



Section 3: Innovating and building capability

This section explains the issues around technology risk for process heat users, and the lack of viable low carbon solutions for emissions-intensive and highly integrated (EIH) industries. It seeks your views on options to:

- Expand EECA’s grants for technology diffusion and capability-building, and
- Collaborate with EIH industries to foster knowledge sharing, develop sectoral low-carbon roadmaps and build capability for the future using a Just Transitions approach.³¹

What’s the problem?

Technology risk and embryonic markets

This section responds to the Productivity Commission’s *Low Emissions Economy* report recommendation:

6.3. The Government should investigate and implement any cost-effective institutional models that:

- scan new low-emissions technologies around the world to identify ones with promise for New Zealand but that may need adapting to suit local conditions;
- help firms to improve their absorptive capacity for external knowledge, including new low-emissions technologies.

Firms tend to be risk averse to technologies that change their production process. This includes energy efficiency and fuel switching technologies. A new process that saves energy but whose effectiveness in producing a safe, quality product is not proven is a risk for a business, particularly low-margin businesses that cannot afford down-time.

In addition, there may be lack of skills and capability, such as systems engineering, process design and installation, to support low emissions technology deployment at the scale needed. New Zealand has an energy efficiency market but it is small relative to the size of the opportunity.

The embryonic market for new and emerging low-emission technologies (for example, high temperature heat pumps), means that firms that are early adopters of the technology face much higher costs than firms that adopt the technology when it is used more widely.

Earlier this year, EECA published information resources including an *International Technology Scan* outlining available commercial technologies to reduce process heat emissions.³²

Low carbon solutions for emissions-intensive highly-integrated industries

In EIH industries, such as the manufacturing of steel, cement or methanol, emissions are typically intrinsic to the process with fossil fuels being used as a feedstock. As such, they cannot readily be abated by a change in fuels, only by changes to processes. In addition, some of these processes have high-temperature heat requirements (typically above 500 degrees Celsius) and so would be very expensive to electrify.

³¹ A “just transitions” approach is about empowering those impacted by change to drive the solutions.

³² EECA (2019). Information resources available at <https://www.eeca.govt.nz/resources-and-tools/research-publications-and-resources/business-publications-and-resources/>

Material decarbonising of these sectors will require long-term decisions to be made around investment in low emissions technologies, as they are developed and commercially proven internationally.

Significant investment and coordinated effort among businesses, governments and researchers will be required to identify or develop such technologies. The European Union and the United States are paying particular attention and investing significant research into decarbonising a wide range of industrial processes over the long term. New Zealand may best benefit by keeping abreast of international developments. Opportunities include innovative industrial production processes (that do not require heat), use of hydrogen as feedstock or fuel, and carbon, capture, utilisation and storage.

What are the options?

Support for demonstration and diffusion not only de-risks low emissions heating technology but helps to train, build and retain new capability for the future and overcome embryonic markets.

We seek feedback on two options:

- Expand EECA's grants for technology diffusion and capability-building
- Collaborate with industry to foster knowledge sharing, develop sectoral low-carbon roadmaps and build capability for the future using a Just Transitions approach.

Technology diffusion and capability-building

Option 3.1

Expand EECA's grants for technology diffusion and capability-building

Description

This option involves expanding EECA's grants for innovative technology demonstration, deployment and diffusion, and related activities (such as case studies and learning site visits). This will reduce perceived risk in the marketplace, create enhanced opportunities for training and building clean energy capability, and help overcome embryonic market barriers. This is required to accelerate diffusion of, and help transform the market for, low emissions technologies.

EECA would retain dedicated funding to support innovative projects and first-of-a-kind (in New Zealand) demonstrations under the existing Technology Demonstration criteria³³, while dedicated technology diffusion funding could then be targeted to technologies that have already been successfully demonstrated and for which public co-investment can accelerate diffusion.

To date, the Technology Demonstration Fund is relatively modest (less than \$1 million was disbursed last year), and the installation of a particular technology can be funded only once. This constrains the potential for wider industry diffusion, although replication is promoted via dissemination of information (e.g. case studies from successful projects).

Even if other businesses become aware of technologies that have been supported by the Technology Demonstration Fund, its replication potential may still be limited by:

³³ Note EECA's Technology Demonstration programme is available for all energy-using technologies or process improvements that meet funding criteria. It is therefore broader than just low emissions heating.

- The Fund’s criteria and quantum of funds available: low emission heat investments tend to require large upfront capital. Under current criteria, co-funding for low emissions heating projects is generally limited to \$250,000. This does not make up a substantial enough proportion of the investment for co-funding to be attractive to potential applicants.
- Exposure and hands-on experience of the demonstrated technology is available only to the service provider and business involved in the demonstration. Project consultants that have not been directly involved with the demonstration may retain a bias towards technologies and processes that they see as “tried and true”, so tend to replace like-for-like.

The additional support for diffusion and related activities would increase the number of low emissions heat technology deployments to reduce perceived risk for wider market uptake. This could involve one, or a combination, of the following:

- Increasing the amount of funding available, to enable a wider range of technologies to be demonstrated across multiple sectors
- Broadening the objectives to include supporting market transformation and increasing capability of clean energy services
- Funding multiple deployments in different circumstances (e.g. process, scale, or sector) to support diffusion of successful demonstrations, and
- Further knowledge-sharing mechanisms, such as learning networks, site visits and technical guidelines. Knowledge sharing and the dissemination of detailed case studies across industry will be important to effectively de-risk technology for wider deployment.

