

# ECONOMIC IMPACTS OF ADVANCED ENERGY

## DEFINING ADVANCED ENERGY

**ADVANCED ENERGY ECONOMY (AEE), A NATIONAL** association of business leaders working to make the global energy system more secure, clean, and affordable, defines advanced energy as a broad range of products and services that constitute the best available commercial technologies for meeting energy needs today and tomorrow. Advanced Energy Economy Institute (AEEI), its educational and charitable affiliate, commissioned Pike Research, a part of Navigant’s Energy Practice, to perform,

for the first time, a quantitative and qualitative analysis of the advanced energy markets in the U.S. and globally.

Specifically, advanced energy consists of seven broad segments, which can be further broken down to 41 distinct subsegments representing specific technologies, products, or services. Advanced energy businesses may participate in one or more segments and subsegments.

ENERGY SUPPLY	ELECTRICITY GENERATION		ELECTRICITY DELIVERY & MANAGEMENT		FUEL PRODUCTION		FUEL DELIVERY
	<ul style="list-style-type: none"> <li>Hydropower</li> <li>Gas Turbines</li> <li>Solar</li> <li>Wind</li> <li>Geothermal</li> <li>Marine</li> </ul>	<ul style="list-style-type: none"> <li>Waste</li> <li>Biomass</li> <li>Nuclear</li> <li>Other DG</li> </ul>	<ul style="list-style-type: none"> <li>Transmission</li> <li>Distribution</li> <li>AMI</li> <li>Micro-grids</li> <li>EV Charging Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Energy Storage</li> <li>Enabling IT</li> </ul>	<ul style="list-style-type: none"> <li>Ethanol &amp; Butanol</li> <li>Biodiesel</li> <li>Biogas</li> <li>Synthetic Diesel &amp; Gasoline</li> </ul>	<ul style="list-style-type: none"> <li>Bio-oil</li> <li>CNG &amp; LNG</li> <li>Hydrogen</li> </ul>	<ul style="list-style-type: none"> <li>Fuel Transportation Infrastructure</li> <li>Fueling Stations</li> </ul>
ENERGY DEMAND	BUILDINGS		TRANSPORTATION			INDUSTRY	
	<ul style="list-style-type: none"> <li>Building Design</li> <li>Building Envelope</li> <li>HVAC</li> <li>District Energy, CHP, CCHP</li> </ul>	<ul style="list-style-type: none"> <li>Water Heating</li> <li>Lighting</li> <li>Appliances &amp; Electronics</li> <li>Enabling IT</li> </ul>	<ul style="list-style-type: none"> <li>Propulsion Systems</li> <li>Vehicle Design &amp; Materials</li> <li>Freight Logistics</li> <li>Land Use &amp; Infrastructure Design</li> <li>Enabling IT</li> </ul>	<ul style="list-style-type: none"> <li>Manufacturing Machinery &amp; Process Equipment</li> <li>Industrial Combined Heat &amp; Power</li> </ul>			

(Source: Advanced Energy Economy Institute)

# SIZING ADVANCED ENERGY MARKETS

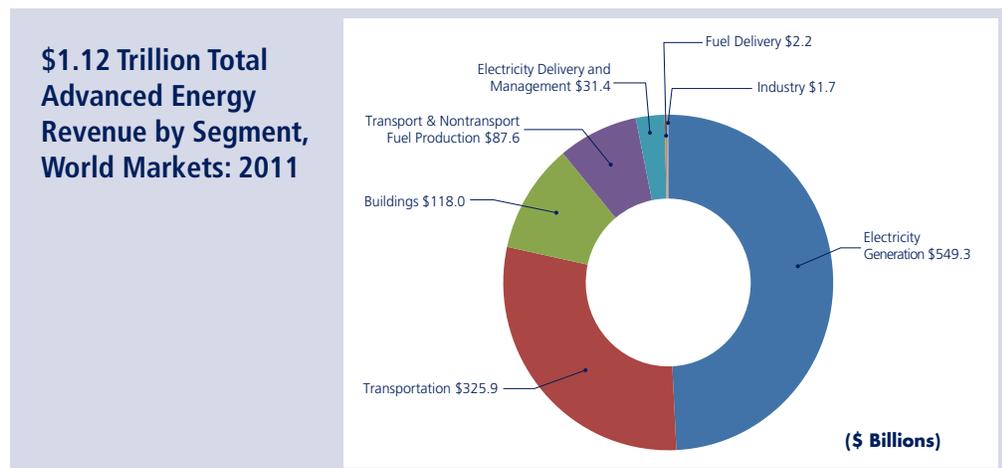
**THE REPORT DRAWS UPON OVER 60 PREVIOUSLY** published Pike Research studies, as well as information maintained by Navigant's Energy Practice, to build an assessment of advanced energy markets measured by revenue generated by the individual product categories, globally and within the United States. The market revenue for most subsegments is based on the total installed cost of the technology. The report also quantifies the contribution of the domestic market to U.S. Gross Domestic Product (GDP) and tax revenues. The results must be viewed

as a conservative assessment, for though this may be the most comprehensive study available to date, it is not necessarily complete, as some segments and subsegments are understated or not quantified at all due to a lack of available data. In addition, the domestic market does not include the value of exports from the U.S., and the impact on U.S. GDP is calculated based only on the domestic content of the U.S. market (i.e., it excludes exports and revenue attributed to non-domestic activity). Revenues for 2012 are estimates made late in 2012 and subject to adjustment.

