



U.S. Department of Energy  
Energy Efficiency and Renewable Energy

# The FY 2005 Budget Request

*Building on a Record of Success*

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Office of Energy Efficiency and Renewable Energy



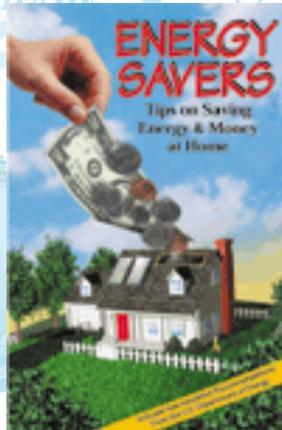
# Meeting Presidential Priorities



**Energy Security**



**Citizen Centered**



**Affordable Energy**



**Climate Change**





# FY 2005 Budget Request

- Supports Presidential commitment to strengthen energy security and enhance energy choices for all Americans while protecting the environment
- Maintains FY 2004 request levels in budget constrained year
- Builds upon and sustains a record of success
  - Research & Development (R&D)
  - Deployment
  - Management



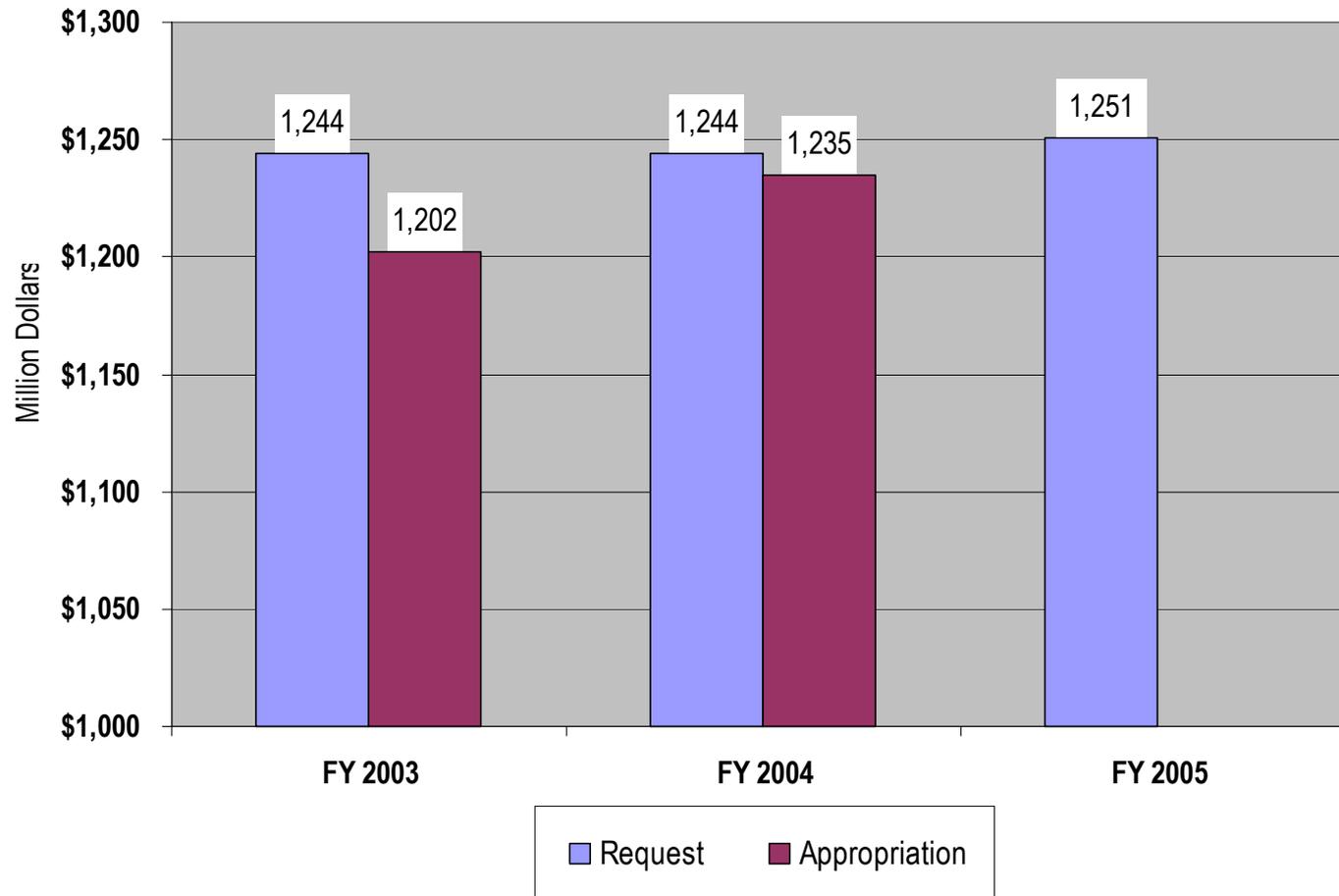
# *Still* EERE's Request Is ^ Priority Driven

