

DSM MODELING TOOL PANEL SESSION

WHAT IS OUT THERE?

Moderator: Rick Morgan, Morgan Marketing Partners

Panelist: Bill Miller, PGE

Panelist: Tom Osterhus, Cinergy

Panelist: Dick Spellman, GDS

To determine cost effectiveness of programs during design and evaluation, there are several “tests” that have been adopted by the industry; Total Resource Cost Test, Ratepayer Impact Measurement test, Utility Cost Test among others. However, the model that was originally used by the industry, DSManager, to determine these test results is no longer available or supported. This panel explores three different software modeling tools that fill the gap left by DSManager. To enable the reader to understand the use and features of each model, the panelists were each asked to answer specific questions about the model they use (in italics). This paper provides those responses.

E3 Calculator – Bill Miller

- *Name of Modeling Tool*
Energy Efficiency Calculator (AKA E3 Calculator)
Developed by Energy and Environmental Economics, Inc. through funding by PG&E, SDG&E, SoCal Gas and Southern California Edison
- *Is it for End User Sale or only with a Consulting project?*
Unrestricted use by the four IOUs, and E3. Available through consulting projects.
- *Please provide a brief overall description of the modeling tool and its capabilities and uses.*
The modeling tool is designed to combine detailed avoided cost and measure impact information in the evaluation of measure and program cost effectiveness. The E3 calculator recognizes differences in both utility costs and measure impact shapes on an area (climate zone and utility planning area) and time (TOU or hourly) specific basis. In order to assist the utility planning and procurement functions, the E3 calculator also provides monthly estimates of therm, kWh and peak kW savings for up to 30 years in the future. These estimates recognize both the intra-year timing of installations, and the disappearance of those reductions as the installed measures reach the end of their expected useful lives. The calculator also reports expected reductions in air emissions.
- *What are the key benefits of using this tool?*
The tool is standardized for all of the California IOUs and is preloaded with accepted measure impact shapes and the avoided costs so that third parties may construct proposals to the IOUs using the same base data as the utilities. This allows for apples-to-apples comparisons of IOU and third party programs.
- *What companies are using the tool?*
PG&E, SDG&E, SoCal Gas and Southern California Edison, plus any third party responding to the IOU's RFPs for the 2006-2008 program cycle.
- *What are the end tests that it provides? (TRC, UCT, RIM, Societal other)*

TRC (with avoided air emissions costs), Program Administrator Cost Test (which is equivalent to the UCT), and RIM.

- *What is the most important unique feature of this tool?*
Allows the IOUs and third parties a means to accommodate hourly cost information by climate zone as well as hourly measure impact shapes by climate zone.
- *How does it handle costs going forward?*
The calculator contains pre-processed impact and avoided cost results for each utility measure shape for thirty years. This input data would be updated when new avoided costs are adopted by the Commission.
- *How does it work on a technology, program and portfolio level?*
The analysis is performed at the measure level, with results aggregated to climate zone, end use categories, customer sector, and program level.
- *Can it be used for Demand Response or Load Control Programs?*
Yes, but the pattern of demand response or load control would have to be pre-determined (based on the avoided costs) and input as any other measure impact shape. Note that the hourly avoided cost model adopted by the CPUC contains a module to produce these pre-determined shapes, based on the operating limitations of a DR or LC program.
- *How does it use Load Curves/Shapes?*
The avoided costs are in hourly resolution, so hourly load shapes are used when available. When measure impact information is only available by TOU period, then the hourly avoided costs are averaged across those periods. This is all handled in the pre-processing of the input data for the tool.
- *How can you consider other prices such as T&D costs?*
Yes, the tool includes T&D costs, emission costs, ancillary service costs, and a market multiplier effect.
- *How does the model take into effect weather extremes?*
The pre-processing uses avoided costs that are based on Typical Meteorological Year (TMY) data. The TMY data contains typical weather (not average weather) so there is a significant amount of variation in the source data, but it does not accommodate extreme conditions. The hourly load shapes are currently based on metered data for individual years, but an effort is underway to model measure impacts with the TMY data that would allow a perfect matching of cost of impact shapes (albeit, for typical, not extreme weather)
- *How can you use the tool to mitigate risks?*
The output from the tool could be used in risk mitigation software, but risk management is not part of the tool.
- *Does it calculate lost revenue or shared savings?*
Lost revenue is calculated as part of the RIM test, but the California IOUs are not currently required to report that information, so the rate impact information in the model is largely illustrative at this point. The Southern California Edison version of the E3 calculator also includes a shared savings calculation.

