ANNEX A

LIST OF LCER PHASE 1 PROJECTS AND LCER PHASE 2 DIRECTED HYDROGEN PROGRAMME TOPICS

List of LCER Phase 1 Projects

SN	Research Theme	Proposal Title, Lead PI, and Organisations	Proposal Description
1			

3	H_2		: Improve the safety of H_2 use, allow deployment of sensors economically to enable trading and safety and increase confidence towards adoption of H_2 for downstream uses

			of better heat transfer, therefore reducing the cost of importing H_2 using this carrier. A comprehensive financial model to access the cost of the H_2 supply chain in Singapore will also be developed by collaborating with our industrial partners.
5	CCUS	: Alternative Sand from Carbon Dioxide and Waste Materials : Dr. Bu Jie, A*STAR : A*STAR; NUS; NTU; Samwoh Innovation Centre Pte Ltd; EnGro Corporation Ltd	: To examine the processes for the capture and mineralisation of CO_2 into alternative sand that can be used for building and construction purposes.

: Prof Chen Wei, NUS
: NUS; NTU; A*STAR;

10	CCUS	: Process Systems Engineering for Guiding R&D on Low-Carbon Technologies : Prof Iftekhar A Karimi. NUS : NUS; ExxonMobil	: This project proposes a new paradigm in which materials research is conducted under the continuous of Process Systems Engineering (PSE) in order to keep focus on the KPIs right from the start of research. : It develops digital toolkits that predict the system-level performances of several CCUS and H_2 projects, helping to guide them to faster and successful scale-up.
11	CCUS	: Adsorptive Carbon Capture Using Framework Materials : Assoc Prof Zhao Dan, NUS : NUS; and Northwestern University; ExxonMobil	: To develop more efficient ways to capture CO_2 from exhaust streams. This project enhances CO_2 capture by using state-of-the-art framework sorbents engineered for high CO_2 selectivity, high intrinsic stability, and facile regenerability from moisture. : Improve the capture rate of CO_2 from existing exhaust/flue gas which is the first step in CCUS.
12	CCUS	: Nanostructured Catalysts for Direct CO_2 Hydrogenation to Higher Alcohols and Fuels : Asst Prof Sergey Kozlov, NUS	

	Improve the H_2 tolerant properties of structural materials and coatings for pipelines to reduce H_2 embrittlement and leakage for cost-effective, large-scale distribution of H_2
	Develop methods to repurpose or retrofit existing liquid natural gas tanks for H_2 or H_2 carrier storage for H_2 distribution
Safety and Regulatory Standards	Modelling and simulation research and development projects would help regulators better understand the technical assumptions and limitations of existing standards
	Design improved hazard mitigation systems and new H_2 infrastructure with smaller health and safety buffers to fit Singapore's context
	Develop suitable preventive, corrective mitigative, and/or 'inherently safe' measures for the potential use-cases for H_2 energy
	Safety and regulatory standards for Singapore H_2 energy
	Design improved hazard mitigation systems and new H_2 infrastructure with smaller health and safety buffers to fit Singapore's context