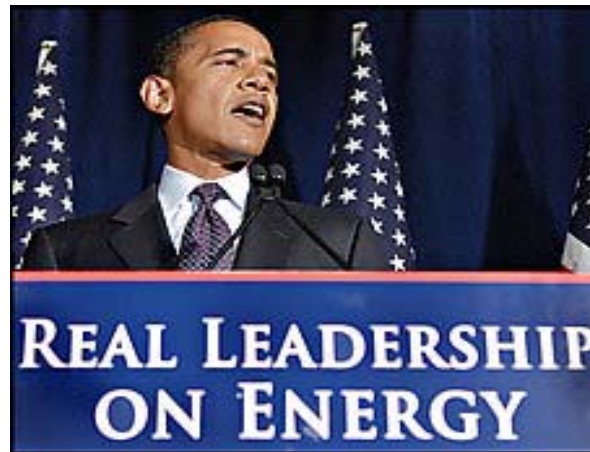


Energy Market Consequences of An Emerging U.S. Carbon Management Policy

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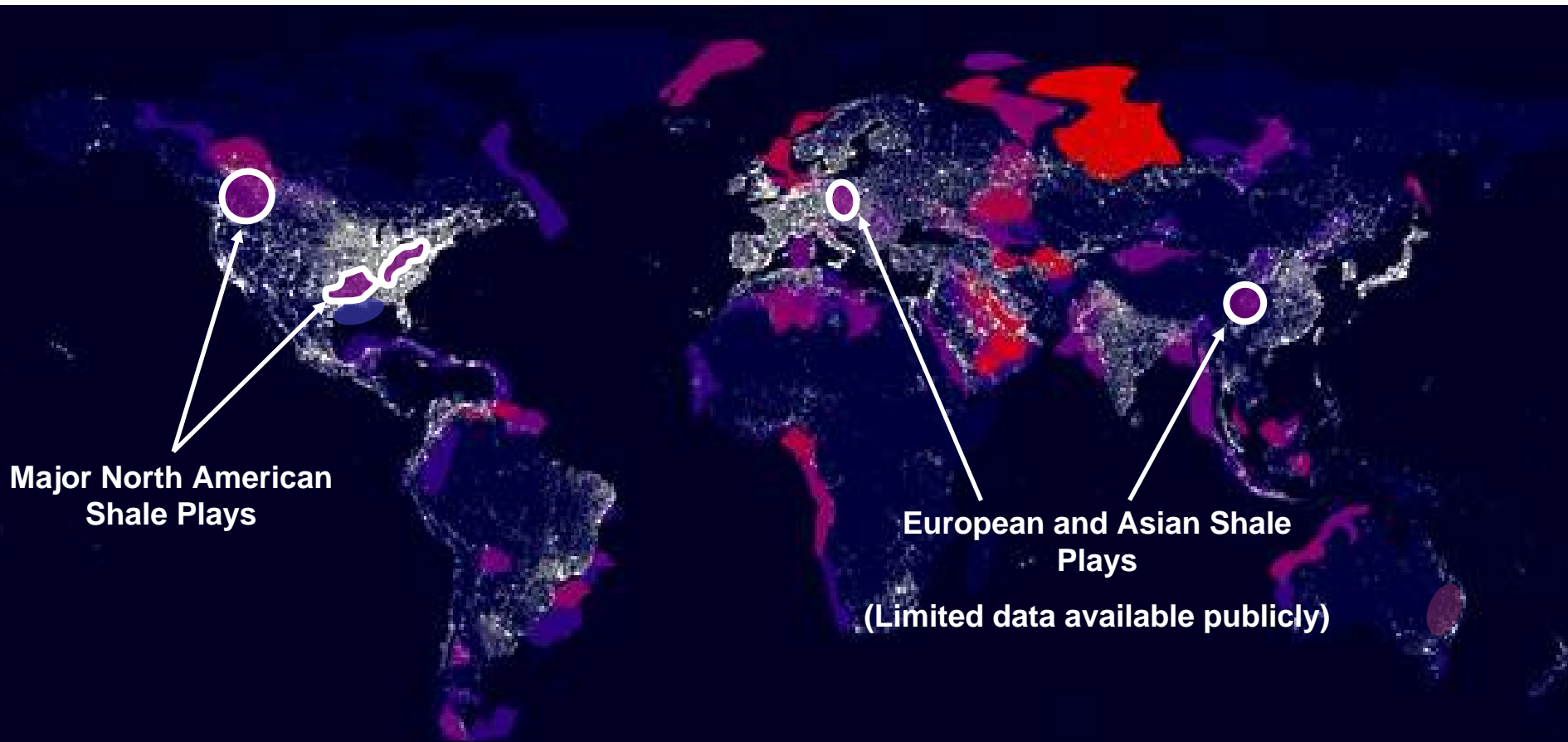


