

DOE FY2013 Congressional Budget Request for EERE

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Outline

- Overview
- Key Funding Changes
- Context / Questions
- Historical Spending Context
- References

Overview

- DOE total request up \$855.5 M (3.2%)
- EERE up \$457.7 M (25.3%)
- Largest EERE increase is for manufacturing
- Electric (OE) up \$3.9 M (2.8%)
- Offsets: oil and natural gas tax subsidies

FY2013 Emphasis

Entire EERE effort: Transformation to Clean Energy Economy

- International Competitiveness (Manufacturing & Jobs)
- Climate Change (Reduced Carbon)
- Oil Imports (EVs & Biofuels)

Administration's Goals

- Reduce oil imports 1/3 by 2025
- 1 million EVs on the road by 2015
- Non-residential buildings 20% more efficient by 2020
- 80% clean energy power generation by 2035 (includes nuclear and efficient gas)
- Cut greenhouse gases 17% below 2005 level by 2020

Program Funding Changes

- Largest \$ increases
- Other large \$ increases
- Significant \$ decreases

Funding Calculation References

- All funding changes shown in the presentation follow those in the DOE request.
- The differences are calculated between the FY2013 request and the FY2012 appropriation.
- DOE mainly uses new subprogram account structure.

New Subprogram Account Structure

- Four new subprograms follow the technology development (RDD&D) progression.
- Each subprogram is identified with technology readiness levels (TRLs), ranging from 1 (basic research) to 10 (market commercialization):
 - Innovations (applied research, TRL 2-3)
 - Emerging Technologies (development, TRL 3-6)
 - Systems Integration (demonstrations, TRL 6-8)
 - Market Barriers (deployment, TRL 8-10)

Largest \$ Increases

Technology Programs:

- Manufacturing + \$174.4 M (151%)
- Vehicles + \$91.2 M (28%)
- Buildings + \$90.8 M (41%)
- Biomass/Biorefinery + \$70.7 M (36%)

Grant Programs:

- Weatherization + \$71.0 M (104%)

Other Notable Increases

- Strategic Programs + \$33.9 M (136%)
- Geothermal + \$27.1 M (72%)
- Solar + \$21.0 M (7%)

Significant Decreases

- Water Power - \$38.8 M (-66%)
- Hydrogen/FC - \$23.6 M (-23%)

EERE Themes for \$ Increases

- Manufacturing Technologies: Processes and Materials
- Vehicles: EV Grand Challenge, Batteries & Electric Drive Technology
- Buildings: Standards/Codes, CBI, Emerging Technologies
- Biomass: Biorefineries, Feedstocks, Conversion Technologies

Innovation Hubs

Hub focus: innovation & commercialization

- Manufacturing, + \$19.5 (?) M for Critical Materials Hub (second year)
- Buildings, + \$23.6 M for Energy-Efficient Building Systems Design Hub (third year)
- Electricity Program, + \$20.0 M for a new Electricity Systems Hub

AMO Manufacturing Overview

- Reduce energy use of manufactured goods by 50% over 10 years
- Process improvements include intelligent sensors/controls, low-temperature operations, and oil substitutes
- Public-private partnerships (MDFs, Awards, Challenges, IMI) for process demonstrations
- Critical Materials Hub: materials substitutes (low density, thermoelectric, rust-resistant) to curb dependence on rare/costly materials

Manufacturing: Old Structure

Industrial Technologies Program, up \$174.4 M
(151%)

- Next Gen. Manuf. Processes, +\$136.7 M
- Next Generation Materials, + \$19.5 M
- Industrial Technical Assistance, + \$13.3 M

Manufacturing: New Structure

Manufacturing Office, up \$174.4 M (151%)

- Innovations, +\$5.4 M
- Emerging Technologies, + \$51.7 M
- Systems Integration, + \$99.0 M
- Marketing Barriers, + \$13.3 M

Manufacturing Processes 1

Funding change for Emerging Technologies:

- New technology and computer simulation tools to reduce/integrate processes & discover alternate processes
- Example: sensors/controls, to reduce energy losses from motors, steam, and process heating
- Example: bio-manufacturing, using plants to produce feedstocks (oil substitutes)

Manufacturing Processes 2

Funding change for Systems Integration:

- Address technical risk by identifying production-scale capability and system-level issues.
- Public-private partnerships would involve project competitions and provide technology access for small/medium firms.
- “Candidate” projects include:
 - high quality composite curing (out of autoclave)
 - three dimensional layering (additive manufacturing)
 - reduced material loss (titanium powder production).

