

U.S. Overview, Quadrennial Energy Review, and Quadrennial Technology Review

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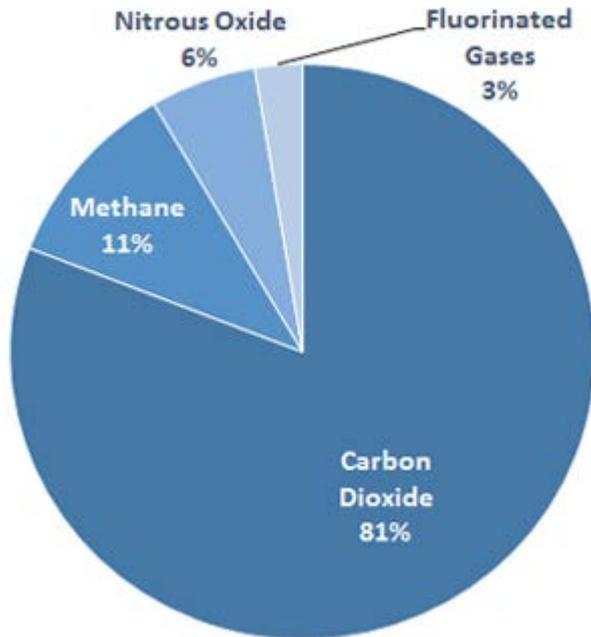


- U.S. Overview
- Quadrennial Energy Review
- Quadrennial Technology Review

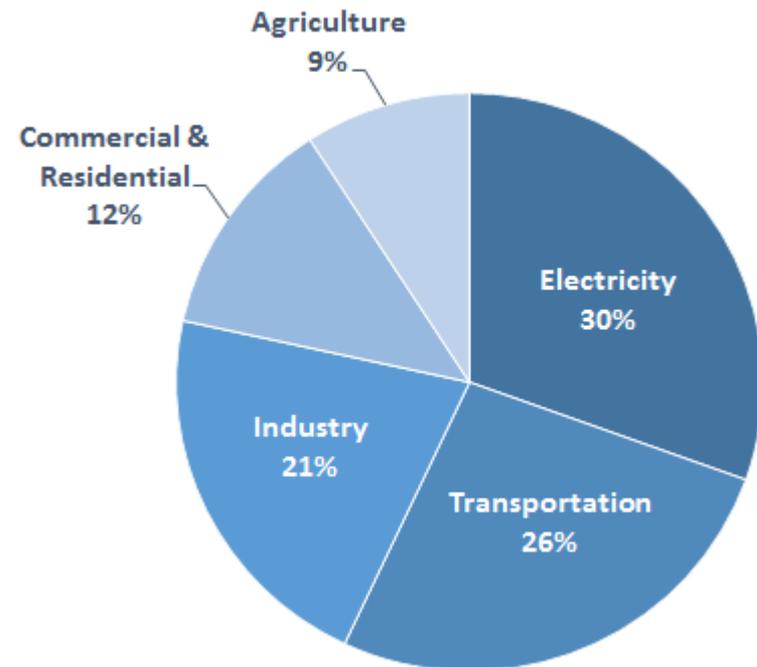
2014 U.S. Emissions by Greenhouse Gas and Sector



