Celanese Corporation is a specialty materials and chemical manufacturing company headquartered in Irving, Texas. Within the chemicals sector, sustainability has become a key factor in multiple focus areas, including capital project design. Celanese identified a need to improve the way the sustainability aspects of a project are evaluated early in the project planning process and how sustainability optimization measures are integrated in capital projects. Specifically, the company developed a new approach to capital project design that promotes the effective evaluation of energy, greenhouse gas (GHG) impact, waste and water conservation, and evaluation of project design improvements that could impact sustainability.

This was done as part of multiple initiatives the company is undertaking to meet its sustainability goals and reduce costs. Since it is typically more expensive to implement sustainability measures after capital projects are commissioned, Celanese introduced the sustainability checklist approach to ensure sustainability considerations are considered and evaluated in capital project design and technical review and to ensure this analysis is done well before final project approval.

Celanese created the sustainability checklist to provide a consistent approach for project engineers to evaluate the sustainability impacts of capital projects and integrate sustainability measures in project design. The checklist enables optimization and efficiency upgrades before project approval and helps reduce the overall lifecycle costs and improve the sustainability impact of capital projects.

ORGANIZATION TYPE
Manufacturer of differentiated chemistry solutions and specialty materials

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BARRIER
Lack of standardized checklist for evaluation of project design options promoting energy and sustainability for capital projects

SOLUTION
Development of a sustainability design consideration checklist for capital projects

OUTCOME
The sustainability checklist enables a standardized project sustainability review that promotes more effective business decisions, including sustainability optimization and efficiency upgrades, before project approval

POLICIES
Celanese has consistently established and met sustainability goals related to energy, waste, water, and emissions. The establishment of the sustainability checklist enables the company to further drive energy reduction and sustainability improvements by providing project engineers with a consistent approach for integrating sustainability in project evaluation.

PROCESS
Celanese formed a subteam of the enterprise-wide Energy Council that included select members of the Energy Council, project engineers, and sustainability subject matter experts. The team was tasked with developing policies and processes that would:

1. emphasize and raise awareness of sustainability;
2. identify sustainability project options upfront in capital project design; and
3. better evaluate project payback and the life cycle cost of projects that included sustainability improvement options.

The team addressed these goals by improving two processes. One of the team’s first actions involved updating a portion of Celanese’s Management of Change (MOC) procedure, specifically the existing Management Systems Review process to require plant teams to consider sustainability in any process change they make. The council achieved this by inserting a sustainability-related question that asks team members to identify the energy, GHG, and waste and water-related impacts of a given manufacturing change.

The team expanded on this update to develop a new and improved capital project sustainability checklist. The team placed a strong emphasis on making sure the checklist was interpretable, simple, and valuable to project managers and design teams. With this in mind, the team developed a one-page checklist over three months and allowed for a six-month feedback period to incorporate feedback from sites and capital teams. The checklist consists of best practices and lessons learned.
from other Celanese energy checklists, as well as concepts shared by American Chemistry Council (ACC) companies and DOE Better Plants partners. The checklist was developed and tailored to Celanese systems, processes, and sustainability requirements to ensure it was applicable to all capital projects.

MEASURING SUCCESS
The sustainability checklist enables project engineers to review and understand the impacts of their project on energy consumption, GHG emissions, water consumption, and waste generation using a standardized format, as well as to develop improvement options to increase the benefit of projects. For projects with overall cost of greater than fifty thousand dollars, project engineers use the checklist to ensure that potential energy and water efficiency solutions are considered. As they fill out the checklist, they are provided questions that help define project design options related to water conservation, carbon footprint reductions, and waste recycling. Whether or not any of the improved sustainability alternatives are selected, cost and benefit information is documented for the alternatives identified and specific reasons for the selection of any of the options included in the analysis.

The checklist includes information on whether appropriate measurement systems, submetering, control elements, and automation are in place to ensure sustainability optimization during operations. The checklist triggers project engineers to consider multiple factors including carbon capture, life cycle analysis (LCA) impact on products, peak loads, as well as potential rebates and funding resources.

Based on the checklist answers, opportunities to improve the project’s sustainability and reduce environmental impact can be defined. The sustainability checklist and potential options are reviewed by site and corporate employees including the Unit Technology Leader, site and global energy champions, as well as project approvers.

Celanese expects the checklist to enable capital project design improvement that result in future reductions in energy usage and improvements to GHG reductions. No current year impacts are yet available because the checklist has only recently been implemented.

OUTCOMES
The sustainability checklist is in the process of being rolled out to all Celanese sites with training and alignment of expectations for affected personnel. The checklist is expected to help to define better design decisions early in the project planning phase and influence equipment specifications for end-of-life replacements. Instead of simply replacing with the same equipment, the checklist is intended to drive project and plant engineers to evaluate cost-effective replacements that improve energy and water efficiency. Celanese believes that the checklist can be further developed to include more specifics for major projects.

However, in its current form, the checklist is intended drive behavior changes during project scoping by requiring design and technical teams to consider and include sustainability measures for capital projects over fifty thousand dollars. In addition, it will promote better decision-making at the project approval phase to include cost-effective sustainability opportunities. The checklist can be easily configured for other companies to use by incorporating details relevant to a company’s business.
operations and corporate culture.