

# Decarbonising Scotland's Industrial Sectors and Sites



A Paper for Discussion with Scottish Energy Intensive Industries

April 2019

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## 1. INTRODUCTION

### 1.1. PURPOSE

Scotland's Energy Strategy<sup>1</sup> committed the Scottish Government to engage with Scottish industry on matters of energy efficiency and decarbonisation. We want to direct public and private sector resources into activities and programmes that will aid the delivery of targets within our Climate Change Plan<sup>2</sup>. To achieve this, we will:

- make the case that decarbonisation can increase economic performance and must be viewed as an investment in manufacturing business;
- outline the profile and trends of Scotland's energy intensive industries (EII), in terms of the sector's economic output, emissions and energy use;
- highlight the barriers to investment in energy efficiency or decarbonisation, gained from engagement with Scottish EII;
- outline the advice and support that is available for industry to invest in energy efficiency or decarbonisation measures, and outline programmes or proposals for Government intervention;
- identify gaps in the provision of incentives, in a Scottish context, with reference to UK and European provisions;
- set out next steps for more focused business support, from Government, that reflects our commitment to manage the transition to decarbonising industry; and
- seek to ensure the regulatory playing field is level for EII competitiveness and protect against carbon leakage through access to emissions trading markets.

This paper summarises our engagement with industry to date, cites the identified barriers to investment in decarbonisation, references the support currently available and proposes next steps to create an improved Scottish support framework.

### 1.2. ENERGY PRODUCTIVITY and EMISSIONS INTENSITY

Our Climate Change Plan (CCP) and Energy Strategy (ES) contain two policy outcomes relevant to EII:

1. By 2032, industrial and commercial energy productivity<sup>3</sup> will improve by at least 30%, from 2015 levels, through a combination of fuel diversification, energy efficiency improvements and heat recovery.
2. By 2032, industrial and commercial emissions intensity<sup>4</sup> will fall by at least 30%, from 2015 levels, through a combination of fuel diversification, energy efficiency improvements and heat recovery.

Analysis shows these targets are consistent with the trajectory outlined in the CCP; to reduce industrial emissions by 21% (or 2.2MtCO<sub>2</sub>e) over the plan's lifetime (2018-2032).

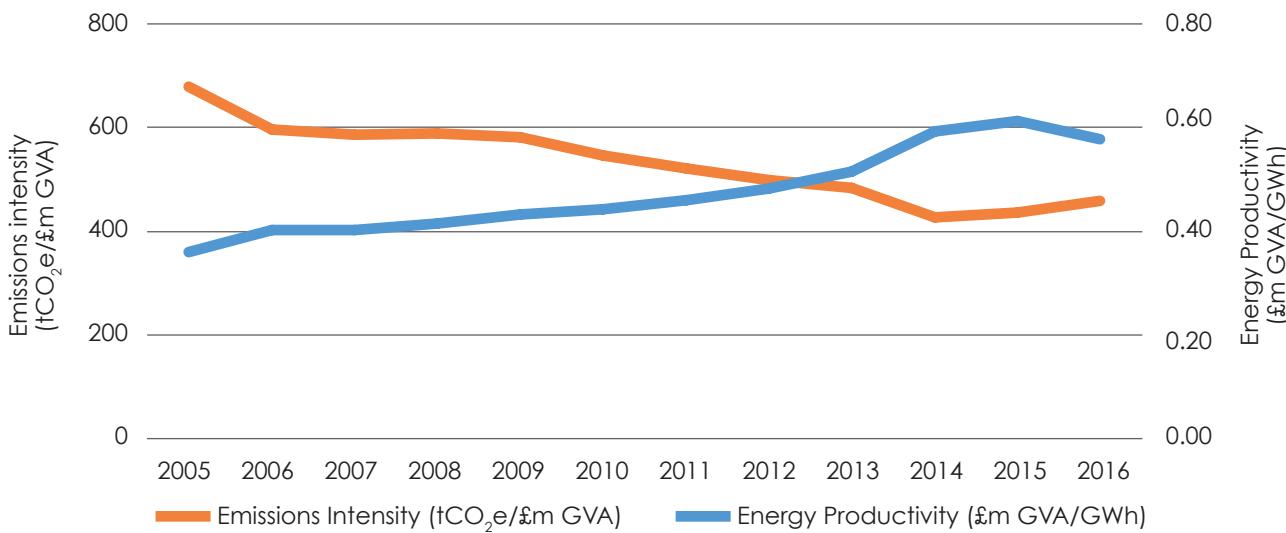
1 <https://www2.gov.scot/Topics/Business-Industry/Energy/energystrategy>

2 <https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018/>

3 Energy Productivity – the ratio of output relative to energy consumption, expressed in £million GVA per GWh of energy consumed.

4 Emissions Intensity – the ratio of GHG emissions produced relative to the level of output, expressed in Tonnes of CO<sub>2</sub>e per £million GVA.

**Figure 1: Comparison of historical (2005-2016) Energy Productivity (GVA/GWh) and Emissions Intensity (tCO<sub>2</sub>e/£m GVA) in the Scottish Industrial sector**



There has been a positive trend of increasing energy productivity and falling emissions intensity since 2005, although from 2014-16 there was a slight reversal. From 2005-16, it is estimated that energy use in the industrial sector fell by a third, and emissions by 28%. Gross Value Added (GVA) in the industrial sector also grew during this time, by around 6% overall. Therefore improvements have resulted from a growing industrial sector with falling emissions and energy usage.