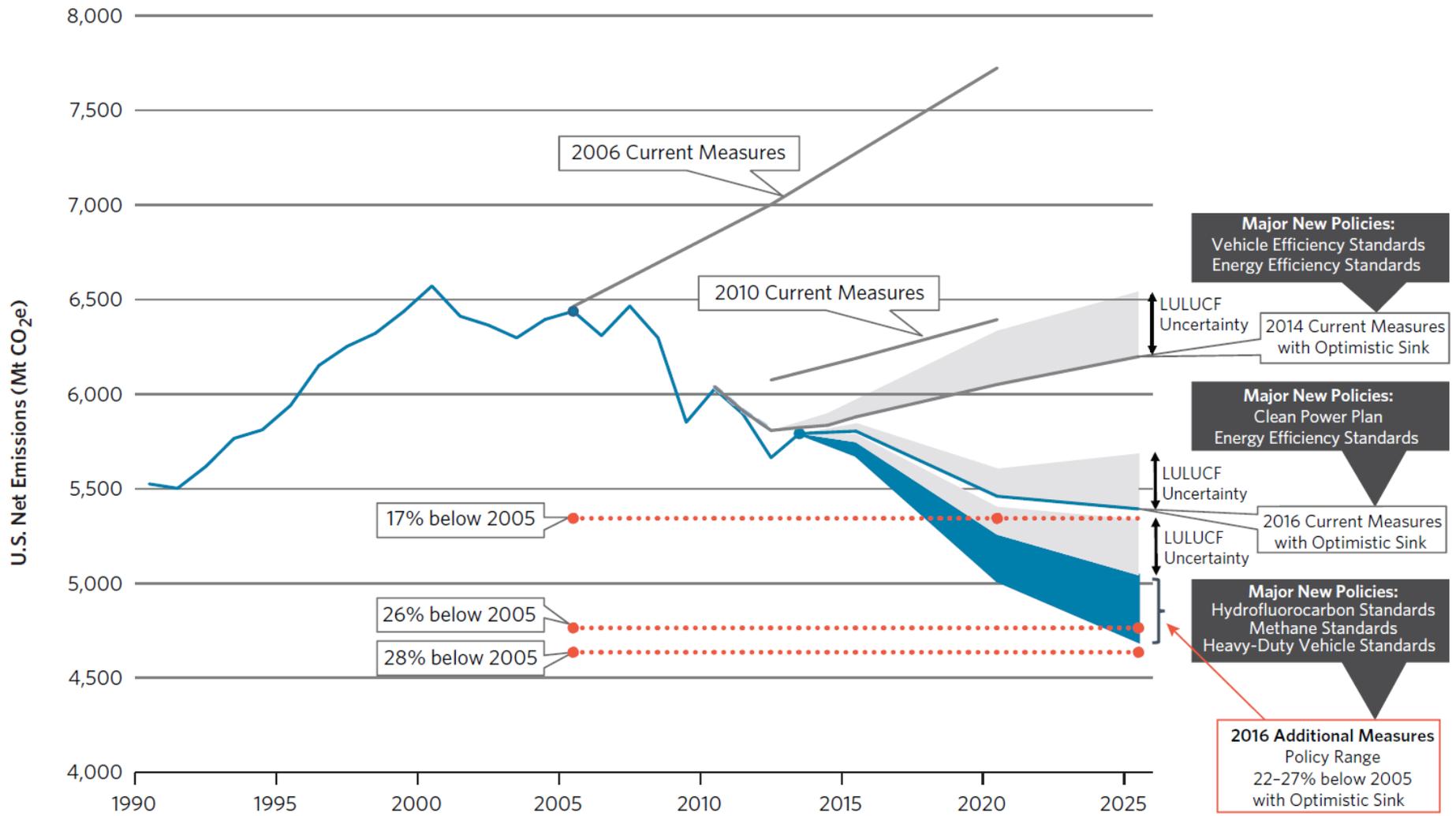
U.S. GHG Emissions by Gas



U.S. GHG Emissions by Sector



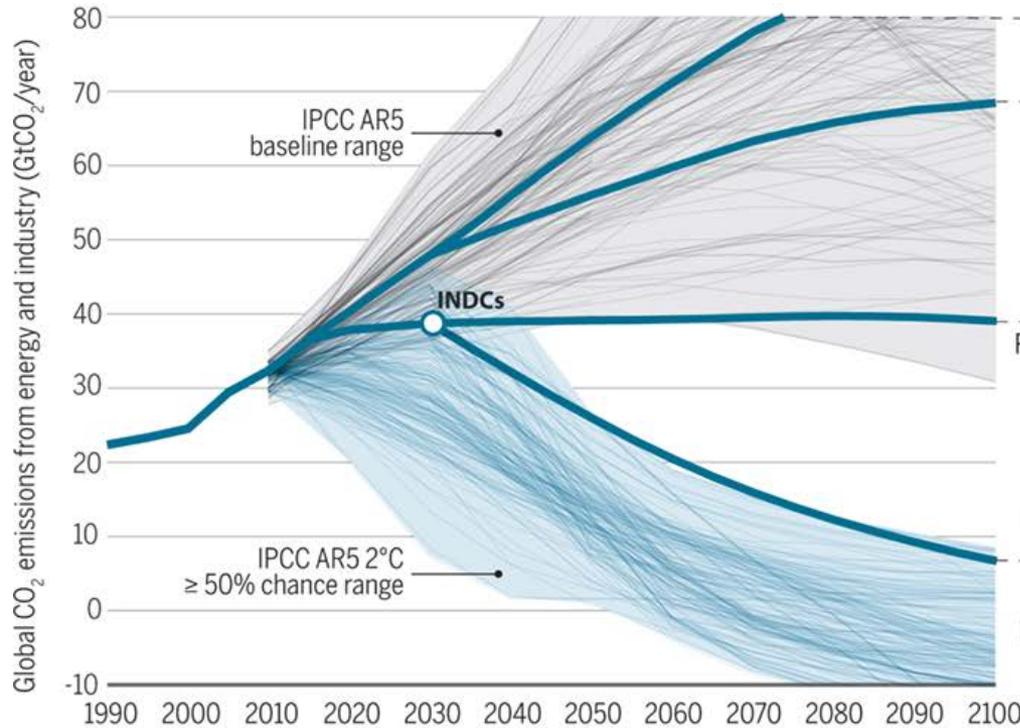
2016 Biennial Report—U.S. Greenhouse Gas Projections



