Updating Energy Efficiency Research and Evaluation for Continued Socio-Environmental Relevance

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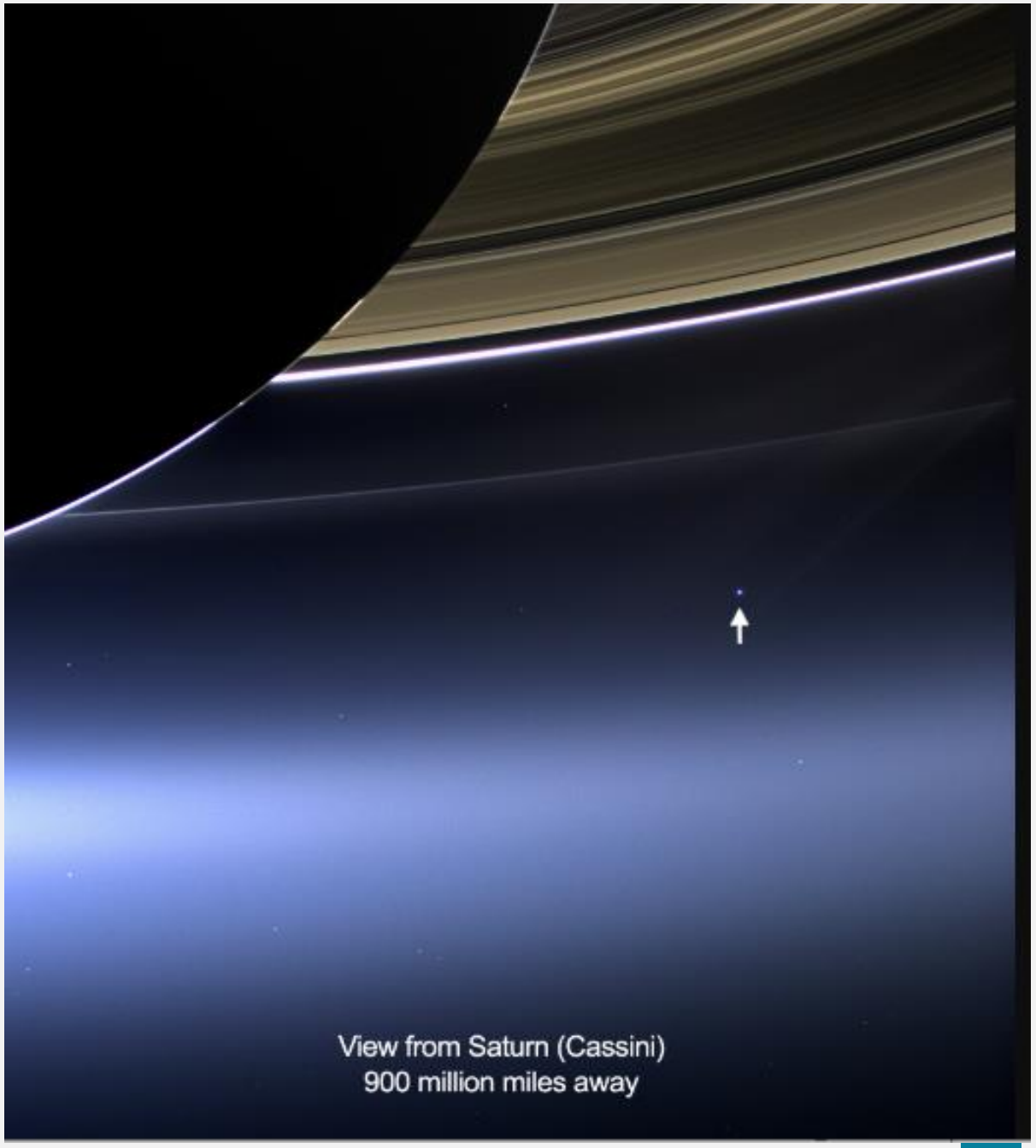
Key Takeaways for Today

- EE, a core option for mitigating climate change, is losing relevancy.
- EE evaluation needs to change to enhance EE's relevancy vis-a-vis climate change.
- Need to update our thinking & doing on EE and evaluation.
- No time to waste!



Useful Research & Evaluation Improves Energy Efficiency Results and Gives More Time!