Considering the interaction of energy, emissions and GVA it is clear that in order to make progress, programmes which support investment to reduce emissions whilst developing economic growth are critical to achieve our targets. Reducing industry emissions whilst boosting productivity is challenging. If trends in emissions and energy consumption remain on their current trajectories, due to stalling investment in efficiency or diminishing returns on the gains from decarbonisation, our annually monitored targets are likely to be missed.

Support programmes and incentives currently exist but there remains a significant risk for EII that could lead to carbon leakage (which occurs when domestic industries relocate overseas, where climate or energy regulation may be less stringent). Both support for investment and a regulatory level playing field between the UK and the European Union is needed. That is why the Scottish Government will continue to seek to ensure that we are protected against carbon leakage through access to emissions trading markets after EU Exit – either through continued participation in the EU Emissions Trading System, or through the creation of a UK Emissions Trading System, linked to the EU ETS.

### 1.3. INDUSTRIAL DECARBONISATION AS AN ECONOMIC INVESTMENT OPPORTUNITY

Industrial decarbonisation is an economic opportunity – to grow our existing energy intensive sectors, and to attract new, advanced manufacturing industries of the future.

The Scottish Government wants to support activity that incentivises investment in existing sectors, building on their considerable existing strengths, some of which are specific to the unique characteristics of industry located in Scotland. We also want to secure investment in new manufacturing sectors attracted by a low carbon energy supply, new fuels such as hydrogen, our R&D excellence, our high skilled labour force, and the locational advantages that clustering and access to carbon capture utilisation and storage (CCUS<sup>5</sup>) infrastructure can offer. Securing technological<sup>6</sup> investment can also help to deliver inclusive growth<sup>7</sup> in Scotland and connect with global Sustainable Development Goals<sup>8</sup>.

The case for resources to facilitate investment is more likely to succeed when environmental concerns are allied to supporting economic output and growth at industrial sites. Investment in environmental performance, through transformational change if necessary, can deliver not only cost savings via efficiencies, but also significant reductions in Green House Gases (GHG).

Investment can sustain a significant number of high-value jobs, that are often at the base of supply chains. This economic activity is vital, not only for securing a better future for regional communities, but for the Scottish manufacturing sector and economy as a whole. Our focus is on factors that we can influence, therefore we are working to:

- better target interventions that have an increased chance of industry take-up;
- maximise the effectiveness of public and private sector resources in overcoming barriers;
- prioritise support to where it can best influence outcomes and more directly connect with the delivery of our high level targets; and
- look at the wider economic and social impacts as EII adapt by engaging with initiatives such as Scotland's Just Transition Commission<sup>9</sup>.

The high levels of investment that Scottish industry will require to decarbonise must largely be sourced from corporate sources. However, our engagement with industry shows that there are significant barriers to attracting the necessary investment – particularly long payback periods – whilst sites must remain internationally competitive. Consequently, the Scottish Government must assess how we can help make this a more attractive commercial investment proposition, and whether innovative finance (for example 'patient' capital loans and/or equity investment) could be deployed to help stimulate the required investment, where it is possible to provide such capital in the challenging fiscal climate.

5 <https://www2.gov.scot/Topics/Business-Industry/Energy/Energy-sources/traditional-fuels/new-technologies/carboncaptureandstorage>

6 In 2017, the [Scottish Assessment of the Industrial Decarbonisation and Energy Efficiency Roadmaps](#) examined potential for decarbonisation within subsectors under Business as Usual (BAU) and 'Max Tech' (maximum technical potential for decarbonisation) pathways. EII, as a whole, contribution to Scottish emissions could be reduced by up to 76% by 2050 via 'Max Tech'.

7 Inclusive Growth: [Scotland's Economic Strategy](#) (2015) set a mission to grow to deliver Inclusive Growth through mutually supportive ambitions: boosting our competitiveness whilst tackling inequalities.

