IDSM Cost-Effectiveness: What Happened Outside of California?

Results from Duke Energy, NVE, Avista …

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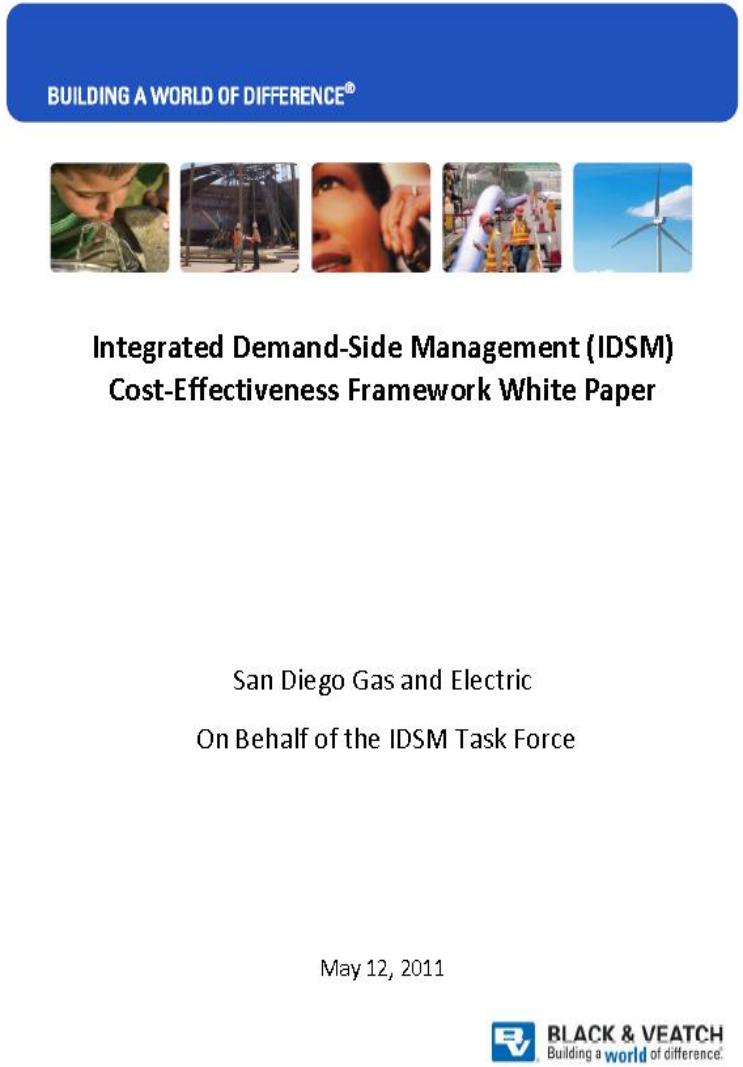


Summary of 4 key recommendations:

- IDSM with greater use of customer AMI, distribution, and local market data to increase accuracy of cost-effectiveness
- "Specific utility distribution circuit data and planning info [needed to] better define deferrable costs with IDSM"
- Inaccuracies with use of averaging of data result in incorrect selection of DSM resources
- Use statistical methods to define critical inputs that better define hedge-value & cost-effectiveness results

http://www.calmac.org%2Fpublications%2FIDSM_Final_White_Paper_12May2011.pdf&ei=JwbAVOz2C8a5ggT3uoGoDw&usg=AFQjCNEwCbeNt9N_mHAty_LioY4JM2RFaw&sig2=7r6naCiJq_zBJFZsdp9CuQ

Defined the Missing Parts in IDSM Cost-Effectiveness? These Point to Specific Needs

1. Focus on customers and locations with granularity
   - ➢Full use of customer (interval), grid, & planning data
   - ➢Power flow analysis down to circuit levels
   - ➢Multi-dimensional geo-spatial load forecasts (> accuracy)
   - ➢Integrated assessment of kWh/kW and volt/VAR needs
2. Integration of the DSM silos & resource providers
3. Optimization of DSM + the grid