Lessons From The Past

- **Pay attention to institutions and institutional set-ups**
  - Who funds and where do the funds come from?
  - Who decides what research to do and how?
  - Does the research framework support collaborative work?
  - How to get stakeholders involved effectively?
  - How to foster timely and actionable results?
  - Who sets up and runs public forums to enhance institutional set-ups, operations, and resolve methodological concerns?
  - How and where do you capture and make public EE knowledge?

Lessons From The Past

- **Integrate developmental, process, impact and market assessments for best feedback**
  - Developmental: ongoing EE intervention design
  - Market assessments: identify key opportunity areas
  - Process: confirm effective intervention activities and areas for improvement
  - Impact: assess results
- **Embed research with implementation teams**
  - Ensure capture needed data
  - Enhance feedback mechanisms and their applicability

Lessons From The Past

- “Believe again” and fully value energy efficiency interventions
- Ensure impact evaluations capture synergies and spillover, not just free riders
- Focus research to define future efforts
- Provide timely, actionable feedback

Near-Term Improvements

- **Integrate energy efficiency research and evaluation with other resource efficiency efforts**
  - Water
  - Materials
  - Smart cities
  - Life cycle and cradle-to-cradle analyses
- **Assess more accurately the societal value of energy efficiency**
  - Nodal pricing (temporal/locational) vs average electricity cost
  - Identify and quantify better non-energy benefits and transaction costs
  - Enhance research on mitigation vs adaptation costs of global climate change

Broader & Deeper Improvements

- **Use research and evaluation for full inclusion of climate change into efficiency efforts**
  - Make oil & gas extraction and refining more efficient or support efficient electric transportation systems?
  - Help monoculture agriculture survive or regenerative agriculture that sequesters Carbon?
  - Focus on efficient buildings or on better land-use, community zoning to foster more sustainable cities?
  - Focus on energy efficiency enhancing electrification, renewable energy sources, storage, and electric transportation via transactive markets?

Conclusions

Energy efficiency can:

- Be the main GHG mitigator
- Enable sustainable socio-environmental development and achievement of SDGs

Research/evaluation must:

- Focus on key knowledge needs
- Expand EE to meet broader societal development goals and shape & tap all opportunities
- Provide timely and actionable knowledge
- Be embedded with the design and implementation teams
- Stay relevant by adapting to contextual changes

Research & evaluation can lead to broader, beyond tech, EE that results in more than a 40-50% reduction in GHGs

THANK YOU

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Extra Slides

Energy Efficiency Can Abate 40% of GHG Emissions Reductions Needed by 2040

- Global efforts to bring down emissions are top of the agenda at the UN Climate Action Summit, which takes place in New York today. The IEA is putting particular emphasis on the need for urgent global action on energy efficiency. This critical but often overlooked area can deliver major reductions in emissions while supporting economic growth, reducing air pollution and also saving consumers money.

- Energy efficiency could bring energy-related CO2 emissions in 2040 to levels that are 12% lower than today; this would represent over 40% of the emissions abatement required to meet the Paris Agreement. But despite this huge potential, efficiency progress is slowing. Global energy intensity – the amount of energy required to produce one unit of economic output – improved by just over 1% last year, well below the 3% needed to meet global sustainable energy goals.

- More than ever, a global push is needed to improve efficiency. That's why we're stepping up our efforts to help governments act quickly to accelerate progress. This summer, the IEA announced a high-level **Global Commission for Urgent Action on Energy Efficiency**, which will produce a set of clear, actionable recommendations for change.

Source: IEA news tag Sep. 23, 2019

Development banks commit to annual climate finance of USD 175bn

- Nine multilateral development banks (MDBs) pledged 175 B US$/year by 2025 to support global climate action investments.

- The plan was announced at the UN Secretary-General's Climate Action Summit in New York on Sunday amid joint efforts to meet the goals of the Paris Agreement. The group of MDBs includes the Asian Development Bank (ADB), the African Development Bank, AIIB, the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), IDB Group, the Islamic Development Bank, the New Development Bank and the World Bank Group.