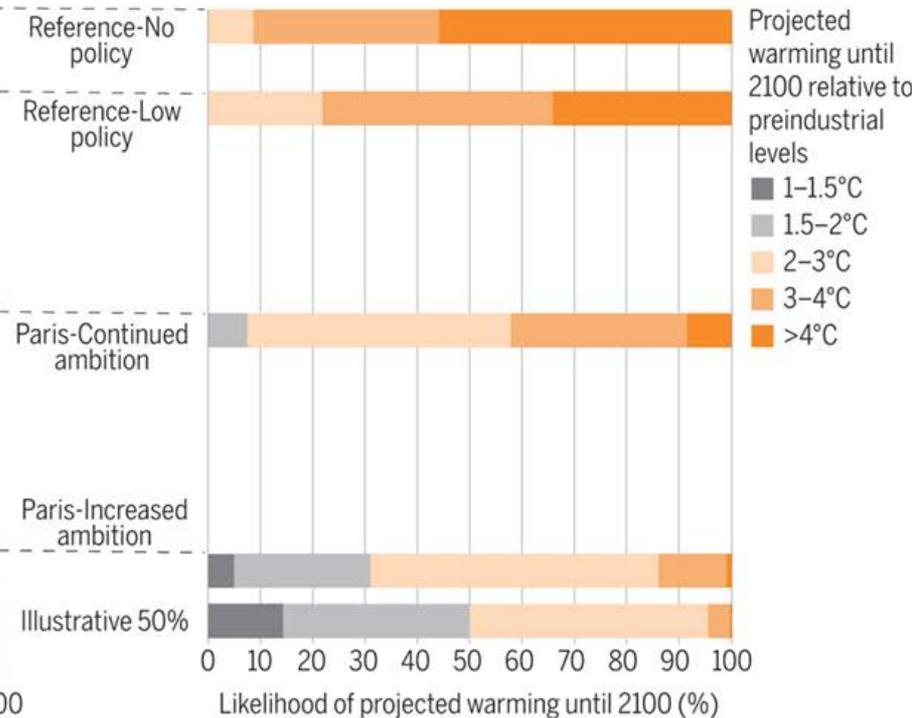
Comparing Climate Goals to COP 21 Temperature Targets



A Emissions pathways



B Temperature probabilities



Fawcett et al 2015, sciencemag.org



The Paris Agreement “*invites* Parties to communicate, by 2020, to the secretariat mid-century, long-term low greenhouse gas emission development strategies.”

In March, in a joint-statement with Canada, the United States committed to “completing, in 2016, mid-century, long-term low greenhouse gas emission development strategies pursuant to the Paris Agreement and encouraging this approach with members of the G-20.”

IEA projection shows nuclear and renewables provide significant world-wide GHG reductions to 2050



Publications

Energy Technology Perspectives

ETP 2016

Data Visualisation

<http://www.iea.org/etp/explore/>

Energy Technology Perspectives 2016





Quadrennial Energy Review: Called for by the President to analyze government-wide energy policy, particularly focused on energy infrastructure.

QER 1.1 published May 2015

QER 1.2 underway

Quadrennial Technology Review: Provides analysis of the most promising RDD&D opportunities across energy technologies in working towards a clean energy economy.