1. Dramatically reduce or even end dependence on foreign oil
2. Reduce the burden of energy prices on the disadvantaged
3. Increase the viability and deployment of renewable energy technologies
4. Increase the reliability and efficiency of electricity generation, delivery, and use
5. Increase the energy efficiency of buildings and appliances
6. Increase the energy efficiency of industry
7. Spur the creation of a domestic bioindustry
8. Lead by example through government's own actions
9. Change the way EERE does business



# Robust Funding with Budget Constraints

## EERE Budgets





# A Closer Look at EERE's Budgets

## Energy Supply Appropriations

(dollars in thousands)

	FY 2003 Comparable Approp	FY 2004 Request to Congress	FY 2004 Comparable Approp	FY 2005 Request to Congress	FY 2005 Request vs. FY 2004 Approp.	
Energy Supply						
Energy Efficiency and Renewable Energy						
Hydrogen technology.....	38,113	87,982	81,991	95,325	+ 13,334	+16.3%
Solar Energy.....	82,330	79,693	83,393	80,333	-3,060	-3.7%
Zero energy buildings.....	7,572	4,000	—	—	—	—
Wind energy.....	41,640	41,600	41,310	41,600	+ 290	+0.7%
Hydropower.....	5,016	7,489	4,905	6,000	+ 1,095	+22.3%
Geothermal technology.....	28,390	25,500	25,508	25,800	+ 292	+1.1%
Biomass and biorefinery systems R&D.....	85,283	69,750	86,471	72,596	-13,875	-16.0%
Intergovernmental activities.....	14,449	16,500	14,720	16,000	+ 1,280	+8.7%
Departmental energy management program.....	1,445	2,300	1,963	1,967	+ 4	+0.2%
Renewable program support.....	—	—	4,919	—	-4,919	-100.0%
National climate change technology initiative.....	—	15,000	—	3,000	+ 3,000	—
Facilities and infrastructure						
National renewable energy laboratory						
Operation and maintenance.....	4,527	4,200	9,025	4,800	-4,225	-46.8%
Construction						
02-E-001 Science and technology facility, National renewable energy laboratory						
Golden, CO.....	770	—	3,925	6,680	+ 2,755	+70.2%
Total, Facilities and infrastructure.....	5,297	4,950	12,950	11,480	-1,470	-11.4%
Program direction.....	12,615	13,711	12,364	20,711	+ 8,347	+67.5%
Subtotal, Energy Supply.....	322,150	367,725	370,494	374,812	+ 4,318	+1.2%
Adjustments:						
Use of prior year balances.....	—	—	-13,000	—	+ 13,000	-100.0%
Total, Energy Supply.....	322,150	368,475	357,494	374,812	+ 17,318	+4.8%



# A Closer Look at EERE's Budgets

## Interior Appropriations

(dollars in thousands)

