

# Valuing Reliability Resources

## **NARUC Joint Meeting Committee on Electricity and Consumer Affairs Committee**

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# Overview

- **Reliability should be considered from the customer's perspective**
  - Power quality is an increasingly important consideration
- **The annual cost of power interruptions is significant**
  - LBNL's "best estimate" is ~\$80 billion/year
  - Yet, the range of uncertainty, due to poor data quality, is large: +/- ~\$50 billion/year
- **Yet, economic costs tell only part of the story**
- **NARUC can play a leadership role in improving the availability of information necessary to better inform public and private decision making on reliability**



# Reliability Should be Defined from the Customer's Perspective

*“ ‘Nines’ are in the eyes of the beholder.”*

*Normal Utility*

*Premium Utility*

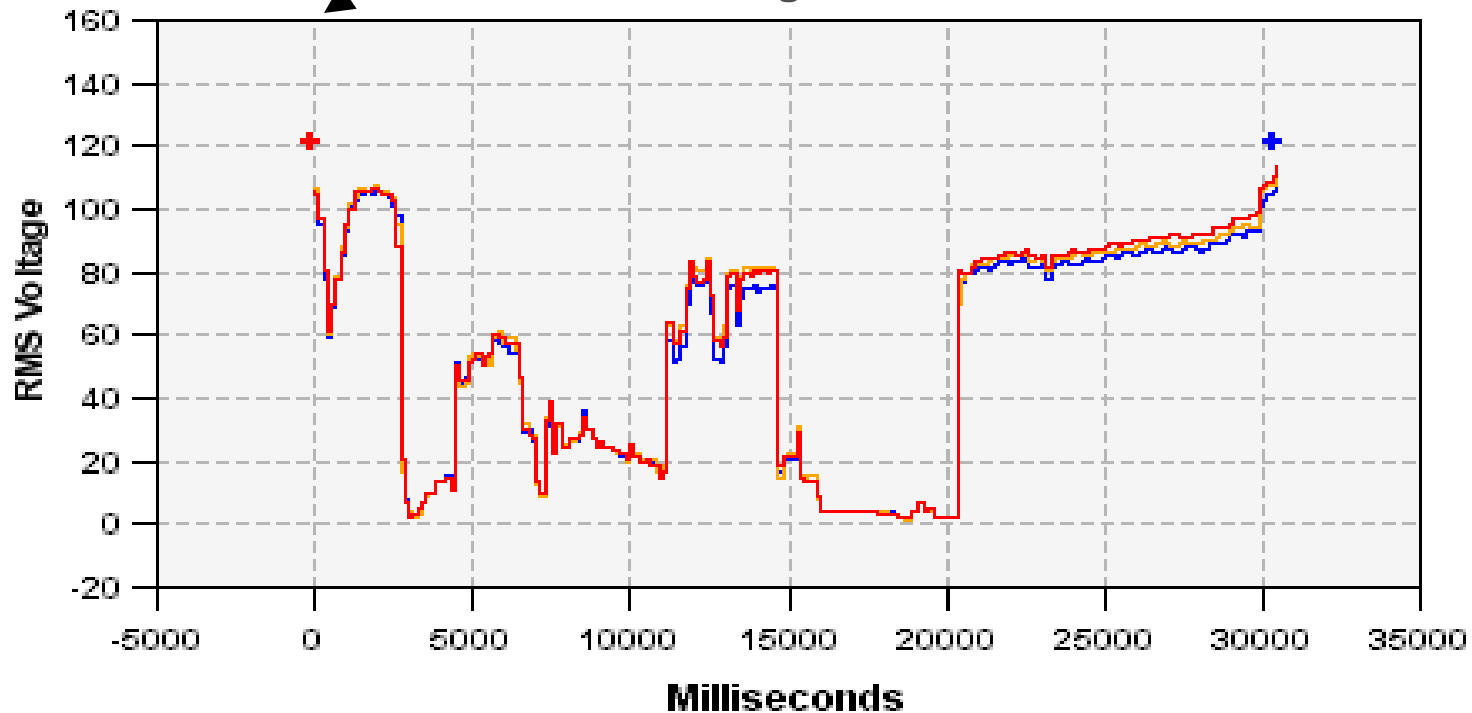
Normal Utility			Premium Utility		
Normal Utility Events	Process Uptime 1 Hr Downtime per Event	Typical Applications	Premium Utility Events	Process Uptime 1 Hr Downtime per Event	Typical Applications
25 events/yr 22 @ ¼ sec 1 @ 2 secs, 1 @ 5 mins, 1 @ ½ hr,	25 Hrs total downtime / yr,	Plastics, PCs, Machinery, Textiles, Cell Towers, Residential	10 events/yr, 0.25 sec each	10 Hrs total Downtime / yr,	Semicon Mfg, Auto Mfg, Fiber Optic Cables, Web farms, Continuous Processes
2,107 sec/yr 99.99% 4-nines	99%, 2-nines		2.5 sec / yr, 99.99999% 7-nines	99%, 2-nines	