Summary of IDSM Activities Outside CA

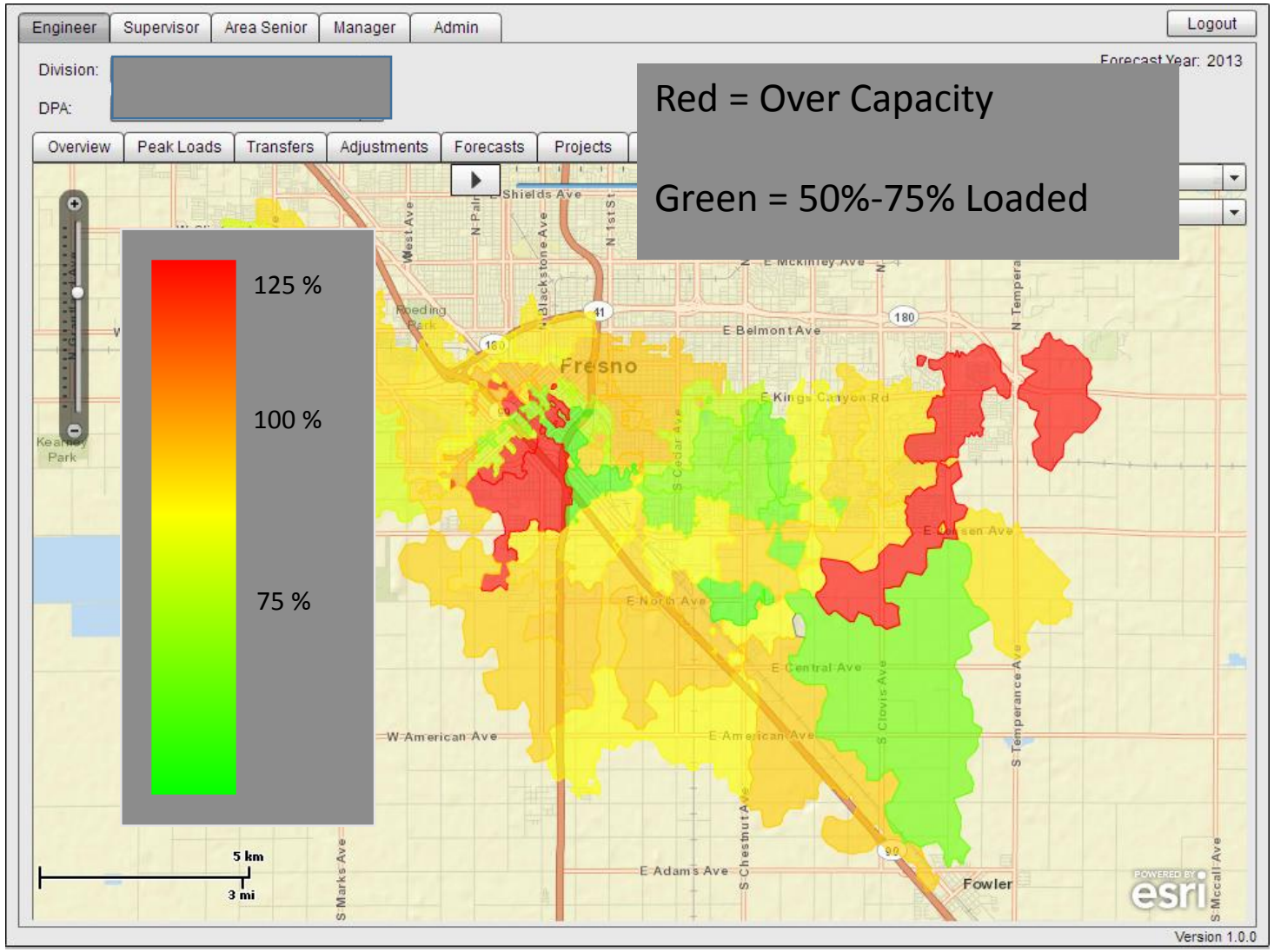
- Developed a 4-part methodology for IDSM and applied this to Duke Energy, NVE, AVISTA, others…
  1) Customer targeting
  2) Distribution location
  3) Hedge/option value
  4) Optimization

