ENERGY FUTURE 2023 IN INDUSTRY

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“Now or never”- Why global Cooperation for Net-Zero Industries?

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World leaders at Mission Innovation's launch at COP21 in Paris, 2015

MI Net-Zero Industries Partnership

Co-Leads (2)
Austria - Australia

Core Mission Members (7)
Canada - China – European Commission – Finnland – Germany – South Korea –United Kingdom

Supporting Member (1)
The United States

Key Mission Sponsors and Partners (15)
Australian Renewable Energy Agency (ARENA)
Austrian Institute of Technology (AIT)
Clean Energy Ministerial Industrial Deep Decarbonisation Initiative (IDDI)
COP28 Presidency
Global Cement and Concrete Association (GCCA)
Heavy Industry Low-carbon Transition Cooperative Research Centre (HILT CRC)
International Energy Agency (IEA)
International Renewable Energy Agency (IRENA)
Klima- und Energiefonds (KLIEN)
Leadership Group for Energy Transition (Lead IT)
Mission Possible Partnership (MPP)
United Nations Industrial Development Organisation (UNIDO)
World Economic Forum (WEF)
World Steel Association (Worldsteel)
Worley

Net Zero Industries Mission purpose:

Accelerating Industrial Uptake of Decarbonisation Technologies

by

Sharing experience over 50 industrial scale demonstrations to build industry trust and investment confidence

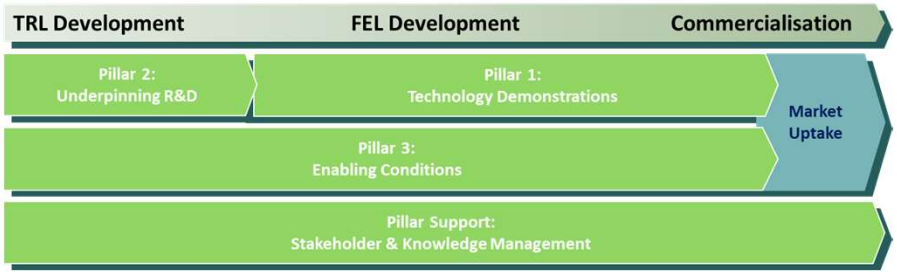
NET-ZERO INDUSTRIES MISSION

The Challenge:

How to leverage existing global initiatives and investment to expedite first demonstrations and transfer that knowledge to build investment confidence for subsequent industry installations

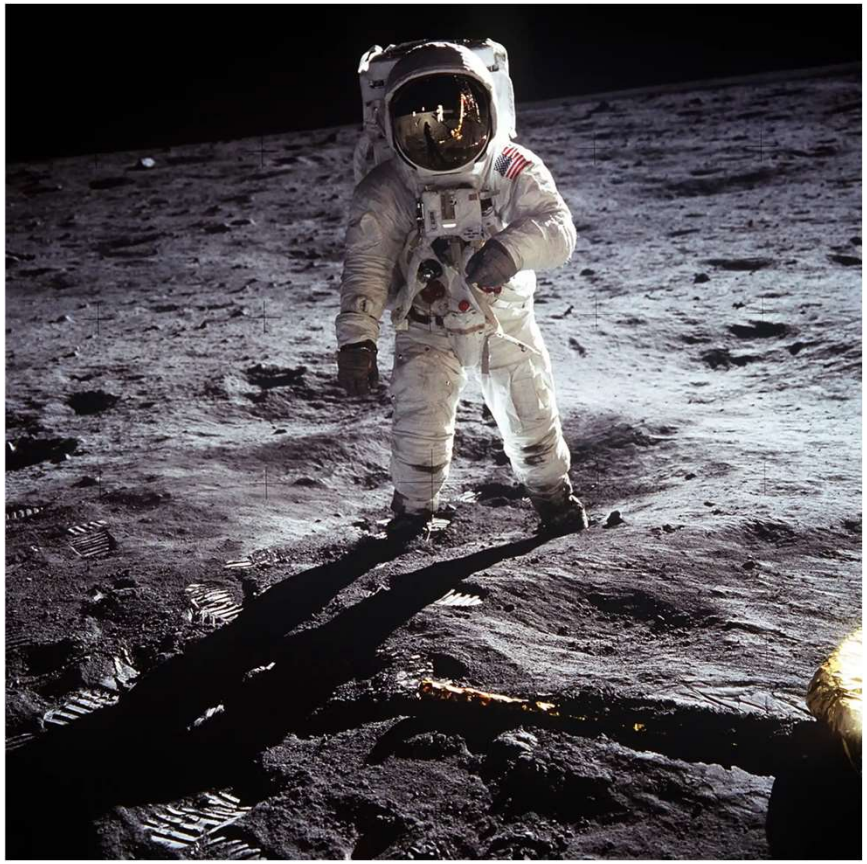
The mission has ambitious goals.

