

Using benefit and other performance information in program planning and evaluation

John Mortensen
Consultant

Conference on Estimating the Benefits of Government-Sponsored Energy R&D
Arlington, VA
March 4-5, 2002

Suggestions for using benefit and other performance information in program planning and evaluation

Suggestion 1 – Use program logic models to develop performance measures, metrics and targets that are consistent with benefit estimates

Suggestion 2 – Use performance information to:

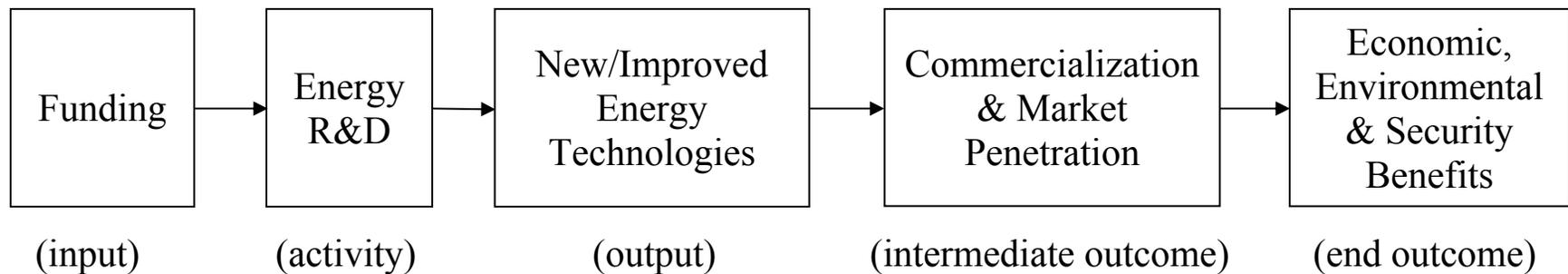
- a) evaluate the credibility of the benefit estimates
- b) evaluate progress towards achieving benefits
- c) fulfill performance measurement requirements of budget, performance plan, performance report

Suggestion 3 – Use benefit information to:

- a) help establish goals
- b) analyze the portfolio of programs

Suggestion 1 – Use program logic models to develop performance measures, metrics and targets that are consistent with benefits

Simplified Logic Model for Energy R&D Program



==== Decreasing Program Influence =====>

Suggestion 1 (cont.) – Use program logic models to develop performance measures, metrics and targets consistent w/benefits

	Inputs	Activities	Outputs	Intermediate Outcomes	End Outcomes
Simplified Energy R&D Logic Model	Funding	Energy R&D	New/improved Energy Technology	Commercialization & Market Penetration	Economic, Environmental & Security Benefits
Performance Measures (metric)	<ul style="list-style-type: none"> - Dollars spent by DOE - Other gov't - Private sector - Total (millions \$) 	<ul style="list-style-type: none"> - R&D projects funded (#) - Time to award projects (weeks) - Time to disburse funds (weeks) - Uncosted balance (millions \$) 	<ul style="list-style-type: none"> - Prototypes (#) Initial Refined Commercial - Energy efficiency improvement (%) - Change in capital cost (%) 	<ul style="list-style-type: none"> - Technologies introduced into market (#) - Avg. market penetration (%) - Net consumer investment (millions \$) 	<ul style="list-style-type: none"> - Energy savings (TBtu) - Oil savings (mbpd) - Emission reductions (MMTC) - Energy & non-energy cost savings (millions \$)
Factors Affecting Performance	<ul style="list-style-type: none"> - State of the economy - Political makeup of White House, Congress 	<ul style="list-style-type: none"> - #, quality, and funding request of R&D proposals - Date appropriation is received 	<ul style="list-style-type: none"> - R&D results 	<ul style="list-style-type: none"> - Cost & perf. of competing technologies - Energy prices - State of the economy - Gov't policies 	<ul style="list-style-type: none"> - Heat rates - Emission factors - Energy prices

Suggestion 2a – Use performance information to evaluate the credibility of the benefit estimates

Example Technology-Level Targets for Energy R&D Program

Tech- nology	Inputs	Outputs					Inter. Outcomes	
	Total Funding	Initial Prototype	Refined Prototype	Commercial Prototype	Tech. Perf.	Tech. Cost	Mkt. Intro.	Mkt. Pen.
A	\$5 M	2004	2006	2008	+20%	0%	2010	10 yrs
B	\$2 M	2000	2002	2004	+10%	-10%	2006	8 yrs
C	\$4 M	2003	2005	2007	+40%	+15%	2009	15 yrs
D	\$8 M	2005	2007	2009	+60%	+20%	2011	20 yrs
E	\$3 M	1998	2000	2002	+30%	+10%	2004	12 yrs

Are funding levels sufficient for the R&D that is required?