Analysis

The intended benefits of an expanded programme are:

- De-risking a wider range of technologies in a wider range of applications
- Greater familiarity of and expertise with new technologies in the energy service industry
- Overcoming embryonic markets, and
- Accelerating the rate of market diffusion of de-risked low emission technologies and help overcome the so-called technological “valley of death”.³⁴

These benefits are intended to support market transformation – i.e. creating lasting change in the market whereby the risks and costs of deploying low emission technologies are reduced, and these technologies are adopted as a matter of standard practice. The longer-term outcomes are that New Zealand businesses are leaders or fast followers of low emission technology deployment, are reaping competitive advantages in international markets and that New Zealand has a carbon neutral and internationally competitive economy.

While the government already supports early-stage science and technology research and development through research and innovation funds, there is currently no government support for diffusion – i.e. the gap between pre-commercialisation and full commercialisation/market transformation. An expanded diffusion and capability-building fund fills a gap in the spectrum of government support for low-emissions technology and innovation.

Due to the co-funding model, both Government and Fund applicants would share the projects’ costs. The Fund is scalable to the tens (or even hundreds) of millions of dollars. Under an expanded programme, there would be increased administrative costs for resourcing and implementation.

³⁴ The gap remaining between pre-commercialisation and full industrial commercialisation of a technology or process.

Questions

Q3.1

Do you agree that de-risking and diffusing commercially viable low-emission technology should be a focus of government support on process heat? Is EECA grant funding to support technology diffusion the best vehicle for this?

Q3.2

For manufacturers and energy service experts: would peer learning and on-site technology demonstration visits lead to reducing perceived technology risks? Is there a role for the Government in facilitating this?

Industrial innovation and transitioning to a low-carbon future

**Option
3.2**

Collaborate with EIH industry to foster knowledge sharing, develop sectoral low-carbon roadmaps and build capability for the future using a Just Transitions approach

Description

This initiative would look to create a partnership between government and EIH industries on industrial decarbonisation. The partnership would provide a platform for collaboration on emissions reduction and knowledge sharing of existing and emerging technical opportunities. Government could support the platform as a facilitator, and bring in international energy and engineering experts.

This option could assist in achieving EIH emissions reductions through identifying feasible technological pathways for sectors to decarbonise, and helps spread and smooth overall costs of decarbonisation to enable optimal investment over the longer-term. Collaboration and roadmap co-design could:

- Enable a first-principles investigation of long-term opportunities and challenges of EIH industries, then help to devise strategies with them to achieve low emissions goals
- Develop a shared understanding of international R&D for “hard-to-abate” industries and identify unique issues for New Zealand R&D efforts
- Effectively address informational asymmetries between industry and government, allowing future interventions to be more effectively targeted, and
- Help ensure an optimal regulatory environment and plan for supporting infrastructure.

Analysis

The intended benefits of this proposal are longer-term and are to support industry to plan and develop their own viable solutions and business models in a low emissions future. As such, the emission reduction benefits will be small in the short-term, but could be significant in the future.

The costs would be shared between industry and government and have not yet been estimated but would involve:

- government and industry staff time and expertise to contribute to the collaborative process
- consultant time to produce background and technical papers, roadmaps, or other publications, and
- resourcing for a secretariat or other coordinating function.

Given the linkage to Industry Transformation Plans (ITPs), this proposal would work in close alignment the ITP process, and leverage (not duplicate) the many existing sector specific initiatives already underway.

Questions

Q3.3	For EIHI stakeholders: What are your views on our proposal to collaborate to develop low-carbon roadmaps? Would they assist in identifying feasible technological pathways for decarbonisation?
Q3.4	What are the most important issues that would benefit from a partnership and co-design approach?
Q3.5	What, in your view, is the scale of resourcing required to make this initiative successful?

Other options considered to address capability and skills barriers

In order to specifically address the capability and skills barrier, we considered a standalone industry capability development scheme, which would involve industry training and working with tertiary institutions to develop engineering courses.

However, this option is not preferred for the following reasons:

- Increasing demand for clean energy through other measures may be sufficient and more effective to trigger a market and capability response.
- If not closely integrated into measures to drive demand for clean energy, there is a risk that that the scheme will not address specific process heat user needs. In contrast, the technology demonstration and diffusion option involves applied learning and experience with real-life demonstration plants and EIHI roadmaps would involve close collaboration between industrial users on sector-specific opportunities.
- The Carbon and Energy Professionals New Zealand (formerly Energy Management Association of New Zealand, EMANZ) is already working closely with EECA to expand and boost its training to gear up for low-carbon future, with a focus on industrial process heat and carbon management.

Summary assessment of options against criteria

	Tech demo and diffusion	EIHI roadmaps	Industry capability scheme
To what extent is the barrier addressed?	✓✓	✓✓	?
Primary benefits – emissions reductions	✓	✓	✓✓
Primary benefits – EE & RE	✓	?	✓✓
Wider economic effects	✓✓✓	✓✓✓	✓
Compliance costs	-	-	-
Admin costs	XX	X	XX

Key: Option under active consideration Option not preferred