**Study Overview
USAAE Luncheon**

November 18, 2010

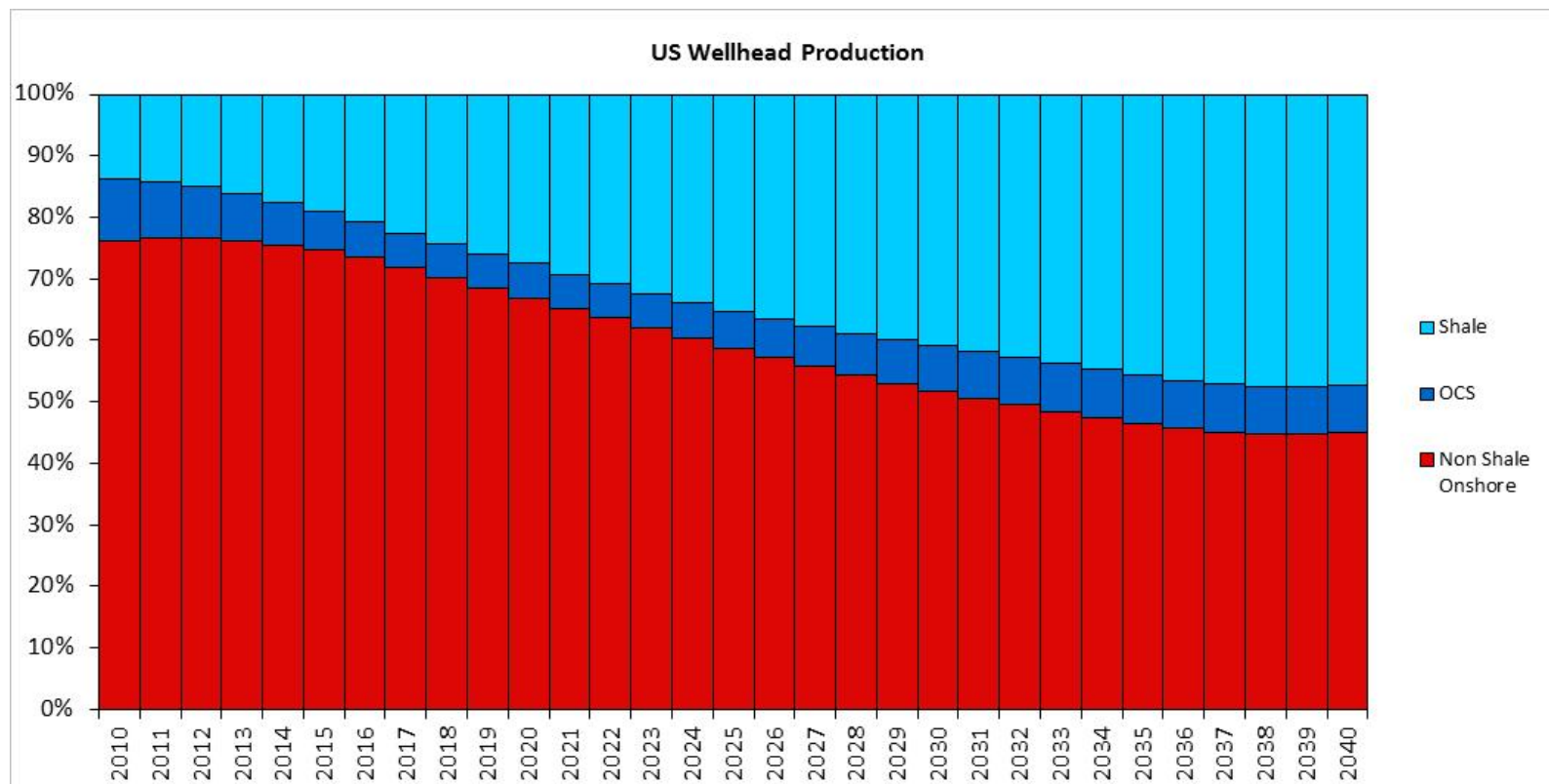


Shale is not confined to North America, and it has significant implications for the global gas market



