Background & Motivation: Metrics for Prioritisation

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Michael McNeil received a Bachelor's degree in Physics from U.C. Berkeley in 1990 and a Ph.D. in Physics from U.C. Santa Cruz in 1996. His graduate research was performed at the Center European Particle Physics (CERN) in Geneva, Switzerland, where he was a member of the ALEPH experimental collaboration.

Michael joined the Energy Efficiency Standards Group at LBNL in 1999. His work with that group focused on analysis of environmental and financial impacts of U.S. federal efficiency standards for appliances. Since 2003, Dr. McNeil has focused his research efforts on analysis of energy efficiency policies beyond the U.S. in over a dozen different developing countries, particularly in the area of appliance and equipment standards and labels.

Dr. McNeil joined LBNL's International Energy Studies Group in 2012, where he serves as Deputy Group Leader. In addition to analysis of energy efficiency standards and labeling, Dr. McNeil leads research involving the Bottom-Up Energy Analysis System (BUENAS) model, which provides analysis supporting the Super-Efficient Appliance Deployment Initiative and the International Energy Agency's World Energy Outlook, among other projects.

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Metrics for Prioritization

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Introduction and Context

- Prioritization (and scope) are important concepts in EES&L programs. Most important deciding factors are **energy savings** and **cost-benefit**.
- Methodologies to measure these is the subject of a future meeting and not detailed here.
- This talk presents straightforward example of prioritization, but considers multiple benefits and criteria as a topic for further discussion and collaboration.
- Later speakers provide examples of experiences of priority metrics, criteria and process.

Energy Efficiency Product Prioritization

Programs generally want to maximize energy savings, given by:

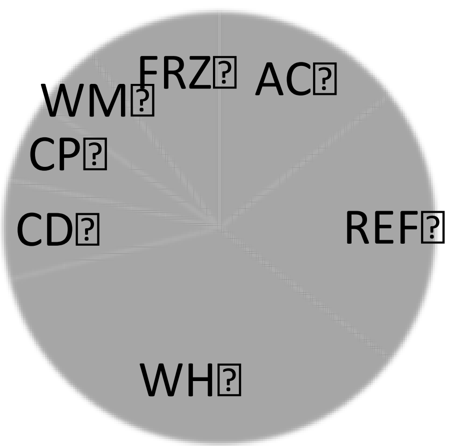
Savings (TWh) = Consumption (TWh) x Δeff (%)

so, first focus on products with high:

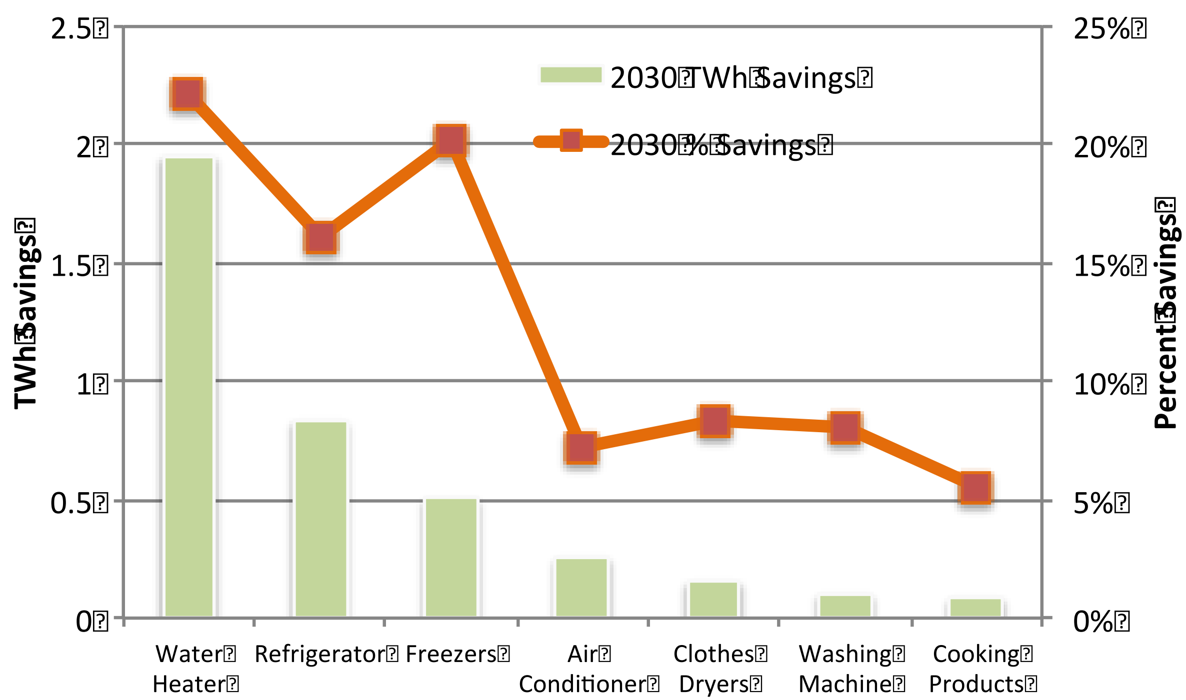
1. Consumption (Foot Print) – heating/cooling/lighting/motors/refrigeration
2. Savings Potential (Δeff) -a few percent (heating systems) to ~80% (standby power and lighting)

However, savings at a future date also critically impacted by growth in consumption (e.g. cooling in hot climate developing countries).

