

# MISSION INNOVATION

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## Accelerating the Clean Energy Revolution

### Clean Energy Materials Innovation Challenge – Progress Summary

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#### Issue

Materials discovery is a key element of the innovation cycle of energy conversion, transmission, and storage technologies, as well as energy use. Development of next-generation energy technologies faces the challenge of finding and integrating new materials at a faster rate. However, even with current state-of-the-art technologies, the innovation process to discover new materials and bring these to market can take 10 to 20 years and is very expensive. Accelerating and improving this process through international collaborative research and development (R&D) could result in major breakthroughs for the energy sector and beyond.

#### Organization

The Clean Energy Materials Innovation Challenge is led by Mexico, and co-led by the United States.

Other participating countries include: Australia, Canada, Denmark, the European Commission, France, Germany, India, Italy, the United Arab Emirates, Finland, Norway, Republic of Korea, Saudi Arabia, Sweden, the Netherlands, and the United Kingdom.

#### Objective

The Clean Energy Materials Innovation Challenge aims to accelerate by 10x the innovation process for new, high-performance, low-cost clean energy materials.

This Challenge has the following goals:

1. Build an improved, shared understanding of the state of technologies for the automation of materials discovery, as well as identify the knowledge gaps, opportunities and the recommendations from the leading scientists around the world;
2. Promote collaboration opportunities to researchers, innovators, and potential investors;
3. Develop new collaboration projects between key partners (government-to-government, researcher-to-researcher, public-private, etc.) in order to integrating and automating the components of materials discovery; and
4. Inspire the decision makers and leaders around the world and showcase the possibilities and benefits that can be generated from bringing together the top minds in science and industry and from working together on finding solutions to the biggest global materials challenges.

#### Approach

Work conducted under this Challenge will be directed towards developing a fully integrated, end-to-end platform that will accelerate materials discovery along the whole process from low to high technology readiness levels (TRLs). The focus will be on R&D breakthrough technologies with a long-term approach

towards 2030 and beyond that will lead to a single breakthrough as a platform, as opposed to deployment and/or policy issues with a shorter time horizon than MI.

This Innovation Challenge will combine advanced theoretical and applied physical chemistry/materials science with next-generation computing, artificial intelligence (machine learning), and robotics tools, with the aim of creating a comprehensive and fully integrated, end-to-end materials innovation platform. Experts and partners in this initiative will automate and/or improve each step of the innovation chain of new materials, such as the discovery, synthesis, data and performance assessment, and process design and scale-up. The proposed unified platform will benefit all stages of the materials innovation process (model, simulate, predict, synthesize, characterize, and test the properties and performance) of new clean energy materials and will leverage international advances from individual activities.

This initiative will benefit a wide range of energy sectors and applications. Specific application areas for new materials include, for example, advanced batteries, high efficiency solar cells and fuel cells, low energy semiconductors and solid state lighting, thermal storage, coatings for various applications, and catalysts for the conversion and capture of CO<sub>2</sub>.

### Progress

The Clean Energy Materials Innovation Challenge is currently planning to hold a 3-day Energy Materials Innovation Workshop (“EMI Workshop”) that will take place in Mexico City on September 11-14, 2017. This invitation-only workshop will convene more than 50 preeminent scientists and experts in advanced theoretical and applied physical chemistry/materials sciences, advanced computing, machine learning, and robotics. These experts will identify critical R&D priorities and gaps in clean energy materials innovation processes and propose opportunities for deeper collaboration.

The planning and organization of the EMI Workshop is fully under way. The event website ([IC6.mission-innovation.net](http://IC6.mission-innovation.net)) includes all details and agenda. To date, more than 100 experts, observers and keynote speakers have been invited; a number of them have been confirmed.

### Next Steps

This Challenge aims for short term pre-emptive funding to hit the ground running this fiscal, or early next fiscal.

The results and recommendations of the EMI Expert Workshop to be published in a detailed report by the end of 2017 will define the substantive next steps. The expectation is that the EMI Workshop and corresponding report will prove valuable to guide and align international R&D programmes, as well as to mobilize funding to meet this Challenge.

Following the EMI Workshop, the Clean Energy Materials Innovation Challenge may consider launching Requests for Proposals, grants, and collaboration projects to address the gaps and opportunities identified by the leading experts and perhaps follow some of their recommendations to meet this challenge. These collaborations could also include public private partnerships and R&D initiatives to discover advanced materials.