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MARKAL MACRO for Strategic Plan

Phillip Tseng
U.S. Department of Energy



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Vision Statement

Typical statements include:

- Affordable energy
- Clean environment
- Sustainable economic growth
- Reliable energy Resources



DOE Goals and Objectives

Examples include:

- Promote reliable, affordable, clean, and diverse domestic supplies
- Promote reliable, affordable, and clean transformation of fuel supplies into electricity and related products
- Increase the efficiency and productivity of energy use, while limiting environmental impacts





EERE Goals and Objectives

Examples include:

- Increase the supply and use of clean energy resources and increase the reliability of the energy system
- Increase the efficiency of the energy system



Current and Outlook of Energy Markets

A Strategic Plan for applied R&D must consider market conditions

- Today's Situation
- How did we get there?
- Where are we going?





Today's Situation

- Summary of the current situation
 - Energy prices
 - Demand for energy services
 - Cost and performance of competitive technologies



How Did We Get Here?

- A review of historical energy market performances
- Identify key drivers and economic factors that are important in shaping the markets





Where are we going?

- Projected Energy consumption and carbon emissions
- Demand for electricity and natural gas
- Oil and Gas reserves
- Potential infrastructure problems



What are Potential Issues?

- High carbon emissions
- Reliance on imported oil
- High natural gas price due to supply shortage
- Potential infrastructure and power plant siting problems





Development of a Strategic Plan

- A strategic plan must link goals and objectives to energy markets and potential problems
- It must make technologies available in the market place where and when they would be needed
- It must consider future energy markets in the development of the plan



What is the Process in Developing a Strategic Plan?

- Understand demand for energy services
- Identify and improve the current R&D portfolio
- Evaluate the rate of technical progress
- Assess/review allocation of resources





Understand demand for energy services

- Consumers use energy to satisfy demand for energy services such as heating and cooling.
- The size of the market (it is the annual sales not the total capital stock) is determined by:
 - Capital stock turn over rate
 - Rate of demand growth
 - Demand for new technologies



Identify and Improve the current R&D Portfolio

- What is the current list of R&D programs in the portfolio?
- How does each research program relate to demand for energy services?
- Can these programs achieve the goals given the current and expected market conditions?
- Are there new technologies that may contribute more in a different market conditions?





Evaluate the rate of technical progress

- Evaluate the rate of technical progress and examine if the costs and performance goals can be achieved
- Evaluate the relationship between R&D funding level and rate of technical progress.



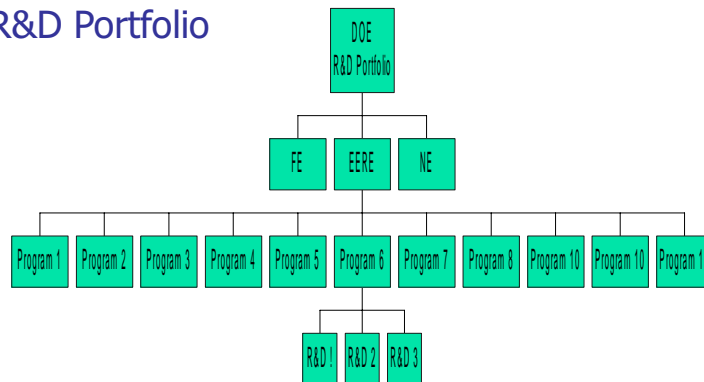
Assess/review allocation of resources

- Assess resource needs based on the rate of technical progress and the target set forth in the goals and objectives
- Evaluate the potential benefits of R&D programs to determine resource allocation



A Portfolio Approach for Strategic Planning

R&D Portfolio



How to Determine a R&D Portfolio?

- Identify potential markets by sector, by energy service demand, and by technology
- Identify efficiency gaps by technologies and by fuel types
- Evaluate potential economic and environmental benefits
- Understand risks in the market place
- Understand the level of R&D efforts required to achieve goals (resource and time)





Factors in a balanced R&D portfolio

- Long-term versus short-term
- Demand versus supply
- Benefits versus risks
- New versus old
- Basic versus applied R&D



Quantitative analysis of Potential benefits - 1

- EERE R&D portfolio generates three types of benefits:
 - Economic
 - Environment
 - Security
- EERE portfolio benefits can occur based on timing and market conditions.
 - Retrospective: realized benefits
 - Prospective: expected to yield benefits given the market conditions
 - Option: expected to yield benefits





Quantitative analysis of Potential benefits - 2

- A bottom up approach can provide a framework to represent all the technologies in the EERE R&D portfolio.
- This framework can capture the interaction of market demand and supply.
- Impacts of a R&D program can be assessed based on Reference case economic assumptions and scenarios that also likely to be realized in the future.



Evaluate Program benefits and adjust Portfolio

- Can current portfolio meet the challenge?
- Are we on the right track and making the needed rate of progress?
- Should we adjust portfolio to improve total benefits of the portfolio





Evaluation of future benefits

- Identify end-use energy service demand by sector
- Identify rate of technical progress associated with specific funding levels
- Simulate the penetration pattern under different market conditions
- Estimate economic benefits, options benefits, and environmental benefits

