Working Group Report Out

GHG Emissions Reduction Audits and Assessments - Industrial

As part of the Better Climate Challenge, DOE hosted the **Industrial GHG Emissions Reduction Audits and Assessments** Working Group. The working group convened more than 15 industrial organizations to discuss the Emission Reduction Planning Framework and its five milestones, with a specific focus on Milestone 3, which relates to identifying emissions reduction measures (ERMs). These sessions provided valuable insights into emission reduction planning processes and practical strategies for achieving decarbonization goals. The group emphasized both technical and operational considerations in their assessments, with a particular focus on identifying, evaluating, and prioritizing measures. These partners, along with DOE technical experts, shared strategies, lessons learned, and ERM analysis approaches in terms of costs, benefits, and risks. Through roundtable discussions, participants shared experiences, barriers, and best practices for ERM scenario planning and implementation.

KEY TAKEAWAYS

- Assessments should focus on large GHG emitters, especially significant energy uses, such as process heat systems
- Emission Reduction Assessments can be conducted at the facility-level and scaled to the portfolio-level
- Multi-scenario planning to determine ERMs should include anticipated changes in the cost of energy, an internal cost of carbon, and the further penetration of renewables on the grid/renewable purchasing.
- The scope of an Emission Reduction Assessment is much broader than a traditional energy assessment and includes the evaluation of ERMs to address fugitive and process emissions.
- The most serious barriers to implementing electro-technologies include high capital and operating costs and the need for utility/facility infrastructure upgrades.

Overview

The Industrial GHG Emission Reduction Audits and Assessments Working Group explored effective planning strategies to conduct a dedicated Emission Reduction Assessment, and how it differs from a traditional energy assessment. Working group participants and DOE technical experts collaborated to discuss developments in identifying and evaluating emissions reduction measures, and how their approach might evolve over time to reach deeper levels of decarbonization needed to meet corporate goals.

Discussion Topics and Conclusions

Throughout seven working group meetings, Better Climate Challenge partners provided significant input on past experiences, challenges, and organizational goals, including:

Benefits of an Emission Reduction Assessment vs. a Traditional Energy Assessment

Taking a more holistic look at assessments results in deeper decarbonization. These assessments entail assessing not just how to reduce energy-related emissions in the near term, but also how to implement higher-impact measures that may not satisfy traditional energy project investment criteria.

Scaling Facility-level Assessments to the Portfolio-level

Initially approach these assessments at the facility level, focusing first on sites with the highest emissions footprint. Then, after demonstrating effective emissions reduction measures that may apply more broadly to other sites, a portfolio-wide approach could be utilized to scale quickly.

Addressing Non-Energy Emission Sources

One critical aspect of a GHG Emission Reduction Assessment is that it also includes sources of GHG emissions that are not a result of energy use, such as fugitive emissions or process-related emissions. Most participants indicated they had good data on these emissions sources, but some still have progress to be made in quantifying these accurately.

Broadening Investment Parameters Beyond Traditional Payback Periods

The group discussed a range of methods for evaluating ERMs that may not meet traditional project economic analysis thresholds (e.g., projects might present longer simple payback periods than an organization traditionally allows when assessing energy projects). ERM evaluation may also include non-energy benefits, to present the benefits of ERMs holistically. Without looking at these investments differently, significant ERMs may not get implemented and prevent the accomplishment of decarbonization goals. Potential approaches discussed included using a capital set-aside to provide funding dedicated to higher impact ERMs that may not meet traditional payback criteria, applying an internal cost of carbon which places a dollar value on emissions reductions, and allowing longer payback projects to proceed.

Concept of the Marginal Cost of Abatement

Using marginal cost of abatement to evaluate ERMs explicitly presents ERMs in terms of their cost relative to their impact on emission reductions, allowing for prioritization of options. The group explored this both at a conceptual level and by previewing the DOE Levelized Cost of Avoided Carbon (LCAC) Tool.

Capital Asset Planning for ERMs

It's critical to identify upcoming asset purchases that may impact emissions reductions and identify options to improve emissions when major assets are replaced, without locking in future emissions. Also, the sequence of asset upgrades and replacements is important, as timing of upgrades may impact replacement options.