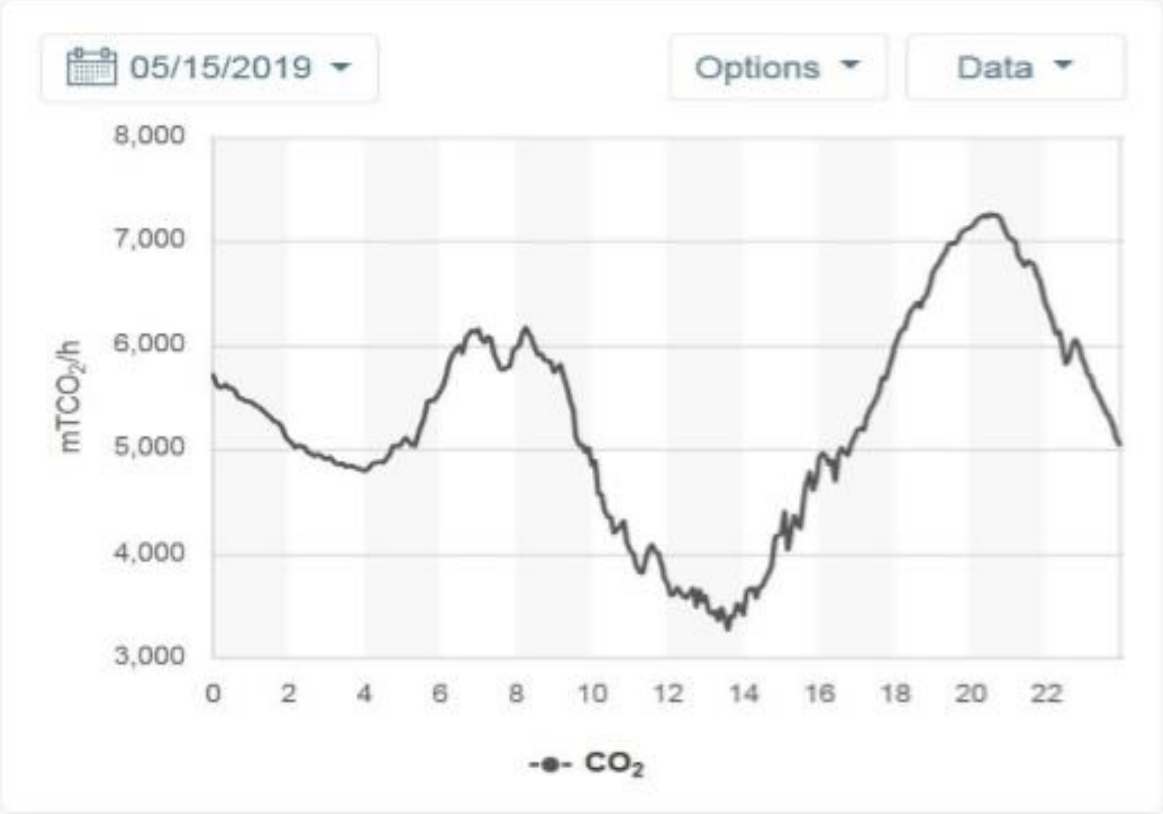
- The new investment commitment represents an increase from the record USD 111 billion of combined MDB climate finance and co-finance funds provided to developing countries and emerging economies last year. By 2025, the combined annual MDB financing will grow 50% from current levels to USD 65 billion, while co-financing for investment in climate action will increase to USD 110 billion.

- The funding will come in three streams. The plan envisages support for low and middle-income economies of USD 50 billion per year and a doubling of the size of financing for annual combined climate adaptation finance to USD 18 billion by 2025. Annual co-financing for investment in climate action is planned to jump to USD 110 billion, with USD 40 billion coming from private sector investors.

- Source: Edited from Renewables Now Sep 23, 2019

What about the future? Focus on A/C?