- Found Net-present-value benefits from IDSM to be <u>2x to 5X greater</u> compared to prior expectations
- Very few other utilities have broken down the silos to integrate EE+DR+DG+ST+smart grid – most fail to integrate/optimize

Spacial Distribution Integration Tool

Red = Target EE/DR/DG/ST

Green = Load Building is Least Cost, for EV Charging or New Economic Development



Selected Take-Aways & Cost-Effectiveness Results

- Increase technical & economic potential substantially – targeting less efficient customers has major upside
- Target less efficient customers AND key distribution circuits to provide discrete IDSM resource benefits
- Targeting areas with reliability risk – capacity needs and timing – with spacial tools enables focused IDSM programs/incentives/financing
- Combinations of customer types, T&D avoided costs, equipment lives, and customer efficiency levels show IDSM spending amounts in scenarios
- Transition to future state; dynamic choreographed IDSM/grid operation
- Much greater benefits are available with sensing and value-of-service

Appendix

IDSM System Level Benefits (from Outside CA)

Supply

- Improve power plant efficiency
- Provide frequency regulation, load follow, and spinning reserve
- Firm renewables

Transmission

- Avoided congestion fees

Distribution

- Provide voltage and frequency support, reduce reactive power (VAR), improve power factor
- Improve power quality and mitigate outages
- Defer system upgrades (load leveling)
- Integrate intermittent renewable and distributed resources

End user

- Improve customer satisfaction and mitigate Value of Lost Load, (VOLL)
- Reduce customer energy bills

Four (SPM) Steps to Maximize Value

Achieve maximum resource integration & optimization

1. Customer targeting/engagement with the use of new data and locational knowledge
2. Utility distribution and DER integration with locational granularity
3. Capture interactive (covariance) benefits
4. Optimize to choreograph loads and resources for maximum benefit

Recommend a New Methodology Consistent with Old SPM Tests for Cost-effectiveness

Standard Practice Manual (SPM) Tests (since 1983, the TRC test)

1. "Participant Test" – customer targeting
2. "Utility Test" -- grid (revenue) impacts @ locations
3. "All Ratepayers" (TRC) – define the covariance, hedge/insurance/option value
4. "Societal Test" to optimize for the utility and all ratepayers