- *Does it include societal benefits?*
Yes, it includes monetized air emission reduction benefits, as well as value to all customers for a reduction in the market clearing price from lower customer demand levels.
- *Any other comments?*
- *For additional information contact?*
Bill Miller wcm2@pge.com or Brian Horii brian@ethree.com

DSMore – Tom Osterhus

- *Name of Modeling Tool*
DSMore, Demand Side Option Risk Evaluator
Developed by Integral Analytics (IA), for application to Cinergy program design and evaluation within both regulated and deregulated markets.
- *Is it for End User Sale or only with a Consulting project?*
Either.
- *Please provide a brief overall description of the modeling tool and its capabilities.*
DSMore values DSM programs over 30+ weather years and 20+ wholesale and retail market price scenarios, one of which is the traditional system lambda production costs used by DSManager. Reviewing DSM impacts over these contexts allows the user to observe the range of cost effectiveness and the conditions under which some DSM programs are more or less cost effective than others. Further, full test result enumerations allows user to view distributions of cost effectiveness, and risk, relative to DSM measure performance in light of the supply, or market price, alternative. The Excel user interface allows a beginning user to quickly run DSM evaluations, but also provides options that are more detailed for a more sophisticated user, or for programs that exhibit more financial risk.
- *What are the key benefits of using this tool?*
Computational power. About 4,000 test results are calculated using efficient programming languages behind an Excel interface, at the hourly level. Best fit regression models are selected from among thousands evaluated. Simulations of DSM impacts are calculated over 30+ years of weather and 20+ market price or avoided cost scenarios. Computational power allows for assessment of risk and value over multiple contexts.

Ease of use. Given the Excel interface, its easy to learn how to evaluate a program and view results using Excel functionality and graphics.
- *What companies are using the tool?*
Public Service Indiana, Union Light Heat and Power, Cincinnati Gas and Electric
- *What are the end tests that it provides? (TRC, UCT, RIM, Societal other)*
TRC, UCT, RIM, RIM to next case, Option Value Test (long run cost effectiveness), Minimum Test Value (under mildest weather and lowest production costs), Maximum Value Test (extreme weather, high avoided market price scenario).

- *What is the most important unique feature of this tool?*
Ability to value DSM across multiple weather and avoided market cost contexts.
- *How does it handle costs going forward?*
Program costs can be evaluated over 25 projected years, or over historical years. Avoided costs for market based energy prices are used by DSMore in valuing DSM. Hourly prices are calculated as a set of inputs into DSMore for all relevant pricing scenarios that the utility expects to be exposed to.....typically in \$2 to \$4 steps.....\$20 to \$70 8760 hourly annual average. DSMore runs cost effectiveness assessments for all 20+ pricing scenarios, for 30+ years of weather, 25 years of projected price increases over future years, all of which have net present values applied back for benefit/cost tests. GARCH time series estimation and modeling is used to create appropriate hourly prices based on weather, time of day, month and day of week. Users have flexibility to adjust hourly prices to match expected average prices, forward prices, volatilities or other benchmarks like past historical prices, if needed.
- *How does it work on a technology, program and portfolio level?*
Program measures can aggregated together in a single analysis, or multiple Excel file analyses for each program can be batched together into a joint portfolio. Batch runs can be analyzed simultaneously where a single global input is being revised (e.g., avoided cost annual escalators, rates or tariffs, ancillary costs, etc.).
- *Can it be used for Demand Response or Load Control Programs?*
Yes, interruptible programs are valued three different ways each time DSMore is run. These methods include 1) a percent load reduced from original load, 2) a load reduction down to a fixed load floor, and 3) a fixed, absolute load reduction irrespective of the original load.
- *How does it use Load Curves/Shapes?*
Five options are available for load savings assessment. Quick load savings analyses are available that 1) reduce pre loads by a fixed percentage annually (from impact evaluation study), 2) by a fixed percentage each month, 3) by a fixed kwh annually (from impact evaluation study), 4) by a fixed kwh per month, or 5) user can not only adjust the loadshape as with DSManager, user can adjust the standard deviations uniquely by hour, month, season or daytype if desired. Savings analysis is available for both gas and electric.
- *How can you consider other prices such as T&D costs?*
Traditional avoided T&D costs can be specified, similar to DSManager. However, additional T&D options include a specific T&D load impact attributable only to T&D that may reflect T&D substation, or other, deferral. Also, incremental avoided commodity costs attributable to LMP (locational marginal price) or losses can be specified uniquely.
- *How does the model take into effect weather extremes?*
Weather extremes are valued for each DSM program by simulating the load savings over 30+ years of weather. Peak impact savings can be 30% to 40% above observed savings, and energy savings impacts can be 10% to 30% above observed savings. Simulating savings over multiple weather scenarios reveals some hidden value for DSM not observable within historically valued observations.
- *How can you use the tool to mitigate risks?*

Risk can be valued explicitly, since all relevant weather and market price scenarios are calculated and quantified on each DSMore run. The upside risk, or value, of DSM is higher during high priced markets, and more extreme weather, more so than the value is decreased during low priced, mild weather. This results in a skewed distribution to the right where DSM has more value during more extreme weather, and higher priced markets. DSM's option value lies in its ability to protect against higher priced market prices, especially during extreme weather.

