Overview of California's Demand Response Load Impact Protocols

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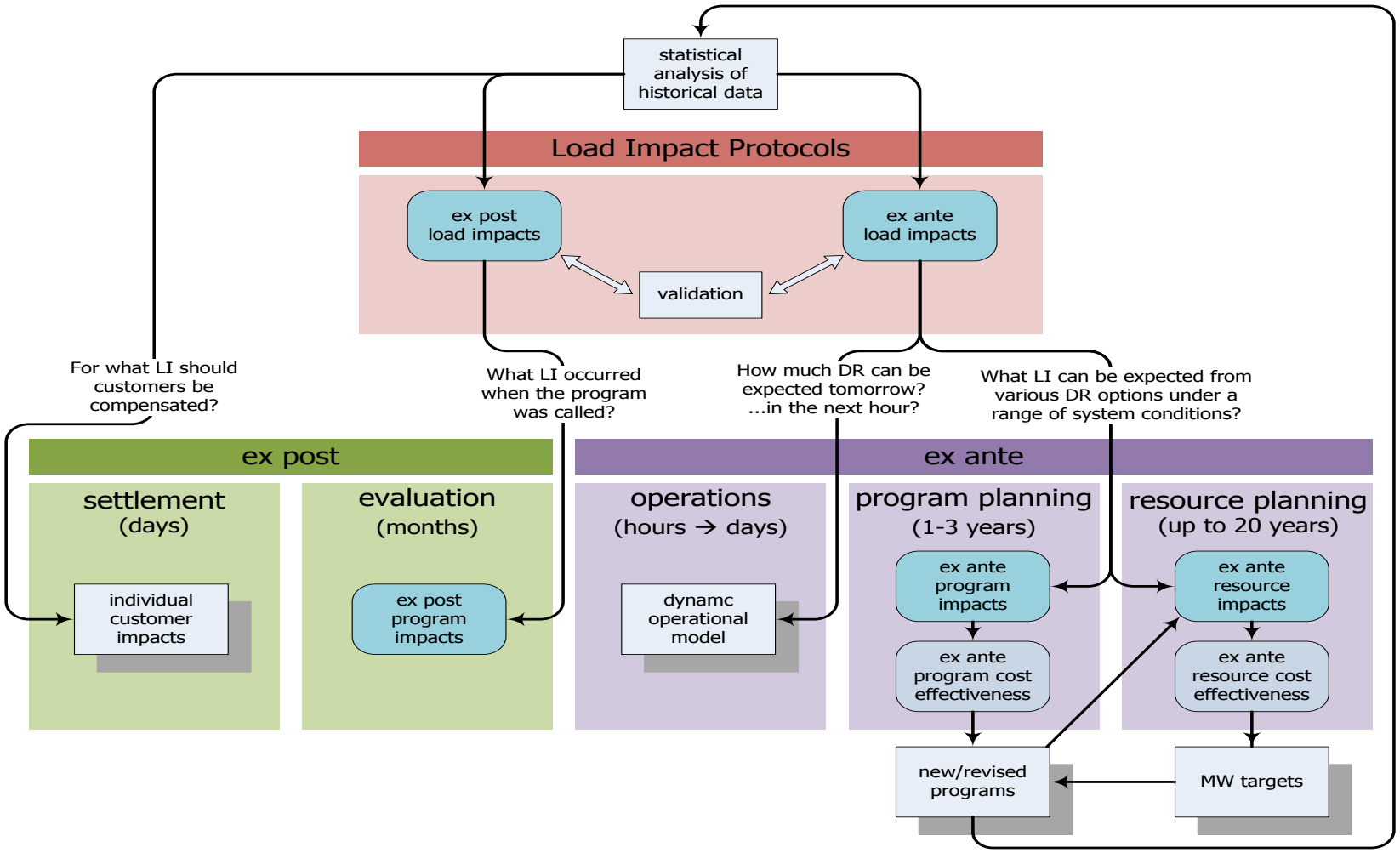
Presentation Overview

- **Overview of ways that load impact estimates are used and implications for analysis**
- **Summary of California DR portfolio**
- **Summary of the California DR load impact protocols**

LI Estimation Can Be Used Throughout the Life Cycle of a DR Resource



How Load Impacts Are Used Drives the Analysis

- What will DR deliver tomorrow or right now?—an ex ante exercise
- Prediction accuracy matters significantly
- Need to incorporate planned non-performance , if known
- Estimate performance given operating conditions and committed resources
- Approaches range from decision tables to predictive models