All four of these steps use greater granularity

IDSM Cost-Effectiveness White Paper – Part 1

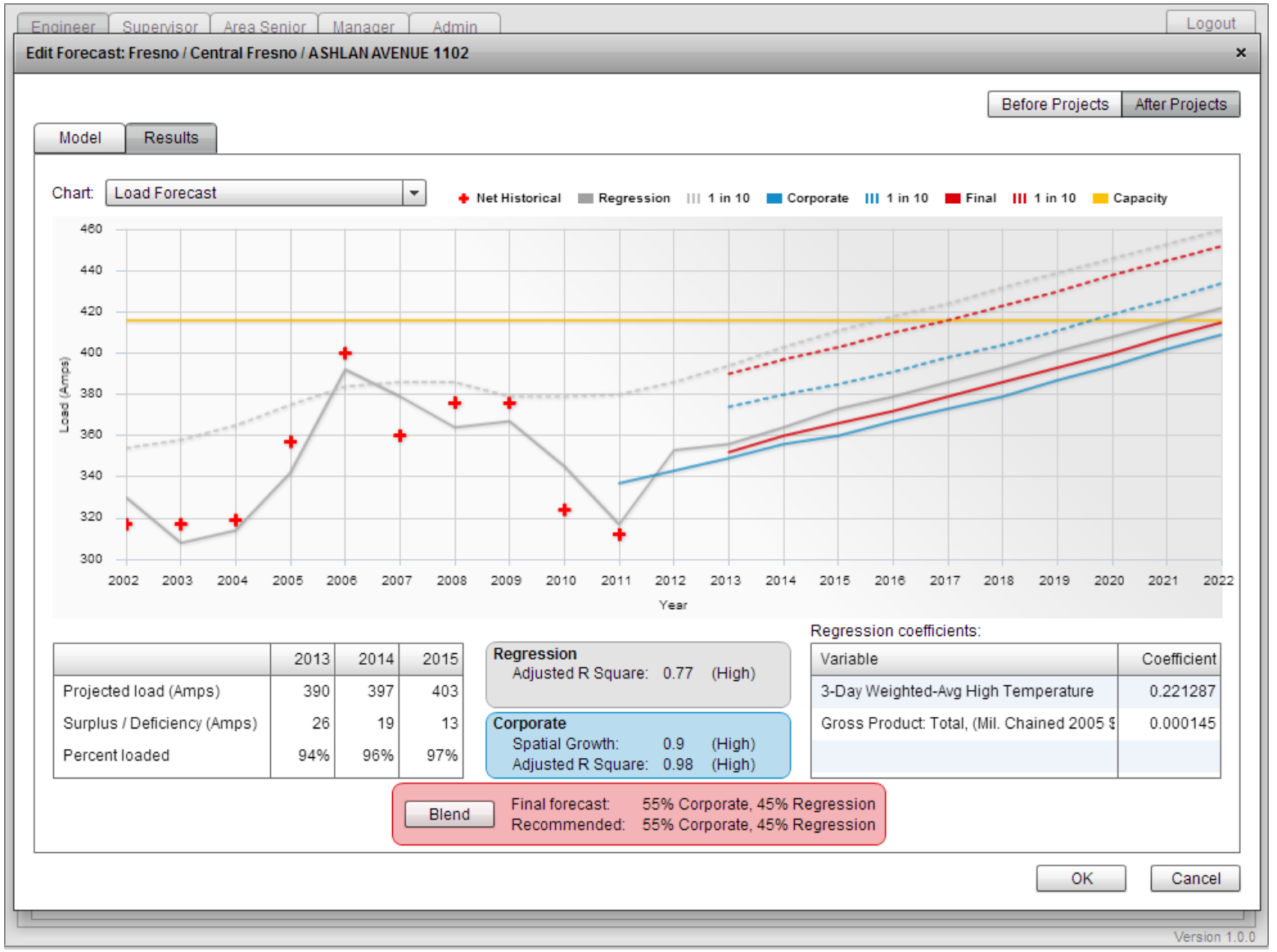
The specific findings from the IDSM Cost-effectiveness Framework White Paper:

- The IDSM customer focused approach – to present all DSM options/measures at once in a coordinated strategy -- is vastly different and aims to make greater use of customer data and regional trends.
- Methods to capture and use automated metering infrastructure and Smart Grid data can enhance IDSM cost-effectiveness by providing better information on which related measurements, assumptions, and inputs are based.
- The use of customer-specific distribution and local market data will increase the accuracy of IDSM cost-effectiveness calculations.
- Specific utility distribution circuit data and planning information can be used to better define deferrable costs with IDSM resources.