Major disconnect exists between a utility and a 'digital economy' customer's perception of reliability

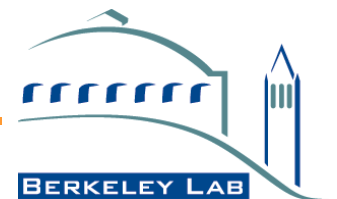
# Power Quality Refers to Subtle Deviations in the Quality of Delivered Electricity that Causes Customer's Equipment to Fail or Mis-operate

Industrial Plant, Southern Ohio

4:10:39 PM EDT, August 14, 2003



← 30 Sec. →

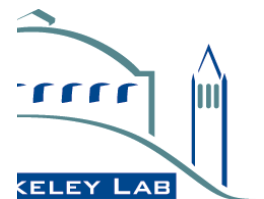


# The Cost of Reliability to C&I Customers is Measured by Downtime, Not Outage Duration

Business Type	Event Description	Economic Cost (\$)
Manufacturer of silicon chip fabrication equipment	Voltage sags and short-duration voltage interruptions	\$350,000 per event
Silicon chip fabrication	Even an outage of a few minutes can lead to 1-1.5 days of downtime	Up to \$500,000 per day in lost revenue
Automotive manufacturer	From a few seconds to one half hour of downtime	Less than \$1,000,000
	More than 1 hour of downtime	In the millions
Financial clearinghouse	30 minutes of downtime due to a lightning strike	\$12,000,000



Source: Eto, J., D. Divan, and W. Brumsickle. *Pilot Evaluation of Power Quality and Reliability Monitoring in California's Silicon Valley with the I-Grid System*. January, 2004. LBNL-52740. download from <http://certs.lbl.gov>



# The Annual Cost of Power Interruptions is Significant

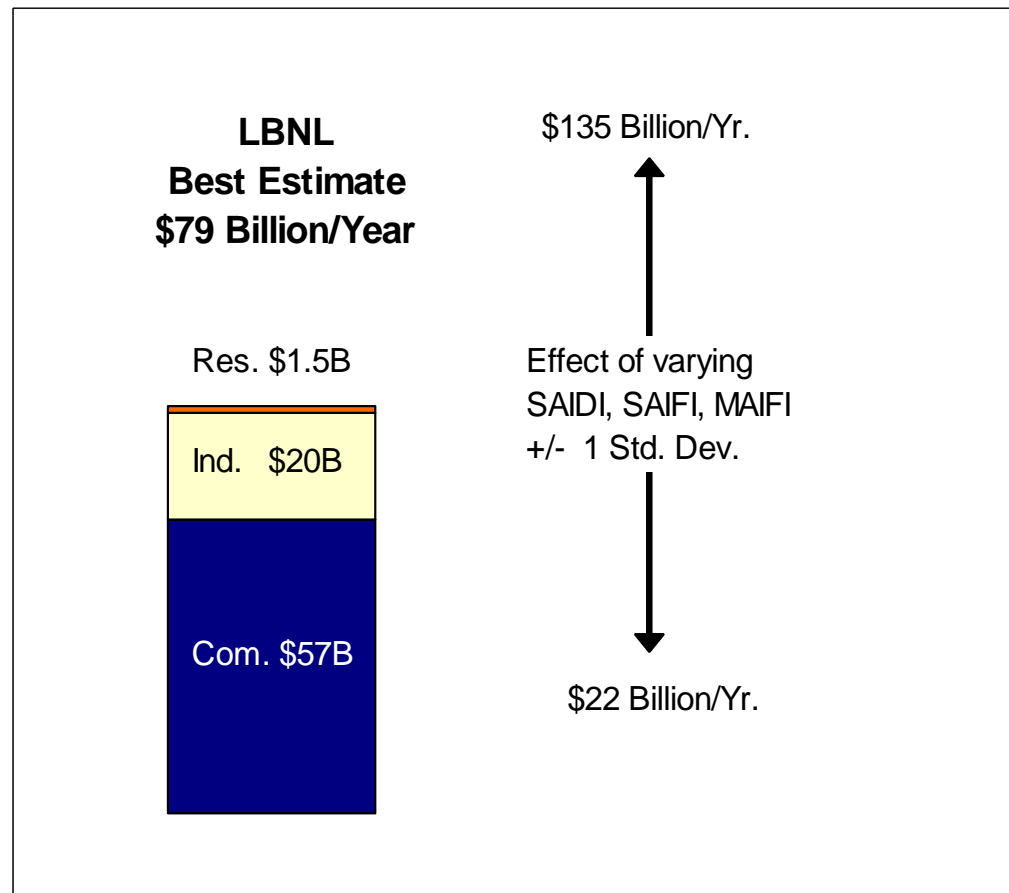
LBNL has developed a national estimate based on:

