

Statement of Intent on Collaboration in Integrated Energy Systems between

Canadian Nuclear Laboratories (CNL) [*Canada*]

Commissariat à l'Énergie Atomique et aux Énergies Alternatives (CEA) [*France*]

Idaho National Laboratory (INL) [*USA*]

Institute of Energy Economics, Japan (IEEJ) [*Japan*]

Japan Atomic Energy Agency (JAEA) [*Japan*]

National Nuclear Laboratory Limited (NNL) [*UK*]

National Renewable Energy Laboratory (NREL) [*USA*]

Energy Systems Catapult [*UK*]

Made 26th January 2022

National Laboratories exist around the world to deliver cutting-edge science to solve some of society's most complex challenges. Discoveries made in our labs have already improved the lives of billions of people.

In November 2021, the UN Climate Change Conference (COP 26) brought together almost every country in the world to decide how best to mitigate and adapt to the effects of climate change, to follow up on the agreement reached at the COP 21 in Paris in 2015. It was not just about seeking a global agreement, it was an important moment to recognise our global interdependency. But to become the truly pivotal moment in history the planet needs, COP26 must be followed by action. The transition to net zero is driving fundamental changes to energy supply, demand, transmission, distribution, storage and use. Research and innovation is required to develop, design and operate, a net zero energy economy.

Energy is used to power our homes, transport, and industry, as well as to heat and cool our buildings. *Integrated Energy Systems* offer unique opportunities to optimise the operation and planning of energy systems to deliver reliable, low cost energy with minimal impact on the environment. An Integrated Energy System can combine low carbon energy sources, such as nuclear and renewables, leveraging the benefits of each technology and their mode of operation to provide reliable, sustainable and affordable low-carbon energy, and energy services that benefit our citizens.

For National Laboratories, this means progressing a holistic understanding of what the future integrated energy system will look like in order to evolve technologies to be fit and ready to deliver.

By working together, we have an opportunity to coordinate and collaborate around our approach, and to enhance the prospect of this decisive next decade being successful. In the spirit of this collaboration, and building on the four aims of COP26 – in particular ‘working together to deliver’ – and UN Sustainable Development Goal (SDG) 17 – ‘creating partnerships’, we will seek to address the actions described in this statement to accelerate net zero targets.

All parties express an intention to do the following:

Within the framework of their **Integrated Energy System** approach, share their vision of such systems, and best practice in research and innovation in areas such as:

- Enabling and preparing for, flexibility in the way energy can be used
- Identifying energy needs across industry sectors, and optimising existing and new infrastructure to deliver energy in the most efficient ways.
- Demonstrating the maturity of the specific technological building blocks required for proof of concept of demonstrators or for the 'First of a Kind' of future integrated energy systems.

Collaboration could include but is not limited to:

Energy System Modelling

Sharing learning, technology datasets, and scenarios on studies to model future integrated energy systems. Sharing results and orienting future studies considering aspects such as the circular economy and life cycle assessment, economics, technological readiness, and deployment timeframes. We would look to make modelling open to benchmarking and challenge, including sharing models as open source where possible.

Hydrogen

All parties recognise that the use of hydrogen as an energy vector will be important in a net-zero world. Whether used directly as a fuel or as a feedstock for other synthetic fuels.

Developing research relating to the generation (including generation using high-temperature heat), use, and storage of low-carbon hydrogen, and share advances made in this area. This could include research on the safe transportation and storage of hydrogen as well as how it is integrated with other industries.

Enabling Technology Demonstration

Sharing elements of our programmes of work, in compliance with IPR of each party, to allow such technology demonstration to happen, and sharing learning from these programmes.

Sustainability in operations

Apply and share best practice in sustainability in our own operations, and maximise where we can use our influence to promote a sustainable future. This includes environmental, economic, and social impacts.

Working Together to Deliver

The means by which our collaboration shall be enhanced could include, but are not limited to, exchange visits, workshops, exchange of correspondence, and joint papers and presentations to conferences and other meetings.

Inspiring Further Collaborations

We would look to communicate our collaborative approach across the globe to inspire further partnerships that advance knowledge around integrated energy systems in the fight against climate change.

Commitment to Continue to the Dialogue

The parties aim to meet annually to review progress and to set the agenda for the future.