

MISSION INNOVATION

Accelerating the Clean Energy Revolution

MISSION INNOVATION ACTION PLAN

Introduction

Mission Innovation (MI) is a global initiative designed to accelerate the pace of innovation and make clean energy widely affordable. Led by the public sector, it aims to mobilise both public and private sector efforts. MI also provides a platform to support collaborations among members and facilitate engagement with business, industry and investors, so as to attract more private funding into innovative clean energy research.

MI was launched in November 2015 at the initiative of the United States, India and France. It now comprises twenty-two economies and the European Commission, representing the European Union, collectively accounting for more than 80 percent of the world's total public financing of clean energy research and development (R&D). Since its inception, MI has partnered with the Breakthrough Energy Coalition, which has made an unprecedented commitment to invest patient capital in early-stage technology development coming out of Mission Innovation countries.

High-level leadership is provided by member governments' Ministers with responsibility for clean energy innovation. A MI Steering Committee delivers senior-level strategic guidance and oversees the support provided by the MI Secretariat.

MI is guided by the principles of the Joint Launch Statement and the provisions of the Mission Innovation Enabling Framework, as agreed by MI Leaders and Ministers, respectively. Each MI member acts independently to design and honour its MI commitments, share information and foster collaboration over an initial 5-year period.

Moving past the organizational phase, MI has identified a number of areas of interest that would benefit from collaborative work. This document presents a high-level action plan to 2020 that will focus on demonstrating progress through individual country programmes and collaborative efforts toward realising MI goals. MI members may elect to participate in any one or more parts of the plan, motivated by their own technical and policy interests.

Goals of Mission Innovation

MI's goal is to accelerate the pace of clean energy innovation so as to achieve performance breakthroughs and cost reductions that can deliver widely affordable and reliable clean energy solutions across the world in the next two decades and beyond.

By the end of 2020, MI will have helped deliver:

1. A substantial boost in public-sector investment in clean energy R&D at the national level of MI members;

2. Increased private sector engagement and investment in energy innovation, particularly in key Innovation Challenges;
3. Many new or strengthened voluntary cross-border networks and partnerships on energy innovation, greater engagement from innovators, and accelerated progress in addressing specific Innovation Challenges; and
4. Greater awareness amongst MI members and the wider clean energy community of the transformational potential of energy innovation, the progress being made, and the remaining critical clean energy innovation gaps and opportunities.

Priority Work-streams

This section describes the priority work-streams to deliver on MI goals and objectives by the end of 2020, and current thinking on high-level plans for their delivery. More detailed work plans for each work-stream have been developed, or are in development. Those plans will include more detailed metrics by which progress and success can be monitored.

1. Encouraging public sector support for clean energy research and innovation

Contribution to MI's Goal: This work-stream will promote increased public sector support for clean energy R&D, in line with national commitments to seek to double governmental and/or state-directed investment in clean energy R&D over five years. It will also provide insights into the progress being made on energy innovation and the remaining critical clean energy innovation gaps and opportunities.

Through this work-stream, MI will encourage public support for clean energy research and innovation and explore benefits of removing regulatory hurdles to R&D and new technology, and thus, over time, allow clean energy technologies to achieve market competitiveness.

Implementation: To be able to show results and progress, MI members will share information and efficiently and flexibly gather and communicate country statistics (country books), evidencing strategies, actions, and investments made to advance clean energy innovation and related R&D. Identifying breakthroughs and documenting the declining cost of clean energy technologies will track outcomes and complement the tracking of inputs, drawing as much as possible on existing sources of information (e.g., data gathered by the International Energy Agency [IEA]).

Timeline: MI is currently focused on innovation gains achieved by the time period through to 2020-2021.

Milestones: Reports in 2018 and 2020 will allow for visible incremental progress on achieving innovation gains.

2. Promoting private sector engagement and investment, particularly in key Innovation Challenges

Contribution to MI's Goal: This work-stream will help deliver increased private sector engagement and investment in energy innovation, particularly in key energy innovation challenges, recognising that private sector engagement is the critical driving factor of clean energy technologies.

