

Valuing R&D in the U.S. Department of Energy: Motivation for Valuing Externalities

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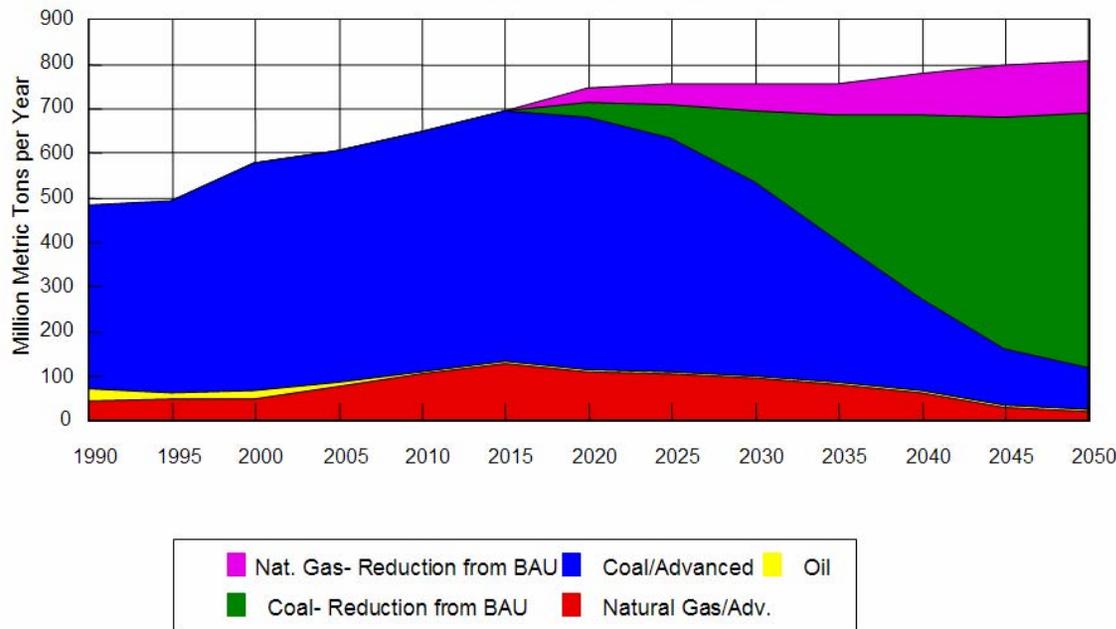
Reasons for Estimating the Externalities of Electricity Production

- Consistent and clear comparison of health and environmental impacts of electricity generation alternatives
- Background for energy policy
- Basis for regulations, standards, taxes, or fees
- *Also help value the benefits of technology R&D*

A key mission of U.S. Department of Energy is to undertake research and development to promote the efficient and environmentally sound production and use of energy

Carbon Emissions From Electric Generators

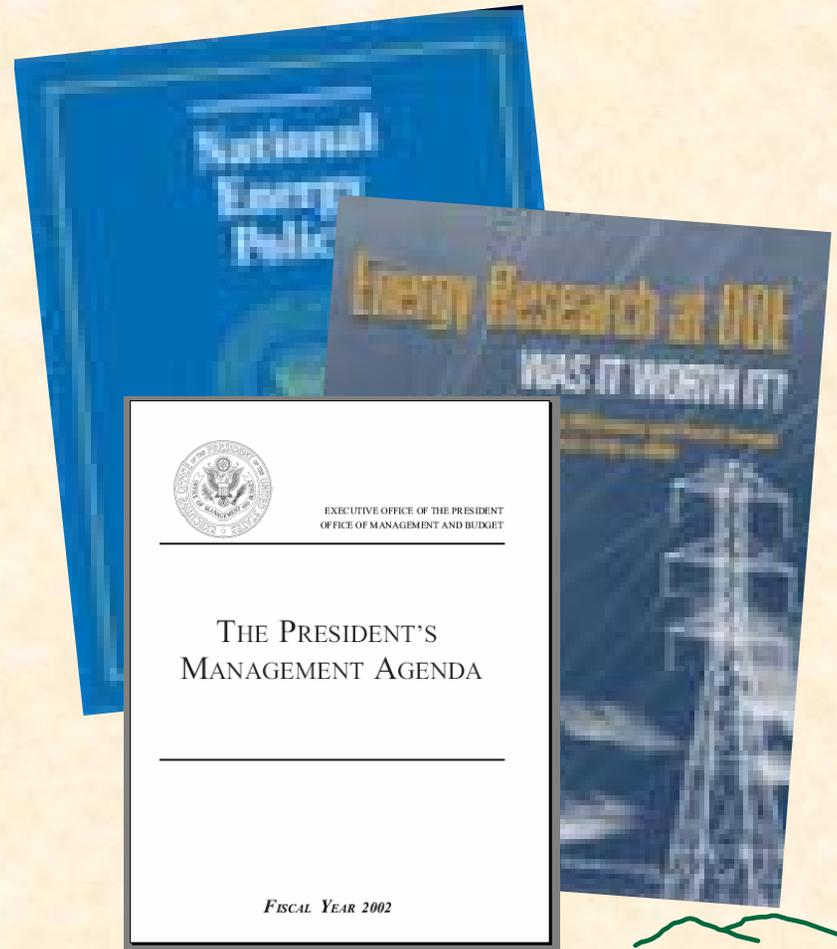
Sequestration begins in 2015 on new units