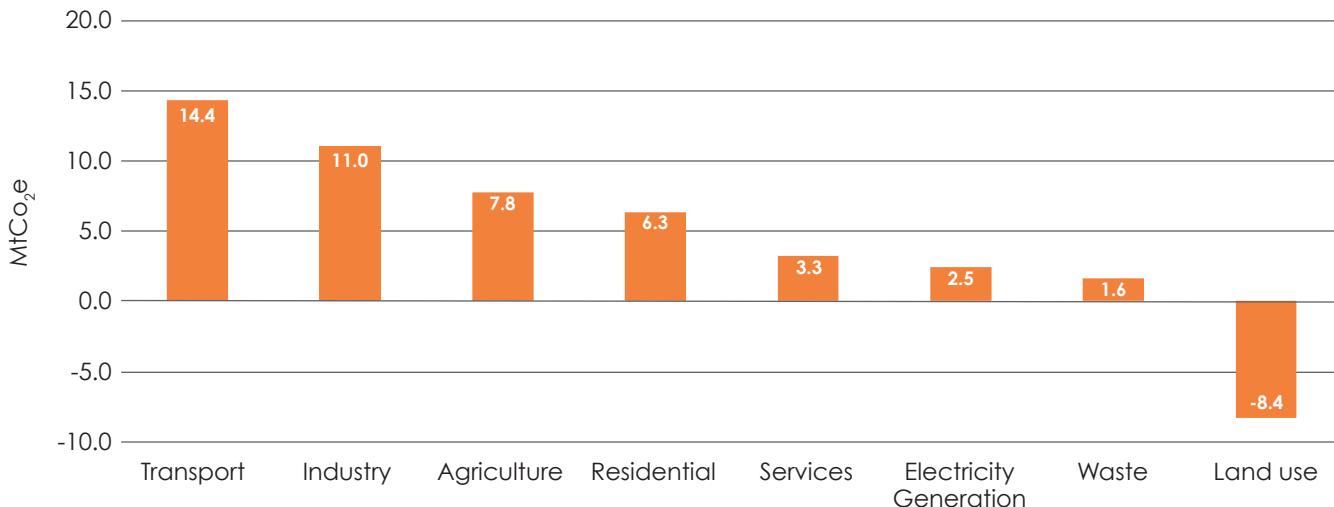
8 <https://www.un.org/sustainabledevelopment/sustainable-development-goals/> – This work contributes most closely to 'Affordable and Clean Energy', 'Decent Work and Economic Growth', 'Industry, Innovation and Infrastructure', Responsible Consumption and Production' and 'Climate Action'.

9 <https://www.gov.scot/groups/just-transition-commission/> – Advising on a carbon-neutral economy that is fair for all. JTC is committed to look at wider impacts and opportunities of a paradigm shift to a carbon neutral economy through the lens of EII.

## 1.4. INDUSTRIAL EMISSIONS IN CONTEXT

The most recent GHG emissions statistics show that in 2016, Scotland's Industrial sector was responsible for 11 MtCO<sub>2</sub>e (around 30% of national (net) CO<sub>2</sub>e emissions).

**Figure 2: Scottish Greenhouse Gas Emissions 2016 (Scottish Government, June 2018)<sup>10</sup>**



Investment to decarbonise industry could contribute significantly to overall climate change targets. But there is no room for underperformance in any sector. Increasing visibility should allow industry to secure and deploy resources to meet its share of our demanding decarbonisation targets. Showing the benefits of these emissions savings contextualised in a way that is more tangible, related to everyday activities in other sectors, helps to communicate the potential impact of investment in industry. For example:

- A 1% reduction in industrial emissions (2016) levels would be equivalent to saving the annual emissions of 41,000 cars<sup>11</sup>.
- A 1% reduction in industrial emissions (2016) levels would be equivalent to saving the annual emissions from 42,000 households<sup>12</sup>.
- A 1% reduction in industrial energy consumption (2016) could reduce fuel costs across industry by approximately £20 million per year<sup>13</sup>.



**A 1% reduction in industrial emissions is the equivalent of cutting emissions from **41,000** cars**



**A 1% reduction in industrial emissions is the equivalent of cutting emissions from **42,000** households**

<sup>10</sup> <https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2016/> – 'Climate Change Plan Sectors' Annex.

<sup>11</sup> Based on medium petrol internal combustion engine cars averaging 7,800 miles per year.

<sup>12</sup> Based on total emissions in Scottish 'residential' sector in the CCP, divided by total number of Scottish households.

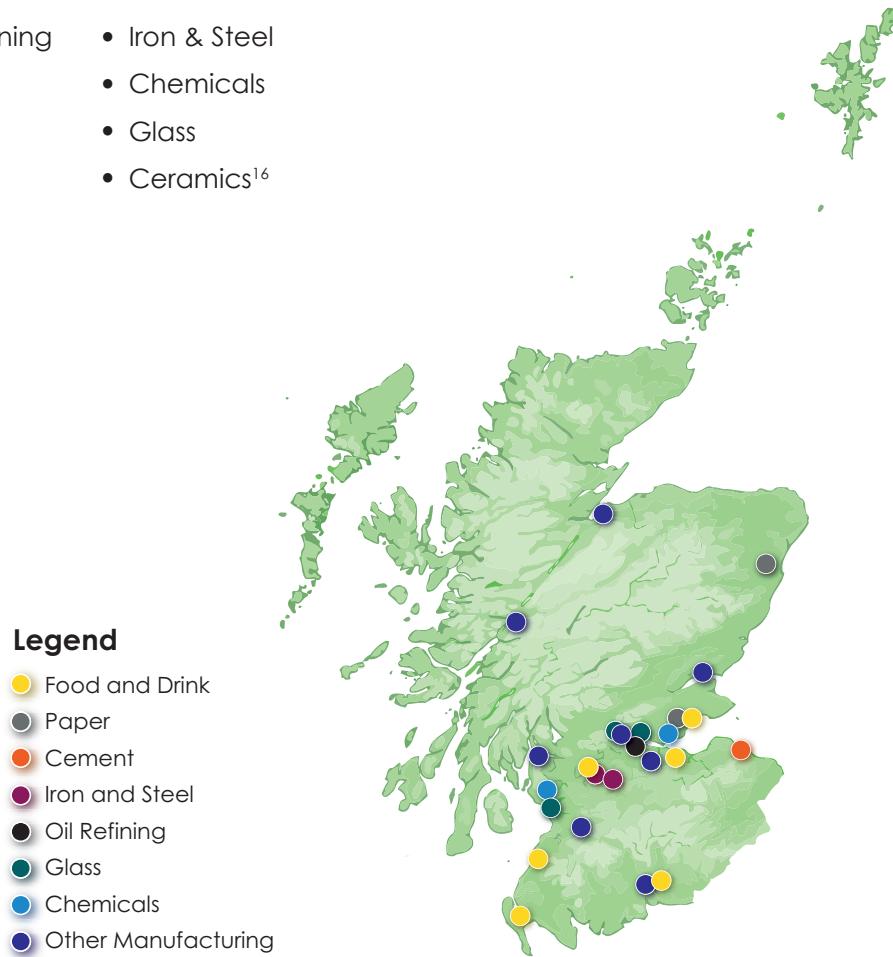
<sup>13</sup> Based on estimated fuel cost savings from a 1% reduction in coal, gas, electricity and petroleum products consumption across industry.