Of particular importance are the linkages between MI and energy companies, private sector clean energy investors, and philanthropists. Greater synergies will afford greater funding into innovative research in this field, and increase the speed of market commercialisation (at scale). Sustained market competitiveness of innovative clean energy technologies and solutions will facilitate further performance and cost advances and pave the way for novel breakthroughs.

Implementation:

Activities under this work-stream will focus, first, on ways to tailor areas of R&D relevant to MI in a way that most effectively encourages greater private sector involvement, including investment and knowledge sharing. Activities will focus on other forms of private sector engagement (including network building, public-private collaborations and agenda setting).

Suitable metrics and indicators will be developed, potentially in collaboration with other international bodies. There is particular need for more fine-grained data on investment (public and private) in clean-energy R&D, broken down by source, sector and region, over and above existing data in the energy sector more generally.

Timeline: Following initial quick-wins, progress would be back-loaded to allow the relevant activities to mature.

Milestones: MI will seek to encourage national policies and programs that incentivise and increase private sector investment in clean energy innovation. The Business and Investor Engagement (BIE) Sub-group will also champion increased investment by the private sector in areas relevant to MI, demonstrating synergies between MI activities and the priorities. MI will celebrate funding pledges and investments made by the private sector with suitable announcements at yearly MI Ministerial meetings, and encourage demonstrable synergies with other/new private-sector-driven funding schemes and initiatives (e.g. the World Economic Forum, the Oil and Gas Climate Initiative, etc.). MI will seek to acquire better understanding of the investment ecosystem of clean energy innovation, including by developing a baseline analysis of key participants (corporates, investors, funds, etc.).

3. Boosting international collaboration and accelerating progress to address key Innovation Challenges

Contribution to MI's Goal: This work-stream will help deliver new and/or strengthened voluntary cross-border networks and partnerships on energy innovation, greater engagement from innovators, and accelerated progress in addressing specific Innovation Challenges. It will also provide insights into the progress being made on energy innovation and the remaining critical clean energy innovation gaps and opportunities.

In order to provide a focus for activities under this work-stream, groups of interested MI members have come together to launch seven Innovation Challenges aimed at catalysing global research efforts in areas that could provide significant benefits in reducing greenhouse gas emissions, increasing energy security, and creating new opportunities for clean economic growth.

Engagement in an Innovation Challenge is entirely voluntary and is built around a coalition of mutually interested Mission Innovation members. With sufficient interest from MI members, new Innovation Challenges could be launched in the future.

Implementation: MI members have each indicated an interest in engaging on particular Challenges with all members involved in at least one Challenge, and many members involved in several. Teams of MI members act as co-leads, working with the other interested members to organise activities. The chairs and members of the Analysis and Joint Research (AJR) Group support and coordinate work across the Challenges. Detailed Work Programmes for each Challenge have been developed by the Challenge teams, and are focused on four objectives:

1. Building an improved and shared understanding of what is needed to address the Challenge, and how to define measurable targets and track progress towards them;
2. Identifying key gaps and opportunities not sufficiently addressed by current activities;
3. Promoting opportunities for researchers, innovators and investors in order to build support and excitement around the Challenges and boost engagement; and
4. Strengthening and expanding collaboration between key partners, including governments, researchers, innovators, and private sector stakeholders.

The Work Programmes set out initial thinking on how to address the above objectives. Early actions include surveying current national activities and plans and convening experts from around the world for a series of workshops to help identify the most critical innovation gaps and opportunities. Follow-up actions to boost private sector engagement in these Challenges are also described and will be expanded upon over time. Measurements of the effect on Mission Innovation objectives including on price reduction

and broader access will be developed with the help of other international organisations based on their experience in the field (e.g., IEA, International Renewable Energy Association [IRENA], etc.).

The seven Innovation Challenges, their objectives, and some examples of actions are listed below. Further details are available in the individual Innovation Challenge Progress Summaries and Work Programmes.