QTR 2011

QTR 2015, in parallel with QER



Quadrennial Energy Review

Submit comments through July 1:
epsa.energy.gov/qer-comments/

QER 1.1: Implementation



Implementation Breakdown:

- Executive Action (White House)
 - DOE – 33
 - Other Federal Agencies – 10
- Legislative Action (Congress)
 - New Appropriation – 11
 - New Statute – 9



Highlights:

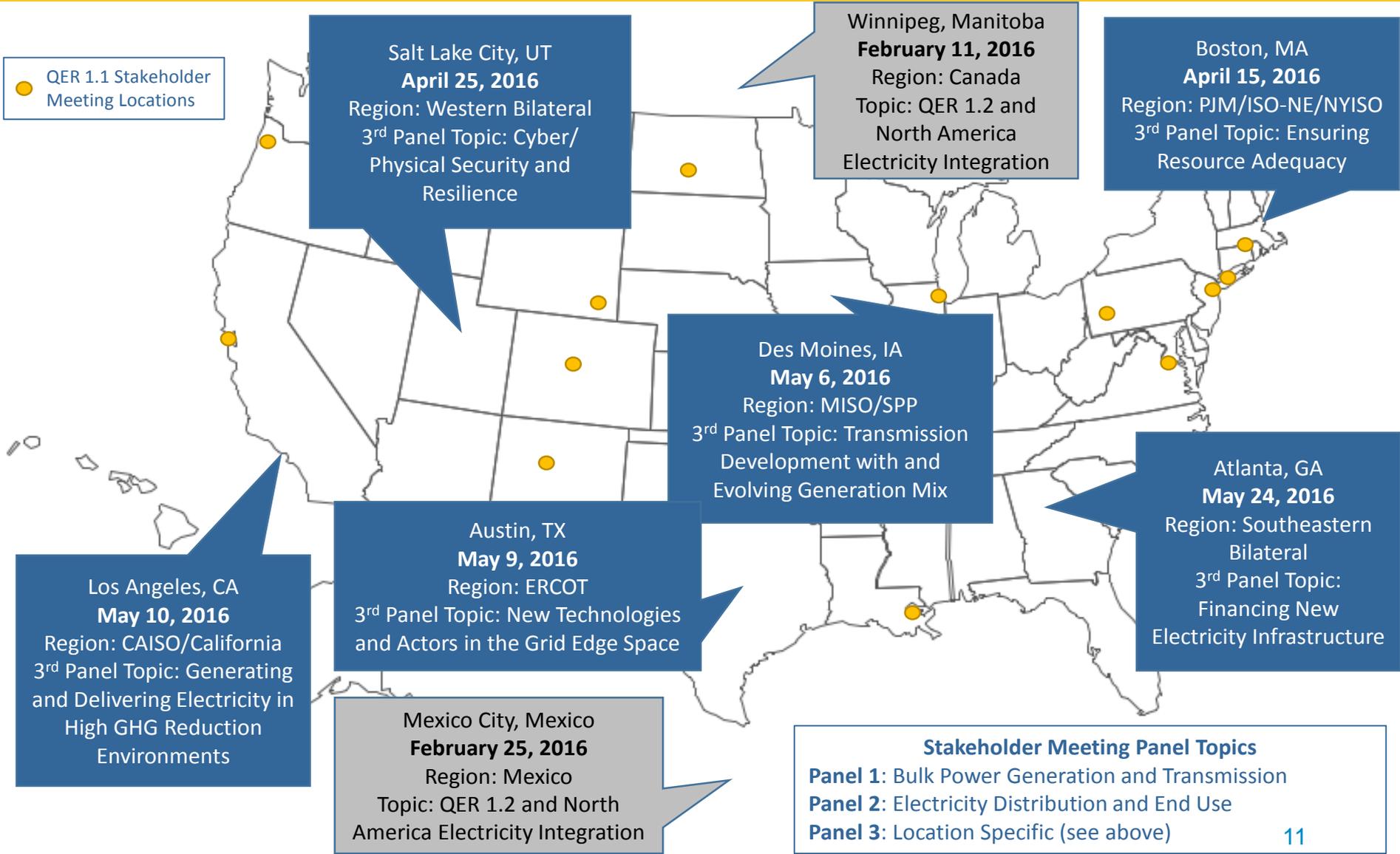
- 3 recommendations are complete
- 9 recommendations are now law following Congressional action
- \$2 billion to modernize the Strategic Petroleum Reserve

QER 1.1 Implementation Report Card

- Detailed analysis of all 63 recommendations
- Shows where additional work is required
- EPSC plans Report Card release in June 2016
- Statutory deadline on June 18: EPSC submits report to Senate Energy and Water Subcommittee (Budget deal passed 12/18)