## 2. PROFILE

### 2.1. What are, and where are, Scotland's energy intensive industries?

Energy Intensive Industries (EII) form a core part of Scotland's manufacturing base, and tend to cover sites which consume the highest levels of energy and emit large volumes of GHG. Within the UK Government's Clean Growth Strategy<sup>14</sup>, Industrial Decarbonisation and Energy Efficiency Action Plans<sup>15</sup>, that focus on promoting the incentivizing of measures to decarbonise industrial processes, refer to EII subsectors:

- Oil & Gas Refining
- Cement
- Pulp & Paper
- Food & Drink
- Iron & Steel
- Chemicals
- Glass
- Ceramics<sup>16</sup>



In 2016, EII were responsible for approximately 15%<sup>17</sup> of all Scottish GHG. Scotland's manufacturing sector accounts for over half of our exports<sup>18</sup> and total business research and development expenditure. The GVA of Scottish manufacturing, of which the EII form the core, totalled £12.7bn in 2016<sup>19</sup> while employment totalled 179,300<sup>20</sup>.

Mapping high CO<sub>2</sub> emitting sites illustrates where Scotland's industrial assets are. 'Clustered' industries, whether from the same sub-sector or not, will share infrastructure already, but there may be a case to consider development that makes more of proximity to improve efficiencies in energy productivity, material supply chains, or the local re-use of by-products such as excess heat. Clusters may act as catalysts for the development of new advanced manufacturing sectors, attracted by the locational advantages of shared low carbon energy supplies, development of alternative fuels, and access to CCUS infrastructure.

14 <https://www.gov.uk/government/publications/clean-growth-strategy>

15 Industrial Decarbonisation and energy efficiency plans

16 No ceramics sites in Scotland large enough to be part of the EU ETS.

17 Includes emissions from all manufacturing sites within SEPA's SPRI database.

18 <https://www2.gov.scot/Resource/0054/00545619.pdf> (Export Statistics Scotland 2017).

19 Manufacturing GVA from Scottish Annual Business Survey (2016) – more detailed breakdown of the sub-sector components.

20 2016 UK Business Register and Employment Survey.

## 2.2. Engagement with energy intensive industry

Representatives from Scottish agencies and EII attended workshops during 2018 and provided feedback on the main barriers to investment and opportunities to decarbonise:

### Top cross-sector barriers

- Unattractive payback periods on measures so investment is diverted to other areas
- The cost of energy (including rising costs as a result of policies on renewables)
- Policy uncertainty in some areas such as on bio-energy
- Limits to growth, change or decarbonisation, often due to constraints on network infrastructure
- Lack of long-term incentives

### Top cross-sector opportunities

- Many potential resource efficiency projects, especially industrial heat recovery (IHR)<sup>21</sup>
- Potential to do more with products viewed as waste and use them more in processes
- Industry to support, and extract efficiency benefits from the distributed storage of energy
- With financial support, Scottish EII have an appetite for an ambitious low-carbon future

Refining and oil products		Chemicals	
opportunities	challenges	opportunities	challenges
The financial environment for investment in proven technology. Waste heat recovery. Clustering.	Investment payback periods. Decline in demand. Low value of carbon counts against support to develop CO <sub>2</sub> capture technology.	Use devolved powers and coalesce Scottish development of networks to influence distributed energy storage and seek more competitive energy-related costs.	Energy costs vs Europe. Where is additional reserve generation capacity or storage infrastructure from?
Mineral products including cement		Metals (steel and aluminium)	
Waste potential. Potential for EII to go low-carbon if financially supported.	Reliable supply of waste. Cost pressures on EII are a barrier to invest.	Many potential projects, but payback too long without government support. Energy storage.	Energy costs vs Europe. Isolated thinking on infrastructure.
Food and Drink (in general)		Scotch Whisky (specifically)	
Finding use (or alternative uses) for low carbon heat.	Lack of clarity policy.	Increase in the generation, use and supply of renewable energy. Development of district heating networks.	Complex and changing policy framework. Infrastructure constraints, e.g. limited rural gas grid. Energy security & supply.
Paper and Pulp		Glass	
Finding suitable use for excess low-grade underutilised heat.	Investment payback periods.	Heat recovery. More recycled glass (cullet) input. Switch to electric melting.	Investment payback periods. Cullet availability. Cost of electricity.