## SUMMARY FINDINGS

### GLOBAL MARKET

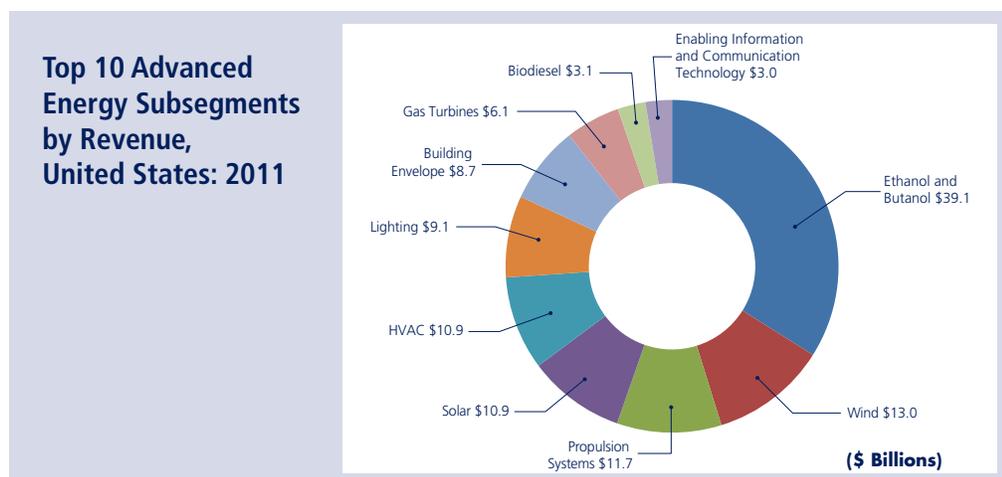
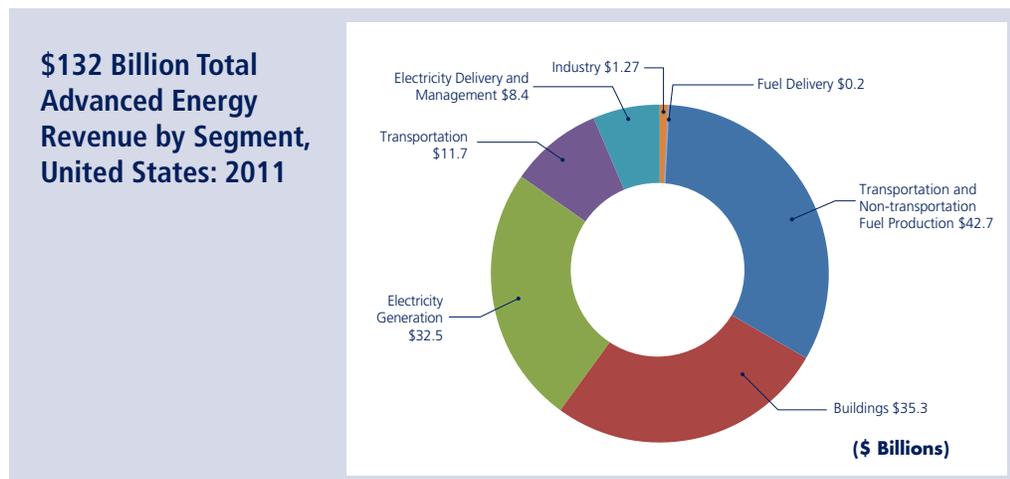
- In 2011, global revenue from the seven advanced energy segments reached nearly \$1.12 trillion. The largest segment was Electricity Generation with \$549.3 billion in 2011 revenues, accounting for 49% of the total and driven by Hydropower, followed by the Solar and Wind subsegments.
- Transportation was the second largest segment with 2011 revenues of \$325.9 billion, which accounted for 29% of the global market, as sales of clean diesel vehicles surpassed 7.3 million units. Next largest was the Buildings segment with revenues of \$118 billion and Fuel Production with revenues of \$87.6 billion.
- Global advanced energy revenues are expected to decline 6% in 2012 to just under \$1.05 trillion driven principally by a cyclical decline in Hydropower, as Chinese orders drop after a big 2011. The only other segment expected to see a year-over-year reduction is Fuel Delivery, down 13% compared to 2011, due to a decrease in new fueling stations in the Asia Pacific region. The five other segments are expected to achieve significant year-on-year growth rates: Electricity Delivery and Management: 40%, Fuel Production: 22%, Buildings: 19%, Transportation: 18%, and Industry: 11%.