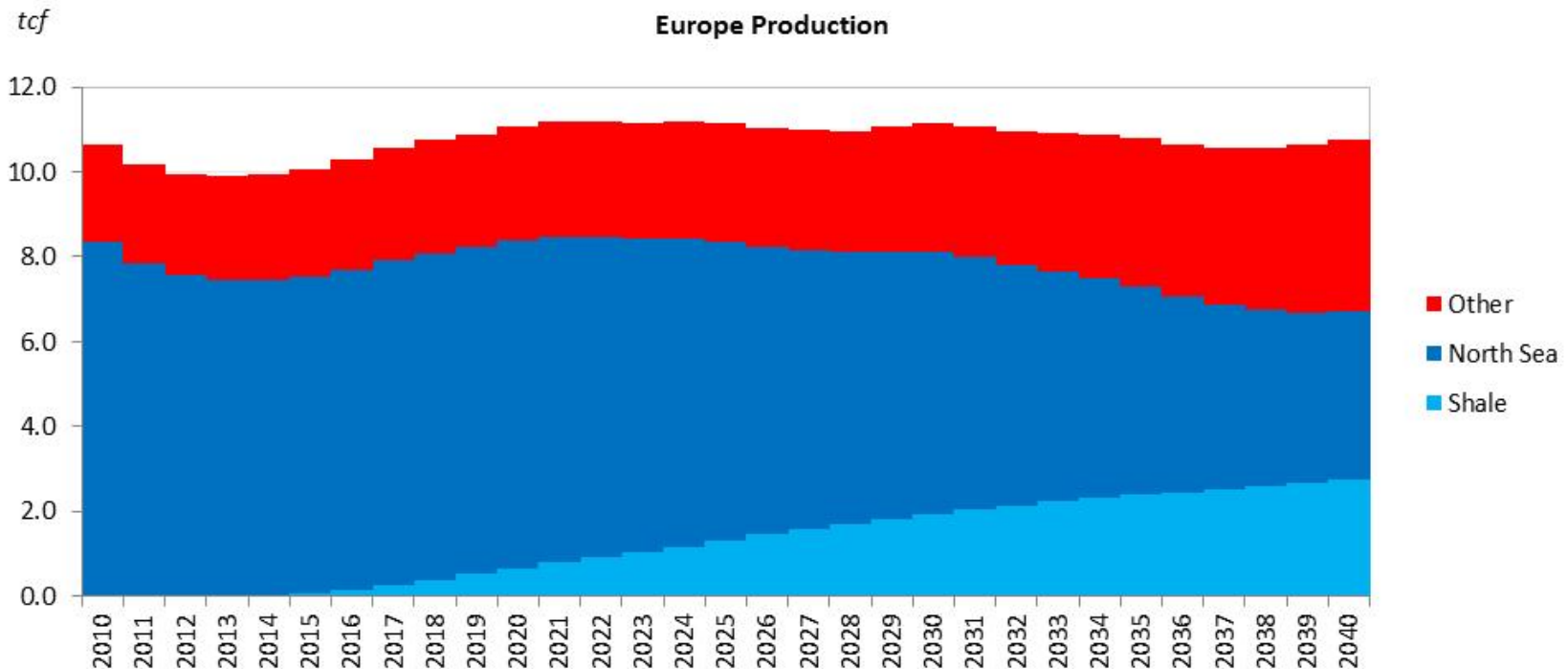
Composition of U.S. Production

- US shale production grows to about 50% of total production by 2040.
- Canadian shale production grows to about 1/3 of total output by 2040 (not pictured). This offsets declines in other resources as total production remains fairly flat.