<sup>21</sup> Industrial Heat Recovery (IHR): recovering waste heat generated in, or for, a process to be reused in a number of ways, including within same facility for heat/cool, or by another end-user. Process has capacity to improve energy efficiency, by reducing fuel requirements/avoiding waste.

## 2.3. Programmes of support on industrial decarbonisation

A table summarising existing advice and support to industry is online at <https://www.gov.scot/publications/energy-efficiency-advice-and-support-for-industry/> and includes:

- Scottish Government sponsored programmes such as the Low Carbon Infrastructure Transition Programme (LCITP) and the Resource Efficient Scotland programme.
- Support delivered by enterprise agencies (Scottish Enterprise<sup>22</sup> (SE), including through the Scottish Manufacturing Advisory Service<sup>23</sup> (SMAS), and Highlands and Island Enterprise (HIE)).
- Support delivered by the Scottish Environment Protection Agency (SEPA) such as Sustainable Growth Agreements<sup>24</sup> (SGA).

Existing support also comprises a workstream linked to Scotland's Manufacturing Action Plan (SMAP) which is focused on co-ordinating activity across agencies to deliver energy efficiency and decarbonisation.

The National Manufacturing Institute Scotland<sup>25</sup> (NMIS) will offer support as an industry-led international centre of expertise. Manufacturers including EII will be able to access cutting edge research or equipment, allowing them to trial and test new processes or technologies whilst de-risking investment. Building on the success of the world-renowned Advanced Forming Research Centre, NMIS will enable companies of all sizes to improve their skills, productivity and innovation potential. The Lightweight Manufacturing Centre, a first phase of NMIS is available to work with now. So too are relevant Innovation Centres<sup>26</sup> such as for Industrial Biotechnology (IBioIC), for Oil and Gas (OGIC), the Construction Scotland Innovation Centre (CsIC) and The Data Lab.

## 2.4. The Energy Efficient Scotland Programme<sup>27</sup> and Industry

Energy efficiency is a National Infrastructure Priority. Energy Efficient Scotland is a co-ordinated programme to improve the efficiency of homes and buildings in all sectors. During 2018, the Scottish Government consulted on aligning advice and support on energy efficiency of industrial buildings with energy consumed for industrial processes. Key findings:

- a substantial majority of respondents said that advice and support to invest in the energy efficiency of industrial or manufacturing buildings should be aligned with wider advice and support on how to reduce energy consumed for productive processes; and
- compared to buildings, assessing the cost-effectiveness of process energy efficiency, or emissions reduction, requires highly specialist expertise.

<sup>22</sup> <https://www.scottish-enterprise.com/>

<sup>23</sup> <https://www.scottish-enterprise.com/support-for-businesses/develop-products-and-services/support-for-manufacturers>

<sup>24</sup> [https://www.sepa.org.uk/media/286874/superglass\\_sustainable\\_growth-agreement.pdf](https://www.sepa.org.uk/media/286874/superglass_sustainable_growth-agreement.pdf)

<sup>25</sup> <https://news.gov.scot/news/national-manufacturing-institute-for-scotland>

<sup>26</sup> [www.innovationcentres.scot](http://www.innovationcentres.scot)

<sup>27</sup> <https://www.gov.scot/policies/energy-efficiency/energy-efficient-scotland/>

## 2.5. Support from outwith Scotland

In the UK, the IETF<sup>28</sup> has up to £315 million allocated to support businesses with high energy use to transition to a low carbon future and cut bills through increased efficiency. There is currently an informal consultation on the design of this fund. The Scottish Government is engaged with UK Government on the design of the fund for Scottish interests.

We are engaging with UK Government to support positioning of Scottish industrial operators to access **Industrial Strategy Challenge Fund**<sup>29</sup> programmes in the areas of Decarbonising Industrial Clusters (£170m) and Transforming Foundation Industry (£66m)

The UK Government's **Industrial Heat Recovery Support Programme** (IHRSP) has £18 million assigned for match funding feasibility studies or capital projects. However, as heating and cooling is a devolved issue, it does not cover sites in Scotland.

**European Union programmes** available to Scottish organisations are either co-funded grants awarded on a competitive basis or loans provided through financial intermediaries. For example the **EU ETS Innovation Fund** which provides up to €11 billion of EU match-funding<sup>30</sup> between 2021-30 to support innovative low-carbon technology projects across energy-intensive industry.

As a signatory to the Under2 Coalition, the Scottish Government is a participant in the **Industry Transition Platform** alongside a group of state or regional governments of industrialised regions to identify the principal low carbon challenges and develop strategies to address these. It runs until 2021.

28 <https://www.gov.uk/government/consultations/designing-the-industrial-energy-transformation-fund>

29 <https://www.gov.uk/government/collections/industrial-strategy-challenge-fund-joint-research-and-innovation>

30 The revenues for the Fund come from the auctioning of 450 million EU ETS allowances from 2021 to 2030, as well as any unspent funds coming from the New Entrant Reserve 300 programme (NER 300). The EU estimates the total value of the Fund to be between €6bn and €11bn (£5.2bn and £9.4bn) throughout Phase IV (2021-2030), depending on the carbon price (estimates are from carbon prices of €15/tCO<sub>2</sub> and €25/tCO<sub>2</sub> respectively).