Next Generation Materials

- Goals: energy, carbon, & economic benefits + product quality & productivity
- Breakthroughs for new capabilities: high function/performance, thermal & degradation resistant, lower cost
- Examples:
 - Low density materials for rotating parts in hubs/gears increase design opportunities for wind turbines & cars
 - High temperature/rust-resistant steels could bypass critical materials and cut costs

Vehicles Highlights

- Goal for 1 million EVs on road by 2015
- Focus on doubling battery energy density and reducing production cost by 70%
- Funding increases, esp. EV Grand Challenge:
 - + \$86 M for Batteries and Electric Drive Technology:
[advanced batteries, power electronics, charging stations]
 - Under new account structure:
 - + \$39 M for Innovations
 - + \$55 M for Emerging Technologies

Buildings Highlights

- Goal of 50% energy use reduction for new buildings by 2030
- + 39.9 M to accelerate equipment standards & building codes and establish 6 new standards
- + 29.2 M for CBI partnerships for retrofit demonstrations and new activities in SSL, HVAC, envelope/windows, sensors/controls, & manuf.
- Building Design Innovation Hub extended again
- Note: Major long-term barriers (Cong. Staff, see CRS report R40670 by Paul Parfomak)

Biomass Highlights

Biomass/Biorefinery, + \$71 M (36%)

- Integrated Biorefineries, + \$52 M for pilot- and demonstration-scale biorefinery plants
- Feedstocks, + \$11.1 M for conversion to solid pellets or “green crude” bio-oil
- Conversion Technologies, + 10.3 M for bio-oil, algae dewatering

Context: System Integration (Demonstration Projects)

- Innovation Valley of Death. Long-standing policy debate over the federal role in filling the gap between R&D and market commercialization.
- Demonstration projects tend to be very expensive.
- ARPA-E was created to spur development of “breakthrough” technologies.
- Recovery Act fast-track loan guarantee program for commercial technologies, now closed.
- Budget deficit concerns tend to limit spending.

FY2011: Compare Efficiency, Renewables, Nuclear, and Fossil

- Nuclear R&D (\$1,173 M) was highest [fission (\$806 M) and fusion (\$367 M)]
- Renewables R&D (\$807 M) was second
- Efficiency R&D (\$689 M) was third
- Fossil R&D (\$434 M) was fourth