GHG Emissions



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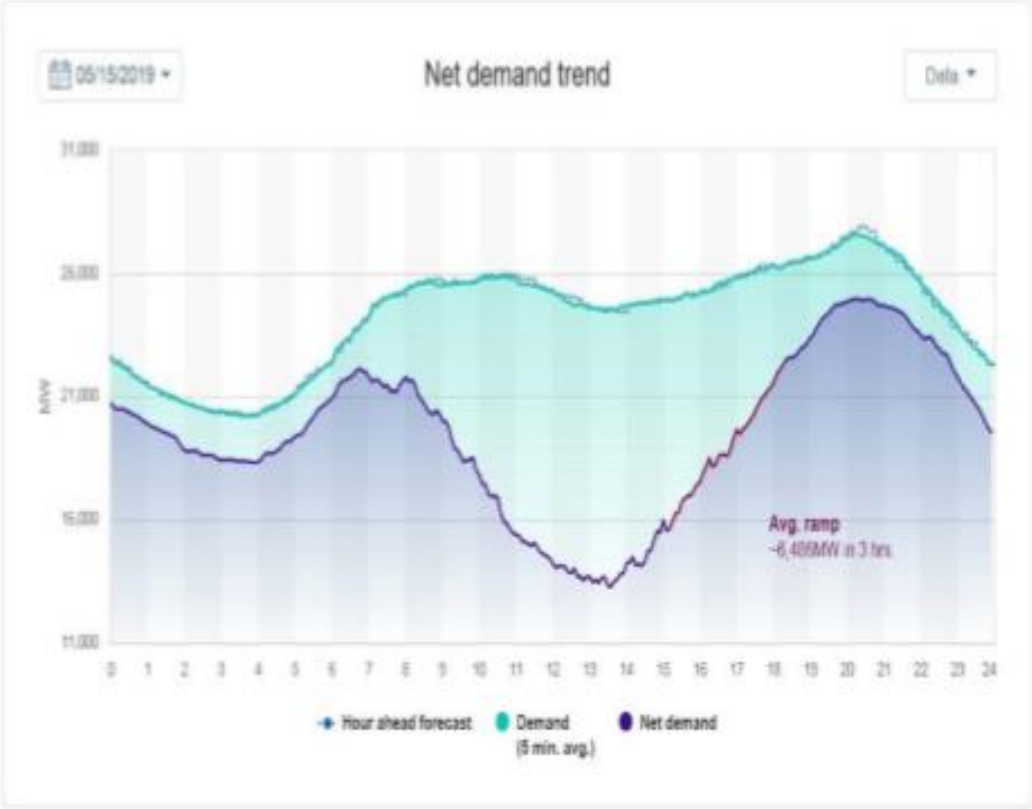
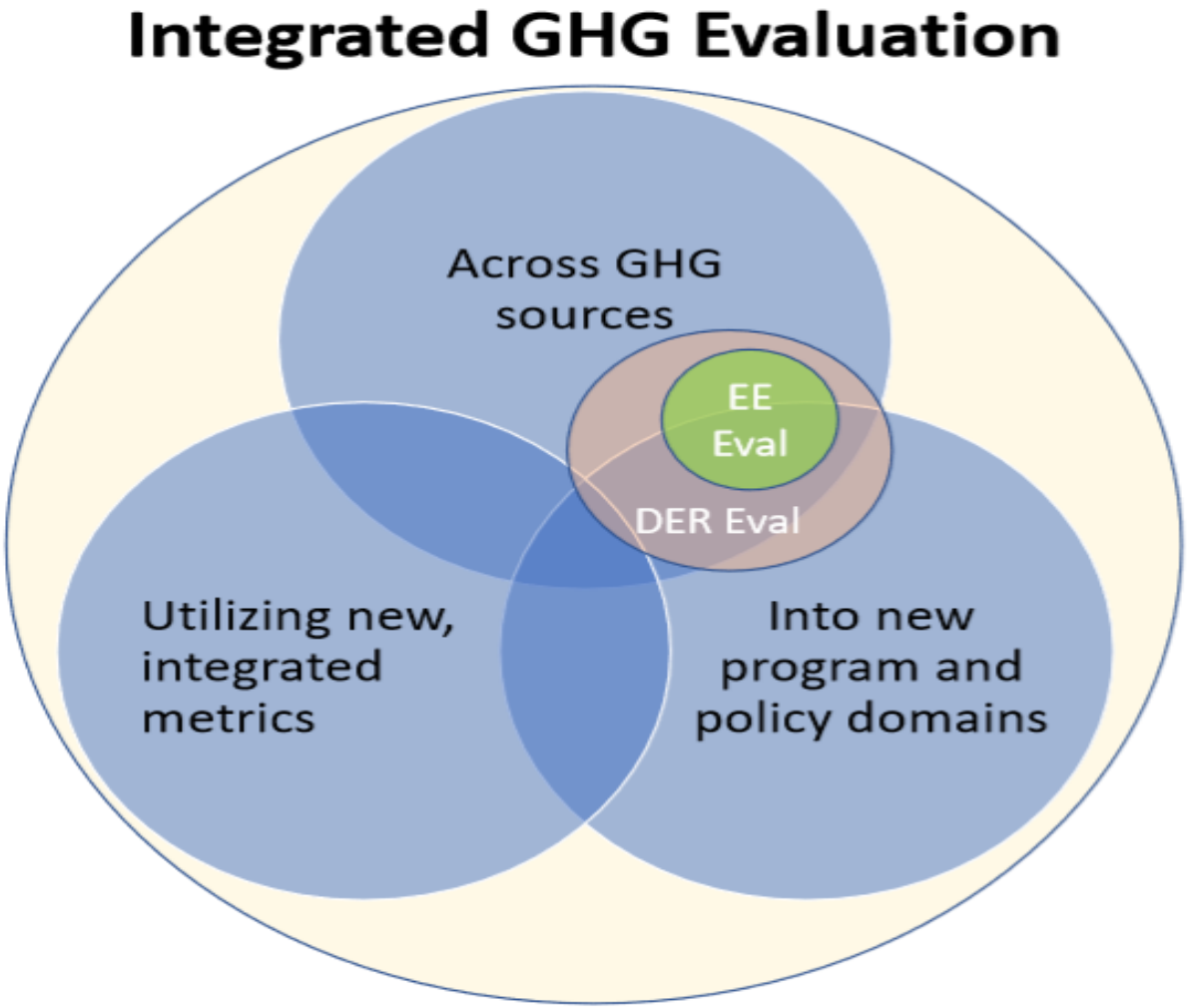