- 1. Smart Grids Innovation Challenge** – this Challenge aims to enable future grids that are powered by affordable, reliable, decentralised renewable electricity systems. Work is being advanced under four sub-challenges, allowing for a more focused approach. Two deep-dive workshops a year will be held to identify priority opportunities and track progress, the first one alongside MI-2. The development of key performance indicators is also underway. Additional actions to increase private sector engagement and foster deeper collaboration will be developed in late 2017 and into 2018.
- 2. Off-Grid Access to Electricity Innovation Challenge** – this Challenge aims to develop systems that enable off-grid households and communities to access affordable and reliable renewable electricity. Activities being advanced include member surveys and international expert workshops (Delhi, May 2017; Paris, July 2017), which aim to inform gap analysis and target-setting. A ‘state of play’ review will be published in June 2017. Actions to deepen engagement with innovators and investors are in development and progress will be demonstrated in a new ‘state of play’ review to be published in 2020.
- 3. Carbon Capture Innovation Challenge** – this Challenge aims to enable near-zero CO₂ emissions from power plants and carbon intensive industries. Work has been focused on organising a major international Experts’ Workshop (Houston, September 2017) to identify priorities, gaps and opportunities. The workshop’s conclusions will be published in January 2018 to aid the identification of future areas of research and international collaboration. Activities to engage the technical and business communities, and longer-term activities focused on engagement and collaboration, will be developed in 2018.
- 4. Sustainable Biofuels Innovation Challenge** – this Challenge aims to develop ways to produce, at scale, widely affordable, advanced biofuels for transportation and industrial applications. A joint survey with the Biofuture Platform, with support from the IEA, has been conducted to map the technology landscape and identify key innovation gaps and opportunities. Stakeholder workshops are planned in India and Brazil in 2018, and a series of reports on research priorities and opportunities will be published in 2018 and beyond. The Challenge intends to engage with private sector stakeholders moving forward.

5. **Converting Sunlight Innovation Challenge** – this Challenge aims to discover affordable ways to convert sunlight into storable solar fuels. An international experts’ group has been established to help define Challenge targets and scope joint actions. There are also plans to participate in multiple international scientific conferences to publicise the Challenge and engage the technical community. Additional activities to engage the private sector, and strengthen and expand collaboration between members, will be explored.
6. **Clean Energy Materials Innovation Challenge** – this Challenge aims to accelerate the exploration, discovery, and use of new high-performance, low-cost clean energy materials. A three-day Experts’ Workshop (Mexico City, September 2017) has been planned to identify research priorities, gaps and opportunities. A workshop report will be published in late 2017. Following the workshop, there are plans to develop an integrated platform to facilitate faster materials innovation, and to work with the World Economic Forum (WEF) to deepen private sector engagement.
7. **Affordable Heating and Cooling of Buildings Innovation Challenge** – this Challenge aims to make low-carbon heating and cooling affordable for everyone. Six priority innovation areas have been identified as a focus for collaborative actions. Surveys of member interests and plans will inform relevant international technical expert workshops to be held in 2017 to identify and highlight key innovation gaps and opportunities. WEF has also identified this Challenge as one of the pilot areas in which to deepen private sector engagement. A number of additional collaborative research opportunities to meet the targets defined will be developed in 2018, and other mechanisms of collaboration to accelerate innovation will be explored.

Timeline: The timelines of the completion of collaborative activities under each IC are set out in the individual work-programmes and are initially focused on the current Mission Innovation timeline (until the end of 2020) but may continue beyond that point. De minimis, concrete evidence and clear trend lines demonstrating progress in pursuit of the objectives will be provided by 2020/21.

Milestones: Each Challenge has set its respective milestones. Progress under each Innovation Challenge Work Programme will be discussed at annual MI Ministerial Meetings.

4. Engaging and informing MI members and the wider clean energy community

Contribution to MI’s Goal: This work-stream will help deliver greater awareness amongst MI members and the wider clean energy community of the transformational potential of energy innovation, the progress being made and the remaining critical clean energy innovation gaps and opportunities.

To maximise the impact of MI, it is critical to communicate with, and secure the support and engagement of, many stakeholders within MI, amongst the private sector, and in the wider clean-energy community.

MI members, other countries, innovators, and investors will all benefit from information about ongoing activities, existing gaps, and opportunities. As a result, countries and companies can make informed investment decisions, which would yield returns and reductions in unproductive duplication (without deterring healthy competition) and an increased likelihood that key gaps are plugged.

There is substantial and growing international activity on clean energy innovation, including in the areas covered by the Innovation Challenges, with many joint and bilateral partnership programmes. MI will tap into these parallel initiatives and seek to create synergies, where possible.