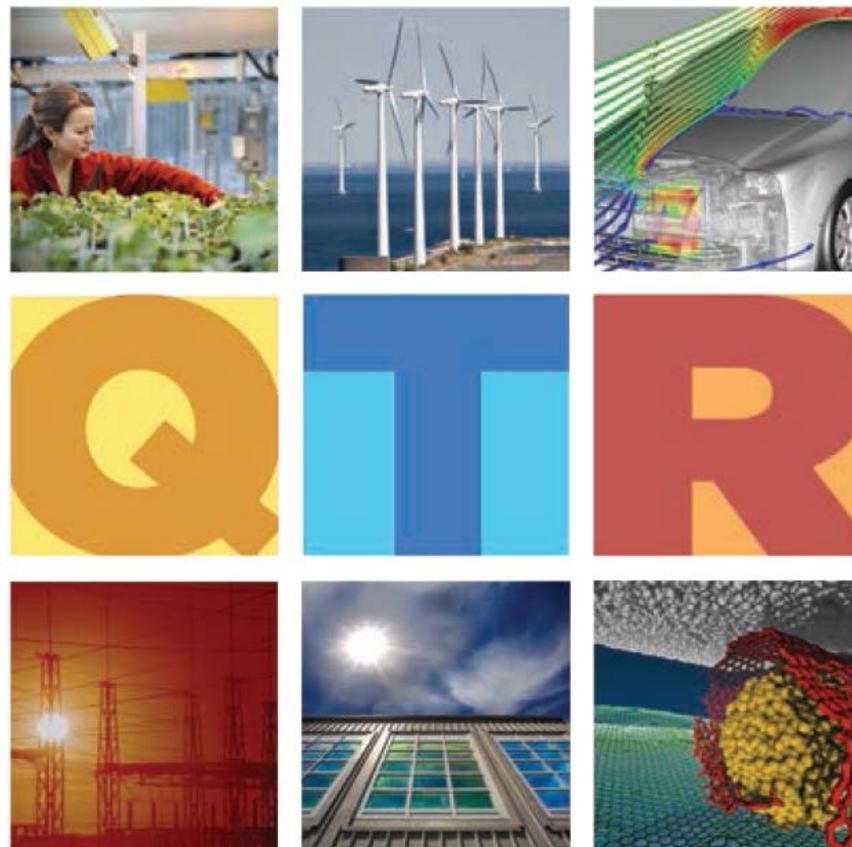


QER 1.2 Stakeholder Meetings





Quadrennial Technology Review



Criteria for Energy Technology Assessments



Maturity

Materiality (Impacts)

