

Electric Power Reliability

The Role of Superconductivity In the Coming Decade



P. M. Grant
DOE Peer Review 17 July 2000

Power Out^rage



*Sec. Energy
Bill Richardson,
April, May 2000*

"If the lights don't come on when we flip the switch, we're left to curse the darkness."

"We're a First World nation with Third World electricity."



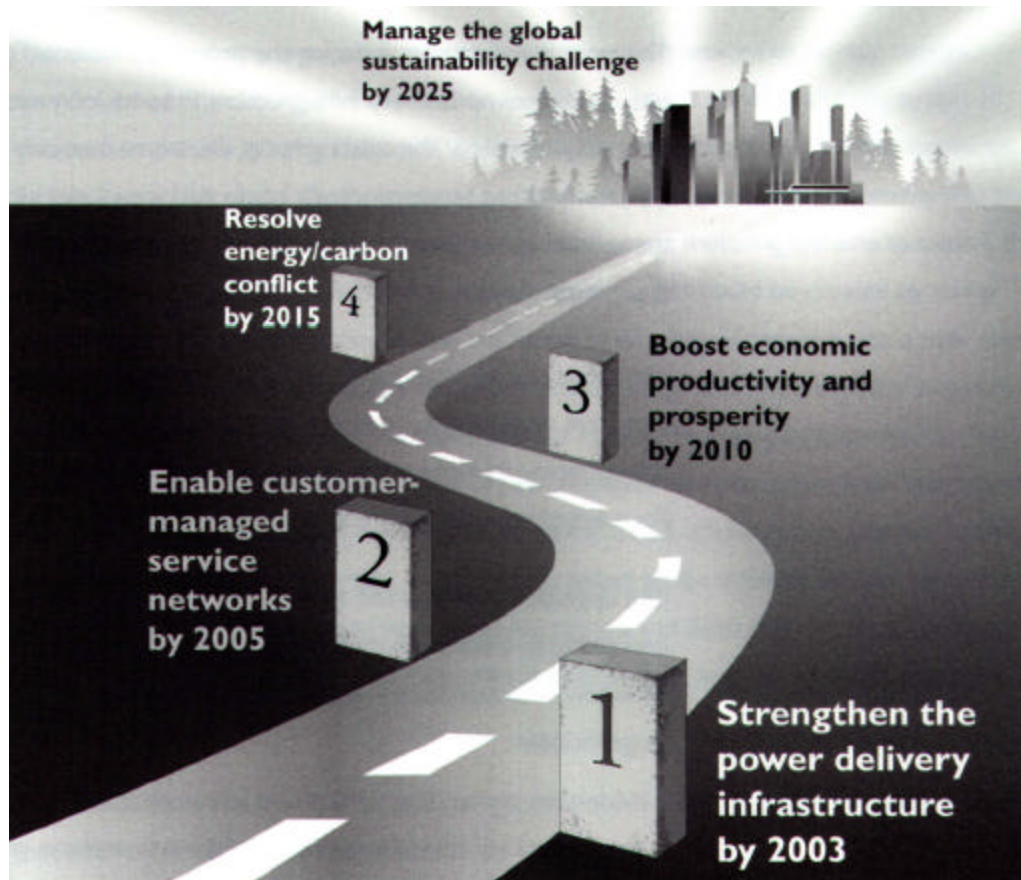
"We are sick and tired of them, and they had better change!"

*Chicago Mayor
Richard Daley on
the August 1999
Blackout*

P. M. Grant

DOE Peer Review 17 July 2000

The EPRI Electricity Technology Roadmap





"We must reverse current trends and make a renewed commitment to energy R&D."

*Kurt Yeager
CEO, EPRI
29 October 1999
NPC Speech*



http://www.epri.com/corporate/discover_epri/roadmap/index.html

Increasing the Reliability of the North American Grid

Targets	Critical Knowledge Gaps	10-Year Funding Outlook (\$million/yr)		
		Current Funding	Additional Funding Needs	Total Funding Needed
Increased reliability and carrying capacity of the North American transmission grid	<ul style="list-style-type: none"> • Wide-bandgap semiconductors for FACTS • Satellite-based Wide Area Management Systems (WAMS) • High-performance polymeric and superconducting cables  • Streamlined, lower-cost construction techniques for underground transmission  • Power flow control in complex grids (hardware, software, communications systems, integration with transaction management functions) • Information technology systems to control the physical grid and manage transactions 	100	100	200