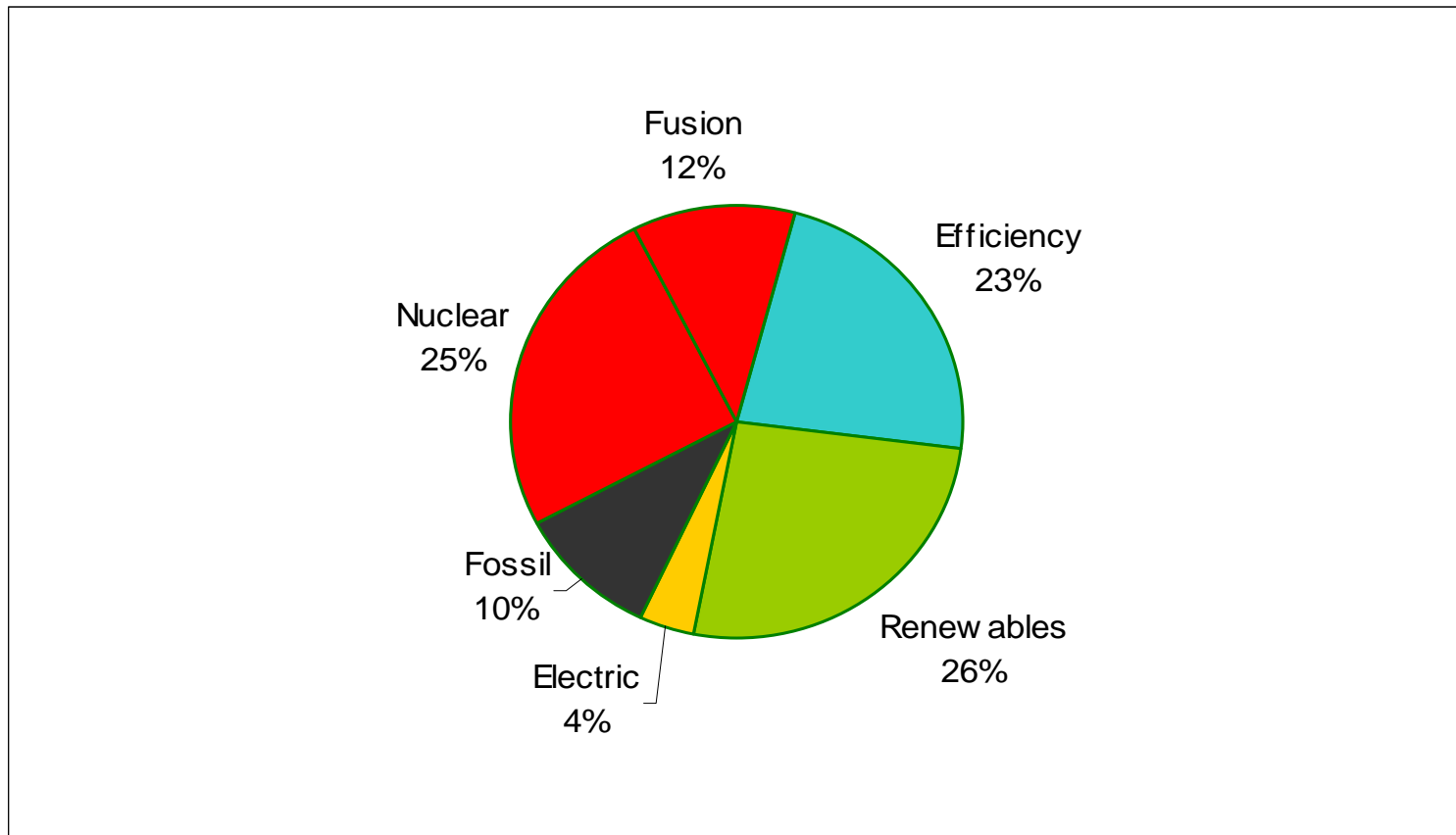
FY2012: Compare Efficiency, Renewables, Nuclear, and Fossil

- Nuclear R&D (\$1,260 M) was highest [fission (\$859 M) and fusion (\$401 M)]
- Renewables R&D (\$890 M) was second
- Efficiency R&D (\$773 M) was third
- Fossil R&D (\$347 M) was fourth