Source: J. Hagler Changing Objectives of Energy Efficiency Evaluation in a Renewable Energy Driven Grid IEPEC 2019

What about the future? Focus on A/C?

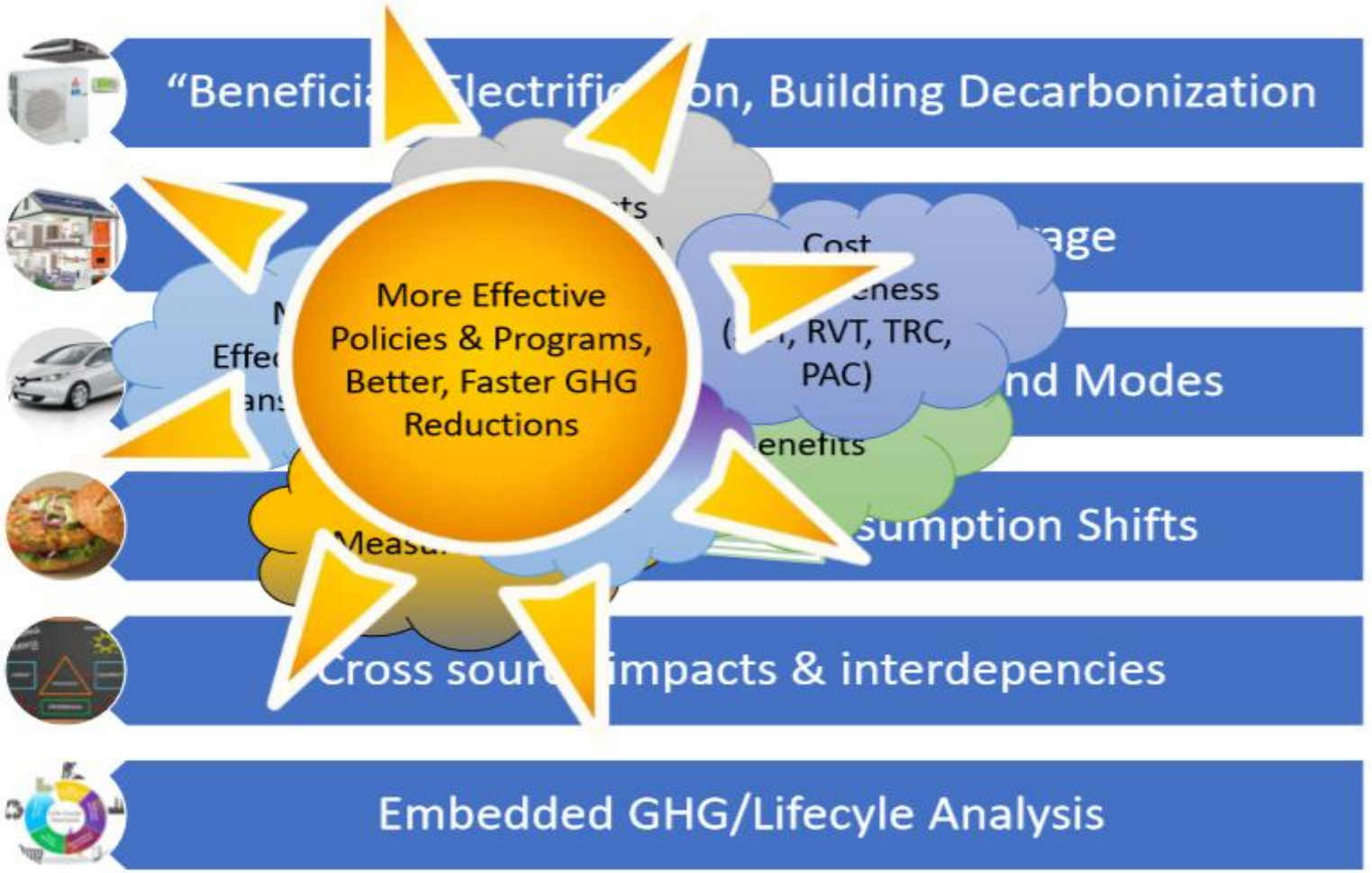
Evaluation Should Be Expanding…



Source: M. Rufo Evaluation's Role in Reducing GHGs: Yes it Matters…A lot!. IEPEC 2019

What about the future? Focus on GHGs!

For Example...



Source: M. Rufo Evaluation's Role in Reducing GHGs: Yes it Matters…A lot!. IEPEC 2019

What about the future? Focus on NEIs!

Marketing cut-sheet:
Retail

Energy Efficiency in Retail Stores

HVAC

Comfort/Sales
Greater comfort creates improved working conditions, and improves customer experience. Increased comfort translates into longer in-store time for customers which will lead to increased sales.

Lighting

O&M Costs savings
The longer life of LEDs provides for lower operations and maintenance costs as bulbs needs replaced less often. This is a benefit in exterior lighting and high-bay applications.

Comfort
LEDs run cooler than fluorescents.

Health & Safety
Increased luminescence decreases error rates for medical staff.

Sales
The color of LEDs can be adjusted to impact the mood of customers and visual display of products. Improving showroom aesthetics results in more pleasant shopping experience increasing "in-store" time translating into sales.

"Customers often enter the store with a coat on so it's better if they aren't too hot."