 **Knowledge Gaps Addressed by Superconductivity**

Removing Power Delivery Constraints

Targets	Critical Knowledge Gaps	10-Year Funding Outlook (\$million/yr)		
		Current Funding	Additional Funding Needs	Total Funding Needed
Removal of geographic constraints on transmission of power and services	<ul style="list-style-type: none"> Removal of transmission bottlenecks among North American regions  Capability for continental-scale power wheeling  	100	100	200

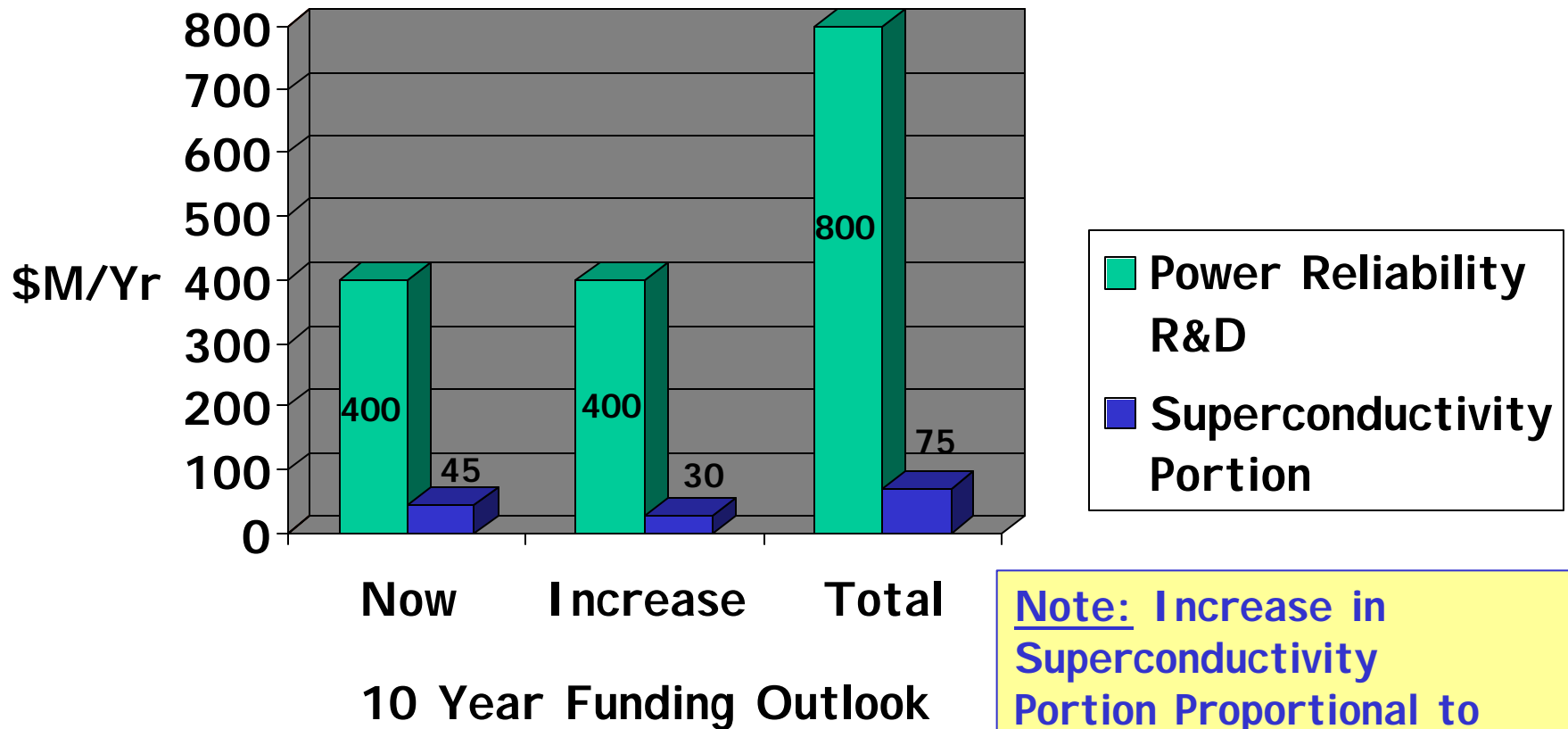
 **Knowledge Gaps Addressed by Superconductivity**