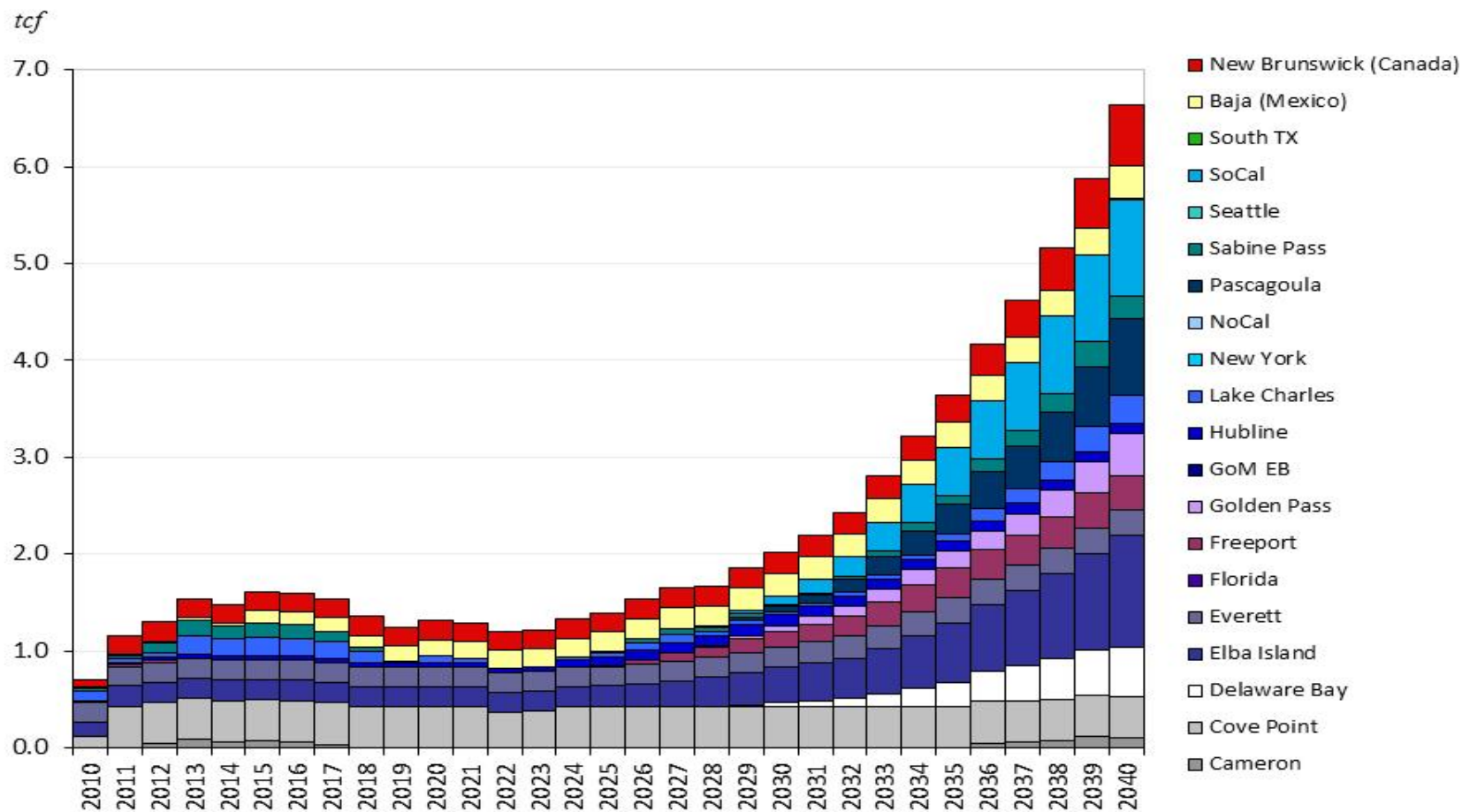
The Impact of European Shale Production

- European shale production grows to about 25% of total production by 2040. While this is not as strong as North America, it does offset the need for increased imports from Russia, North Africa, and LNG. In fact, the impact of shale growth in Europe is tilted toward offsetting Russian imports, but it also lowers North Sea production at the margin, as well as other sources of imports.



LNG Imports targeting the US

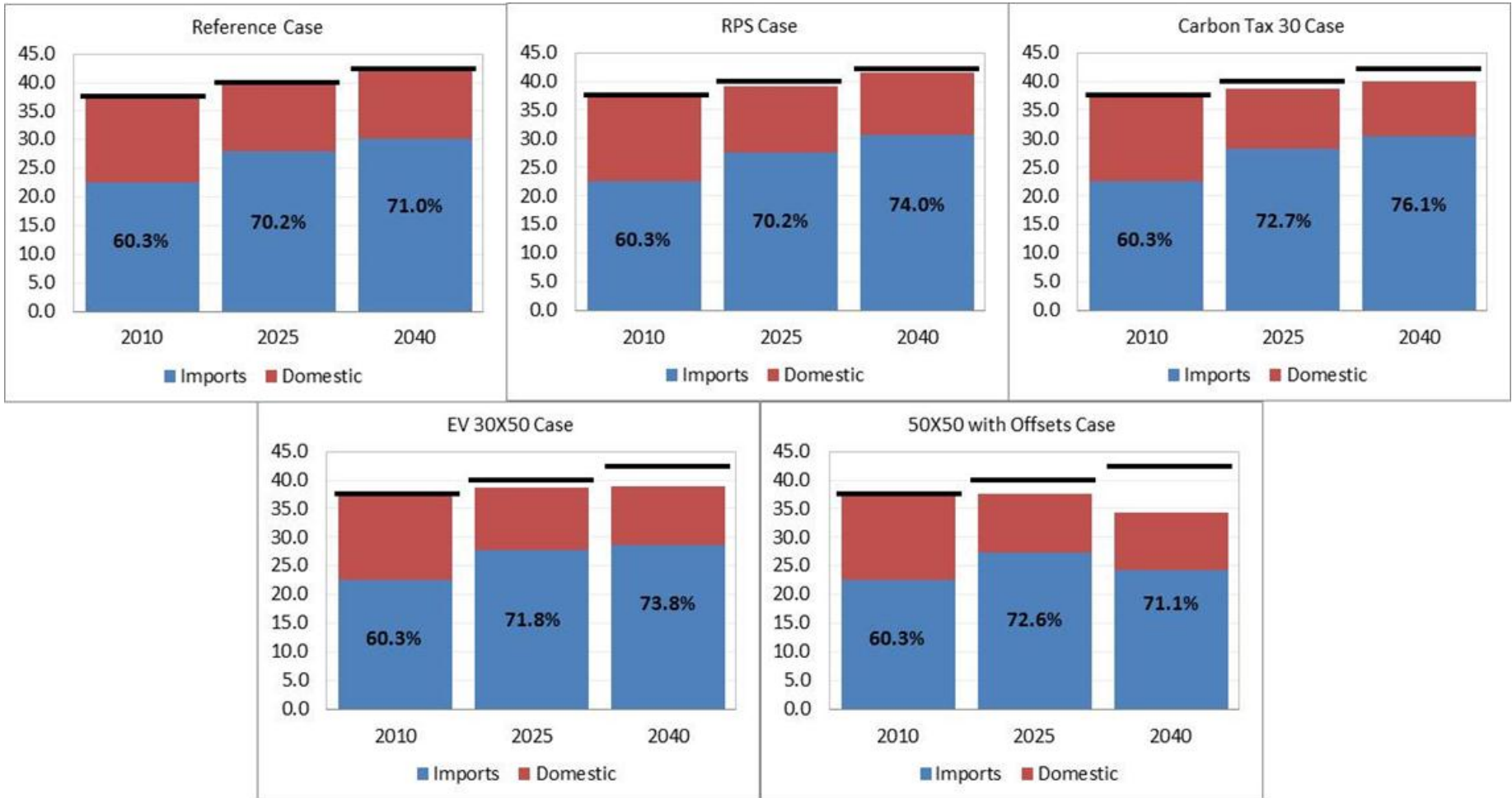
- Growth in North American shale resources renders load factors very low.
 - Load factors approach an average of 35% by the mid-2030s. However, they remain below 20% for the balance of the next two decades.