- SAIDI, SAIFI, MAIFI;
- Customer damage functions; and
- EIA customer data

Range of uncertainty is large due to poor data quality

SAIDI, SAIFI data are recorded inconsistently

Power quality events are not recorded at all



Source: Hamachi-LaCommare, K, and J. Eto.  
*Understanding the Cost of Power Interruptions and Power Quality.* [in preparation].



# The Economic Costs of Power Interruptions Tell Only Part of the Story

According to a recent meta-analysis of 24,000 surveys of utility customers, the cost of a 1 hour interruption is:

- ~ \$8,200 for a Large C&I customer
- ~ \$1,200 for a Small/Med C&I customer, and
- ~ \$ 3 for a Residential customer

Nevertheless, utility surveys do not capture  
Infrastructure costs from large events (e.g., Aug 14, 2003)  
Public inconvenience/hassle costs  
Health and safety impacts  
Supply chain disruptions  
Customer investments in reliability-enhancing technologies  
(e.g. energy storage, back-up generation)

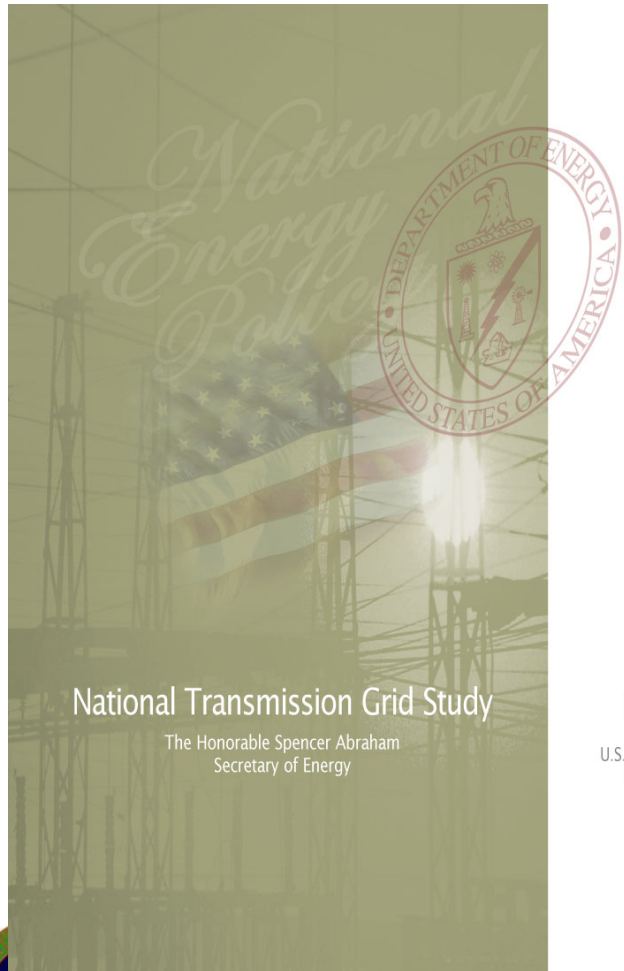
Don't confuse the things you can count with the things that really count!



Source: Lawton, L., A. Katz, M. Sullivan, K. VanLiere, and J. Eto. *A Framework and Review of Customer Outage Costs: Integration and Analysis of Electric Utility Outage Cost Surveys*. download from <http://certs.lbl.gov>



# NARUC Can Play a Leadership Role in Improving Availability of Information Needed to Make Better Reliability Decisions



DOE will work with the Energy Information Administration (EIA), FERC, National Governors Association (NGA), the **National Association of Regulatory Utility Commissioners (NARUC)**, the National Association of State Energy Officials (NASEO), industry, and consumer representatives to *determine what economic and reliability data related to the transmission and the electricity system should be collected at the federal level and under what circumstances these data should be made publicly available.*

DOE will work with FERC, state PUCs, and industry to *ensure the routine collection of consistent data on the frequency, duration, extent (number of customers and amount of load affected), and costs of reliability and power quality events, to better assess the value of reliability to the nation's consumers.*



May 2002

