U.S. DEPARTMENT OF ENERGY

Competitiveness and Commercialization of Energy Technologies

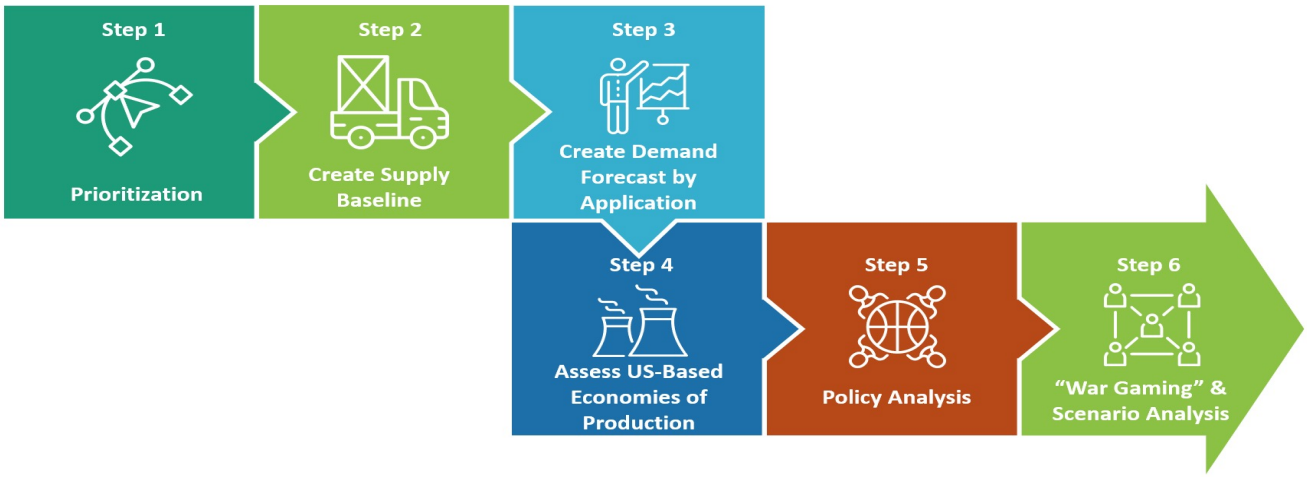
Summary

The United States Department of Energy (DOE) is focused on growing innovative clean energy technologies that will provide for the American people the secure, reliable, and sustainable energy solutions that they need. Across the Department, commercialization is a key strategy for enhancing U.S. competitiveness in the clean energy industry, as outlined in Executive Order 14017, signed by President Biden in February of 2021.

To further mitigate risks and identify opportunities for competitiveness and commercialization, an end-to-end supply chain analysis is necessary. The economic analysis framework that this report lays out will allow DOE to leverage its research, development, demonstration, and deployment (RDD&D) capabilities to fully realize the objectives of E.O. 14017.

Key Findings and Opportunities

This report, authored by the Office of Technology Transitions (OTT), provides a six-step structured analytical approach to such an economic analysis of supply chains:



Step 1: Prioritization. For each technology, map the supply chain, and screen where the biggest vulnerabilities and opportunities are based on qualitative assessments of current supply and demand. Based on the assessment, prioritize where further detailed analysis is required.

Step 2: Create Supply Baseline. Create the supply chain baseline of the current and projected global asset footprint, which includes location, costs, and volumes of assets (such as manufacturing plants), and considers the impact of new technologies.

Step 3: Create Demand Forecast. The demand forecast includes the prices the market is willing to bear, given the component's value proposition across applications, and the likely volumes demanded by the marketplace.

Step 4: Assess U.S.-based Economics of Production. Understand what it would cost to build U.S.-based assets and the unit economics to manufacture in the United States in the context of potential new technology commercialization opportunities and other market dynamics. Given that, understand where in the current supply chain stack potential U.S. assets would reside, and understand for which applications the U.S.-based output would be competitive.

Step 5: Policy Analysis. Given the supply/demand scenarios and U.S. cost competitiveness, lay out policy options that would catalyze the building of a U.S.-based supply chain.

Step 6: "War Gaming" and Scenario Analysis. The marketplace is dynamic, so any new policies or changes to the supply stack will elicit competitive responses. Use scenario analysis and simulate potential outcomes in the supply stacks, demand stacks, and global and domestic markets.

A systematic analysis for the most at-risk supply chains based on the above approach will guide decision-making across DOE and the U.S. government. The approach will be challenging to implement due to significant data gaps, difficult-to-model system dynamics, and complex interactions between companies and governments; thus, sufficient resources, multiple agencies, and central coordination will be required over the long term. This report describes the establishment of a hub-and-spoke model for analytics capabilities that will significantly augment the current capacity within DOE to execute these analyses.

The output of these analyses will inform complementary activities by interagency partners in support for U.S. exports, scale-up of small businesses, increasing competitiveness for U.S. manufacturing, and reduction in global emissions through the deployment of U.S.-developed low-emissions technology around the world.

Augmenting Supply Chain Analysis Capabilities through a Hub and Spoke Model

The clean energy sector faces rapidly changing global markets; the emergence of numerous new technologies, rapid policy development, and implementation in countries around the world to address climate change and support domestic economies; and increased action by companies to respond to this dynamic environment. Accomplishing the detailed analyses described in this report at the speed, scale, and rigor necessary, and in an ongoing manner, requires an expansion on already existing capabilities.

A hub-and-spoke model could be implemented in which a central office at DOE develops and maintains shared data and analysis tools that can be applied across multiple economic analysis contexts. The central office could provide access to data sets, "off-the-shelf" models for common analyses, such as unit costs from a production facility, analysts capable

of quick-turn and longer-term analysis tasks, and contract mechanisms to engage external subject matter experts.

Additionally, the hub could develop baseline economic analyses for cross-cutting supply chain topics, such as upstream materials relevant to multiple downstream markets and common assumptions that offices should use. ■

Download the full document and the corresponding other documents that are part of the DOE response to the supply chain executive order at: www.energy.gov/policy/supplychains