- How much DR did we get last month?—an ex post exercise
- Need customer buy-in
- Participants want payment quickly
- Estimates at the individual participant level
- Prediction accuracy affects costs (overpayments /penalties)
- Usually based on baseline or day matching methods

- How much DR will we get over the next several years or decade?
- Ability to compare DR with other resources is critical for cost-effectiveness and planning
- Need to estimate deliverable resources under a standard set of conditions that align with system planning
- The focus is on impacts for the program and for key segments
- More detailed, robust, and/or complex analyses are possible

California Has 3 Large IOUs Serving Almost 10 Million Electricity Consumers

PG&E

- Serves Northern CA
- Provides electricity and gas
- ~5.0m electric customers
- Climatically very diverse
- DR program budget for 2009 to 2011 ~$350m

SCE

- Serves Southern CA (except for San Diego and some large muni's)
- Electricity only
- ~4.5 m electric customers
- Climatically less diverse than PG&E but still from coast to desert
- DR program budget for 2009 to 2011 ~$250m

SDG&E

- Serves San Diego county
- Provides electricity and gas
- ~1.2m electric customers
- Most customers in mild climate zone near coast
- DR program budget for 2009 to 2011 ~$52m

The California DR Portfolio is Large and Diverse

Residential Programs

- The largest dynamic pricing program in the country at PG&E
- All three utilities with plans to roll out peak time rebates in 2011
- PG&E filed default critical peak pricing rate in the fall
- Three very diverse a/c load control programs with total enrollment around 500,000 customers

Non-Residential Programs

- Statewide Base Interruptible Program
- Demand Bidding Program at PG&E and SCE
- Statewide Capacity Bidding Program
- Voluntary Opt-in Critical Peak Pricing at PG&E and SCE, and Opt-Out CPP at SDG&E
- By 2012, all non-residential customers will be on default dynamic pricing with opt-out rate a TOU rate
- An “RTP” program at SCE
- Aggregator managed programs at all three utilities
- Agricultural pumping interruptible program at SCE
- A/C load control programs at all three utilities

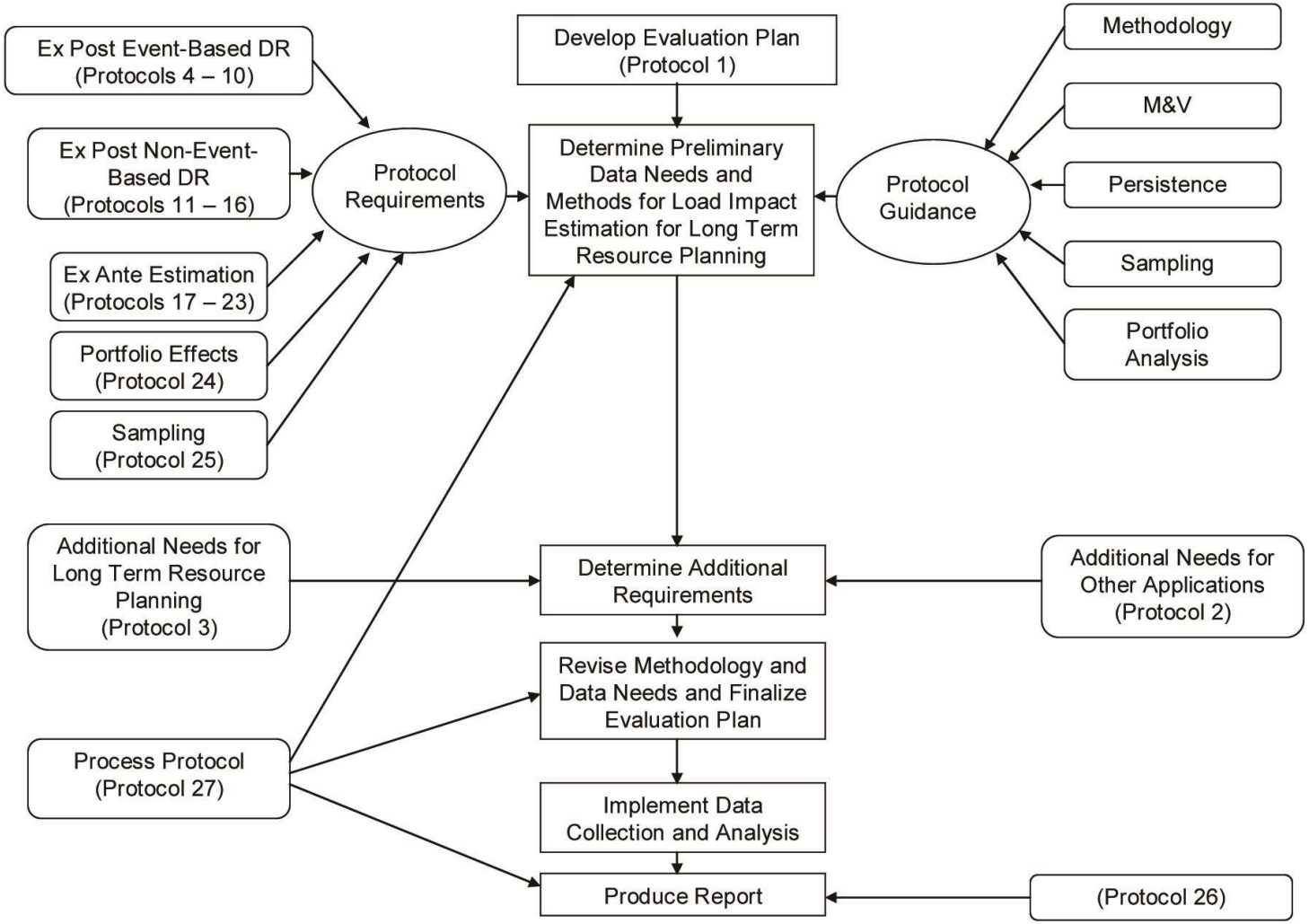
Each April 1st, All Three CA Utilities Must File Load Impact Evaluations for all Programs