Consideration of Additional Pillars of Decarbonization

In addition to identifying and evaluating ERMs for energy efficiency, an Emission Reduction Assessment should also consider options for low-carbon fuels, renewables, electrification, and potentially carbon capture and storage.

Lessons Learned

The working group identified several industry trends and best practices and discussed how Emission Reduction Assessments are different from traditional energy assessments (see Table 1 below) and strategies for transitioning to Emission Reduction Assessments.

Scope Criteria	Traditional Energy Assessments	Emission Reduction Assessment
Evaluation of fugitive and process ERMs	No	Yes
Payback periods/ ROI	Under 2-3 years for most ERMs, focusing on energy cost savings	May allow 5 or more years for high-impact ERMs, and may consider internal cost of carbon and/or indirect benefits of projects
Asset Lifetimes and Replacement Schedules	May be considered if known by plant staff	Considers equipment slated for replacement and impact of new fossil-fueled investments on a lifetime basis (alignment with decarbonization pathway)
Impact of renewables purchasing/ electrification	May consider electrification in terms of energy cost savings, with current grid emissions factors	Considers value of future emissions reduction as grid becomes greener, as well as energy cost savings over time
Sequencing of ERMs	No	Considers how phasing of ERMs affects impacts (e.g. efficiency may limit the need for renewables and/or free up capacity to electrify)

The group also discussed the importance of continuing to do traditional energy assessments but recognized their limitations and will strive to broaden their scope to Emission Reduction Assessments over time. Other key lessons learned included:

- Many potential emissions reduction measures (ERMs) also include benefits beyond energy reductions, such as improved efficiency, safety, productivity, product quality, and waste reduction. Some of these would ultimately lead to projected revenue increases or labor/material cost reductions. In quantifying such benefits, the ERMs request for capital could include an improved return on investment.
- Non-energy emissions for some sites may be minimal, but it is first necessary to quantify such emissions before deeming them insignificant. Refrigerant emissions from HVAC units are one source that should be evaluated. For other sites, the non-energy emissions may lead to significant reductions and must be addressed to reach reduction goals.
- Portfolio-wide analysis could potentially be integrated within asset planning that may address replacement of assets at end of life. The importance of identifying significant greenhouse gas emitters (SGEs) at each site is critical to finding ERMs that can be applied portfolio-wide without necessarily evaluating each site comprehensively. This process could also be tied to corporate asset planning, if possible. Furthermore, the impact of the corporate renewables purchasing strategy on the scope 2 emissions factors to be used should be incorporated in such evaluations as well.
- Asset planning provides a critical opportunity for ERM funding. If an ERM is considered an end of life asset replacement (i.e. the equipment must be replaced anyways), it should be viewed on an incremental cost basis, evaluating the cost of the ERM to be simply the cost difference of the low-

emissions alternative and the equipment that would otherwise be installed. However, as the group discussed, it may be more challenging to stay ahead of these asset replacement procurements. In addition, implementing an ERM in a process that may ultimately be replaced should be done with full knowledge of whether there is enough time to recover the ERM investment before the asset is to be replaced and also if there is a pending decision to install a new fossil-fueled option which may be reconsidered.

- The sequencing of ERMs is also important for understanding their impact. Organizations should avoid making an ERM investment which may improve upon an existing asset but may not have time to fully recover the investment before that asset is replaced. Likewise, implementing energy efficiency options may create more capacity for other options, such as electrification.
- Project approvals were noted as one of the biggest barriers to implementing ERMs, with multiple stages of review being challenging (i.e., legal, procurement, etc.) There is usually a disconnect between corporate-level expectations and plant-level ability to get projects across the finish line. Corporate teams working on implementation are stretched thin, resulting in plant-level resources striving to obtain multiple bids, modifying power infrastructure if necessary for electrification, and confronting other challenges. In addition, finding contractors that have the necessary skill level for certain projects can constrain implementation and delay timelines.

Next Steps

DOE will develop the scope and structure for a GHG Emission Reduction Assessment, creating a “how to” resource for partners to structure such an assessment. This will include assembling a toolkit of resources to support partners in doing their own assessments, drawing from existing tools, and identifying any gaps where additional tools may be needed.