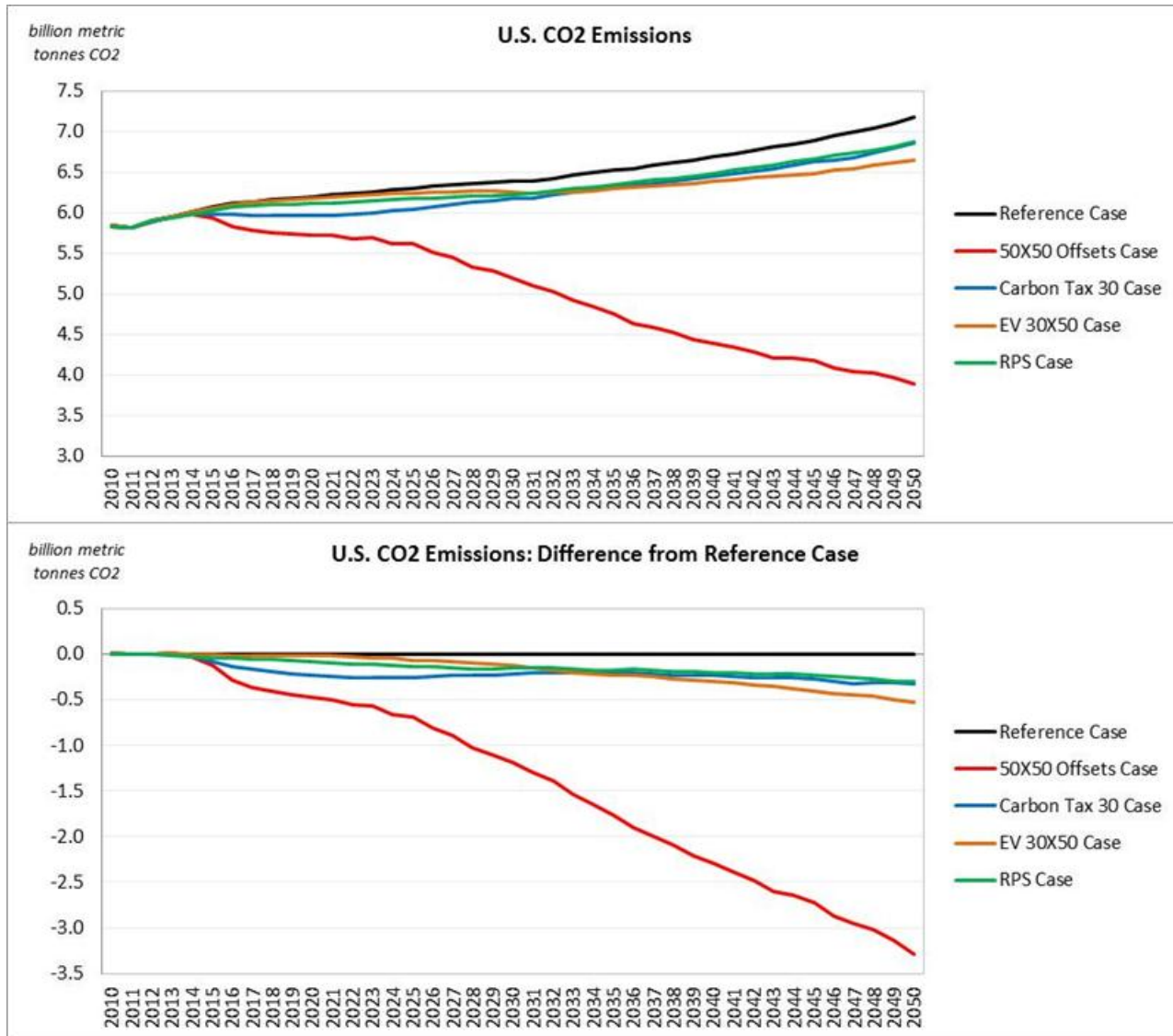
Key Finding: Policies that Sound Appealing Don't Always Bring About the Intended Consequences

