IDA Ireland Submission to the Department of the Environment, Climate and Communications (DECC) Research and Innovation Strategy Consultation

The following are perspectives from IDA Ireland on selected questions in the DECC consultation:

1. What gaps do you see in the Department's current research and innovation activities? How should we address those gaps in the Department Research and Innovation Strategy?

Sustainability and climate action are key priorities nationally, with the Government having set very challenging decarbonisation targets across various sectors in the economy (e.g. 35% reduction in industry emissions by 2030). The targets will be very difficult to achieve and accordingly very strong focus and 'new ways of operating/doing things' will be required to achieve carbon abatement.

Notwithstanding the challenges, the R&D community (public and private) is generally very focused on building 'climate action' into their research and innovation programmes. **However, IDA Ireland believes that existing research and innovation programmes will not be sufficient to adequately address the challenges of climate action in the timeframe required and accordingly a significantly large and dedicated national Research and Innovation Budget needs to be put in place to support more research and innovation.** The budget should be multi-annual and could coincide with the emissions' budgetary periods. Substantial new solutions, methodologies and tools will be needed to decarbonise industry.

2. What actions can the Department take to identify future trends in the areas under our remit?

Some of the world's leading and most innovative companies have significant operations in Ireland. IDA Ireland would be pleased to introduce DECC to some clients. IDA Ireland also has a team of technologists working across various sectors (i.e. climate action, tech, engineering and financial services). IDA Ireland's technologists would welcome the opportunity to talk to DECC about enterprise-based developments in their respective areas of responsibilities and how additional research and innovation supports could be of value to enterprise (e.g. in climate action and cybersecurity).

3. Are there specific thematic areas relevant to the Department's remit which you would like to see more research and innovation activity in? How can this be achieved?

Sustainability and climate action are areas where there needs to be significantly more research and innovation taking place. Specific areas that IDA Ireland believes merit more research and innovation activity include:

<u>IT/Energy</u>

- The development of next generation IT network equipment that would help reduce power consumption and optimise network management in areas that include factory of the future (Industry 5.0), energy intensive manufacturing, and data centres. New chip designs and AI-based approaches would be of particular relevance here.
- Machine learning for predictive modelling and active control of grid load. Machine learning offers a very powerful tool to manage grid load, by a) predicting grid loading from meteorological data (e.g. wind strengths), b) automating grid response through load reallocation (shedding) via, for example, batteries.

- Designing LEU operations to optimally exploit excess renewable energy generation (e.g. via thermal storage, chillers, etc).
- The use of AI and quantum computing to optimise power consumption and network loads at next generation data centres (with particular focus on generative AI and quantum capabilities).

Communications/Cybersecurity

- New communication protocols around 5G+ and 6G, with emphasis on high level data processing, seamless connectivity, and developing the next generation factory of the future (involving highly automated connected buildings, with automated distribution warehousing, 24/7 lights off in advanced manufacturing plants, etc).
- The security of communications on future networks such as dedicated quantum networks or hybrid quantum/classical networks.

Climate Action

- To date, heat pump technologies have generally been developed to operate in medium heat manufacturing environments of up to 100C. Significant research should be undertaken to develop heat pump technology to cater for heat temperatures in the 100C - 300C range.
- Currently, there are limitations to the capacity of batteries for industrial applications. More research on building larger capacities would be worthwhile.

Data Centres

- There is not a huge level of research on data centres currently taking place in Ireland. At the same time, the use of data centres has grown very significantly in recent years. This trend is expected to continue, as cloud computing continues to become more prevalent. **IDA Ireland believes that much more data centre research and innovation needs to take place.** The following would (in addition to points already mentioned above) merit research:

    - Developing alternative/modified cooling techniques.
    - Developing productive uses for waste heat.
    - Finding new technical solutions for storing and processing data optimally (e.g. maximising data processing outside of peak electricity demand).

10. Are there any other matters you wish to raise in relation to the development of the research and innovation strategy?

It is generally accepted that Ireland has huge potential in the whole area of renewable energy, especially in offshore wind. The Programme for Government references potential of at least 30GW of floating wind power with several experts estimating the potential at 50 GW plus. At such levels, Ireland would have excess electricity and accordingly would need to find a market for the excess (current peak demand is 5.5 GW).

There are varying views on what could be done with the excess. Some experts believe that excess electricity should be exported as green electricity via interconnectors, while more speak of the need for large electricity storage. Others believe that excess electricity should be converted into green hydrogen/ammonia and then exported. More experts see opportunities to establish new high

energy intensive manufacturing industries in the country, industries which heretofore were traditionally based in countries with strong indigenous energy sources.

Some experts believe that the country should use the excess electricity to power data centres and this would underpin the country's future tech sector; the point here is that it would be more economic for Ireland to 'export data rather than electricity'.

IDA Ireland believes that it would be important that comprehensive research and analysis would be undertaken to ascertain the likely and best possible options for the excess electricity, and where best economic value can be achieved. Thereafter, economic policy and direction (e.g. capital investment, research focus, etc) should reflect the best and likely options (which probably will incorporate several, but at varying levels).

Ireland needs research and innovation at all technology readiness levels (TRL's). With the challenge that the climate crisis poses today, there needs to be support for the acceleration of technologies that are close to commercialisation, thereby helping the country to speedily reach the ambitious climate action plan targets.