



# Overview of California's Demand Response Load Impact Protocols

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EPA Webinar on EM&V of Demand Response Programs

April 26<sup>th</sup> 2011



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# Demand Response – Critical Measurement Issues

- **Dynamic pricing is critical to the efficient functioning of wholesale markets – can reduce market power of suppliers – but there are issues:**
  - **Predictability**
  - **Reliability**
  - **Settlement**
  - **Persistence**
- **Integration of wind and solar into production mix can greatly impact the reliability of generation systems – DR can significantly reduce cost of operating reserves by substituting short duration DR events for spinning and non-spinning reserves (i.e. ancillary services) – but there are issues**
  - **Large enough**
  - **Fast enough**
  - **Observable in real time operating environment**

# Multiplicity of Applications Drives Analysis Requirements



- 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

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

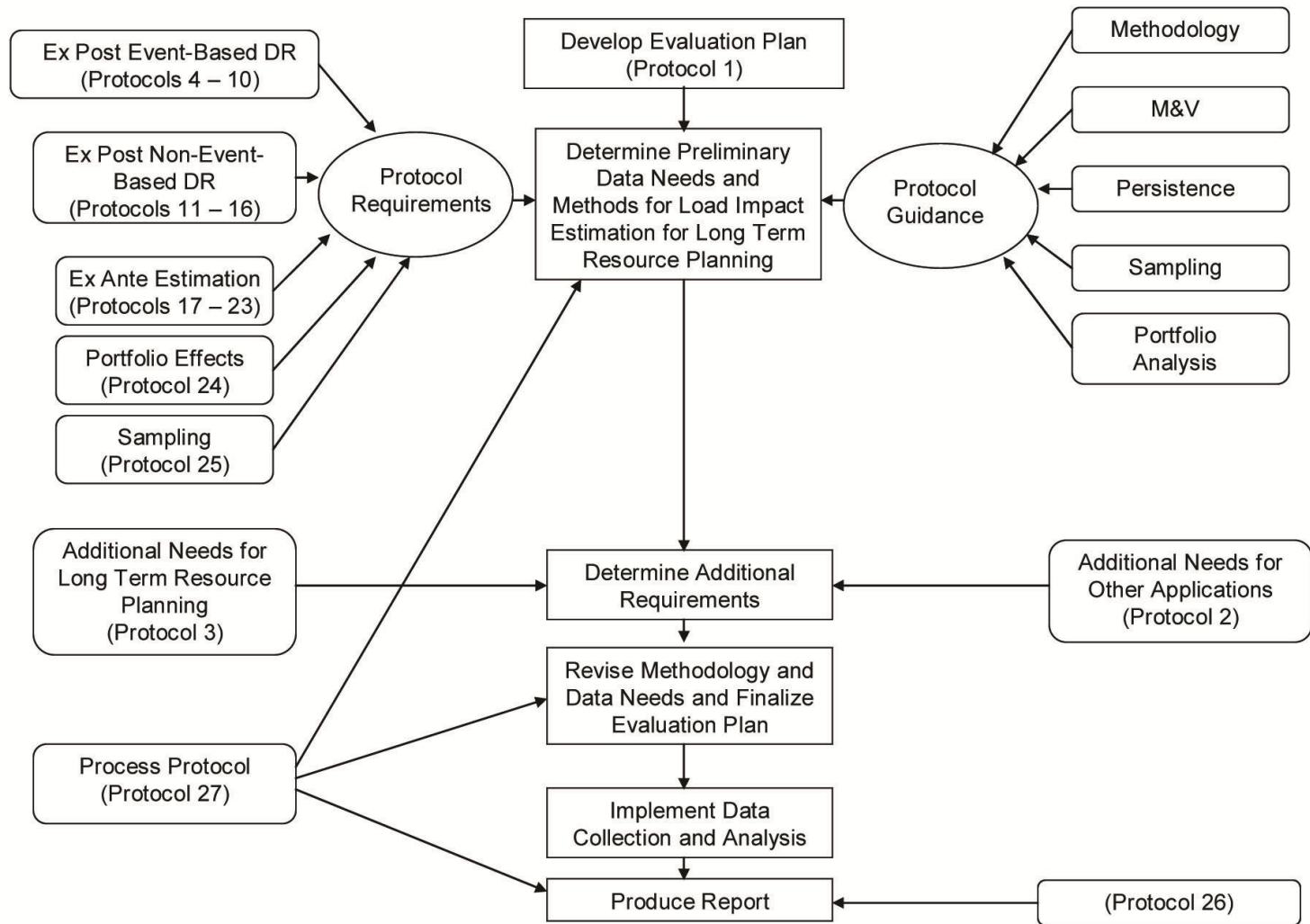
- **Variation in consumer activity across the hours in a day**
- **Variation in temperature across hours and days**
- **Variation in the level and timing of customer activity across months and seasons**
- **Variation in incentives (e.g., prices, capacity payments, program availability, etc.) across hours,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

**A commonly accepted set of impact estimation protocols that can account for all of these factors was needed**

# California 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



# 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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