- For most of the carbon abatement policies under discussion, there is often a hidden trade-off between lowering oil use/imports and lowering GHG emissions.
- Many climate policies under discussion do not actually lower the extent of U.S. dependence on foreign oil
- Some of the most effective policies to reduce emissions will also be the most expensive to the U.S. economy and U.S. consumers, a 50 percent cap could more than triple electricity prices over time
- Renewable energy is not the be-all, end-all to lowering oil demand or even lowering GHG emissions and policy that speed their use can be expensive
- Electrification of vehicles could have positive impact on energy security over time
- Acting alone, the United States will have difficulty making a dent on global GHG emissions, even if it takes the most stringent policies
- Many policies that taxing or price carbon will alter the current business as usual natural gas picture that would have limited LNG imports and kept prices stable for years to come; Iran and Venezuela would be big winners to a \$30 U.S. carbon price
- Subsidizing renewable energy will not necessarily grow GDP
- A national RPS will not significantly lower U.S. oil use or foreign imports, only drops emissions by 4 percent
- Being the first mover in alternative energy and then adopting protectionist policies to guard U.S. alternative energy technology might not be the optimum strategy for lowering overall global emissions or enhancing U.S. jobs
- Cap and Trade design is will be critical in determining the costs to consumers and also the impact on domestic industry.