- **Ex post evaluations for the prior program year and ex ante estimates for the subsequent 10 years using a common format**
  - **Hourly values**
  - **Common event window for event based resources**
  - **Monthly system peak day**
  - **Average week day for non-event programs**
  - **Normal and extreme weather conditions (1-in-2 and 1-in-10 weather years)**
  - **By local capacity area (of which there are 10)**
  - **Many estimates are provided for different business categories and other customer segments**
- **See *Load Impact Estimation for Demand Response: Protocols and Regulatory Guidance* at http://fscgroup.com/index.php/consulting-reports/311--load-impact-estimation-for-demand-response-protocols-and-regulatory-guidance**

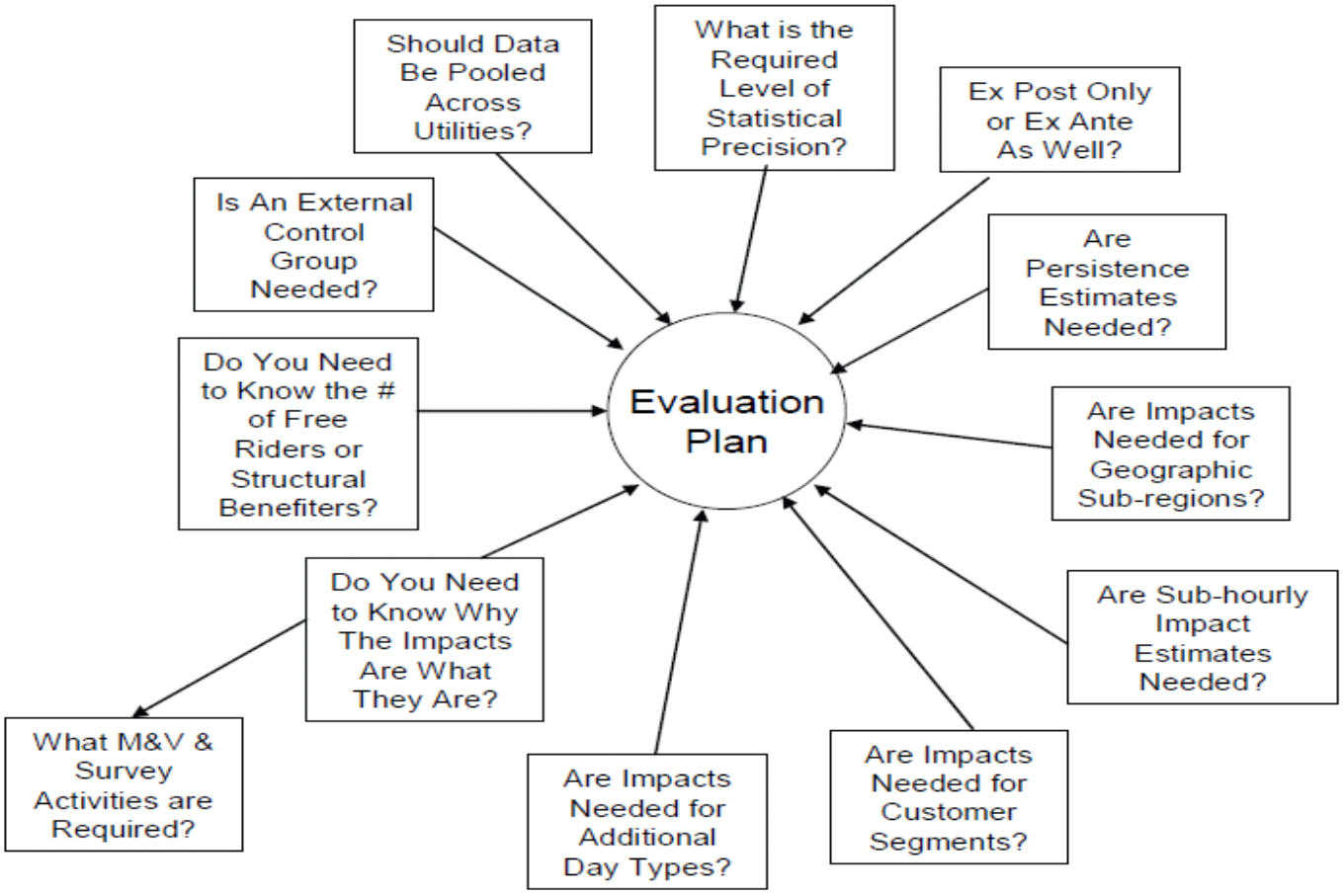
Key Components of the Load Impact Protocols