	FY 2003 Comparable Approp	FY 2004 Request to Congress	FY 2004 Comparable Approp	FY 2005 Request to Congress	FY 2005 Request vs. FY 2004 Approp.	
Energy Conservation						
Vehicle technologies.....	174,171	157,623	178,002	156,656	-21,346	-12.0%
Fuel cell technologies.....	53,906	77,500	65,187	77,500	+ 12,313	+18.9%
Weatherization & intergovernmental activities						
Weatherization assistance grants.....	223,537	288,200	227,166	291,200	+ 64,034	+28.2%
State energy program grants.....	44,708	38,798	43,952	40,798	-3,154	-7.2%
State energy activities.....	5,265	2,353	2,324	2,353	+ 29	+1.2%
Gateway deployment.....	40,645	27,609	35,170	29,716	-5,454	-15.5%
Total, Weatherization & intergovernmental activities.....	314,155	356,960	308,612	364,067	+ 55,455	+18.0%
Distributed energy resources.....	60,054	51,784	61,023	53,080	-7,943	-13.0%
Building technologies.....	58,327	52,563	59,866	58,284	-1,582	-2.6%
Industrial technologies.....	96,824	64,429	93,068	58,102	-34,966	-37.6%
Biomass and biorefinery systems R&D.....	24,050	8,808	7,506	8,680	+ 1,174	+15.6%
Federal energy management program.....	19,299	19,962	19,716	17,900	-1,816	-9.2%
National climate change technology initiative.....	—	9,500	—	—	—	—
Program management.....	76,950	76,664	85,004	81,664	-3,340	-3.9%
Energy efficiency science initiative.....	2,440	—	—	—	—	—
Total, Energy Conservation.....	880,176	875,793	877,984	875,933	-2,051	-0.2%



# Building on R&D Success

## FreedomCAR & Hydrogen Fuel Initiative



Research achieved a high power 25 kw battery volume cost estimate of \$1,180 per battery system, a dramatic reduction from the 1999 estimate of \$3,000.



Installed first-of-its-kind hydrogen refueling station.



Met cost of \$225/kW for a hydrogen-fueled, 50 kW fuel cell power system.



# Building on R&D Success

## Demand-Side Technologies



Developed world-record setting, high-radiance, prototype LED for white light.



Demonstrated technical feasibility of zero energy home concept.



Advances in natural gas technologies helped manufacturers cut costs and emissions.



Achieved a projected volume cost of carbon fiber (for use in light weighting of vehicle structures) of less than \$7 per pound, a reduction of \$5 per pound from the 1998 base cost.



# Building on R&D Success

## Supply-Side Technologies



Completed advanced R&D partnership for 1.5 MW wind turbine capable of 3.6 cents/kWh (Class 6 winds) and 4.5 cents/kWh (Class 4).



Developed a 13% efficient stable prototype thin film PV cell in partnership with industry using a High Rate Vapor Transport Deposition (HRVTD) process (2003 R&D 100 Award Winner).



Reduced PV manufacturing cost to \$2.10/Watt.



# Building on R&D Success

## Supply-Side Technologies



Scientists succeeded in reducing by a factor of 10 the cost of enzymes needed for biomass ethanol production.



Completed field demonstration of 4.6MW advanced turbine system which produces onsite power with high efficiency and ultra low emissions without after-treatment. Technology announced as commercially available in 2004.



Thermaloc geothermal well cement increases useful well life resulting in annual savings of \$150,000 per well (2002 R&D 100 Award Winner).

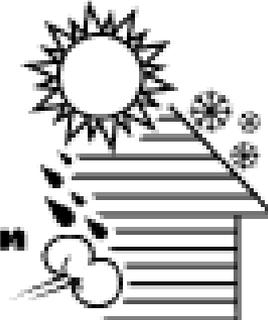


# Building on Deployment Success



12 appliance standards have been developed by the Department, saving consumers over \$25 billion in cumulative electricity costs.

**Weatherization Assistance Program**



Weatherized over 250,000 low-income homes in the last 3 fiscal years.