- *Does it calculate lost revenue or shared savings?*
Yes, lost revenues are calculated in full, and net of fuel. Shared savings calculated as a percent of overall value, where percent is set by user through Excel.
- *Does it include societal benefits?*
Yes, societal benefits can be calculated for Sox, Nox, Particulate matter, CO, CO2, CH4, as well as for arrears savings or any generic per household value. Additionally, given the Excel interface, other societal valuations available within Excel can be linked to DSMore inputs and outputs (e.g., TecMarket Works Non-Energy Valuations).
- *Any other comments?*
- *For additional information contact?*
Tom.Osterhus@Cinergy.com or Norm.Baker@integralanalytics.com

GDS Benefit/Cost Model – Dick Spellman

- *Name of Modeling Tool*
GDS Benefit/Cost Model
GDS developed this tool and we make it available to GDS clients. We will also sell the tool if someone wants to purchase it.
- *Is it for End User Sale or only with a Consulting project?*
This tool is available either way.
- *Please provide a brief overall description of the modeling tool and its capabilities and uses.*
GDS has developed a detailed Excel spreadsheet model for use in calculating benefit/cost ratios for energy efficiency, load management and demand response measures or programs. The model is user friendly, well documented, and provides the following benefit/cost ratio calculations:
 - Total Resource Cost Test
 - Utility Cost Test
 - Participant Test, and
 - Rate Impact Measure Test.The model is comprehensive and takes the following types of data as input:
 - Costs, useful lives and energy savings of energy efficiency and load management measures
 - Load shape impacts of electric energy efficiency measures
 - Avoided costs of electricity for generation, transmission and distribution
 - Avoided costs of natural gas and other fuels
 - Avoided water costs
 - Projected or actual measure or program penetration assuming no program

- Projected or actual measure or program penetration with a program
- Participant costs
- Energy efficiency organization or utility costs (including rebates or financial incentives)
- Non energy benefits
- Electric line losses
- Discount rate
- Inflation rate

The model provides calculations of benefit/cost ratios as well as year by year and cumulative energy and dollar costs and savings.

- *What are the key benefits of using this tool?*
User friendly, logic is transparent, and it is not a black box. GDS consultants are available to answer questions about the tool, and are available to customize this tool.
- *What companies are using the tool?*
Several GDS clients.
- *What are the end tests that it provides? (TRC, UCT, RIM, Societal other)*
The model will calculate the TRC, Participant, RIM and Utility Cost Tests.
- *What is the most important unique feature of this tool?*
User friendly and logic is transparent.
- *How does it handle costs going forward?*
Costs are escalated based upon a rate of escalation input by the user. The benefit/cost ratio calculations discount costs and benefits to present day dollars.
- *How does it work on a technology, program and portfolio level?*
The tool uses the same logic for a single measure, multiple measures or for a program, or multiple programs.
- *Can it be used for Demand Response or Load Control Programs?*
Yes
- *How does it use Load Curves/Shapes?*
The model uses simplified load shapes.
- *How can you consider other prices such as T&D costs?*
Avoided transmission and distribution costs are considered by the model.
- *How does the model take into effect weather extremes?*
This is handled through scenario analyses.
- *How can you use the tool to mitigate risks?*
The model can be used to examine multiple scenarios; higher and lower avoided costs, higher and lower penetration, higher and lower efficiency measure costs, etc.

- *Does it calculate lost revenue or shared savings?*
Yes
- *Does it include societal benefits?*
The user may input societal benefits.
- *Any other comments?*
The GDS benefit/cost model is ideal for organizations seeking a user friendly, inexpensive, benefit/cost tool that calculates the most common benefit/cost ratios.
- *For additional information contact?*
Dick.Spellman@GDSassociates.com

Conclusion

To effectively analyze the impacts from energy efficiency and DSM programs, planners and policy makers must have a tool from which they can make judgments and optimize their program designs. The three tools presented above are options for program designers and policy planners to understand the cost benefits to the stakeholders involved. There may be other software tools not identified prior to this panel report and the reader is encouraged to explore options. However it is hoped that the panel information provides a baseline and comparison so that potential users can make informed decisions about the correct tool for them.