Is the private sector sufficiently involved?

Are the timelines realistic?

Are technology performance and cost targets achievable?

Are market penetration times appropriate given technology cost, performance, stock turnover, and industry investment in new technology?

Suggestion 2b – Use performance information to evaluate progress towards achieving benefits

Example Results for Energy R&D Program

Tech- nology	Inputs	Outputs					Inter. Outcomes	
	Total Funding	Initial Prototype	Refined Prototype	Commercial Prototype	Tech. Perf.	Tech. Cost	Mkt. Intro.	Mkt. Pen.
A	\$3 M	2007	2009	2011	+20%	0%	2013	10 yrs
B	\$2 M	2000	--	--	--	--	--	--
C	\$4 M	2003	2006	2009	+40%	+15%	2011	15 yrs
D	\$8 M	2005	2007	2009	+60%	+40%	2011	25 yrs
E	\$3 M	1998	2000	2002	+30%	+10%	2004	20 yrs

Reasons why targets were not achieved

- Funding was below expectations
- R&D did not yield hoped-for results
- Took longer than expected to develop prototypes

- Materials costs higher than projected

- Lower cost of competing technology
- Low energy prices

Questions to consider in future analyses

- Are funding projections too optimistic?
- Are timelines too optimistic?

- Have our cost targets been too optimistic?

- Are we considering improvements in competing technology?

Suggestion 2c – Use performance information to fulfill performance measurement requirements of the budget, performance plan, performance report

Example Output & Intermediate Outcome Targets for Budget Document

2004

- Initial prototype of technology A developed
- Commercial prototype of technology B developed
- Commercial introduction of technology E that is 30% more efficient and has only 10% greater capital cost than comparable technology

2005

- Refined prototype of technology C developed
- Initial prototype of technology D developed

2006

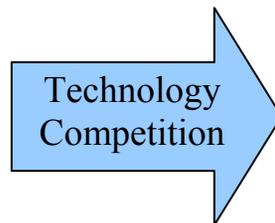
- Refined prototype of technology A developed
- Commercial introduction of technology B that is 10% more efficient and has 10% lower capital cost than comparable technology

Suggestion 3a – Use benefit information to help establish goals

Summation of Individual Program Benefits

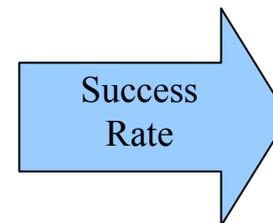
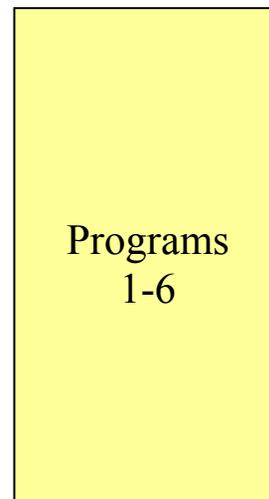
(2 mbpd oil)

Program 1
Program 2
Program 3
Program 4
Program 5
Program 6



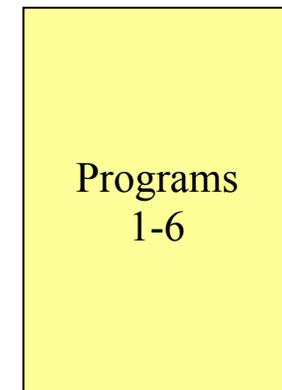
Integrated Program Benefits

(1.7 mbpd oil)



Benefit Goal

(1.4 mbpd oil)