25% reduction in energy use by the Federal government, due in part to innovative Federal energy management programs.



**Rebuild America**  
U.S. Dept. of Energy

80 million square feet of floor space in public schools and other facilities upgraded through new and existing Rebuild America community partnerships.



# Building on Management Success

*“Getting more work done for each dollar spent”*

- EERE’s FY 2003 “Extreme Makeover” moving ahead
- Reorganization entering 2nd year and first reviews favorable
  - Positive comments on Phase 1 (program management) from White House and Nat’l Academy of Public Administration
  - Kicking off Phase 2 (project management) - new Project Management Center
- EERE Management Action Plan updated to reflect lessons learned in first year of reorganization
- EERE workforce analysis complete and workforce plans under development



U.S. Department of Energy  
Energy Efficiency and Renewable Energy

# EERE Program Details

## FY 2005 Budget Request



# President's FreedomCAR and Hydrogen Fuel Initiative

## Budget

Funding (dollars in thousands)			
Office	FY03 Comparable Approp.	FY04 Comparable Approp.	FY05 Request
<b>EERE</b>	176,100	236,914	264,225
Fuel Cells	53,906	65,187	77,500
Hydrogen	38,113	81,991	95,325
Vehicles	84,081	89,736	91,400
FE	2,280	4,889	16,000
NE	2,000	6,377	9,000
SC	0	0	29,183
<b>DOE total</b>	<b>180,380</b>	<b>248,180</b>	<b>318,408</b>
DOT	0	555	832
<b>FC-HFI Total</b>	<b>180,380</b>	<b>248,735</b>	<b>319,240</b>

## Key Activities

- Increase focus on fundamental R&D, i.e. novel materials, modeling, catalysts, and biological and solar hydrogen production (SC)
- Coordinate with DOT, NIST and EPA on enhanced safety research to provide the underpinnings for codes and standards (EERE)
- Expand systems analysis of hydrogen pathways to assess energy, environmental and economic impacts of hydrogen energy systems (EERE)
- Expand advanced battery research, which is a critical component for hybrid propulsion (EERE)
- Accelerate and expand research on the production of hydrogen from renewables (EERE), nuclear (NE) and coal (FE)



# Hydrogen, Fuel Cells & Infrastructure Tech. Prg.

Program Focus: Research, develop, and validate fuel cell and hydrogen production, delivery, and storage technologies for transportation and stationary applications.

## Budget

## Key Activities

Funding (dollars in thousands)				
Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
<b>Fuel Cell Technologies (Energy Conservation)</b>				
Transportation Systems	6,160	7,600	7,506	7,600
Distributed Energy Systems	7,268	7,500	7,408	7,500
Stack Component R&D	14,803	28,000	25,186	30,000
Fuel Processor R&D	23,489	19,000	14,815	13,858
Technology Validation	1,788	15,000	9,877	18,000
Technical/Program Management Support	398	400	395	542
<b>Hydrogen Technology (Energy Supply)</b>				
Production and Delivery R&D	11,215	23,000	22,564	25,325
Storage R&D	10,790	30,000	29,432	30,000
Infrastructure Validation	9,680	13,160	18,379	15,000
Safety, Codes & Standards, and Utilization	4,531	16,000	5,904	18,000
Education and Cross-Cutting Analysis	1,897	5,822	5,712	7,000
<b>Total</b>	<b>92,019</b>	<b>165,482</b>	<b>147,178</b>	<b>172,825</b>

- Initiate three “Centers of Excellence” for hydrogen storage meeting 2010 targets of 2.0 kWh/kg and 1.5 kWh/L.
- Complete testing of 10,000 psi tanks achieving 2005 targets of 1.5 kWh/kg and 1.2 kWh/L.
- Initiate comprehensive safety research for codes and standards development.
- Complete research on distributed natural gas production technologies leading to \$3.00/gge at the station.
- Initiate new industry projects that will use wind to produce hydrogen for \$4.60/gge by 2009.
- Reduce technology cost to \$125/kW for a 50kW vehicle fuel cell power system (high volume production levels) toward achieving the 2010 goal of \$45/kW.
- Validate fuel cell performance and durability in real world conditions through vehicle/ infrastructure “learning demonstrations.”



