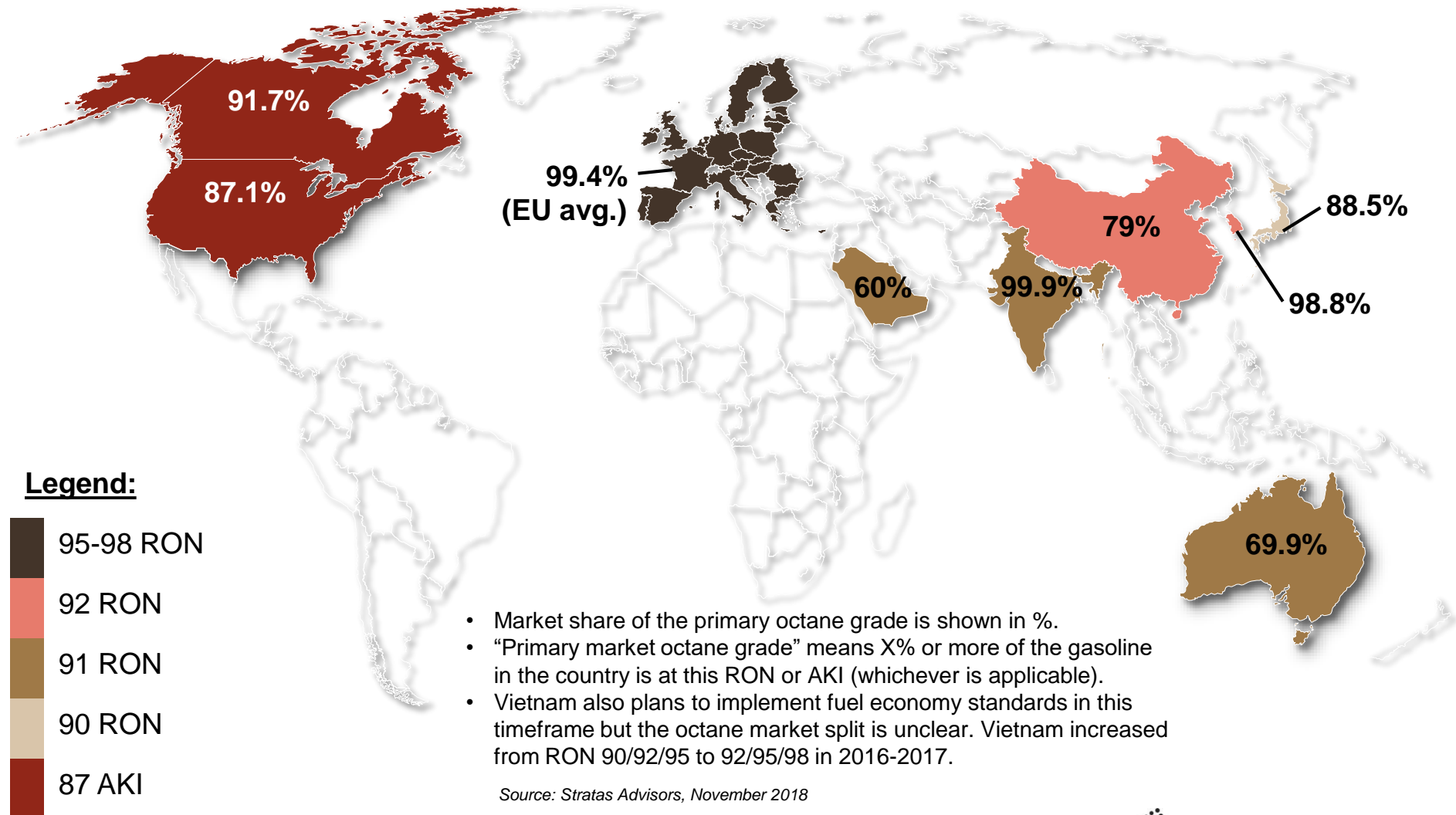


- As time goes on the – the refining environment could become more competitive...
- ...but Middle East refineries with the appropriate configuration should be survivors



# Primary Market Octane Grade in Countries Expecting Fuel Economy Changes in 2020

Initial analysis suggests that octane levels may not be enough to meet automaker needs in coming years



Source: *Stratas Advisors, November 2018*

# Implications

- Demand is continuing to shift toward cleaner and higher-quality fuels
- Many stakeholders would like to move faster – including governments and automotive manufacturers



- The refining industry may have pressure to make additional investments and to do so faster than expected



# Strategic Implications

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# Need to Take a Strategic Approach

- Understand your portfolio of businesses within the context of current environment and future environment
- Invest only in assets and positions for which structural advantages can be established – structural disadvantages cannot be overcome through improving operations
- Consider opportunities across time horizons and in terms of materiality – and the organizational capabilities required for success
- Assess current and future risk factors – and the ability to manage – and the impact on ability to drive risk-adjusted returns
- Utilize a comprehensive business model that links forward-looking strategies with capabilities, assets and external network to drive value for all stakeholders

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Stratas Advisors, a Hart Energy company, is a global consulting and advisory firm that covers the full spectrum of the energy sector and related industries. We can help you develop a deeper understanding of the developments that are shaping the future of oil & gas. Our support includes customized consulting that is focused on a client's specific strategic objectives, competitive challenges and asset base. Additionally, we offer support through subscription services and comprehensive market studies

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