

An Evaluation Framework for DER

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by

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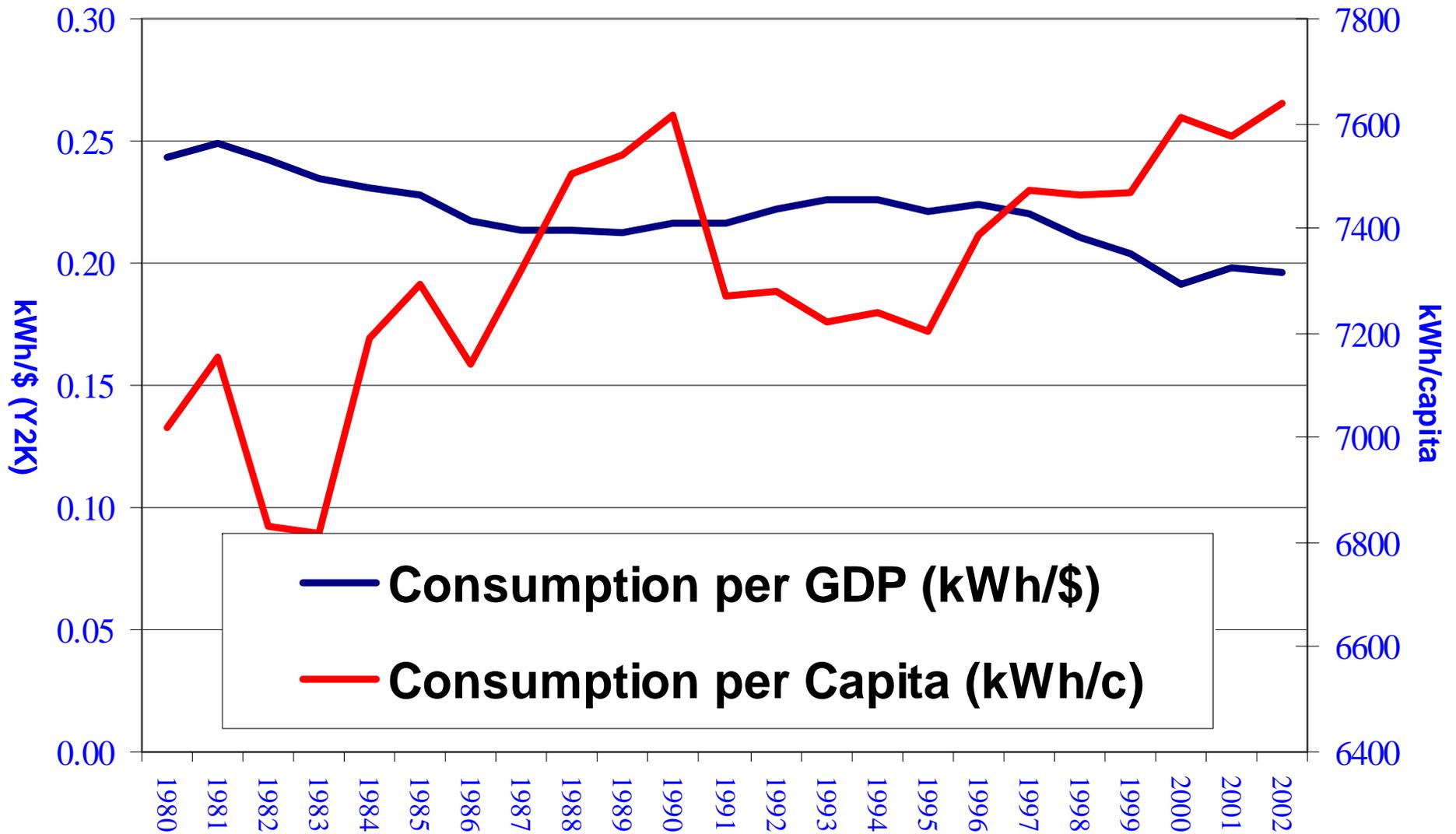
Environmental Energy Technologies Division

Outline

- I. Introduction
- II. Benefits Taxonomy
- III. Consumer Price Protection
- IV. Reliability & Security
- V. Conclusion



California Electricity Use



Motivation for Study

1. lay out a global framework for estimating DER benefits on a common basis
2. show that because a benefit is incalculable doesn't mean its value is zero
3. emphasize estimates have to be around a certain common point
4. identify areas of public policy interest



