

Forecast Uncertainty in Critical Material Stockpile Needs

James S. Thomason (jthomaso@ida.org), Justin M. Lloyd (jlloyd@ida.org), Wallace Y. Ao (wao@ida.org), Amrit K. Romana (aromana@ida.org), and Eleanor L. Schwartz (eschwart@ida.org)

The Strategic and Critical Materials Defense Stock Piling Act requires the Secretary of Defense to provide a biennial report to Congress on estimated requirements for the national defense stockpile. The report must include analyses of the sensitivity of the requirements to variability in model assumptions and input data. IDA contributes to this biennial effort not only by helping to determine stockpile requirements but also by conducting sensitivity analyses.

The United States relies heavily on imports of strategic and critical materials (e.g., rare earth elements, metals, and carbon fibers) from Asian, South American, African, and European countries.

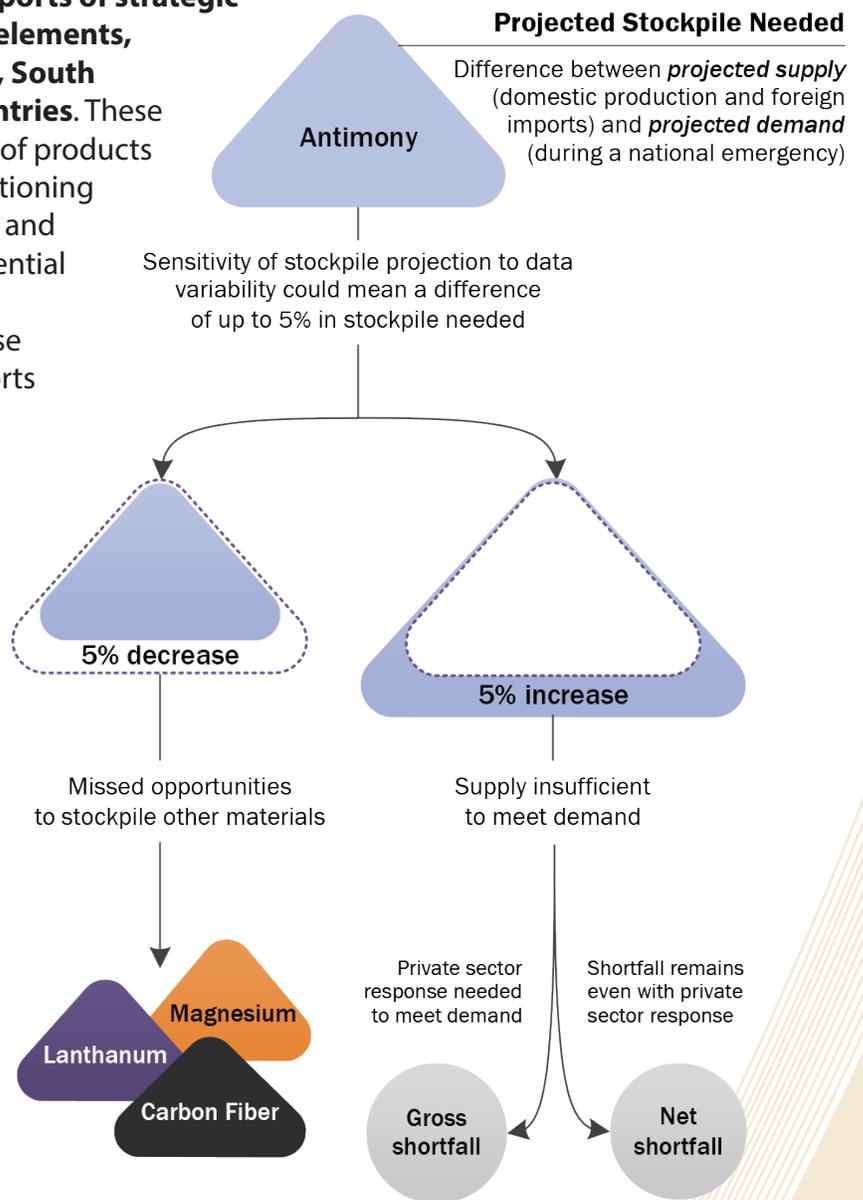
These materials are elements of a broad range of products from airframes, engines, and global positioning satellites to transmission lines, batteries, and pharmaceuticals, many of which are essential to sustaining critical civilian and military services. The U.S. stockpiles some of these materials as insurance in the event imports are disrupted. Potential shortfalls in the supply of these materials are an important consideration in the biennial report to Congress on what materials the U.S. stockpile should contain.

The Risk Assessment and Mitigation Framework for Strategic Materials (RAMF-SM) suite of models is used to help the Department of Defense (DoD) determine material stockpile requirements.

The DoD-accredited RAMF-SM identifies the materials needed to meet civilian and military demand given a baseline national emergency scenario. These demands are compared to estimates of supplies to determine potential shortfalls. Materials subject to potential shortfall become candidates for stockpiling or other measures.

RAMF-SM integrates an extensive government-wide repository of data and policy judgments spanning legislative and executive branches, other government offices and agencies, and the private sector. RAMF-SM results were the basis of determinations made in *Strategic and Critical Materials 2015 Report on Stockpile Requirements*, the 2015 biennial report to Congress.

(Continued on back)



IDA researchers examined the sensitivity of the baseline projections in the 2015 report to variability in the underlying data in the economic modeling.

The modeling was configured to track annual forecasts of major U.S. macroeconomic variables provided by the President's Council of Economic Advisors (CEA). To explore the potential sensitivity of the 2015 report's conclusions to the accuracy of the CEA's forecast, researchers observed the effect of



systematic variations to the baseline economic forecast on material shortfall calculations. They found that sensitivity to the variations could induce a 5-percent difference in projections of material stockpiles. This work contributes to a better understanding of the effect of economic forecasting errors—a measure of forecast uncertainty—on material shortfall estimates.

Based on [IDA P-5310](#), *Methods in Macroeconomic Forecasting Uncertainty Analysis: An Assessment of the 2015 National Defense Stockpile Requirements Report*, W. Ao, J. M. Lloyd, A. K. Romana, and E. L. Schwartz, March 2016. Research sponsored by the Strategic Materials Office of the Defense Logistics Agency.