# FreedomCAR & Vehicle Technologies Program

Program Focus: Enable America to use less petroleum through research and development of technologies to improve the energy efficiency of cars and trucks.

## Budget

## Key Activities

Funding (dollars in thousands)

Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
FreedomCAR and Vehicle Technologies (Energy Conservation)				
Vehicle Systems	13,485	14,514	14,335	13,883
Innovative Concepts	1,590	500	494	500
Hybrid and Electric Propulsion	41,996	49,563	45,002	51,821
Advanced Combustion R&D	55,267	37,085	54,405	35,936
Materials Technology	36,094	39,640	39,744	39,799
Fuels Technology	19,164	6,800	16,494	6,800
Technology Introduction	4,570	5,900	4,939	6,014
Technical Program Mgmt Supt	2,005	2,121	2,095	1,903
Biennial FreedomCAR Peer Review	-	1,500	494	-
<b>Total</b>	<b>174,171</b>	<b>157,623</b>	<b>178,002</b>	<b>156,656</b>

- Place greater emphasis on long-term, exploratory energy storage research for combustion and fuel cell hybrid vehicles that exhibit significant potential for performance breakthroughs.
- Expand research on advanced combustion regimes having promise of very high efficiencies with near zero emissions.
- Shift emphasis to R&D on fuel formulations enabling advanced combustion regimes.



# Solar Energy Technology Program

Program Focus: Develop more efficient, reliable, and affordable solar energy systems that can convert sunlight into useful products such as electrical power, space heat, hot water, and lighting.

## Budget

## Key Activities

Funding (dollars in thousands)

Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
Solar Energy (Energy Supply)				
Photovoltaic Energy Systems	73,249	76,693	75,053	75,433
Solar Heating and Lighting	3,783	3,000	2,944	2,900
Concentrating Solar Power	5,298	-	5,396	2,000
<b>Total</b>	<b>82,330</b>	<b>79,693</b>	<b>83,393</b>	<b>80,333</b>

- Reduce PV module manufacturing costs from \$2.10/Watt in 2003 to \$1.85 – 1.95/Watt through R&D.
- Continue emphasis on thin films and next-generation materials with potential for dramatic cost reductions.
- Develop low-cost solar water heaters for freezing climates.
- Assess concentrating solar power technologies.



# Wind & Hydropower Technologies Program

Program Focus: Low wind speed technology R&D for large and small wind turbines, R&D to develop environmentally-friendly hydropower technologies that enable increased electric power generation at existing plants, and R&D for integrating wind into electric grid systems and distributed power applications.

## Budget

## Key Activities

Funding (dollars in thousands)

Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
<b>Wind Energy (Energy Supply)</b>				
Technology Viability	28,209	29,800	29,235	31,000
Technology Application	13,431	11,800	12,075	10,600
<b>Hydropower Technologies (Energy Supply)</b>				
Technology Viability	3,811	5,989	3,487	4,400
Technology Application	1,205	1,500	1,418	1,600
<b>Total</b>	<b>46,656</b>	<b>49,089</b>	<b>46,215</b>	<b>47,600</b>

- Field test first full-scale Low Wind Speed Technology prototype turbine (2.5 megawatts).
- Fabricate and test advanced drivetrain, power converter, and blades for future low wind speed turbines.
- Complete testing of fish-friendly hydropower turbine technology that boosts downstream dissolved oxygen levels.



# Biomass Program

**Program Focus:** Expand the use of biomass for energy and industrial products through advanced bioconversion techniques that focus primarily on cellulosic feedstock, and develop advanced equipment and techniques for expanding the infrastructure for collecting and transporting biomass.