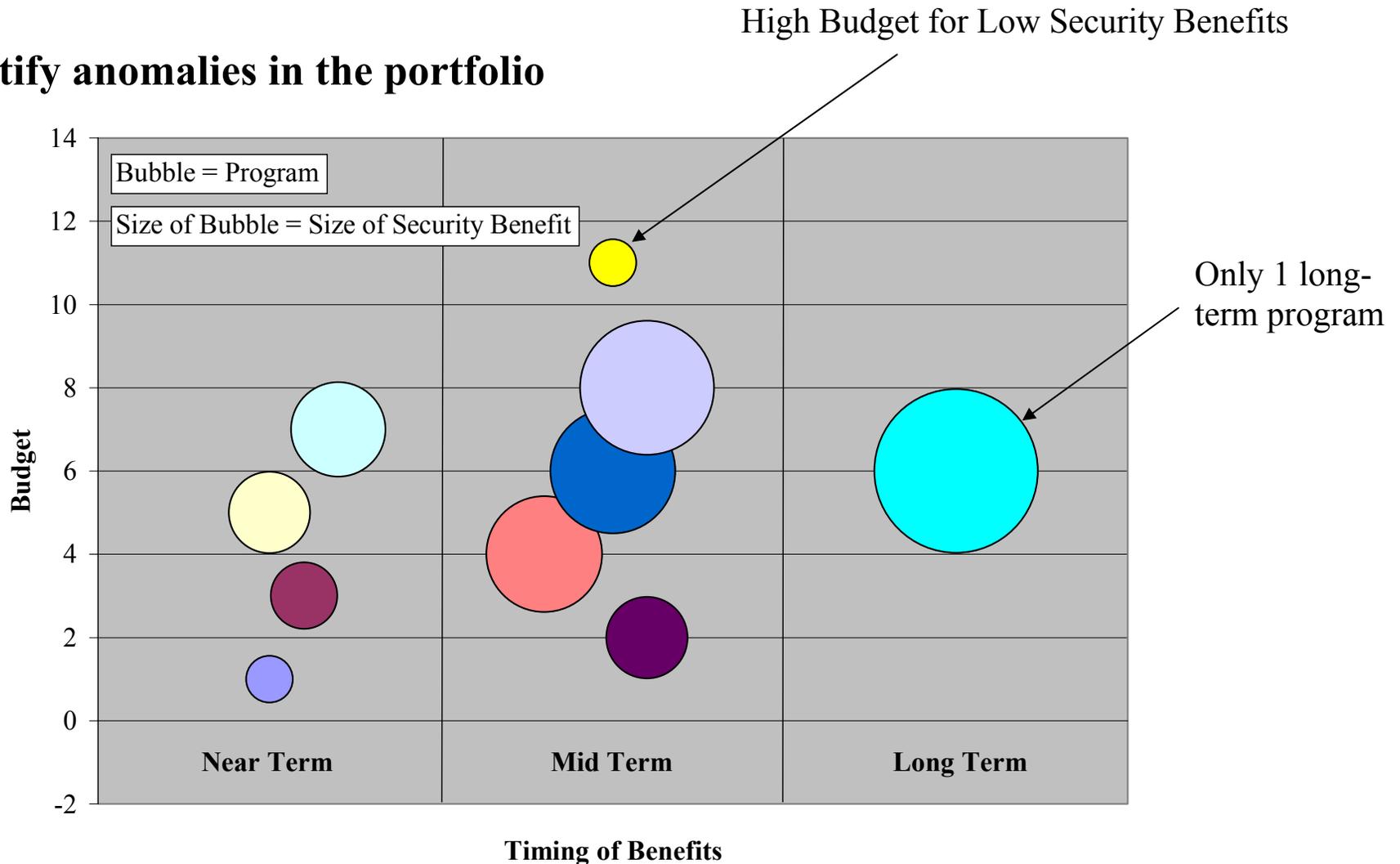
Suggestion 3b – Use benefit information to analyze the portfolio of programs

Characterize the portfolio according to the following measures:

- Benefits – Economic, environment, security
- Type of Benefit – Prospective, options, knowledge
- Timing – Near-term, mid-term, long-term
- Technical and Market Risk – Low, medium, high

