Open Modeling Framework (OMF)

Online Platform for Power Systems Modeling

Presented by: National Rural Electric Cooperative Association

1. INTRODUCTION

The Open Modeling Framework (OMF) is an online platform for power systems modeling. It will allow 900+ rural electric cooperatives to access the advanced analytic capabilities of GridLAB-D and NREL's System Advisor Model, among other models, with an easy-to-use graphical interface. The OMF currently emphasizes models that determine the cost-benefit impacts of conservation voltage reduction, distributed photovoltaics and smart feeder switching.

2. PUBLICATIONS

- Pinney D, **Costs and Benefits of Conservation Voltage Reduction: CVR Warrants Careful Examination** • http://www.nreca.coop/smartgrid
- Pinney D, **Costs and Benefits of Smart Feeder Switching: Quantifying the Operating Value of SFS** • http://www.nreca.coop/smartgrid
- Martin M, **Running the Numbers: CRN to Release New Smart Grid Cost-Benefit Analysis Tool** • https://remagazine.cooperative.com/Showcase/techcurve/Pages/TechCurveFeb2013.aspx
- Miller C, et al., **Achieving a Resilient and Agile Grid** • http://nreca.coop/what-we-do/cooperative-research-network/white-papers/

3. MODEL EXECUTION TIMELINE

01 Log In
Users log in to **www.omf.coop**, which archives all past model runs.

02 Import Feeder
Distribution feeder data can be imported directly from Milsoft Windmil or Cooper Cymdist.

03 Configure Model
Model GUIs are available for common technologies; users can also duplicate models shared by other utilities.

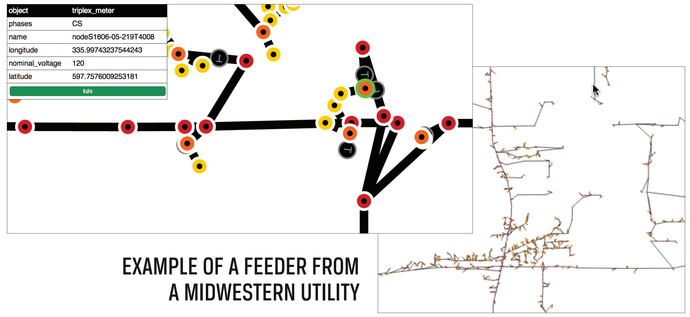
04 Execute Model
Models run on a hosted cluster at Amazon Web Services.

05 Analyze Results
Model raw data and charts available as output.

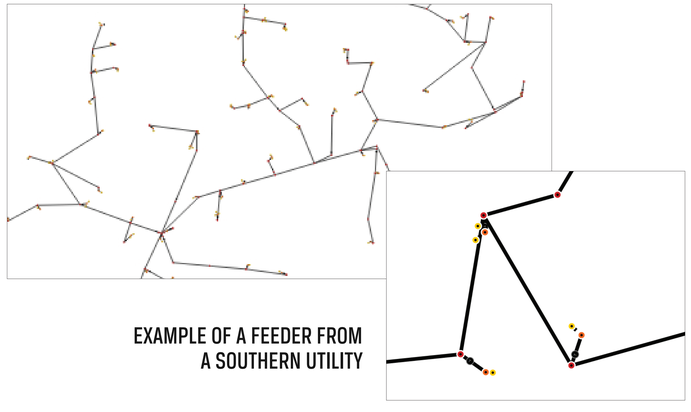
4. FEEDER EDITING INTERFACE

- Graphical interface for editing feeder descriptions with 10k+ components.
- GIS and connectivity graph representations available.
- Components can be added from a shared database and edited.

ZOOMING IN TO EDIT A LOAD MODEL ATTACHED TO A METER



EXAMPLE OF A FEEDER FROM A MIDWESTERN UTILITY

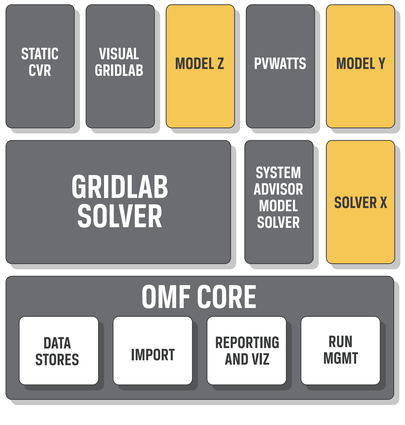


EXAMPLE OF A FEEDER FROM A SOUTHERN UTILITY

5. SYSTEM ARCHITECTURE

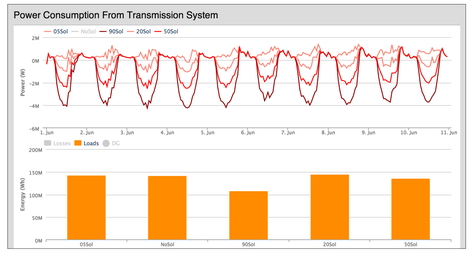
The OMF includes multiple models built on top of multiple solvers:

- PvWatts and Solar Water Heater from NREL's System Advisor Model
- GridLAB-D from PNNL
- OpenDSS from EPRI (planned)

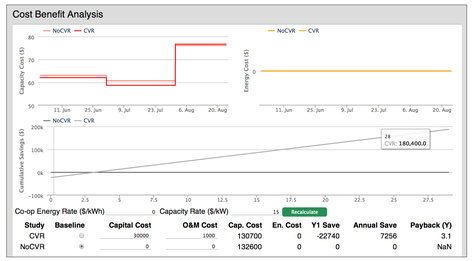


6. MODEL OUTPUT EXAMPLES

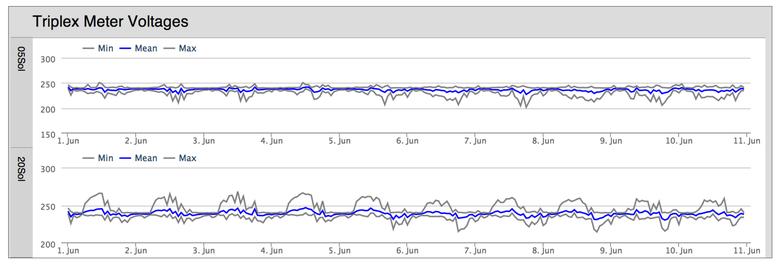
A.



B.



C.



A. **Powerflow comparison of multiple penetrations of residential PV used to predict reverse powerflow conditions.**

B. **Cost benefit analysis of conservation voltage reduction scheme. Engineering simulation results are monetized and have an interface for what-if analysis.**

C. **Time series meter voltage simulation for distributed generation identifying potential over- and under-voltage conditions.**

7. CONCLUSION, VALUE AND FUTURE OF THE OMF:

The OMF is already being used for evaluation of Volt-Var Optimization systems at a limited set of cooperatives. The end goal is provide open access for all NRECA member utilities.

Future work will continue to refine the model extraction and calibration process, incorporate additional study capabilities (e.g., high penetration photovoltaic, distributed energy storage, and demand response), and continue to improve the performance of the underlying GridLAB-D engine.

For more information about the OMF please visit www.OMF.coop or contact David Pinney or Thomas Kirk at David.Pinney@NRECA.coop

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