### 3. ANALYSIS

Barriers to investment, as raised by Energy Intensive Industries (EII), may be categorised under 3 themes: accessing funding; resource efficiency projects; and enabling infrastructure/pathways to deeper decarbonisation. The analysis below identifies four issues and 'gaps' under each theme and raises a number of questions – in the green boxes – for discussion.

#### 3.1. Accessing funding and the wider financial environment

<b>Issue</b> (barrier or opportunity)	<b>Gap</b>
The lengthy payback periods on investment diverts it elsewhere.	<b>Provision of finance that has a patient capital approach to repayments.</b>
Scottish EII acknowledge potential to go low-carbon if financially viable, but decisions on decarbonisation can lack priority compared to other investment options.	<b>Positioning industrial decarbonisation as an economic investment opportunity for industrial sites, and for Scotland as a whole.</b>
Demand for support that industry needs to remain internationally competitive, is not affordable for the Scottish Government alone.	<b>Knowledge of potential opportunities to secure non-UK funding.</b>
Investment in processes to make products with lower carbon or environmental footprint fails to gain competitive market advantages.	<b>Market benefits from products that possess greater energy/carbon efficiency as a result of investment in manufacturing processes.</b>

- Provision of finance that has a 'patient capital' approach to repayments**

Mechanisms such as the European Private Finance for Energy Efficiency Programme (PF4EE)<sup>31</sup> show that creating economies of scale can open up financing opportunities. If risk is shared, it can prove more attractive for those responsible for rewarding long-term investment or loan guarantees. Patient capital will be a feature of the Scottish National Investment Bank.

**How can the challenge to decarbonise Scottish EII attract institutions with a long-term investment focus or innovative finance?**

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- Positioning industrial decarbonisation as an economic investment opportunity for Scotland**

EII have an appetite for an ambitious low-carbon future. But demands on profitability mean that decarbonisation investment decisions often made in multinationals' boardrooms, face competition with non-Scottish alternatives. In addition, there is limited broader knowledge of industry's potential to make significant inroads into emissions reductions by securing more resources.

**What steps should be taken to raise awareness of industrial decarbonisation as economic investment opportunity, and influence a wider group of stakeholders?**

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<sup>31</sup> <http://www.eib.org/en/products/blending/pf4ee/index.htm>

- Knowledge of potential opportunities to secure non-UK funding**

Scottish EII must secure investment from many sources including outside Scotland. Investigation should learn how Scottish industry could access opportunities<sup>32</sup>.

**What would be the parameters of a review of international support?**

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- Market benefits from products that possess greater energy/carbon efficiency**

Industry highlights a desire for lower-carbon products to be given greater credit in contract awards. Public sector procurement<sup>33</sup>, and consumer or business purchasing choices, should account for carbon impact but additional value is rarely realised.

**How can manufacturers gain market advantage because of investment that 'greens' production?**

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### 3.2. Resource efficiency projects

Issue (barrier or opportunity)	Gap
Failing to make optimal use of available programme support.	<b>Awareness/access to support programmes amongst some EII sites &amp; more links with business efficiency.</b>
Despite industrial heat recovery potentially being funded via other available support programmes, eligibility of IHRSP does not include Scotland	<b>Continuity of available match-funding opportunities for IHR projects to progress in Scotland whilst IHRSP is current in England and Wales</b>
Energy efficiency of industrial processes remains lower profile compared to buildings.	<b>Limited evidence on how to tackle process energy efficiency. Definition of Energy Efficient Scotland for industry.</b>
Supplies of recyclate material with potential for more efficient EII processes,	<b>Reliable flow of recyclate, and supply chain awareness to improve material efficiency.</b>

<sup>32</sup> <https://www.scotlandeuropea.com/> who overlap with Scottish Enterprise and other Scottish agencies can advise

<sup>33</sup> Public sector consumption can influence demand for low carbon commodities. Incentivizing industrial decarbonisation through procurement aligns with generating value for local communities from procurement. [Sustainable Procurement Duty<sup>\(1\)</sup>](#) outlined in [Procurement Reform \(Scotland\) Act 2014](#) requires consideration of Social, Environmental and Economic wellbeing. Guidance supports organisations to place a proportionate requirement on suppliers to evidence minimizing energy/emissions. The Scottish Government aims to see this embedded in procurements and understand how lower-carbon footprint commodities can gain international competitive advantage.

- **Awareness/access to support programmes amongst some EII sites and more links with business efficiency**  
The Scottish Government publishes an overview of support, but eligibility can be complex. Funded programmes tend to be accessed by projects centred on renewable generation, with limited direct benefit for established EII sites. In addition, energy productivity could accrue as a beneficial side effect from general business efficiency projects.

***How can more projects be encouraged to come forward to receive support that is more effective, so that barriers to progression are overcome?***

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- **Continuity of available match-funding opportunities for IHR projects to progress in Scotland**  
Businesses with sites across UK may favour investment in schemes that provide a single UK framework.

***How should Scottish IHR opportunities receive support to progress to delivery?***

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- **Limited evidence on how to tackle process energy efficiency**

There is a desire to align energy efficiency support for processes with that for buildings, however, delivery will diverge because EII issues are more bespoke. Obligations to improve may be linked to advice/support and the role of the Building Scotland Fund explored. Experience from consultancy focused on identifying IHR opportunities suggests that energy efficiency opportunities are spotted during the same investigation.

