



EDISON ELECTRIC
INSTITUTE

*Developing a Guide to the
Technical, Strategic, and
Economic Implications of
EPACT Sec 1252*

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Audience

- Policy makers
- Utilities
- Interested publics



Purpose

- Support good decision making:
 - Objective assessment of benefits and costs
 - Understand technology issues



Vendor

- Plexus Research, Boxborough, Massachusetts:
 - Founded 1983
 - Corporate focus - *The business & technologies of utility interaction with customers.*
 - Core Expertise:
 - Metering, Meter Data Systems
 - Data Communications
 - Telecommunications
 - Customer Services, Technologies & Automation
 - Clients have included NARUC
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Contents

- Key provisions of EPCRA Sec 1252
 - Background and selected drivers
 - Business case development
 - Brief tutorial on enabling technology, metering, AMI/AMR, "Smart Metering"
 - Technical and economic implications of technology choices
 - Purchasing, installation and integration best practices
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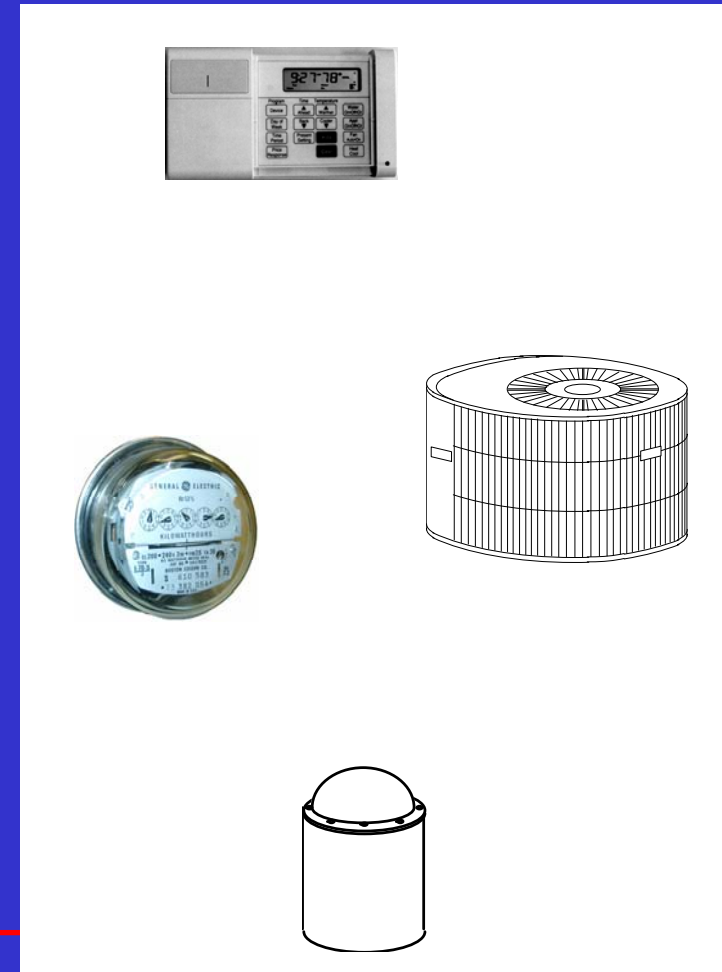
Contents (Con't)

- Lessons learned from prevailing practice
- Decision support tree – tools
- Conclusions and recommendations
- Glossary & definitions
- Appendices



Defining Terms

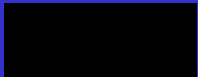
- DR = Demand response
 - Utility activity that prompts customer response to electric market dynamics
- AMR = Automated remote meter reading
 - Supports traditional utility operations
- AMI = Advanced metering infrastructure
 - = DR + AMR