Benefit Rating System

benefit rating	1 or 1	2 or 2	3 or 3
economic size	small	medium	large
market likelihood	public policy intervention	partially internalized	largely internalized
tractability	hard to quantify	possibly calculable	readily estimated

green for positive benefits

red for negative benefits, a.k.a. costs



Benefits (& Costs) of DER 1

	Benefit/Cost	Economic Size	Market Likelihood	Tractability
1	Lower Cost of Electricity	2-3	3	3
2	Consumer Electricity Price Protection	1-2	3	2
3	Enhanced Electricity Price Elasticity	1-2	1	1
4	Reliability & Power Quality (DER adopter) (other customers)	2 & 1-2	3 & 1	2 & 1
5	Reduced Security Risk to Grid	2	1	1
6	Combined Heat and Power/Efficiency	3	3	3
7	Noise Disturbance	1	1	2
8	T & D Deferral and Congestion Relief	3	2	2
9	Capacity Deferral/Standed Assets	2-2	1	2



Benefits (& Costs) of DER 2

	Benefit/Cost	Economic Size	Market Likelihood	Tractability
10	Reduced T&D Losses	1	1	2
11	Voltage Support to Electric Grid	1-2	1	1
12	Consumer Control	1	3	1
13	Indoor Emissions	1	1	2
14	Airborne or Outdoor Emissions	2-2	1	2
15	DER Fuel Delivery Challenges	1-2	2	2
16	NIMBY – BANANA – Environmental Equity	1	1	1
17	Land Use Effects.	1	1	2



The DER Adopter Can Lower Bills

	Economic Size	Market Likelihood	Tractability
Lower Cost of Electricity	2-3	3	3

- DER adopter will likely only be motivated if there are bill savings
- lowered total cost of purchased energy will be captured
- ability to optimally trade might be restricted



The DER Adopter Can Lower Volatility

	Economic Size	Market Likelihood	Tractability
Consumer Electricity Price Protection	1-2	3	2

- DER adopter will
 - likely be able to contract long-term for generating fuels
 - be able to avoid regulatory uncertainty
 - control costs



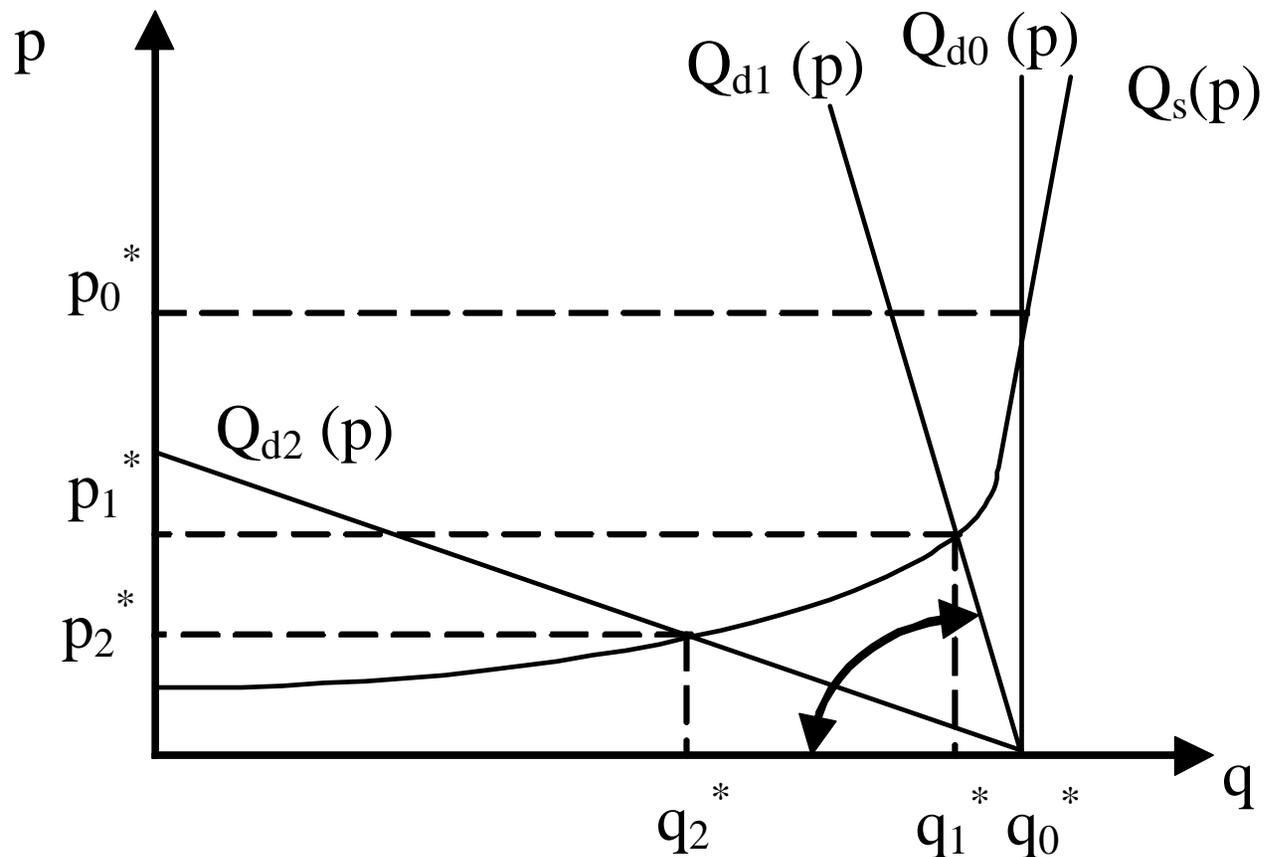
DER Can Provide Price Response

	Economic Size	Market Likelihood	Tractability
Enhanced Electricity Price Elasticity	1-2	1	1

- DER owners will be able to respond to prices
- enhanced elasticity will tame markets
- will volatility be reduced?