***How should industrial energy use be integrated into the Energy Efficient Scotland programme?***

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- **Reliable flow of recyclate, and supply chain awareness to improve material efficiency**

Industries have examples, such as glass-making. Where greater availability of quality cullet (recycled glass) would reduce process energy use – value chains could be improved in line with our circular economy strategy, 'Making Things Last'.<sup>34</sup>

***How can circular economy practice more directly benefit industrial decarbonisation?***

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34 <https://www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland/>

### 3.3. Enabling infrastructure, and pathways to deeper decarbonisation

Issue (barrier or opportunity)	Gap
Constraints on infrastructure, often external to physical site location, that could support energy efficiency/decarbonisation, or use excess heat.	<b>Capacity of infrastructure providers and EII to engage and overcome strategic barriers, including matching excess heat from industry with places of adjacent demand.</b>
For some sectors to deeply decarbonise there is need for either a) significant penetration of CCUS; and/or, b) production and use of hydrogen fuel.	<b>Limits to: EII awareness of technology potential; capacity to participate in demonstration; knowledge of how to deploy beneficially.</b>
Adequate supply of biofuels, synthetic fuels or bioenergy.	<b>Reliable long-term supplies that give confidence to switch from fossil fuels.</b>
Efficiency benefits from increased generation/supply of renewable electricity, or distributed storage of energy.	<b>Generation/storage capacity to enable decarbonisation, and viability of electrifying processes.</b>

- Capacity of infrastructure providers and EII to engage to overcome barriers, including matching excess heat from industry with places of adjacent demand**

It is difficult for industry to influence infrastructure providers who are responsible for the means along which fuel, energy, heat, utility, or essential manufacturing materials are delivered. There will often be complex private and public sector interests, including regulated asset bases, or statutory consents such as planning, involved.

**How can EII and network infrastructure providers be influenced, including how to join-up excess heat with adjacent places of demand, to remove constraints?**

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- Limits to: EII awareness of technology potential; capacity to participate in demonstration; knowledge of how to deploy beneficially**

'Clustering' can facilitate infrastructure upgrades, potentially for CCUS, biomass or heat – decarbonising existing emitters and attracting new industry to plug their emissions into. But EII and investors require long-term policy commitment and confidence that these forms of carbon management can become a going concern.

**How to align investment planning with anticipated CCUS or hydrogen deployment?**

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- **Reliable long-term supplies that give confidence to switch from fossil fuels**

Greater focus by all parties, including infrastructure providers and industry, to shift heat requirements to waste-derived fuel sources.

**What opportunities exist to increase reliability of low-carbon fuel supplies?**

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- **Generation/storage capacity to enable decarbonisation, and electrifying processes**

Our ES<sup>35</sup> encourages the accelerated development of battery technology. Devolved powers, or influencing UK policy<sup>36</sup>, may enable more competitive energy costs and technologies such as Electrification of Heat<sup>37</sup>. To support the development of electricity and gas networks, the Scottish Government has published strategic Networks Vision statements<sup>38</sup>.

**How can energy generation and storage be used to help industry decarbonise?**

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35 Strategic priorities within [Energy Strategy](#) are system security and flexibility. Support for new and innovative storage solutions has been provided through the Low Carbon Infrastructure Transition Programme.

36 For example, Ofgem's network price controls.

37 Electrification of Heat (EoH) is when processes shift power from fossil fuel to electricity. As long as the grid gradually decarbonises and thus generates lower net emissions, carbon benefits accrue. Investment viability is highly sensitive to relative price changes in grid electricity or alternatives such as gas. On-site, or dedicated off-site renewables can help to protect from supply or cost uncertainty.

38 <https://www.gov.scot/publications/vision-scotlands-electricity-gas-networks-2030/>

## 4. NEXT STEPS

### 4.1. Overcoming financial barriers

Our engagement with Energy Intensive Industries (EII) has identified that the principal and most commonly cited barriers are the long payback periods on commercial investment and a lack of access to innovative finance mechanisms – resulting in investment being diverted elsewhere. Without overcoming these obstacles, transformational change amongst Scotland's EII, to reach emissions reductions targets, is unlikely to materialise.

The typically long payback periods that discourage commercial investment could be remedied in part by industry having access to loans that adopt a patient approach to capital repayment. This would provide industry with the necessary finance to undertake investments to lower emissions whilst improving economic performance. It would give them an alternative source of finance with less aggressive terms.

Mechanisms currently exist for encouraging the directing of private finance towards energy efficiency and decarbonisation. A good example of an innovative mechanism is PF4EE which draws on Horizon 2020 funding<sup>39</sup>. The programme aims to make lending for energy efficiency more sustainable across the EU and increase the availability of debt financing by providing:

- A loan framework from the European Investment Bank (EIB) which, as a non-commercial lender, supports beneficiaries through lower pricings and longer maturity than commercial providers.
- A risk sharing facility in which the financial intermediary creates a loan portfolio of all energy efficiency loans. The EIB pays a collateral sum of 16% of the value of the total portfolio, which is designed to mitigate the risk of projects defaulting on loan payments.

