Research and Evaluation in a Changing Energy Landscape: Quick Takes from IEPEC Lifetime Achievement Award Winners

Jenna Canseco, DNV GL
IEPEC Board of Directors
2019 IEPEC Chair
IEPEC Lifetime Achievement Award

- Awarded every two years by IEPEC’s Board of Directors and Conference Planning Committee (PC)
- Recognizes individuals who have consistently made significant contributions to the field
- Nomination period for the 2019 Award closes on Friday, May 31, 2019
  - Submit your nominations online at this link: https://www.surveymonkey.com/r/LAIEPEC2019
- IEPEC’s Board and PC will…
  - Review nominations and select an awardee in July 2019
  - Announce this year’s winner at the conference in August 2019
Conference preview

Insights from recognized industry leaders

☐ How are energy research and evaluation evolving?
☐ What’s driving this evolution?
Today’s Presenters

Ralph Prahl
Prahl & Associates
2015 IEPEC Lifetime Achievement Award Winner

Steve Schiller
Schiller Consulting
2013 IEPEC Lifetime Achievement Award Winner

Jane Peters, Ph.D.
Opinion Dynamics
2013 IEPEC Lifetime Achievement Award Winner

Mike Rufo
Itron, Inc.
2017 IEPEC Lifetime Achievement Award Winner
What Does the 2019 IEPEC Conference Agenda Tell Us About Where Our Industry is Heading?

Ralph Prahl
Prahl & Associates
Preliminary agenda for the 2019 IEPEC Conference provides a handy way of assessing industry trends

- Abstracts are selected competitively through a blind review process
- A surge in the number of papers on a particular topic thus suggests an increase in industry attention/resources for that topic
- That may in turn suggest a longer-term industry trend
- Of course, it’s possible to go too far with this approach
  - IEPEC’s abstract invitation called out specific topics
  - Abstract reviewers have biases, as do all human beings
  - An apparent trend could turn out to be a fad
- However, let’s see where this approach leads us
So What Topics Appear to be Hot?

- Judging from the preliminary agenda, Distributed Energy Resources (DER) appears to be on fire
  - Roughly 30 out of 100 papers
  - Including: storage; EV; DER methods; smart devices; PV

- Also well represented:
  - Pay for performance and Normalized Metered Energy Consumption (NMEC)
  - Papers on methodological innovations
  - Papers synthesizing findings across multiple studies
What Topics Appear to be Cooler?

- Lighting
  - (That’s so 2018…)
- M&V 2.0
  - (Depending on how you define and count papers)
- Write-ups on individual evaluations
- Process evaluation
What Broader Questions Might These Trends Raise?

- DER
  - Where is the funding for all the DER research coming from?
  - Will DER be evaluated as rigorously as energy efficiency has been?
  - How much will the growth of DER ultimately help with emissions reduction?

- The role of technological progress in the energy program evaluation industry
  - What’s more important: change in the technologies we are evaluating, or change in the technologies we are using to do the evaluation?
  - Most of the focus seems to be on the latter, but perhaps the former is a bigger driver of change
DEMAND SIDE RESOURCES AND MARKETS ARE CHANGING – SO IS ENERGY EFFICIENCY PROGRAM EVALUATION

Steve Schiller
A reliable, resilient, reasonably priced and clean (carbon free) grid requires integrated demand- and supply-side infrastructures

Drivers of Change

- Buildings consume approximately 75% of U.S. electricity and drive as much as 80% of peak power demand in some regions. [US DOE]

- Changing and complex grid driven by technology, IoT, climate change, etc.
  - Growing peak demand
  - Increasing variable renewable generation
  - T&D constraints
  - Building decarbonization
  - Data availability, new technologies
  - Recognition of non-energy impacts (in benefit/cost analyses)

Solutions

Flexible demand buildings with integrated distributed energy resources – EE, DR, storage, DG, EV charging

Grid Interactive Efficient Buildings - GEBs
- major initiative of DOE’s Building Technology Office

https://www.energy.gov/eere/buildings/grid-interactive-efficient-buildings
Flexible Buildings

Diagram and some of context from:
• These flexible buildings are complex with complex interactions between grid, operators, occupants, etc.
• They need to work effectively and reliably
• And, that means evaluation

- Need:
  - Metrics
  - Approaches and protocols - and related analytical tools
  - Data
  - Baselines
  - Process evaluations
  - Attribution ????