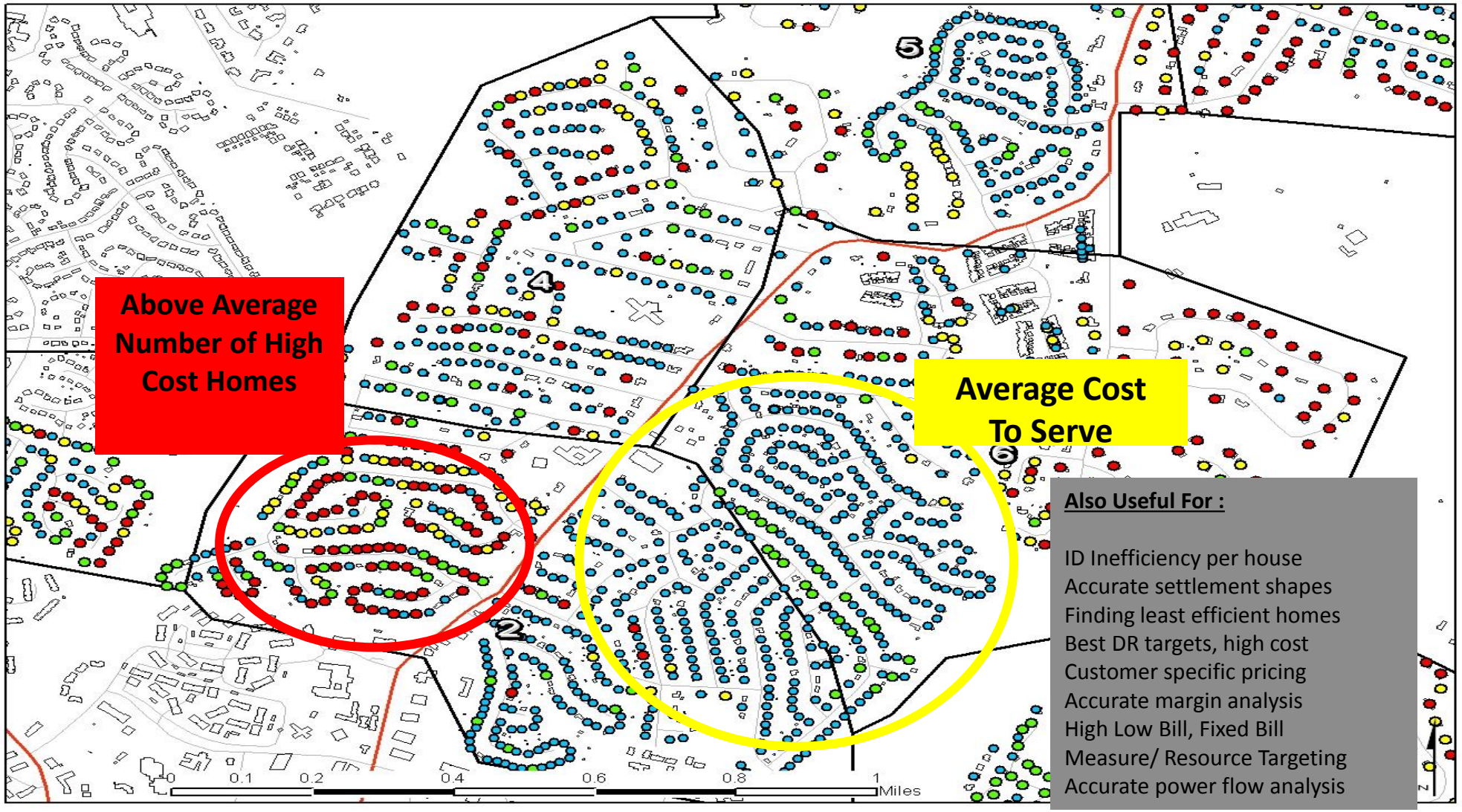
IDSM Cost-Effectiveness White Paper – Part 2

- Inaccuracies that stem from the averaging of DSM data may result in the incorrect selection of IDSM resources.
- Erroneous conclusions about IDSM cost-effectiveness result because of inaccurate and inconsistent calculation methods and assumptions, lack of updated assumptions, and separate uncoordinated CPUC proceedings.
- The use of statistics and probability distributions can help define critical inputs, including IDSM value and long-term economic and hedging benefits, which then better define cost-effectiveness results.
- A three step IDSM cost-effectiveness framework can be utilized in the short term and be continually developed to capture greater accuracy in the long term.

Locational Distribution Integration Tool



Locational covariance



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