## Budget

## Key Activities

Funding (dollars in thousands)

Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
<b>Biomass and Biorefinery Systems R&amp;D (Energy Conservation)</b>				
Utilization of Platform Outputs	8,960	8,408	7,110	8,280
Industrial Gasification	14,279	-	-	-
Technical Program Management Support	811	400	396	400
<b>Biomass and Biorefinery Systems R&amp;D (Energy Supply)</b>				
Feedstock Infrastructure	2,405	2,000	2,212	2,000
Platforms Research and Development	44,841	39,000	41,491	43,000
Utilization of Platform Outputs	38,037	28,750	42,768	27,596
<b>Total</b>	<b>109,333</b>	<b>78,558</b>	<b>93,977</b>	<b>81,276</b>

- Continue successful multi-agency collaboration toward the integrated industrial biorefinery
- Continue lowering cost of biomass enzymes through public-private partnerships.
- Evaluate new pathways for improved economics and performance to biobased products.



# Geothermal Technologies Program

**Program Focus:** Increase the U.S. geothermal resource base and reduce the cost of heat and power through advanced technologies.

## Budget

## Key Activities

Funding (dollars in thousands)

Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
Geothermal Technology (Energy Supply)				
Technology Development	18,656	19,600	17,905	19,750
Technology Application	9,734	5,900	7,603	6,050
<b>Total</b>	<b>28,390</b>	<b>25,500</b>	<b>25,508</b>	<b>25,800</b>

- Field test enhanced geothermal systems technology at geothermal sites in California and Nevada.
- Field test the Diagnostics-While-Drilling advanced drilling system in a high temperature geothermal well.
- Add two new geothermal State working groups (Alaska and California), bringing the total number of working groups to nine.



# Building Technologies Program

**Program Focus:** Develop technologies, tools, and standards for making residential and commercial buildings and appliances more energy efficient.

## Budget

## Key Activities

Funding (dollars in thousands)				
Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
<b>Buildings Technologies (Energy Conservation)</b>				
Residential Buildings Integration	12,133	15,230	13,067	18,932
Commercial Buildings Integration	4,386	4,995	4,440	4,995
Emerging Technologies	30,564	21,821	29,997	25,057
Equipment Standards and Analysis	9,635	9,017	10,387	7,800
Oil Heat Research for Residential Buildings	-	-	494	-
Technical/Program Management Support	1,609	1,500	1,481	1,500
<b>Buildings Technologies (Energy Supply)</b>				
Zero Energy Buildings	7,572	4,000	-	-
<b>Total</b>	<b>65,899</b>	<b>56,563</b>	<b>59,866</b>	<b>58,284</b>

- “Leap-frog” current lighting technology by advancing organic and inorganic light emitting diodes (LEDs) with a focus on applied research that enables the industrial base to manufacture LEDs.
- Integrate renewable energy systems into highly efficient building designs and operations, the focus of which is design packages that enable residential buildings that use 40-50% less energy than current practice.
- Improve the energy efficiency of building components and equipment, and their effective integration using whole-building-system-design techniques.
- Continues commitment to equipment standards and test procedures.



# Distributed Energy Program

**Program Focus:** Strengthen America's energy infrastructure and provide utilities and consumers with a greater array of energy efficient technology choices for the on-site generation of electricity and use of thermal energy.

## Budget

## Key Activities

Funding (dollars in thousands)

Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
Distributed Energy (Energy Conservation)				
Distributed Generation Technology Development	39,796	31,916	40,413	32,689
End-Use System Integration and Interface	19,732	19,338	20,086	19,861
Technical/Program Management Support	526	530	524	530
<b>Total</b>	<b>60,054</b>	<b>51,784</b>	<b>61,023</b>	<b>53,080</b>

- Field evaluation of 33% efficient microturbine resulting in a 5 percentage point increase compared to current technologies.
- Design a 45% efficient reciprocating engine resulting in a 9 percentage point increase compared to current technologies.
- Complete Ambient heat pump research (under thermally activated research).
- Demonstrate an integrated CHP package system consisting of a turbine, chiller and control system.