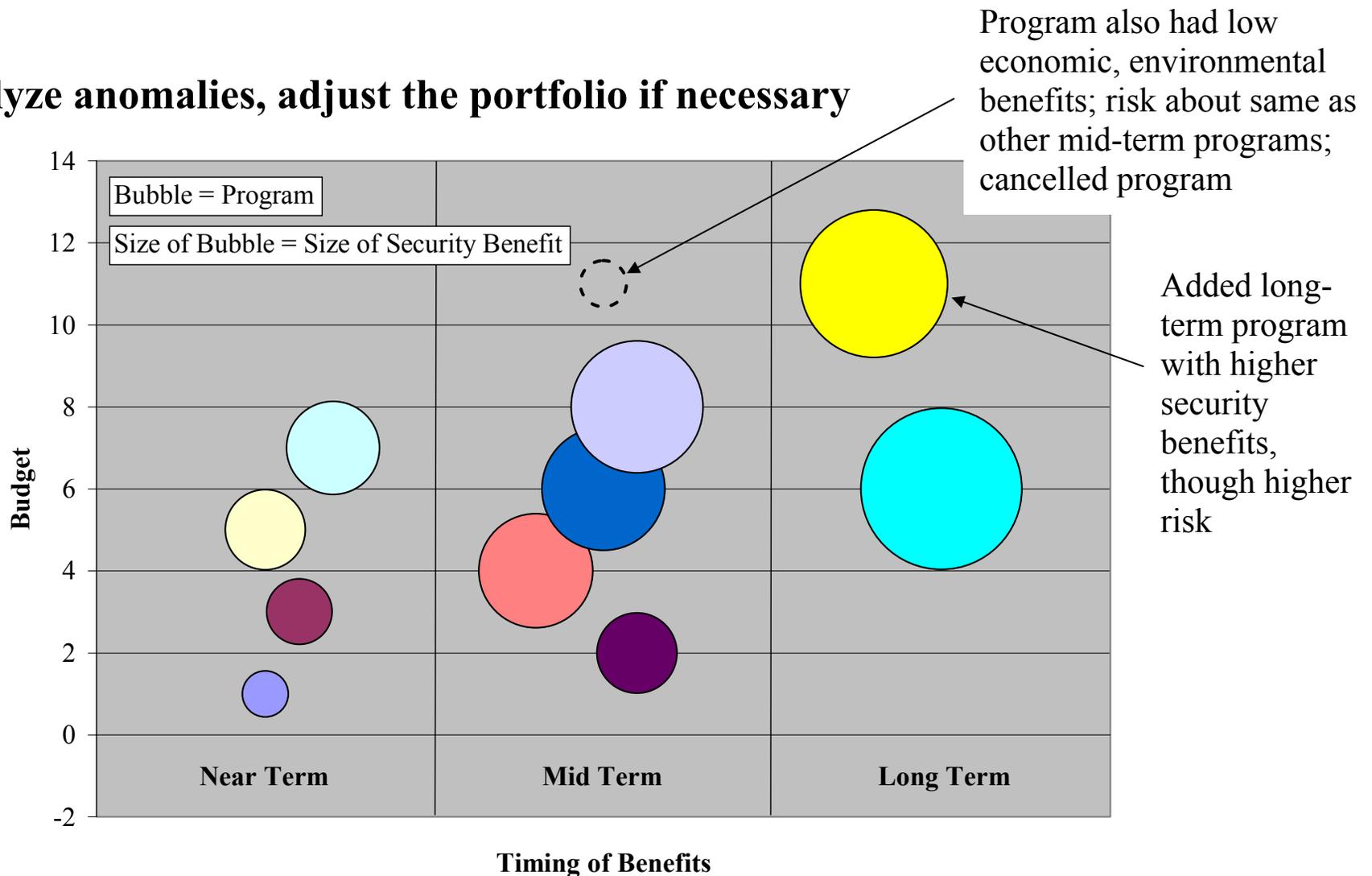
Suggestion 3b (cont.) – Use benefit information to analyze the portfolio of programs

Identify anomalies in the portfolio



Suggestion 3b (cont.) – Use benefit information to analyze the portfolio of programs

Analyze anomalies, adjust the portfolio if necessary



Questions to consider about portfolio analysis

- What is a “good” portfolio?
- How will risk be measured?
- What is the tradeoff between benefits and budget? (for portfolio adjustment)
- How much control does DOE have over budget levels?