

# Innovation Impact Report: KEY FINDINGS

Materials and manufacturing breakthroughs can vastly improve the productivity and competitiveness of the U.S. manufacturing sector and hold the key to enhancing clean energy products. The *Innovation Impact Report* from The Minerals, Metals and Materials Society (TMS) identifies opportunities for materials and manufacturing innovation to deliver significant energy, environmental, and economic impacts in as soon as 2 to 10 years.

The report identifies five innovation impact areas containing 54 specific breakthrough opportunities that together can:

- » Save more than 2,800 trillion British thermal units (TBtu).
- » Avoid 435 million metric tons (MMT) of carbon dioxide (CO<sub>2</sub>) emissions.
- » Eliminate \$65 billion in unproductive energy expenditures.

## Impact Highlights

Investing in the breakthrough opportunities will have significant impacts that contribute to the overall energy, emissions, and cost savings:

- A 10% reduction in the weight of the U.S. car and light-duty truck fleet can save 1,100 trillion British thermal units (TBtu), 72 million metric tons (MMT), and \$34 billion.
- A 5% improvement in the fuel economy of the U.S. car and light-duty truck fleet can save 780 TBtu, 53 MMT, and \$25 billion.
- A 1% reduction in fuel used to generate electricity using turbines can save 350 TBtu, 22 MMT, and \$400 million.
- Remanufacturing 1 million engines instead of manufacturing new engines can save 15 TBtu and 1 MMT.

The breakthrough opportunities identified in the report provide a strategic plan for R&D investment in materials and manufacturing innovation. Making this significant and sustained investment now will deliver immediate benefits to U.S. manufacturers while laying the groundwork for future clean energy advances.

### Functional Surface Technologies

Material surfaces that serve specific functions, such as speeding chemical reactions or protecting parts from wear, to deliver the maximum energy and environmental performance required by tomorrow's energy systems.

### Materials Integration in Clean Energy Systems

Integrating different combinations of materials into clean energy systems to maximize the benefits of each material for optimal system performance.

### Higher-Performance Materials

New materials designed to perform under the extreme conditions that are required to achieve greater energy efficiency, such as extreme temperatures, speeds, or other harsh conditions.

### New Paradigm Materials Manufacturing Processes

Reimagining manufacturing to use far less energy and eliminate waste to enhance U.S. manufacturing competitiveness.

### Materials and Process Development Acceleration Tools

New computer-based tools that allow scientists and engineers to understand the nature of materials in new ways, which enables new materials to be discovered and brought to market faster and more cost-effectively.

Innovation Impact Areas

TMS ENERGY

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