"Less complaints from employees about hot bulbs and less burns from bulbs overall."

LIGHTING
Life-cycle cost analysis of measures installed through AEP Ohio programs: Lighting - average annual O&M cost savings is 28% of the one-time incentive, and 13% of the annual kWh savings for lighting projects.

Literature review found Target invested in LEDs due to Life-cycle cost savings: Target installed roughly 130,000 troffers in 107 Target sites nationwide: 1.6 year payback - Payback based on total cost of ownership.

Operations and Maintenance Cost Savings

Measure Category	Average of annual savings (kWh)	Average incentive amount	Value of annual energy savings	Average annual NEI	Payback Years: Savings, incentive plus NEI
Custom	$191,779	$15,342	$23,013	$2,050	9.20
Lighting	$12,586	$962	$1,510	$273	3.29
VSD	$4,388	$765	$527	$31	26.91
Total	$13,194	$1,012	$1,583	$278	3.58

Source: N. Stevens et al. The bottom line and energy efficiency: how non-energy impacts improve the bottom line and create targeted messages addressing industry specific pain points IEPEC 2019

What's Wrong Here?

- *Energy Efficiency Can Abate 40% of GHG Emissions Reductions Needed by 2040.*

  Source: IEA news tag Sep. 23, 2019

- *Development banks commit to annual climate finance of USD 175bn*

  Source: Edited from Renewables Now Sep 23, 2019

- Answer: Energy efficiency isn't mentioned!