- Power plant efficiency increases about 50% over today's deployed plants
- Sequestration is available >2015 to greatly reduce carbon emissions, if needed

A Motivation for Valuing Externalities: To estimate the benefits of DOE's R&D programs that will reduce external costs

- Government Performance and Results Act
- National Energy Policy
- National Research Council study
- President's Management Agenda for FY02
- Office of Management and Budget's (OMB's) Program Assessment Rating Tool (PART)
- OMB's R&D Investment Criteria



Some Questions in OMB's PART Could be Addressed Using Externality Valuation

- **Market fails to motivate private investment?**
- **Output and outcome measures?**
- **Potential public benefits?**
- **Potential benefits compare favorably?**

OMB's R&D Investment Criteria State that Government R&D Could be Justified ...

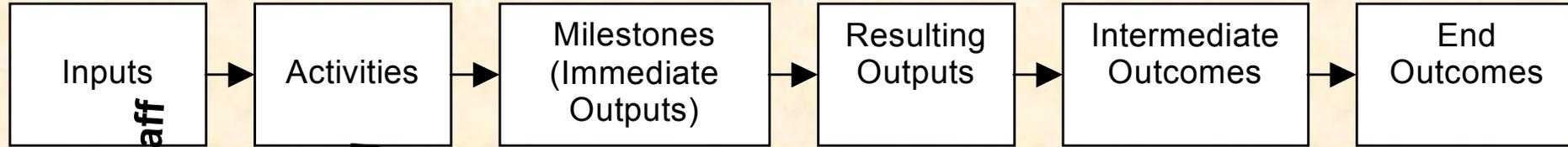
If there are

- **Barriers to Entry**
- **Imperfect Information**
- **Externalities**
- **Public Goods**
- **National Security Risks, or**
- **Non-Competitive Practices, and ...**

If

- **Total Benefits Exceed Total Costs**

Greater Emphasis is Being Placed on the Projected Outcomes in Assessing Investment in R&D Programs



Funding, materials, staff

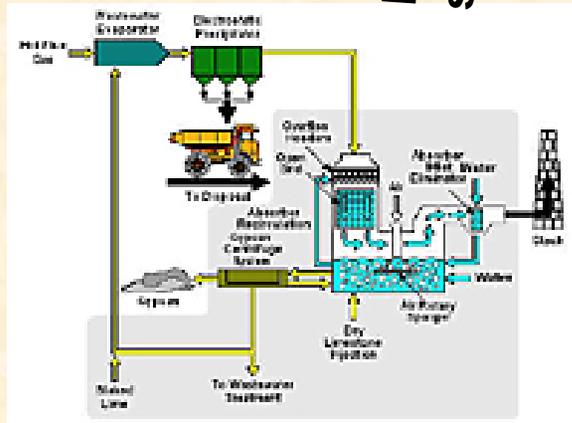
Research on advanced scrubbing processes

Achievement of target scrubbing efficiency

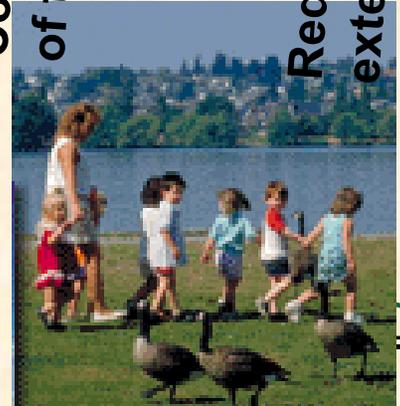
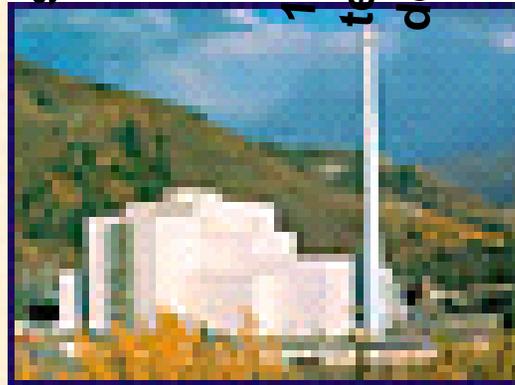
1st generation clean coal technology demonstration

Commercial application of technology

Reduction in adverse externalities



ATORY



National Research Council Committee developed a methodological framework for retrospectively estimating benefits of FE and EERE's programs.