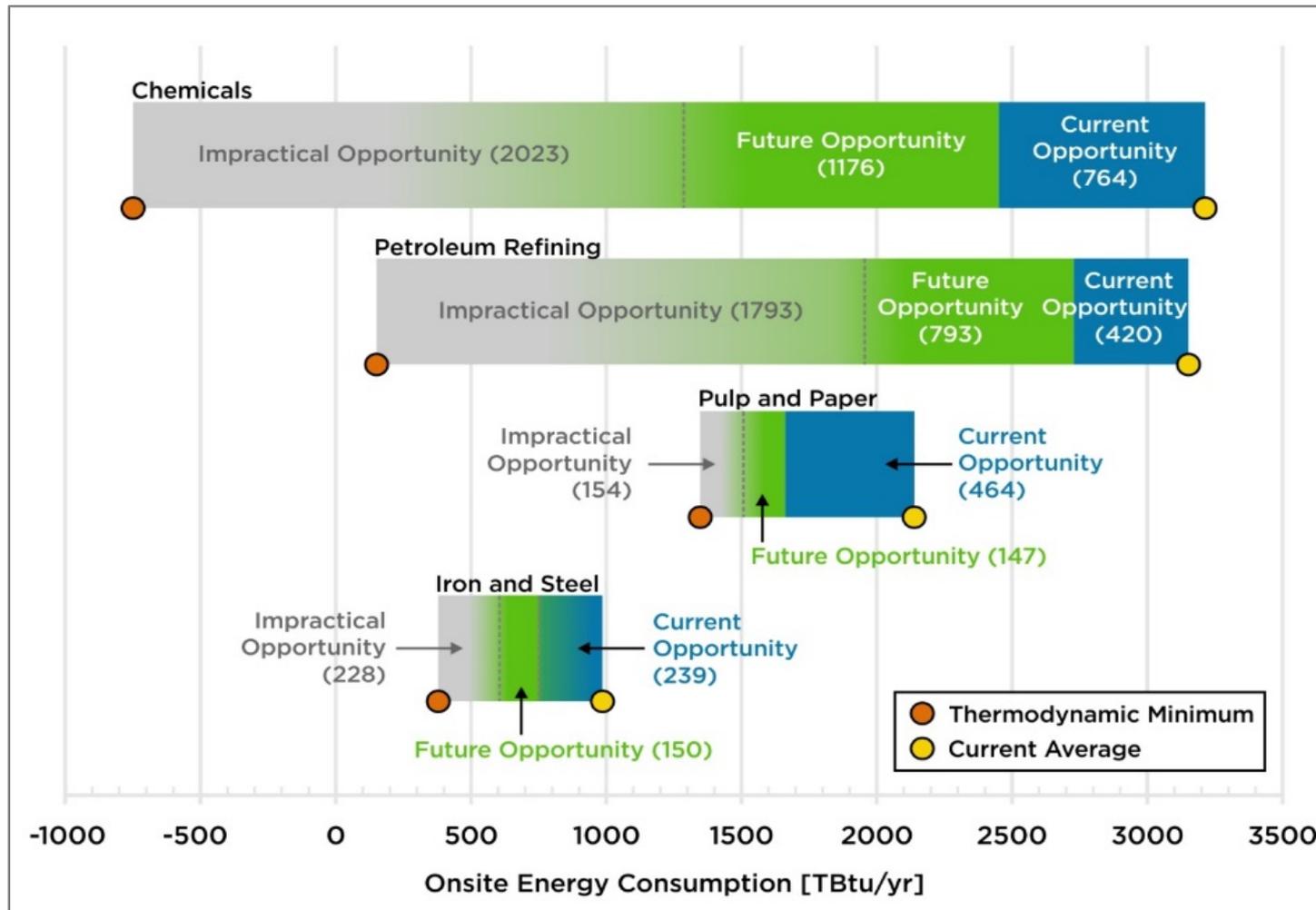
Market potential

Public benefits

Public role

QTR 2015: Opportunities in clean electric power technology development	
Nuclear power	<p>Light water reactors: Characterize reactor material aging, drive down costs of new construction, improve analysis tools to better characterize safety margins</p> <p>High temperature and fast reactors: Advanced materials/fuels, modeling and simulation with validation experiments to demonstrate performance</p> <p>Fuel cycle technology: Improved understanding of material degradation under extended storage of high-burnup fuels; assessing alternate repository geologies and long-term interaction effects with waste forms; research and testing of actinide-bearing fuels</p> <p>Hybrid systems: Dynamic modeling and demonstration of subsystem interfaces</p>
Hydropower	<p>Materials and turbine designs, modularization, technology-based footprint reduction</p> <p>Supporting research needed in hydrologic, ecological, environmental, hydrodynamic, hydromechanical, operations, and power system data collection, monitoring, modeling, and analysis</p>
Wind power	<p>HPC model development, verification, and validation of high-fidelity physics-based atmospheric and complex flow models to improve wind farm design and operation</p> <p>Effective grid integration, including high-resolution short-term resource forecasting</p>
Biopower	<p>Utility-scale biopower with CCS to improve power production efficiency and offer a cost-competitive GHG reduction alternative</p> <p>Use and integration of biogas processes</p>
Solar (PV and CSP)	<p>PV: Innovation that will enable low cost manufacturing in the United States</p> <p>CSP: Lower capital cost for large-scale deployment</p> <p>Systems integration: Integration with storage solutions and energy management systems</p> <p>Nonhardware soft cost: Solutions to streamline processes and drive down costs of permitting, interconnection, finance, and customer acquisition</p>
Geothermal energy	<p>Develop advanced remote resource characterization tools to identify geothermal opportunities without surface expression</p> <p>Purposeful control of subsurface fracturing and flow</p> <p>Improved and lower \$/MW subsurface access technologies</p> <p>Develop mineral recovery and hybrid systems to provide second stream of value</p>
Fuel cells	<p>Drive down costs through research into membrane processes and materials</p> <p>Focus on gas cleanup for increased fuel flexibility, advanced materials, hydrogen production, and manufacturing technology</p> <p>Modeling and simulation with technology validation to demonstrate performance</p>
Marine hydrokinetic power	<p>Next-generation component technology RDD&D designed specifically for the challenges of the marine environment, including advanced controls to tune devices to optimize energy extraction, compact high-torque low-speed generator technologies, and corrosion and biofouling resistant materials and coatings</p> <p>Development of open source, fully validated MHK modeling and simulation codes</p> <p>Collection of technology performance and cost data through device demonstrations</p>

Technical potential for reducing energy consumption in four energy intensive industrial sub-sectors



DOE Advanced Manufacturing Office Bandwidth Studies, 2015



Thank you!

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