Example of Prioritization – South Africa



2030 Energy Consumption



South Africa EES&L Prioritization Study (2012)

Geyser standby losses:

- highest electricity consumer
- biggest potential for savings (actual impacts were even larger)

Freezers:

- smaller footprint than refrigerators
- high savings potential (low baseline)

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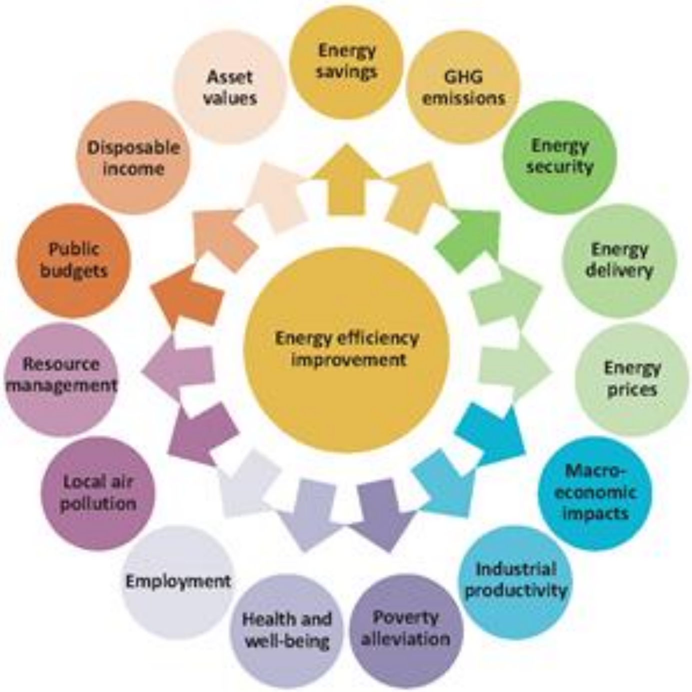
Towards a Multiple-Benefit / Multiple Criteria Approach to Prioritization

- **Multiple-Benefits**
  - Energy savings over a specific time horizon is often the explicit metric of the program, but energy savings has no value in itself.
  - Multiple benefits resulting more or less directly from energy savings are valuable to different audiences within government and civil society.
- **Multiple Criteria**
  - Incorporating a multiple benefits approach may shift the priority of products, *or at least allow for more sophisticated articulation of payoffs*.
- **Program Cost-Benefit Analysis**
  - Real, practical trade-offs must be made in order to minimize transaction and political costs to program, an often implicit prioritization.



Source: IEA

Differential Benefits and Criteria of EE

Benefit		Criterion
Consumer Financial Benefit	→	Maximize Benefit – Cost Ratio
Energy Security	→	Imported Fuels
Greenhouse Gas Emissions Abatement	→	Fossil Fuel-Based Electricity
Reduction of Government Energy Subsidies	→	Most Highly Subsidized Fuels and Sectors
Peak Demand Reduction	→	High Peak Load Coincidence Products
Energy Access	→	Products used in Low-Income / Rural Households
Health	→	Coal-Generated Electricity

Non-Energy Related Criteria

Authority	legislative and legal basis for regulation. Some products, schemes or technology substitution is not 'in bounds' for an efficiency program.
Test Procedures / Infrastructure	Lack of these can slow or eliminate product options.
"Additionality"	Rapidly evolving technologies may seem attractive, but may be moving faster than regulation can catch up with, making value added questionable.
Harmonization Potential	existence of well-defined programs with common test procedures and product sources present short cuts to program development.
Stakeholders	A relatively small number of players and less contentious environment may make regulations or negotiated performance levels more readily achievable.
Market base	Mix of domestic manufacturers vs. imports, small business or unorganized market complicates decision-making. Advantages to mfg. seeking to export.
Long-term technology outlook	Smoothly-evolving technologies should be targeted incrementally and frequently updated. Disruptable technologies may call for judicious timing and / or reinforcement through other programs
Consumer sub-groups	Governments avoid programs perceived to unduly burden low-income households, or to reward (incentivize) high-income ones.
More Plentiful vs. More Stringent	Pushing a single industry toward greater improvement may carry political risks, but ultimately save more energy than promulgating more, but less effective standards.

Questions for Discussion

- What are current processes or metrics for determining which products to target?
- What are methods for assessing these before implementation and measuring them afterward (next SPEx meeting)?
- Are program mandates specific / flexible enough to incorporate multiple benefit criteria?
- Can program impacts be expanded to multiple benefits and tailored for various audiences?
- How can international collaboration help? What is the level of interest for a discussion group on 'multiple benefit' analysis?