Follow-up conference suggested refinements and ideas on how to extend this framework to make *prospective* assessments.

NRC Benefits Matrix:

	Realized	Option	Knowledge
Economic			
Environmental			
Security			



Framework that Emerged from the Conference:

	Past	Future	
	Realized	Projected	Option Cases
Economic			
Environmental			
Security			
Knowledge			

Refinement of the NRC Benefits Framework

Estimates of Prospective Benefits (e.g., reduced externalities) Could Affect R&D Budgets:

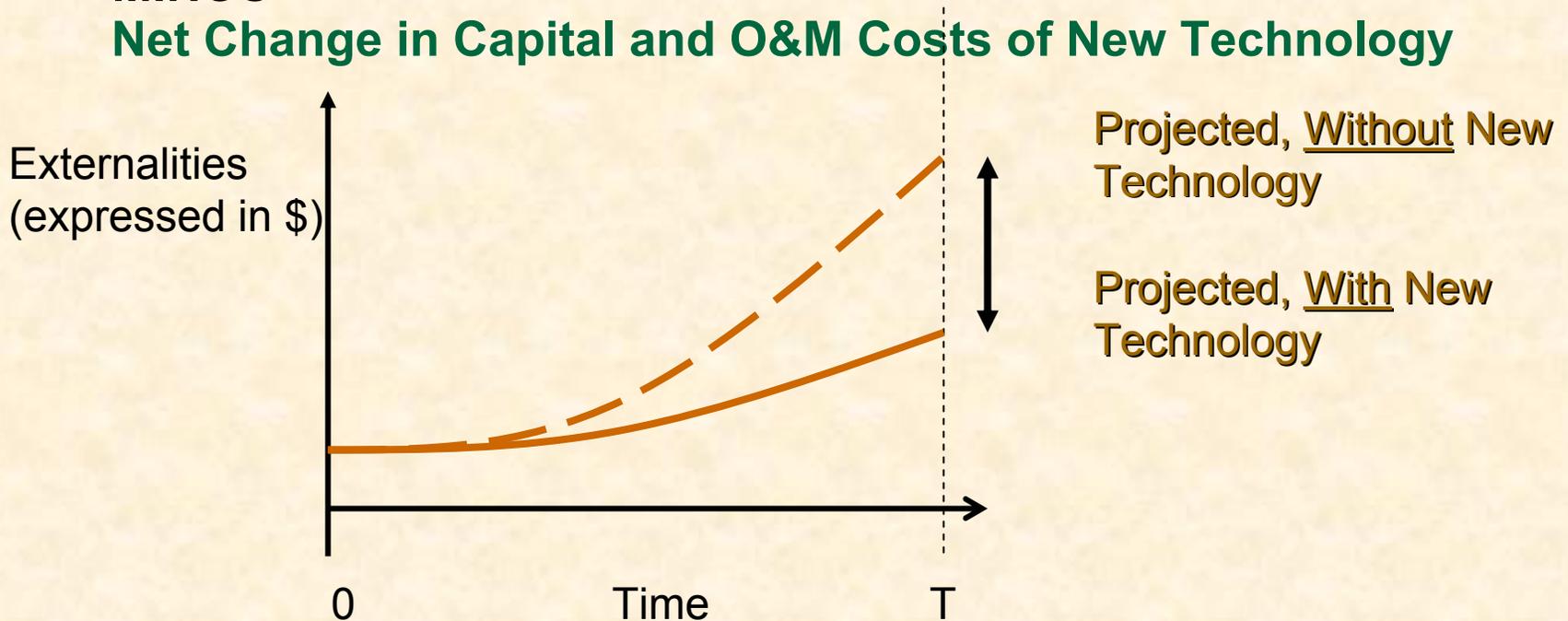
Externalities in Reference Case Without New Technology

MINUS

Externalities in Reference Case With It

MINUS

Net Change in Capital and O&M Costs of New Technology





FE Assistant Secretary Smith and EERE Assistant Secretary Garman are committed to developing and using a systematic approach to estimate the benefits of their R&D programs



Benefits Conference web site:
www.esd.ornl.gov/benefits_conference

Administration and Congress are Making Performance-Based Assessments a Priority in the Planning of R&D Programs

- **OMB PART and R&D Investment Criteria have been developed and are being used across DOE and the whole Federal \$100 billion R&D budget**
- **Congress is encouraging DOE (FE and EERE in particular) to apply a consistent and transparent set of methods for valuing its R&D**
- **Require more careful consideration of the ultimate outcomes of proposed R&D and how it might affect those outcomes**

R&D programs can improve prospects of funding for advanced energy technologies by ...

- **Proactively considering the ultimate outcomes of their proposed R&D**
- **Identifying and addressing the key research issues that will lead to the greatest reductions in externalities, i.e., the greatest benefits to the R&D**