- Seven Decarbonisation Technology Pathways
- Four major Industry Sectors covering 25% of global emissions
- Minimum of 2 industry scale demonstrations in each – over 50 in total
- Supporting RD&D and Enabling Conditions to accelerate and expedite technology adoption



Industrial Sectors

		Iron & Steel	Cement & Lime	Chemicals & Refining	Other Energy Intensive & Hard to Abate
Fuel switch	**Alternative fuels and feedstocks**	Use of alternative fuels (bioenergy & waste)	Alternative fuels (incl biomass)	Biomass, H_2, Ammonia and plastic waste as an alternative feedstock	Alternative fuels (incl biomass)
	Low-carbon hydrogen	Direct reduction using H_2	Integrated H_2 production for CCU	Integrated production of Hydrogen	Replacing NG with H_2
Electrification of production and processes		Direct reduction using electricity, adaptation of electric arc furnaces	Electrification of sintering and calcination processes. Electrochemical formulation of calcium hydroxide	Electrification of crackers and chemical processes	Steam electrification and furnace / kiln / calciner conversion
Digitalisation & flexibilisation		Process control and automation, digital twins and simulation, temperature upgrade of excess heat, smart management of variable energy resources such as PV and wind power, hybridisation of different sources, excess heat to power or cold, flexibility in power generation / utilisation including bottleneck management and redispatch			
Carbon capture & storage / utilisation		Direct capture and separation, and adsorption / absorption of CO_2 process and combustion emissions and its storage The capture, purification, and valorisation of CO_2 into chemicals, polymers synthetic/alternative fuels and raw materials, and also the use of CO_2 exhaust gases in other processes			
Alternative materials and more efficient processes		Improved thermal efficiency, waste heat recovery, regenerative burners, process efficiency, alternative binding materials in cements and alternatives to carbon based feedstocks such as coking coal			
Materials efficiency and industrial symbiosis		Harnessing by-products from one industry as alternative inputs to another industry and technical upgrading of by-products, industrial symbiosis, carbonation of mineral residues,			



Photograph: NASA

The moon landing and industrial deep decarbonization are both mega-projects with a thousand questions and many possible solutions.

The path to the moon was successful because tasks were coordinated together, and the public could be enthused.

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Unanswered questions on industrial decarbonisation…

- Which technologies will succeed and when? Risk of lock in effects!
- How will the energy infrastructure (electricity, renewable gases, CO_2...) develop?
- How will the prices (energy, CO2, plant engineering…) develop? Supply, demand, regulatory framework...
- How is demand for the products of the energy-intensive industry developing? In the developed world and in emerging economies? What is the willingness to pay for green steel, green cement ...?

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- The deep decarbonization of industry requires both the development of breakthrough technologies and a better understanding of net-zero industries in the future energy system

Cooperation can speed this up because it is most efficient to …

- share some of the high development risks along the value chain
- reduce "time to market" & accelerate technology transfer
- join forces to create knowledge about the future energy system and raise awareness for this transformation in industry, politics and civil society

Thank you!

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