FY2013: Compare Efficiency, Renewables, Nuclear, and Fossil

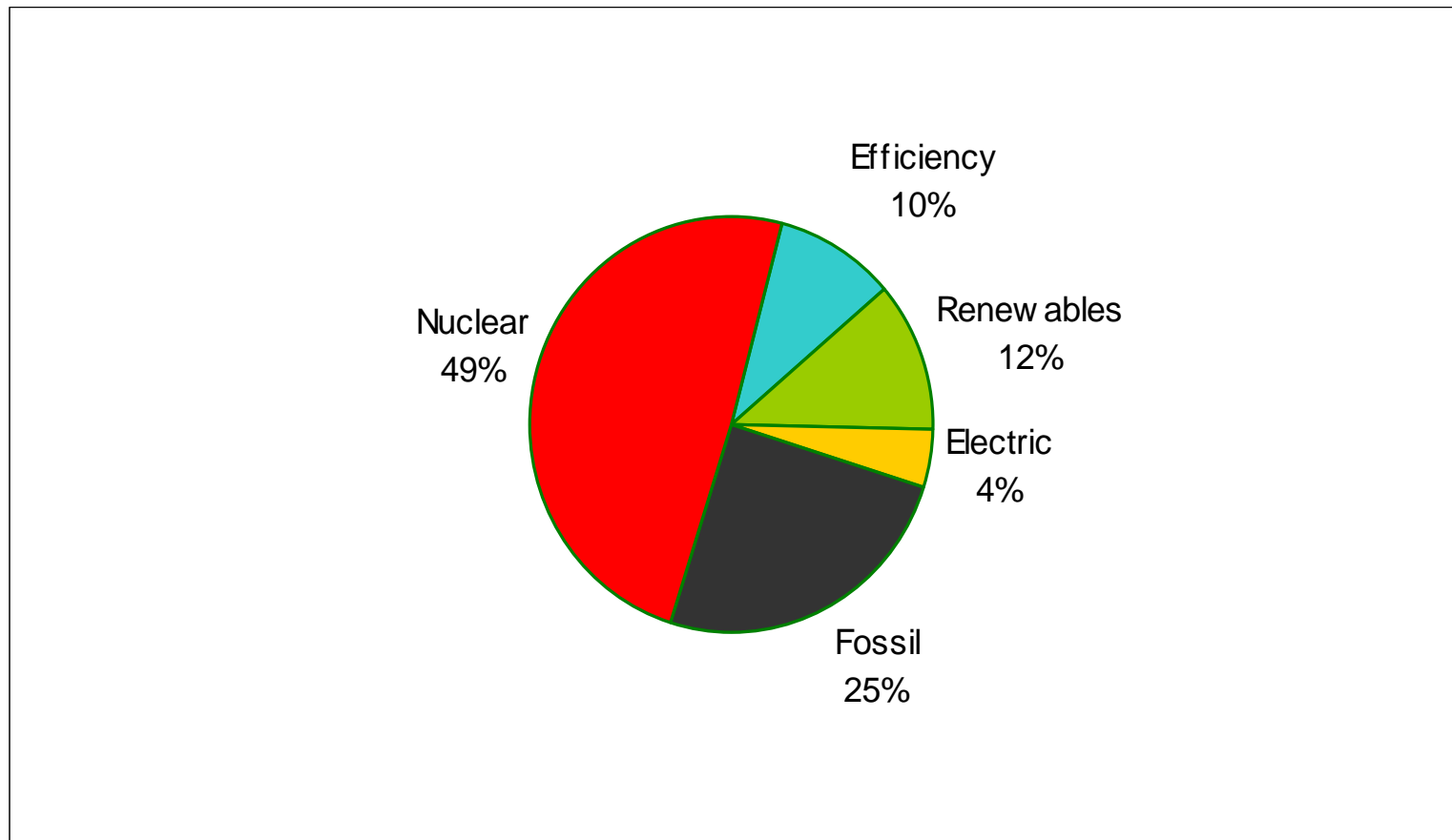
- Nuclear R&D (\$1,169 M) is highest
[fission (\$770 M) and fusion (\$398 M)]
- Efficiency R&D (\$1,085 M) is second
- Renewables R&D (\$965 M) is third
- Fossil R&D (\$421 M) is fourth
- Historically, much less spent for efficiency and renewables than for nuclear and fossil

Energy R&D Funding, FY2012



Source: DOE FY2013 Cong. Budget Request. Fusion is funded under Office of Science, all others under Energy Resources Supply and Conservation

DOE Energy R&D Funding Shares, FY1948-FY2012



Note: Nuclear includes Fission & Fusion. Source: DOE, Analysis of Federal Incentives, 1980; & DOE History Table. 28

Complex Set of Issues for Congressional Staff

- Role of Government
- Budget deficit
- Trade deficit & Competitiveness
- Energy security
- Energy prices
- Pollution & Greenhouse gas emissions

Further information available to Congressional Staff:

- CRS R41908, DOE FY2012 appropriations
- CRS R41150, DOE FY2011 appropriations
- CRS R40669, DOE FY2010 appropriations
- CRS RS22858, on R&D Funding History
- All are on the CRS web site at <http://www.crs.gov/>
- Fred is at 7-7039, fsissine@crs.loc.gov