- To:
  - Deliver assessments of demand flexibility impacts –
    - Real time and persisting
    - Ex-post and predictive (planning)
  - Understand interaction of multiple DERs
  - Support continuous improvement
PROGRAM OPTIMIZATION WHEN EVALUATION MANDATES CEASE OR TECHNOLOGY TAKES OVER

Jane S. Peters

May 21, 2019
What Has Happened?

- Energy Efficiency has always had more evaluation compared to other DERs
- DERs in general have more evaluation compared to traditional supply side energy solutions

- Good news
  - We have confidence in demand side resources
  - There are evaluation jobs
  - EE programs today work well as they have had lots of optimization efforts

- Bad news
  - Evaluation costs more than regulators or program administrators want
  - DERs tend to lose money for utilities, hence without a mandate no evaluation occurs
What Is Happening?

- Net to Gross ratios are getting worse
- Cost effectiveness for many residential programs are dropping
- Measurement costs are declining - AMI
- Data analysis costs are declining – big data
- Program optimization evaluation is not mentioned for California 3rd party programs

Good news
- Monitoring and verification can be done less expensively and at a more nuanced level
- Impacts can be derived more easily and cheaply using these M&V data

Bad news
- M&V does not equal evaluation – so will there still be evaluation?
- Program optimization is not a big data problem, it’s a human problem
On The Other Hand We Aren’t Done

- We need more energy efficiency to meet GHG reductions
  - There are fewer public funds available to buy energy efficiency
  - There are fewer program opportunities that meet cost effectiveness targets
- Attribution is poorly measured
  - We don’t really know what would have happened without program support
  - Yet potential studies show there is lots of energy efficiency that never got done in existing buildings across nearly every sector
- Potential studies suggest that increased customer engagement will yield more savings
  - More engagement and more transactions will cost more
- Program selections are shifting to third parties and non-utility parties
  - Can competition alone ensure the best program designs are being deployed?
Where is Program Optimization?

- Market research?
- Embedded evaluation?
- Who will spend the 1% for research on optimizing programs?
- Is there a way to ensure evaluation is part of the future?
- Are implementers going to ask for research to be included in their program development budgets?
- Example of BPA Industrial Program now 10 years old but built on the research from 1984-2009 when launched.
Evaluation’s Role in Reducing GHG: Yes, it matters...A Lot!

Mike Rufo
Executive Consultant
Itron Inc.
Evaluation, It Cycles

- Historic booms and busts
- Shifting objectives and rationales
- Changing industry structures
- Changing paradigms and technologies

GHG Reduction Policies
CA GHG Goals & Policies (CA GHG Scoping Plan)

**California’s Climate Policy Portfolio**

- Double building efficiency
- 50% renewable power
- More clean, renewable fuels
- Cleaner zero or near-zero emission cars, trucks, and buses
- Walkable/Bikeable communities with transit
- Cleaner freight and goods movement
- Slash potent “super-pollutants” from dairies, landfills and refrigerants
- Cap emissions from transportation, industry, natural gas, and electricity
- Invest in communities to reduce emissions
CA GHG Goals & Policies (CA GHG Scoping Plan)
Evaluation and the Climate Change Challenge

- Cost of mitigation options vary widely
- GHG sources are silo’d, despite interdependencies
- Magnitude/pace of change could limit or expand evaluation
Evaluation Should Be Expanding…

Integrated GHG Evaluation

Across GHG sources

Utilizing new, integrated metrics

Into new program and policy domains

DER Eval

EE Eval
For Example...