Outreach to like-minded partners and networks, as well as international organisations and bodies, will help improve the flow of information and expertise, which can optimise investments and improve the delivery of projects. Creating a vision and a strategy for communication on MI topics as a way to attract investment and extend collaboration is a key priority.

Implementation: Descriptions of the range of new activities created since the launch of MI will be developed, with feedback from MI members and stakeholders. Case studies of valuable partnerships and their impacts will be conducted. Further, material on the MI-dedicated website will provide a wide audience with background material and updates on recent developments. MI may also explore the creation of collaborative common virtual spaces.

Timeline: This work-stream comprises front-loaded activities, with the bulk of the work to be done in the short- to medium-term, to allow for better and quicker establishment of MI as a prime contributor in the field of international clean energy collaboration strategies and initiatives.

Milestones: Launching the MI Champions Prize Program will help MI mobilise researchers around the world. Each annual MI Ministerial gathering will provide an occasion for relevant MI announcements, such as new activities, new activity streams, progress in the various Innovation Challenges, etc.

Organisational structure and governance

As agreed among MI members at the inaugural MI Ministerial meeting in San Francisco in June 2016, and embodied in the Mission Innovation Enabling Framework, MI members independently determine the best use of their clean energy R&D funding. Equally,

participation in international collaborative activities is voluntary and subject to national decisions by MI members.

The high-level support of the MI goals, however, coupled with the agreement to share information and encourage engagement with the private sector, provides a unique opportunity for productive collaboration among MI members who wish to opt in. It also provides an attractive platform for businesses, industry and investors to gain access to, learn about, and participate in the overall innovation ecosystem on clean energy R&D, from early discovery to market expansion in MI countries.

In recognition of these opportunities, the Enabling Framework provided means to guide and facilitate cooperation among MI members by establishing a Steering Committee with rotating chairs and members, which would guide the work to be carried out by volunteer members of sub-groups and leaders of various initiatives – all with the support of the MI Secretariat. The Steering Committee provides high-level strategic guidance and oversees the work of the Secretariat. All roles are currently staffed on an opt-in, ad hoc basis. Resources for specific activities are derived from MI members that are interested in, and volunteer to, participate and further a particular activity.

Detailed activities are guided by three Sub-groups:

1. The Analysis and Joint Research Sub-group brings together interested MI members to develop and share insights into gaps, opportunities, and progress, and coordinates work on the identified Innovation Challenges;
2. The Business and Investor Engagement aims to identify and engage with prospective businesses and investors in emerging technologies to expand and enhance the innovation pipeline, particularly with regards to the identified Innovation Challenges; and
3. The Information Sharing, Communications and Outreach helps leverage combined knowledge, promote good practices, share expertise, and identify, promote, and use available platforms for collaboration and facilitate research partnerships, where mutual interest exists.

Additional groups or projects team may be established as needed to deliver on specific tasks. All activities are undertaken on a voluntary opt-in basis, and involvement in any sub-group is open to all MI members. Decisions are made by consensus (on a no-objection basis). Resources are provided directly, mostly in-kind, by participating MI members.

The Secretariat will call for periodic Sub-group reports, as needed, and summarize MI activities annually for the benefit of all MI members and, to the extent appropriate, share such information with other stakeholders and interested parties.

The procedures for passing on the duties of the Steering Committee rotating chair, accessing new MI members, and determining roles for non-MI member observers will be

more fully articulated going forward, but without endangering the voluntary character of the MI initiative. These procedures will be developed by the Secretariat in consultation with the members of the Steering Committee and submitted for approval by all members of MI by the end of 2017.

Similarly, the resources necessary to deliver on the agreed work plans and activities, including the coordination of preparations of annual meetings, will be reviewed by the Steering Committee, and recommendations for future resourcing will be submitted for consideration by all members of MI by the end of 2017.

Reporting

Meetings of all MI Ministers are planned to be held annually, in conjunction with meetings of the Clean Energy Ministerial. These meetings will be the main occasions for reporting on progress, reviewing plans, and agreeing to updates on MI work plans and the launch of major activities.

All-Member conference calls will be held frequently throughout the year (approximately monthly) to provide MI officials with updates on progress, and to discuss and agree on adjustments to plans and/or new initiatives.