DOE/OE Transmission Reliability Program
June 2017 Reliability & Markets and NETL FOA 1493

Reviewer Comments and Ratings – June 14, 2017

Models and Strategies for Optimal Demand Side Management in the Chemical Industries
Michael Baldea, University of Texas at Austin
Average Score: 3.5

Budhraja: **Very Valuable (4)**

Q1: Important research for improving market efficiency.

Q2: Feasibility assessment i.e., dependence on spare capacity; risk. Applicability of least cost dispatch.

Gribik: **Valuable (3)**

Q1: Current design seems more applicable to time of use pricing rather than demand response controlled by and RTO. This is due to time scale difference (process timeframe > day) (RTO < day). Could be extended if industrial process could be controlled < 1 day.

Q2: More focus on how data on price/demand curve will be provided to RTO and the impact on RTO market software. Should have more focus on what data RTO could use without disrupting existing software e.g., determine a base demand and a range for adjustment with concave price curve.

O'Neill: **No rating given**

Comments: This type of work is very important to future efficiency in power markets. Work on reducing process to a bid function in the day-ahead market and real-time market. In PJM price-responsive demand does not pay capacity costs

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Economical & Engineering Aspects of Proactive Demand Participation: Centralized vs Bilateral Control
Nanpeng Yu, University of California at Riverside
Average Score: 3.5

Budhraja: **Valuable (3)**

Q1: Interesting and path breaking research. Implementation requirements may be difficult. Likely to be very beneficial in improving understanding of distribution systems.

Q2: Define steps and assess feasibility of implementation.

Gribik: **Very Valuable (4)**

Q1: Operation of distribution system with DER is becoming more challenging. This work can address aspects. Too much focus on optimization technique.

Q2: More focus on defining the problem to be solved is needed (distribution operation problem—DSO and ISO interaction). Define problem before focusing on optimization technique used.

O'Neill: **No rating given**

Comments: This project may be too broad and encompassing. It has too many moving parts and is filled with jargon. The project needs refocus. Be specific on how transitive energy differs from just trading. What is the need for this model?

Multi-Stage and Multi-Timescale Robust Co-Optimization Planning for Reliable and Sustainable Power Systems
Lei Wu, Clarkson University
Average Score: 2.0

Budhraja: **Somewhat Valuable (2)**
Q1: Very ambitions – long-term, short term; ISO coordinate planning. Too broad; not clear how results will be useable.

Q2: (no comments given)

Gribik: **Somewhat Valuable (2)**
Q1: Unclear to me who will use the product. If generation owner, transmission expansion that RTO will do should be considered a parameter. If RTO, generation expansion should be a parameter.

Q2: Clarify what aspects of the problem would be used by different classes of participants to optimize their decisions with decisions for others treated as parameters.

O'Neill: **No rating given**
Comments: The planning models need lots of work. Why are they separating long term reliability and short term economic operation? Why wind storage coordination, why not co-optimization? AC is continuous function non-convex. Planning is binary non-convex. Together this is a very difficult problem.

Management of Risk and Uncertainty through Optimized Cooperation of Transmission System and Microgrids with Responsive Loads
Lindsay Anderson, Cornell University
Average Score: 3.0

Budhraja: **Valuable (3)**
Q1: Understanding behavior of microgrids under different scenarios is important for informing DSO if they emerge as entities.

Q2: Link research to how and who will use results.

Gribik: **Valuable (3)**
Q1: Demand response modeling is important. Methods to better model uncertainty are important.

Q2: How could price responsive demand bid be formulated for use in market?

O'Neill: **No rating given**
Comments: Uncertainty in renewables is a problem in predicting weather and needs more work in designing ancillary services. Bid functions in day-ahead market and real-time market need research. Price-responsive demand bid functions capabilities by class. Not special categories. For example, storage facility and process control deferrable load looks a lot like startup and

min run time for generators. Co-optimization is key. Losses in the distribution system are important

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Flexible Service Contracting for Risk Management within Integrated Transmission and Distribution Systems
Zhaoyu Wang, Iowa State University Science & Tech
Average Score: 2.5

Budhraja: **Valuable (3)**
Q1: Concept is interesting. Implementation questions should be addressed.