- "Beneficial" Electrification, Building Decarbonization
- Behind-the-Meter Battery Storage
- Alternative Transportation Fuels and Modes
- Agricultural and Food Consumption Shifts
- Cross source impacts & interdependencies
- Embedded GHG/Lifecycle Analysis

$ per metric ton of carbon equivalent avoided
For Example...

- "Beneficial" Electrification, Building Decarbonization
- Behind-the-Meter Battery Storage
- Alternative Transportation Fuels and Modes
- Agricultural and Food Consumption Shifts
- Cross source impacts & interdependencies
- Embedded GHG/Lifecycle Analysis

$ per metric ton of carbon equivalent avoided
For Example...

- "Beneficial" Electrification, Building Decarbonization
- Battery Storage
- Alternative Transportation Fuels and Modes
- Agricultural and Food Consumption Shifts
- Cross source impacts & interdependencies
- Embedded GHG/Lifecycle Analysis

Net impacts (Additionality)

$ per metric ton of carbon equivalent avoided
For Example…

“Beneficial” Electrification, Building Decarbonization

Agricultural and Food Consumption Shifts

Cross source impacts & interdependencies

Embedded GHG/Lifecycle Analysis

Net impacts (additional)

Market Effects/Market Transformation

$ per metric ton of carbon equivalent avoided
For Example...

- "Beneficial" Electrification, Building Decarbonization
- Battery Storage
- Hydrogen Fuels and Modes
- Consumption Shifts
- Cross source impacts & interdependencies
- Embedded GHG/Lifecycle Analysis

Net impacts (additionality)

Market Effects/Market Transformation

Incremental Measure Costs

$ per metric ton of carbon equivalent avoided
For Example...

- "Beneficial" Electrification, Building Decarbonization
- Battery Storage
- Behind-the-Meter Battery Storage
- Alternative Transportation Fuels and Modes
- Agricultural and Food Consumption Shifts
- Cross source impacts & interdependencies
- Embedded GHG/Lifecycle Analysis

Net impacts (additionality)

Market Effects/Market Transformation

Indirect Costs & Benefits

Incremental Measure Costs

$ per metric ton of carbon equivalent avoided
For Example…

“Beneficial” Electrification, Building Decarbonization

Market Effects/Market Transformation

Net impacts (Additionality)

Incremental Measure Costs

Cross source impacts & interdependencies

Embedded GHG/Lifecycle Analysis

Cost Effectiveness (SCT, RVT, TRC, PAC)

Net impacts

Indirect Costs & Benefits

$ per metric ton of carbon equivalent avoided
For Example...

- "Beneficial" Electrification, Building Decarbonization
- Behind-the-Meter Battery Storage
- Alternative Transportation Fuels and Modes
- Agricultural and Food Consumption Shifts
- Cross source impacts & interdependencies
- Embedded GHG/Lifecycle Analysis

Net impacts (Additionality)

Cost Effectiveness (SCT, RVT, TRC, PAC)

Market Effects/Market Transformation

Boundary Scope

Incremental Measure Costs & Benefits

$ per metric ton of carbon equivalent avoided
For Example...

“Beneficial” Electrification, Building Decarbonization

Behind-the-Meter Battery Storage

Alternative Transportation Fuels and Modes

Agricultural and Food Consumption Shifts

Cross source impacts & interdependencies

Embedded GHG/Lifecycle Analysis

$ per metric ton of carbon equivalent avoided

More Effective Policies & Programs, Better, Faster GHG Reductions

Cost Effectiveness

(SCT, RVT, TRC, PAC)

Market Effects/Market Transformation

Incremental Measure Costs & Benefits

Boundary Scopes

More Effective Policies & Programs, Better, Faster GHG Reductions
Quick Reminders

- May 31: Lifetime Achievement Award nominations due to IEPEC
- July 12: Authors’ final papers due to session moderators
- July 31: Discounted registration ends for the 2019 conference
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