Source: Pike Research, a Part of Navigant's Energy Practice

## U.S. MARKET

- In 2011, the U.S. advanced energy market reached \$132.0 billion, representing nearly 12% of the global market. The domestic advanced energy market is expected to grow to an estimated \$157.0 billion in 2012, with the U.S. share of the global market expected to rise to 15%.
- Revenues from the top 10 U.S. advanced energy subsegments in 2011 accounted for \$115.3 billion, or 87% of all U.S. advanced energy revenue. The same top 10 subsegments are expected to grow to a combined \$136.8 billion in 2012 and account for 87% of the U.S. advanced energy market.
- Ethanol was the biggest U.S. subsegment with revenues of \$39.1 billion, which contributed to Fuel Production being the largest U.S. segment in 2011 at \$42.7 billion. The next largest segment, Buildings, accounted for \$35.3 billion in 2011 revenues, led by the Heating, Ventilation, and Air Conditioning (HVAC) subsegment. The Buildings segment is expected to grow to \$41.6 billion in 2012.

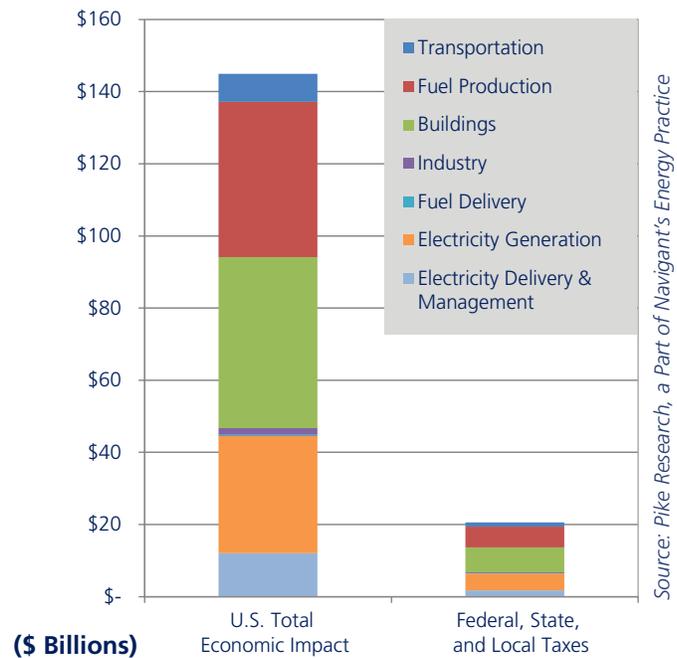


Source: Pike Research, a Part of Navigant's Energy Practice

## IMPACT ON U.S. ECONOMY AND TAX REVENUES

- The \$132 billion in U.S. revenues from the seven advanced energy segments in 2011 resulted in \$145 billion in increased U.S. GDP. The economic impact of U.S. exports into global markets is not captured in the contribution to U.S. GDP, making this a conservative estimate.
- The U.S. advanced energy industry contributed \$13.9 billion in federal tax revenue in 2011, plus another \$6.7 billion in state and local tax revenue, for a total tax contribution of \$20.6 billion.

### Advanced Energy Economic Impact & Tax Generation, United States: 2011

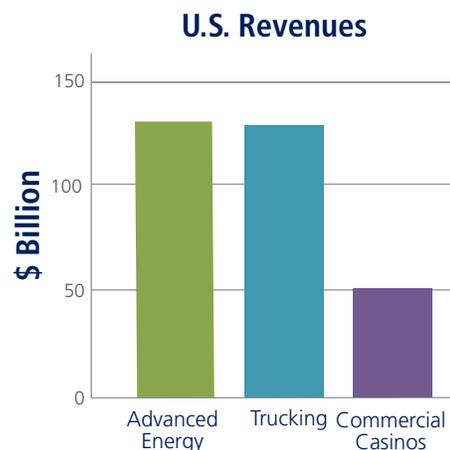
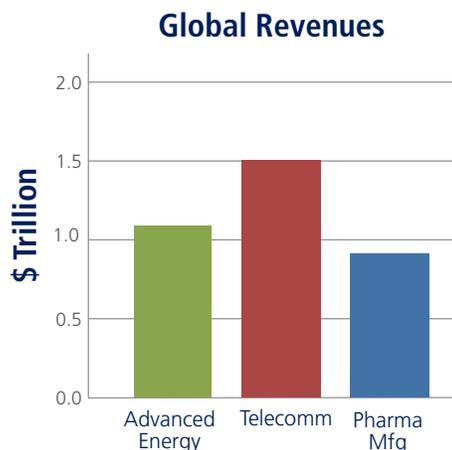


Source: Pike Research, a Part of Navigant's Energy Practice

## CONCLUSION

- Based on 2011 revenues, advanced energy represents a significant industry in the U.S. and around the world.
- Globally, advanced energy is larger, by revenue, than pharmaceutical manufacturing, and roughly 2/3 the size of telecommunications.
- In the U.S., advanced energy is larger than the trucking industry that distributes goods throughout the country, and more than twice the size of the commercial casino industry.

### Comparisons of Advanced Energy Market Size to Other Industries



Sources: Pike Research, a Part of Navigant's Energy Practice (advanced energy), First Research (freight trucking and pharma), The Brattle Group (casinos), World Trade Organization (Telecomm), AEE analysis