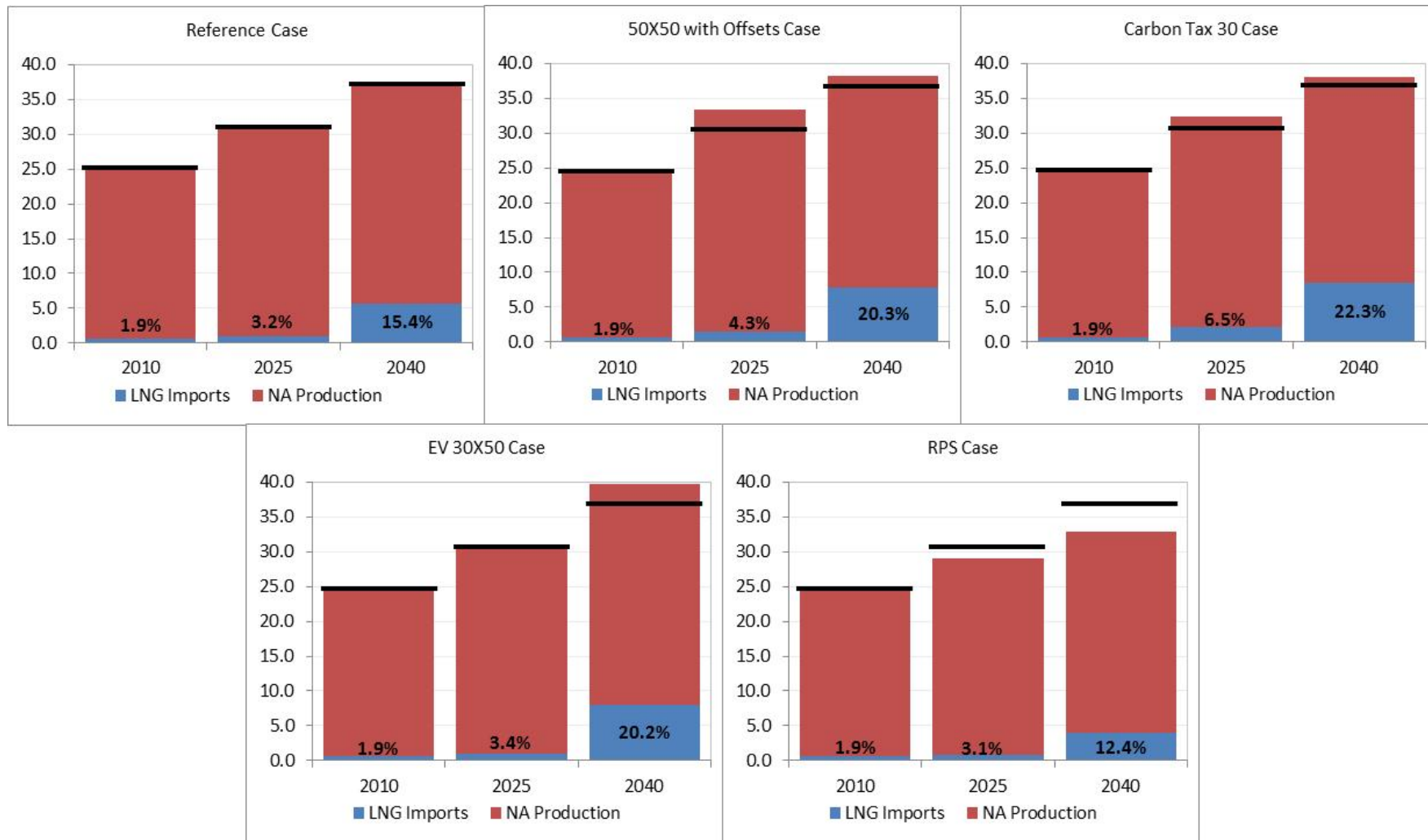
US Oil Supply in Select Cases



CO2 Emissions for Select Cases

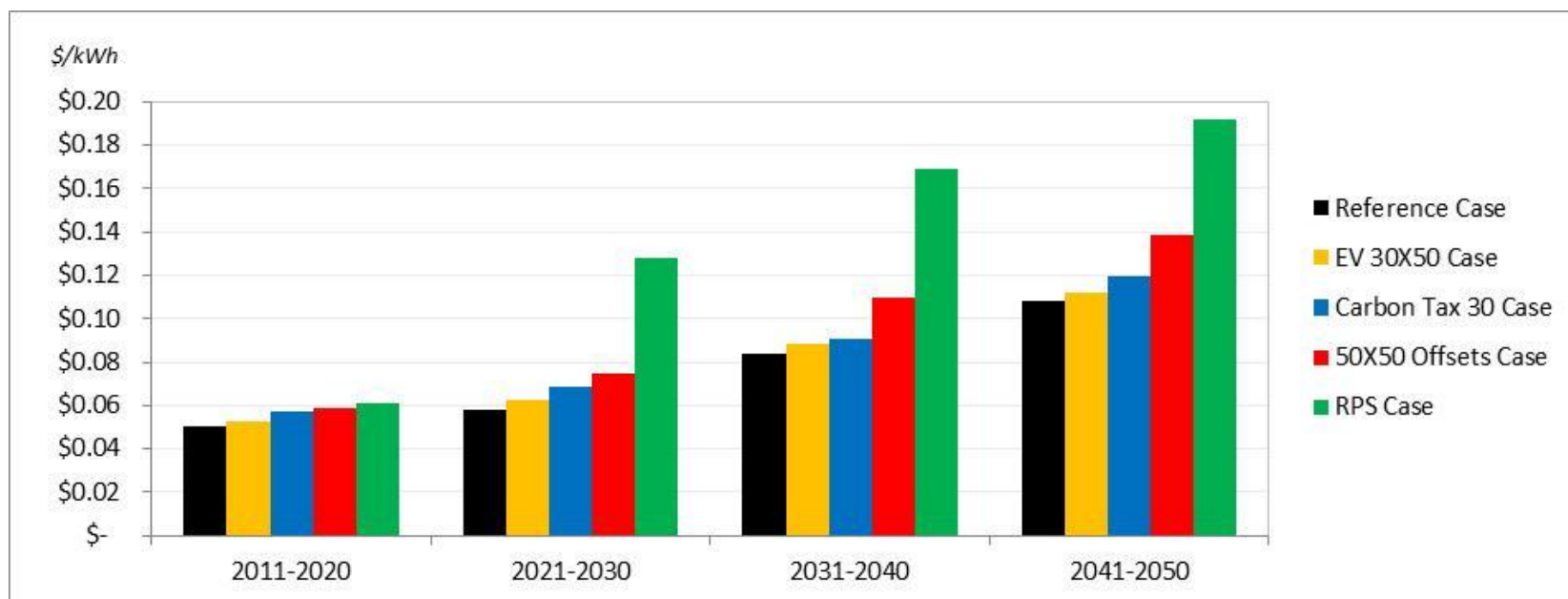


US Natural Gas Supply in Select Cases



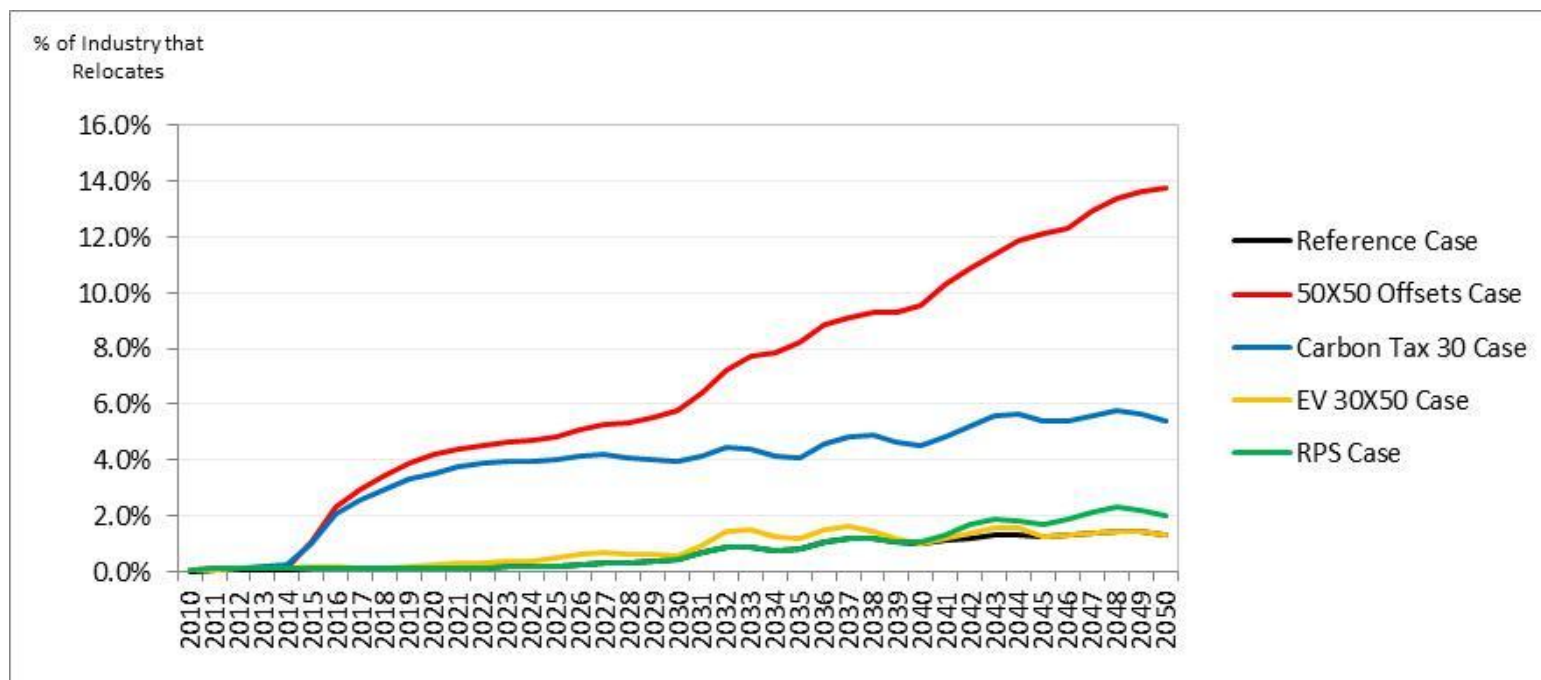
Data from *RWEM*, Hartley and Medlock 2010

Wholesale Electricity Prices in Select Cases



Data from RWEM, Hartley and Medlock 2010

Industrial Relocation in Select Cases



Data from RWEM, Hartley and Medlock 2010

Policy Take-Aways

- Two trends, the shift in car design to an electric drive train and the boom in onshore U.S. natural gas resource development offer the United States unique opportunities to enhance energy security and restrain the growth in CO₂ emissions.
- Cap and Trade design will have to be carefully considered to minimize the cost of the program on U.S. energy prices, its impact on future development of U.S. unconventional oil and gas and its influence on migration of U.S. industry
- Climate and energy security policy are not always two sides of the same coin. Optimum strategies need to take both into account. Climate policies may need to phase in certain restrictions on unconventional domestic resources to ensure that climate policy does not worsen the U.S. oil and natural gas import balance, thereby strengthening countries whose policies are hostile to the United States and its allies and increase the vulnerability of the U.S. national interest and economic prosperity in the intermediate term.
- Unintended consequences need to be evaluated more clearly before embarking on major policy changes.