Effect of Inelastic Electricity Demand

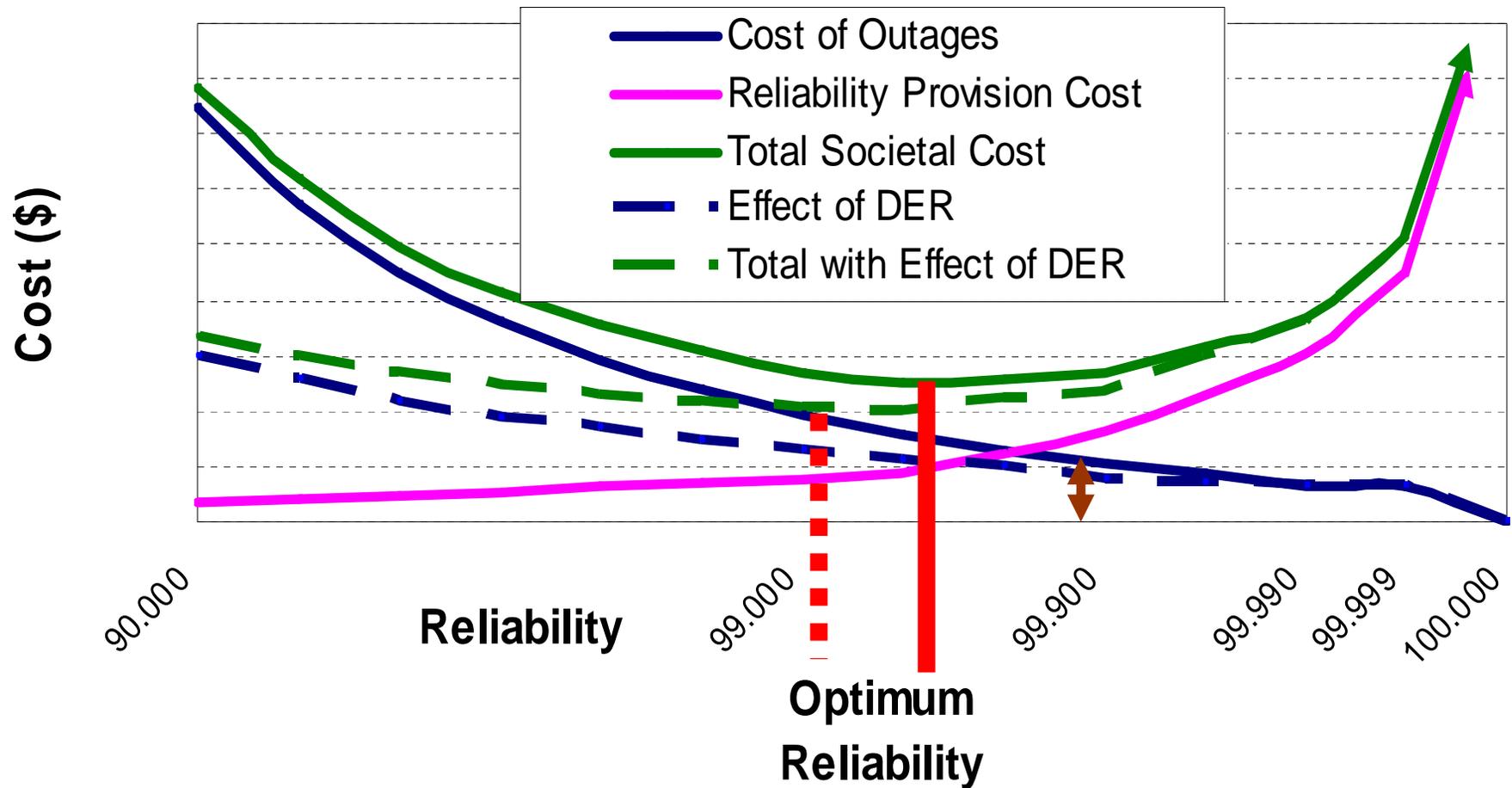


The Complex Reliability Picture

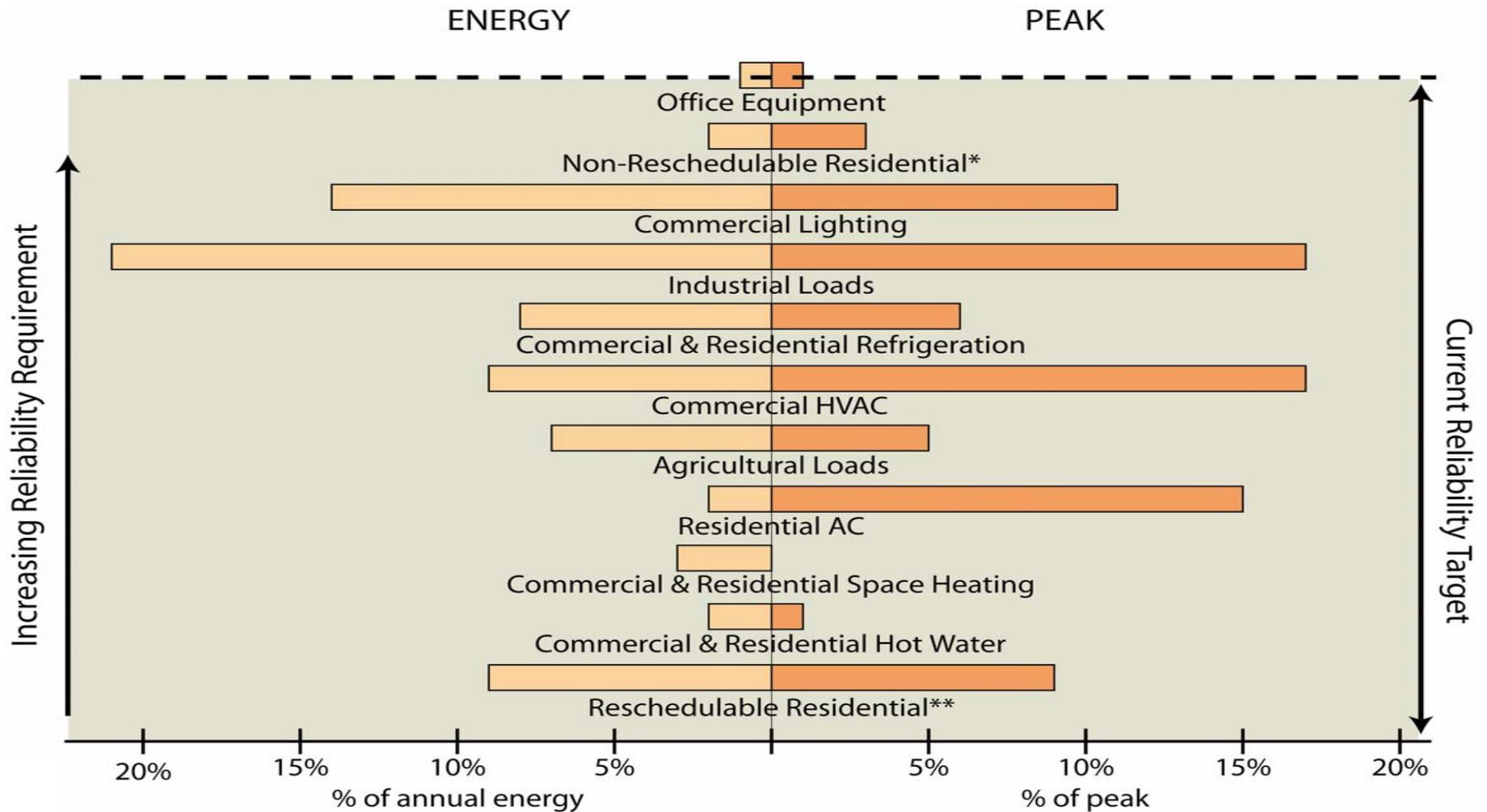
- DER adopter
 - DER Adopter will capture the benefit
 - reliability likely to be a big driver of DER
- power grid effects are another story...
 - power systems comprised of a larger number of small sources are inherently more reliable



The Optimal Societal Level of Electricity Supply Reliability



1999 California Electricity Consumption by End-Use



* includes cooking and TV

** includes dryers, pools & spas, freezers, dishwashers, waterbed heaters, and clothes washers

Reduced Grid Security Risk

- the power grid is a attractive and vulnerable target
- providing for sensitive loads locally lowers the security risk of grid failure
- lower grid dependence reduces its attractiveness as a target



Conclusion

- A comprehensive and consistent approach is needed for DER benefits estimation.
- It's important to not lose sight of the big picture.
- Some issues are complex and fundamental e.g. power grid effects.
- Can the consequences of a paradigm shift actually be estimated?

http://eetd.lbl.gov/ea/EMS/EMS_pubs.html#DER