# Federal Energy Management Program

**Program Focus:** Reduce energy costs and environmental impacts of government by promoting energy efficiency, water conservation, use of distributed and renewable energy, and make sound utility management decisions at Federal sites.

## Budget

## Key Activities

- Continue to offer key alternative financing and technical assistance while streamlining certain support activities.
- Sustain its high-return investments in DOE energy efficiency projects.
- Continue to assist in the transfer of EERE technologies to benefit Federal energy performance.

Funding (dollars in thousands)

Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
Federal Energy Management Program (Energy Conservation)				
Project Financing	7,839	8,227	8,126	7,450
Technical Guidance and Assistance	7,825	8,242	8,140	7,900
Planning, Reporting and Evaluation	2,751	2,603	2,571	2,550
Technical Program Management Support	884	890	879	-
Departmental Energy Management Program (Energy Supply)				
Energy Management Project Support	1,084	1,800	1,472	1,467
Energy Management Model Program Development	361	500	491	500
<b>Total</b>	<b>20,744</b>	<b>22,262</b>	<b>21,679</b>	<b>19,867</b>



# Industrial Technologies Program

**Program Focus:** Improve the energy intensity of the U.S. industrial sector through a coordinated program of research and development, validation, and dissemination of energy efficiency technologies and operating practices.

## Budget

## Key Activities

Funding (dollars in thousands)				
Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
Industrial Technologies (Energy Conservation)				
Industries of the Future (Specific)	59,293	24,037	47,247	22,409
Industries of the Future (Crosscutting)	33,533	34,401	39,904	31,900
Technical Program Management Support	3,998	5,991	5,917	3,793
<b>Total</b>	<b>96,824</b>	<b>64,429</b>	<b>93,068</b>	<b>58,102</b>

- Refocus program on long-term, high return R&D in areas such as the Steel Grand Challenge (Mesabi Nugget - a cokeless ironmaking demonstration of a pilot plant).
- Continue replication of energy-saving technologies through Best Practices and other technical assistance.



# Weatherization & Intergovernmental Program

**Program Focus:** Facilitate the movement of energy efficient and renewable energy products into the marketplace for a wide range of consumers, including State and local governments, weatherization agencies, communities, companies, fleet managers, building code officials, technology developers, Native American Tribal governments, and international agencies.

## Budget

## Key Activities

Funding (dollars in thousands)

Subprogram	FY03 Approp.	FY04 Request	FY04 Approp.	FY05 Request
<b>Weatherization (Energy Conservation)</b>				
Weatherization Assistance Grants	223,537	288,200	227,166	291,200
State Energy Program Grants	44,708	38,798	43,952	40,798
State Energy Activities	5,265	2,353	2,324	2,353
Gateway Deployment	40,645	27,609	35,170	29,716
<b>Intergovernmental (Energy Supply)</b>				
International Renewable Energy Program	3,853	6,500	5,888	6,500
Tribal Energy Activities	5,780	6,000	4,906	5,500
Renewable Energy Production Incentive	4,816	4,000	3,926	4,000
<b>Total</b>	<b>328,604</b>	<b>373,460</b>	<b>323,332</b>	<b>380,067</b>

- Weatherize 119,000 homes at an energy savings of 3.5 Million MBtu annually.
- Provide States \$40,798K in grants to develop emergency energy plans, foster clean, reliable, and diverse energy supplies, and reduce demand through energy efficiency.
- Recruit 500 retail stores, 5 utilities, and 10 manufacturers to join Energy Star.
- Displace oil demand through the addition of alternative fuel vehicles to reach total of 218,000.
- Help building owners upgrade 60 million square feet of floor space.
- Provide technical support and funding for Tribal energy projects.



## In Conclusion, We Are...

- Maintaining funding at a level comparable to FY 2004 in a budget constrained year
- Building upon and sustaining our record of success
- Committed to increasing energy security and enhancing energy choices for all Americans