Distributed Generation: Power Delivery Requirements

Targets	Critical Knowledge Gaps	10-Year Funding Outlook (\$million/yr)		
		Current Funding	Additional Funding Needs	Total Funding Needed
Emergence of the distributed utility	<ul style="list-style-type: none"> • Cost-effective distributed generation and storage technologies  • Interconnection standards plus control and protection systems for mixed central/distributed systems • Low-cost converter technology to enable DC distribution networks • VAR support without requiring new generating capacity  	200	200	400

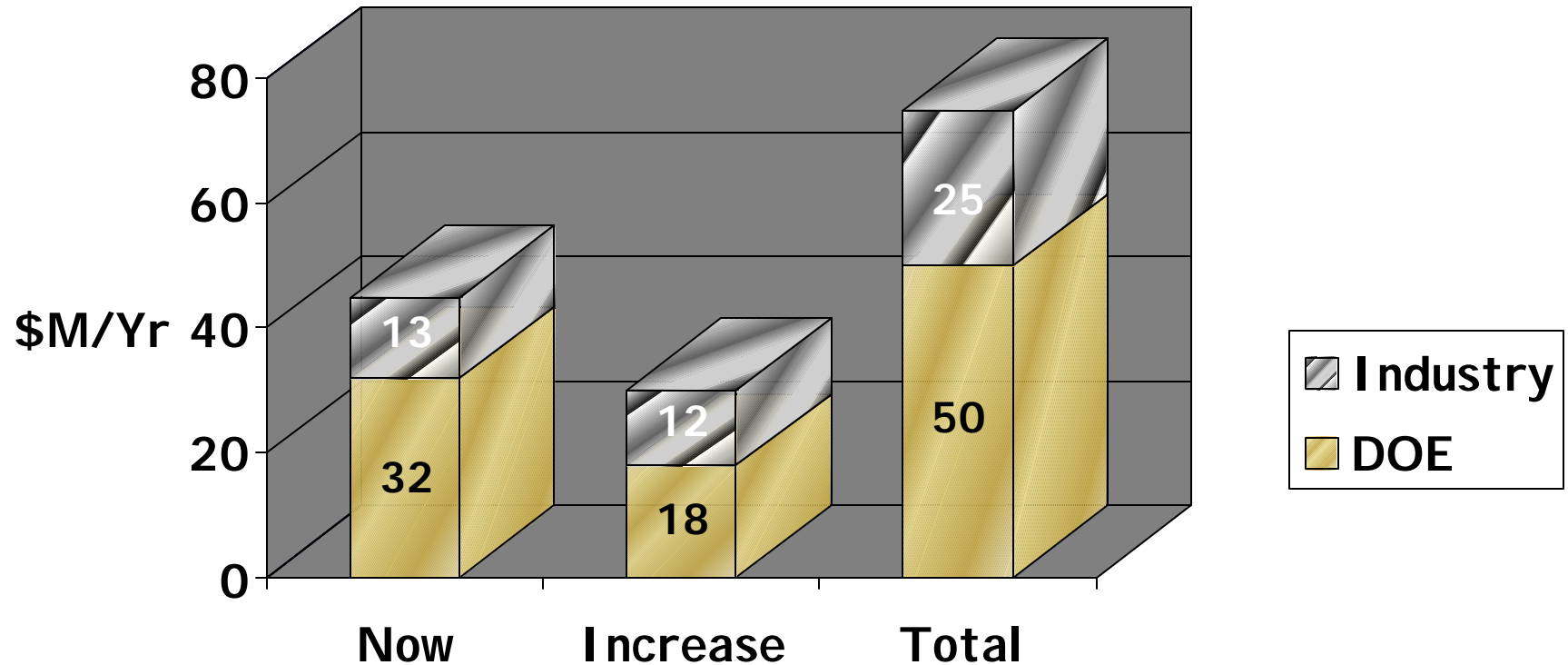
 **Knowledge Gaps Addressed by Superconductivity**

10-Year Funding Outlook: Power Reliability R&D



Now Increase Total
10 Year Funding Outlook

10-Year Funding Outlook: Superconductivity



10 Year Funding Outlook

P. M. Grant

DOE Peer Review

17 July 2000

Conclusions

- Superconductivity has the potential to help meet the power reliability challenge facing the nation.
- However, this potential can only be fulfilled through R&D efforts by DOE and industry concomitant with an expanded investment in improving the reliability of the nation's power delivery infrastructure.