Q2: Quantify available benefits and compare with implementation costs to test feasibility.

Gribik: **Somewhat Valuable (2)**
Q1: The simulation investigation is interesting. However, more information on market design is needed to evaluate the importance of the project. Unclear what it intends to achieve. Better definition of the goal could boost importance.

Q2: More detail on definition of swing contract: what services will be offered; how they will be cleared in market (slice of contract or individual services); how they will be priced. Will result fit in existing RTO markets?

O'Neill: **No rating given**
Comments: I do not understand why this is being done.

Impact of Coordinated Aggregation of DER on Bulk Power System Performance
Alejandro Dominguez-Garcia, University of Illinois at Urbana-Champaign
Average Score: 3.5

Budhraja: **Very Valuable (4)**
Q1: Focus on ancillary services aggregation and dispatch is going to be important. Application will depend on market structure.

Q2: (no comments given)

Gribik: **Valuable (3)**
Q1: Shows how a DER can incorporate uncertainty when supplying Reg. Important as DER on distribution grows.

Q2: More work on improving ability of DER to more fully participate in markets would be valuable. Treating uncertainty they is needed.

O'Neill: **No rating given**
Comments: What is the role of aggregators? Where is the value added? Need to control the physical system but not pure aggregation

Managing Uncertainty in the Modern Power System
Eilyan Bitar, Cornell University
Average Score: 4.5

Budhraja: **Highest Value (5)**
Q1: Concept of distributed controllers is very good. Promising results.

Q2: Field validation.

Gribik: **Very Valuable (4)**
Q1: Control of distributed resources on distribution system to enforce distribution level constraints is very important to DSO. Good work.

Q2: More of the same work to extend.

O'Neill: **No rating given**
Comments: Why is storage not gen and load and not instead of transmission. The goal of market mechanisms is market efficiency. Minimization of losses is not a cost criterion and does not achieve efficiency. Volt-var optimization is keeping voltage near 1 and is not efficient.

Probabilistic Forecast of Real-Time LMPs
Lang Tong, Cornell University
Average Score: 3.5

Budhraja: **Highest Value (5)**
Q1: Good research

Q2: Linkng to ISO priorities will important.

Gribik: **Somewhat Valuable (2)**
Q1: Unclear how this improved CTS will address and eliminate loopflow, which can arise from schedules in a single RTO.

Q2: More work on how to better model flows on tie lines caused by trades between nodes in RTOs. This is poorly modeled in today's CTS models.

O'Neill: **No rating given**
Comments: Loop flows are free; make the ISOs pay for loop flow. Loop flow or scheduled transactions. Hard to follow presentation

On Valuing System Inertia and Fast Storage Response
Ti Xu, University of Illinois at Urbana-Champaign
Average Score: 4.0

Budhraja: **Project not reviewed**

Gribik: **Very Valuable (4)**
Q1: Inertia is important (including primary frequency control) and increasing. Need for inertia and pfc should be evaluated and locational needs also should be evaluated. This work provides some needed info.

Q2: Continue work on locational requirement and integrating need into markets. (I assume that storage would be providing synthetic inertia via its control settings.)

O'Neill: **No rating given**
Comments: the presentation was hard to understand and follow.

Dynamic Reserve Policies for Market Management Systems
Nikita Singhal, Arizona State University
Average Score: 4.0

Budhraja: **Project not reviewed**

Gribik: **Very Valuable (4)**
Q1: Investigates using stochastic optimization to inform RTO markets re reserve requirements and deployment. Good path to get benefits of stochastic models into today's market structure.

Q2: Look at more market processes that could be improved using similar method.

O'Neill: **No rating given**
Comments: Very interesting but difficult to follow.

Random Topology Power Grid Modeling and Automated Simulation Platform
Zhifang Wang, Virginia Commonwealth University
Average Score: 3.0

Budhraja: **Project not reviewed**

Gribik: **Valuable (3)**
Q1: Development of synthetic grid models is very useful.

Q2: Address question that the synthetic model has similar operating/solution properties to actual grid models.

O'Neill: **No rating given**
Comments: Need to convince to users that testing on synthetic problems has value.