- **Focus primarily on estimating impacts for planning and cost-effectiveness assessment**
- **Report the load impacts using transparent, robust, and precise methods, but the protocols do not dictate methodology**
  - Tell you what to do but not how to do it
- **When possible and practical, base ex-ante estimates on ex-post evaluation**
- **Provide standard tests and output to validate that estimated impacts are accurate**
- **Standardize load impacts for extreme conditions that drive system planning (e.g., 1-in-10 weather year conditions)**
- **Deliver impacts in a consistent format that can be used to compare results, incorporate DR into planning, and to assess cost-effectiveness**

27 Protocols Guide Evaluation Planning



Protocol 3 Requires that Evaluation Plans Identify What Will be Done Over & Above the Minimum Requirements



The Protocols Dictate the Day Types for Which Impact Estimates are to be Provided

	Event Based Resources			Non-Event Based Resources		
Day Types	Event Driven Pricing	Direct Load Control	Callable DR	Non-event Driven Pricing	Scheduled DR	Permanent Load Reductions
Ex Post Day Types						
Each Event Day	X	X	X			
Average Event Day	X	X	X			
Average Weekday Each Month				X	X	X
Monthly System Peak Day				X	X	X
Ex Ante Day Types						
Typical Event Day	X	X	X			
Average Weekday Each Month (1-in-2 and 1-in-10 Weather Year)	X	X	X	X	X	X
Monthly System Peak Day (1-in-2 and 1-in-10 Weather Year)	X	X	X	X	X	X

Loads, and Load Impacts, Are Influenced by a Variety of Factors That Must be Incorporated Into Impact Estimation

- Variation in consumer activity across the hours in a day
- Variation in temperature across hours and days
- Variation in the level and timing of customer activity across months and seasons
- Variation in incentives (e.g., prices, capacity payments, program availability, etc.) across hours, days, months and seasons
- Change in customer characteristics over time

Impact estimation methods must account for all of these factors

While the Protocols Don't Dictate Methodology, Standard Approaches Are Rapidly Evolving

- **Regression analysis is almost universally used**
- **For event- based programs, individual customer regressions are the most common approach**
  - Do not require external control groups
  - Provide very granular output that is very useful for program planning and improvement
- **For load control programs, the utilities have been using end-use load research data but this may change for residential customers as smart meter data can produce accurate impact estimates**
  - But still may need a load research sample that can be called more frequently than the program is called for a typical participant
- **For non-event-based resources (which are not widespread), some type of control group is typically used**

If you have questions, please contact

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