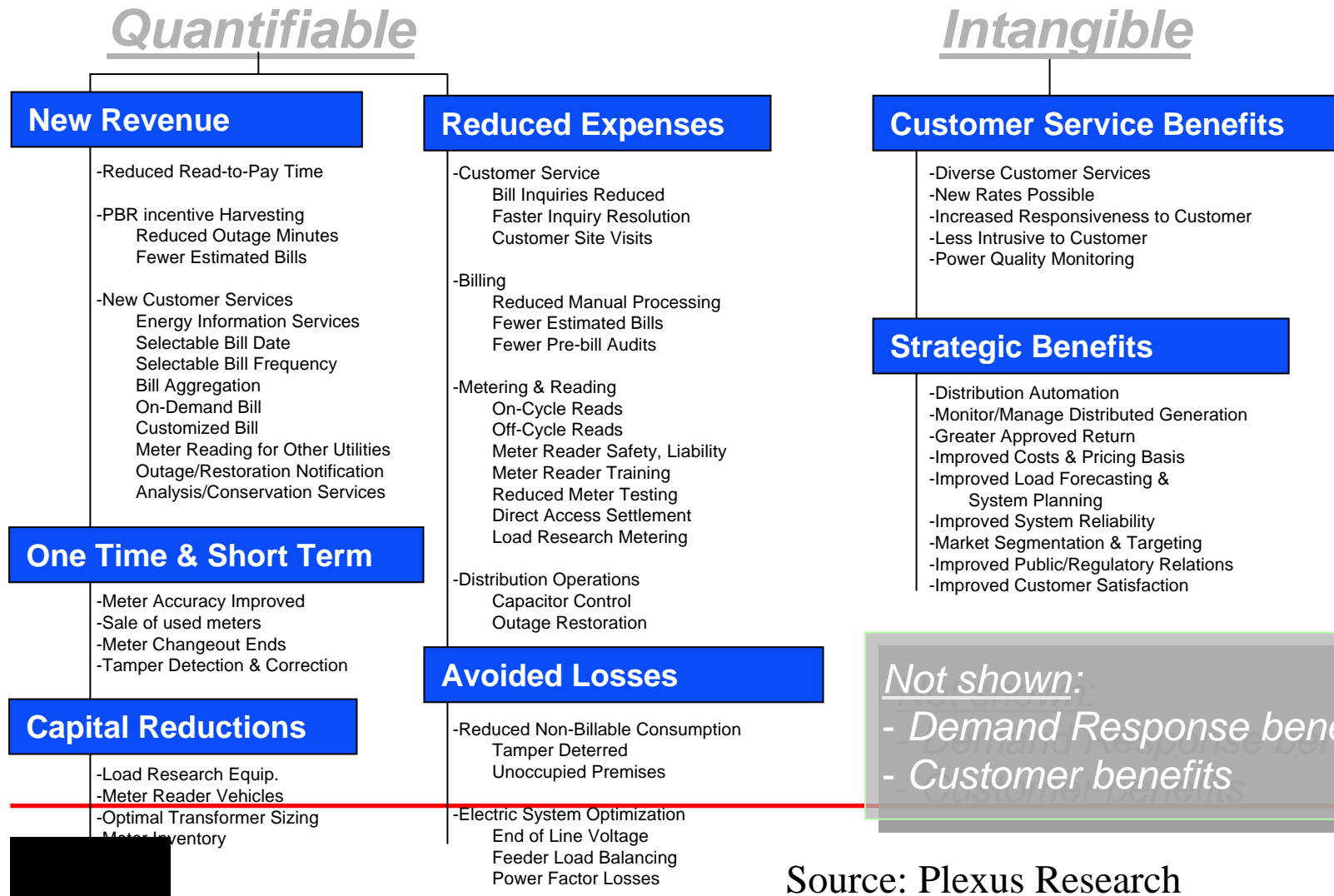
Business Case Development

- Evaluating benefits and costs to:
 - Identify high-yield applications
 - Guide systems specification

- Discussion of representative benefits and typical costs
 - Will not address changes in consumption behavior:
 - Not an economics firm
 - Significant uncertainty - CA Statewide Pricing Pilot: 20-40% residential demand reduction – How much will persist? What are reasonable assumptions elsewhere?



Utility Benefits of AMR



Source: Plexus Research

Typical AMR System Costs

	System cost (\$ per meter)
Drive-by (radio)	~\$50 - \$90
Radio Fixed Network	~\$90 - \$130
Power Line Fixed Network	~\$100 - \$150

Notes

Figures shown include hardware, software, installation, billing integration, training, vendor deployment support.

Costs vary widely, figures shown are approximate, middle-of-range, for estimating purposes only.

Actual values will vary substantially with size of project, geography, customer density, functional requirements, meter inventory, corporate strategy, and many other factors.

Drive-by does not always cost less than fixed network. A power line system may be less costly than a radio system.

O&M costs (not shown) vary widely and appreciably affect annual net benefit.