Losing access to EIB funding as a result of EU Exit, would, however, put such financing support mechanisms at risk.

The financing required to progress opportunities will come from many sources including EII company reserves. Securing investment will require persuasion, often within multinationals who are driven by commercial imperatives. However, where public sector support and economic plans align with environmental aims, boardrooms may change the threshold for strategic investment decisions.

### 4.2. Promoting project progression

To better identify both the number and scope of viable opportunities (and capacity to progress them to investment grade business cases), the Scottish Government proposes to co-ordinate knowledge of project opportunities across EII in Scotland. To structure this gathering of evidence, investment potential will be differentiated by common factors such as:

- **Readiness:** investor-ready projects and those more complex.
- **Scale:** large emitters with fairly unique needs versus more comparable requirements.
- **Sub-Sector:** between the different sub-sectors of EII which may have specific needs.
- **Types of technology:** between innovative and more mature or established approaches.
- **Geographic clustering:** site-level and place-specific approaches.

<sup>39</sup> <https://ec.europa.eu/programmes/horizon2020/what-horizon-2020>

The findings from proposed evidence gathering could be used to:

- a) Map a Scottish site-based viable 'prospect list' or pipeline.
- b) Enhance understanding of what each project owner considers an acceptable payback period (within company defined thresholds).
- c) Develop a risk profile to stimulate finance interest.
- d) Influence cost-benefit analysis of programme design stages, with a likely focus on IRR.
- e) Enable more advantageous project positioning for UK/global funding or financing.
- f) Assist in identifying skills/capacity/innovation gaps<sup>40</sup>.
- g) Inform conversations to overcome barriers to infrastructural change.

#### **4.3. A Support Framework Built from Collaboration with Scottish Industry**

The Scottish Government proposes to intensify its working relationship with EII. Subject to agreement, we will convene a Scottish EII Forum to develop from a 'partnership approach'<sup>41</sup> into an action-oriented group that spans the public and private sectors. Members would buy in to the long-term policy approach to industrial decarbonisation as well as a culture of collaboration.

The Forum would fulfil an advocacy role to engage with a range of linked initiatives, including international ones, with the intention of aligning activities to mutually support decarbonisation. It would connect with other leadership groups without duplicating effort, and shape common viewpoints to strengthen the position of Scottish EII to influence infrastructure development.

In addition to the above, industry leaders could assist in data gathering amongst membership organisations<sup>42</sup> to help define sub-sector decarbonisation pathways. Industry can advise the public sector on how advice and support for industry is perceived by users and on tiered approaches. For example: bilateral mechanisms for the largest companies<sup>43</sup>, design-based process engineering studies or business case development support for mid-sized firms.

Alongside the proposed Forum, the following actions will be carried out with our agency partners who deliver aspects of support:

- Continue engagement to ensure industry is clearly directed to support.
- Consider who might be best placed to deliver parts of a more joined-up, redesigned support landscape, deploying appropriate tools as required.
- Forge connections between EII and potential investment in innovative or advanced manufacturing.
- Promote consistency in quantification and appraisal: primary process energy efficiency and carbon emitted; heat recovery opportunities; other options to decarbonise.
- Ensure that enterprise agencies raise the profile of energy efficiency and decarbonisation policy as relationships are built with businesses.
- Consider which EII sites are also SME, and therefore potentially eligible for more assistance<sup>44</sup>.
- Develop case studies where cost, energy and carbon savings have resulted from investment, or where benefits have stemmed from 'green branding' of industrial manufactured products.
- Explore options to research energy use in industrial processes, compared with premises.

<sup>40</sup> One of three identified barriers in the [Scottish Assessment of the Industry Sector Roadmaps](#) was a shortage of technical or managerial resource. Others were payback periods that are longer than company defined thresholds; and competition with other projects for corporate funding.

<sup>41</sup> In late 2017, we drafted a [partnership agreement for Scottish Government and key representatives to work together](#)

<sup>42</sup> To target support more directly to the profile of Scottish industry we have begun to engage with specific sub-sectors in more detail, starting with the Scotch Whisky industry.

<sup>43</sup> These would usually be reserved, due to capacity, be most suitable for large or complex projects that, if realised, would provide significant energy productivity or emissions intensity benefits.

<sup>44</sup> Distinctions due to size (or location, sub-sector, technology) can be arbitrary but may be pragmatic for programmes to distinguish for regulatory purposes. SME can be advantaged to promote opportunities, with large users more likely to negotiate lower tariffs.

#### 4.4. Looking ahead

Feedback on the questions and next steps will allow us to prioritise actions before a Scottish EII Forum comes together, later in 2019. During the year ahead, we can forge links with other initiatives to progress matters that will encourage deeper decarbonisation.

Our strategic policies set a vision to decarbonise whilst enhancing economic output. Investing in industrial decarbonisation could provide a more sustainable future for manufacturing and, with the right infrastructure, and support from government, could attract new industries to Scotland. Securing investment to realise this opportunity has the potential to significantly boost local economies, supply chains and the overall competitiveness of Scotland's EII in their respective global markets.

Our vision – where Scottish industry has met its emissions reduction obligations whilst growing economic capacity – is ambitious. It is only by working in collaboration, over time, that we will build a support framework, then a detailed plan, to deliver this.

## NOTES



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