P. M. Grant

DOE Peer Review

17 July 2000

Proposal

Robust and Reliable Electricity Delivery is a Vital Public Need - To Aid the National Effort toward this Goal, CSAC proposes that,

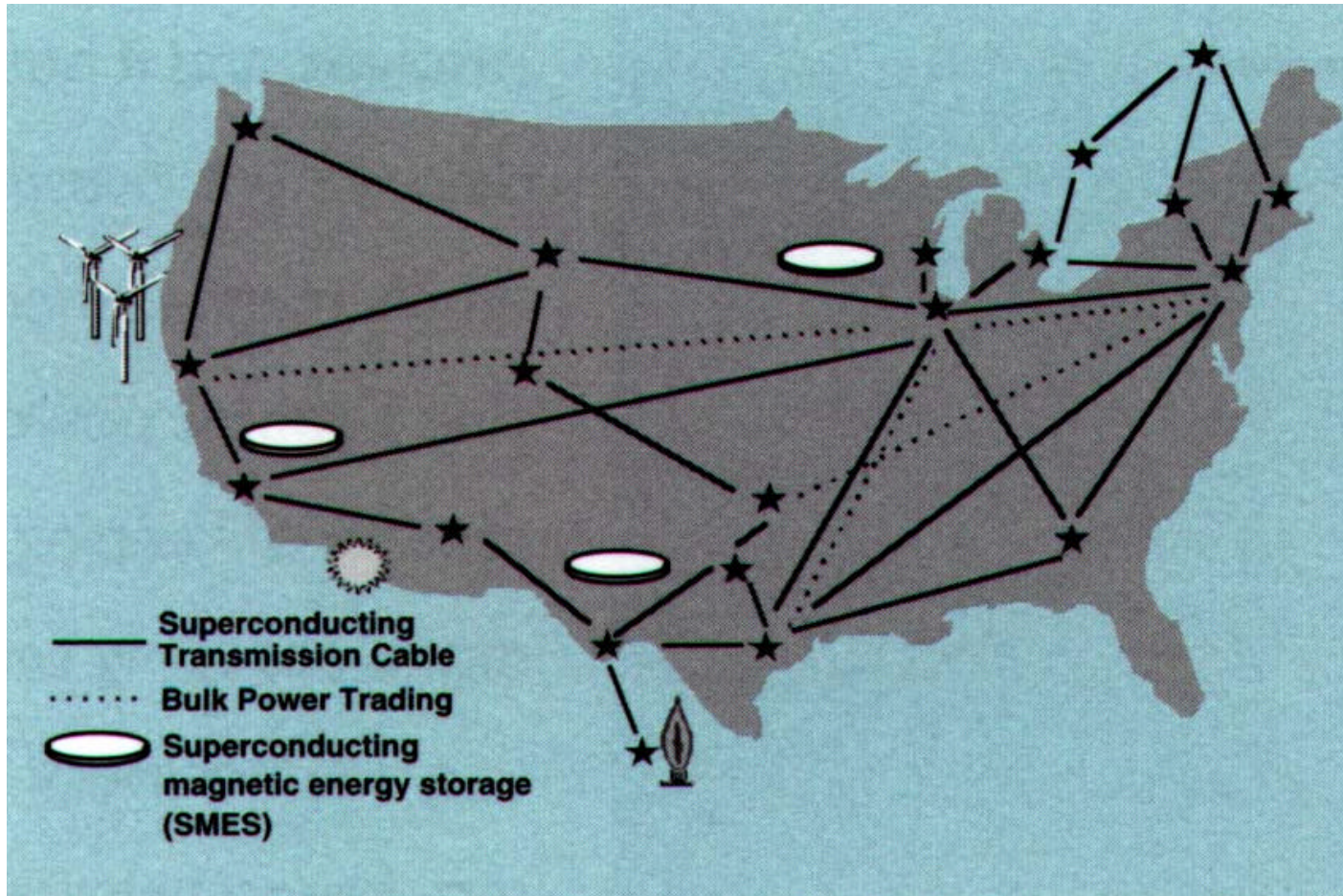
- Concomitant with increases in other R&D programs to promote power delivery reliability, the Superconductivity Program for Electric Power be increased by \$18M/yr.
- This increase be applied appropriately to 1) promote innovative demonstrations of superconductivity for power (e.g., “all-superconducting substations,” low voltage sc dc distribution), and 2) to accelerate the commercialization of “coated conductor” wire to maximize the impact of superconductivity technology on improving power delivery reliability.

P. M. Grant

DOE Peer Review

17 July 2000

The Dream Electricity Machine!



P. M. Grant

DOE Peer Review 17 July 2000

PDF e-copies of this poster can be
obtained from CSAC by e-mailing
Larry Grossman at
lgrossman@cassidy.com