Product status, risks, performance and other factors vary widely and often have cost & benefit consequences.

Assumptions

Saturation deployment.

Typical mix of single-, network- and poly-phase meters.

50/50 meter retrofit/replacement.

Source: Plexus Research



AMR Cost / Benefit Illustration

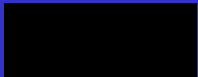
Type of System	Radio	Radio	Power Line	Radio	Power Line	Radio	Power Line
Costs							
As submitted							
Acq & Install	\$40,615,230	\$56,146,657	\$70,632,795	\$52,131,165	\$52,441,925	\$52,514,550	\$73,247,380
Annual O&M	\$16,856	\$27,000	\$0	\$1,200	\$24,000	\$20,200	\$100,020
As adjusted							
Acq & Install	\$51,887,575	\$51,408,365	\$91,106,635	\$54,057,240	\$59,602,300	\$62,559,575	\$58,384,510
Annual O&M	\$324,703	\$321,536	\$606,074	\$518,840	\$555,050	\$1,036,140	\$576,890
Acq & Install/point	92	92	\$162	\$96	\$106	\$111	\$104
Results							
Annual Net Benefit	\$7,872,178	\$7,755,553	\$9,479,227	\$9,697,312	\$9,606,787	\$8,580,920	\$9,133,915
Simple Payback (yrs)	6.5	6.5	9.5	5.5	6.1	7.2	6.3
Not Included		Electric load profile Service dis/connect On-demand read				Some lg C&I meters	Some lg C&I meters Electric load profile Service dis/connect
Upside	Includes demand New load profile Solid G,W,E	Solid G,W, E is new. OK mixed DB/FN	Full 2-w ay Excellent head end Mature tech	Mature technology Extensive E,G	Expandable to 2 w ay Mature technology Possible hi injection \$	Full 2-w ay Solid mtrng+AMR Extensive E,W	Bidirectionality Good in E,G,W
Downside	No svc disconnect 3Ø not now a product FN Migration ?	FN Migration ?	Gas AMI "coming" Busy Line conditioning	Infrastructure cost Cannot do: Load control Service dis/connect	New technical tests Line conditioning	? # of nodes 1-w ay System size? Cannot do: Service dis/connect	Big system exp. Bidirectionality
Plexus Changes	+LP 1Ø meters +2Ø & 3Ø meters +All meter installation	- special LP meters - some install cost	+All meter install +Substation install	+some phone AMR +500 concentrators	+All meter install +Substation install	+All meter install +2500 concentrators	- special LP meters - turnkey costs + Some meter install
Notes:	Training and IT support costs added to O&M for all vendors.						
	None supports (as quoted) data recovery from intelligent distribution devices.						
	Some estimated full turnkey delivery. Plexus assumes (for all vendors) that utility will manage the project internally.						
	All figures approximate, based on extrapolation from multiple previous projects with diverse requirements & assumptions.						

Note: Illustrative only. Do not draw rigorous conclusions from this chart.
Data reflect arbitrary adjustment and extrapolation of data for multiple utilities.
Details have been scrambled to obscure participant identities.

Source: Plexus Research

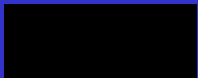
Enabling Technology

- Technology choices for metering and data communications:
 - Drive-by vs. fixed network systems
 - RF vs. powerline carrier
 - Urban vs. rural deployment issues
 - One-way vs two-way
 - Saturation vs. spotty deployment



Implications

- Performance and cost implications of increasingly complex / data-intensive systems
- Implications of alternative TOU rate designs
 - Fixed & seasonal TOU
 - Demand rates
 - CPP
 - RTP
 - Peak load reduction agreements



Best Practices

- Specialized procurement practices, based on Plexus's experience:
 - RFI and RFP development
 - Technology and vendor selection
 - Contracting exposures and countermeasures
 - Mixed technology systems
 - Turn-key contracts
 - Outsourcing models
 - Installation services contracting



Lessons Learned

- Big picture
- Risks/rewards
- Key trade offs
- Timing and pace



Decision Support Tool

- Value tree:
 - Categories of quantifiable benefits
 - Categories of "soft" benefits

- Components of 3 key implementation phases:
 - Evaluation, planning, definition, requirements & preparation, business case
 - System specification, RFI, RFP, Scoring, Contracting
 - Deployment, installation strategies, acceptance tests

