

# Renewables and Hydrogen in Scotland

An aerial photograph of the Forth Road Bridge and the Forth Rail Bridge in Scotland. The Forth Road Bridge is a white cable-stayed bridge in the foreground, and the Forth Rail Bridge is a red cantilever bridge in the background. The bridges span the Firth of Forth, with a marina and residential areas visible on the right side of the image.

Neil Francis  
Managing Director  
Scottish Development International

Scotland & Lower Saxony – Frontrunners  
in Renewables

March 30<sup>th</sup> 2022

# Welcome to Scotland

Fàilte Gu Alba

## Scotland Key Facts

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**POPULATION**- 5.5 million

**WORKFORCE** – approx. 3 million

**CURRENCY** – UK Pound Sterling (£)

**MAIN LANGUAGE** - English

**AVERAGE WEEKLY SALARY** - £563 before tax (approx. \$750)



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The background of the entire slide is a photograph of several large offshore wind turbines in the sea. The turbines are white with yellow bases. The sea is a dark, choppy green. In the distance, a coastline with some buildings and hills is visible under a sky filled with soft, grey clouds.

# WELCOME TO SCOTLAND

THE SMALL COUNTRY MAKING A BIG IMPACT ON

# THE GLOBAL LANDSCAPE

“Our net zero 2045 emissions target will halt Scotland’s contribution to global climate change within one generation, setting the pace for the rest of the world and opening up huge opportunities for companies like yours...”

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# SCOTLAND'S VALUES



Sustainable and  
inclusive economic  
growth



Net zero



Fair work



## WORLD-LEADING CLIMATE CHANGE TARGETS & RESULTS

**Scotland is committed to a net zero future**



50% of Scotland's total energy demand (electricity, heat and transport) to be supplied by renewable sources by 2030



Net zero greenhouse gas emissions by 2045



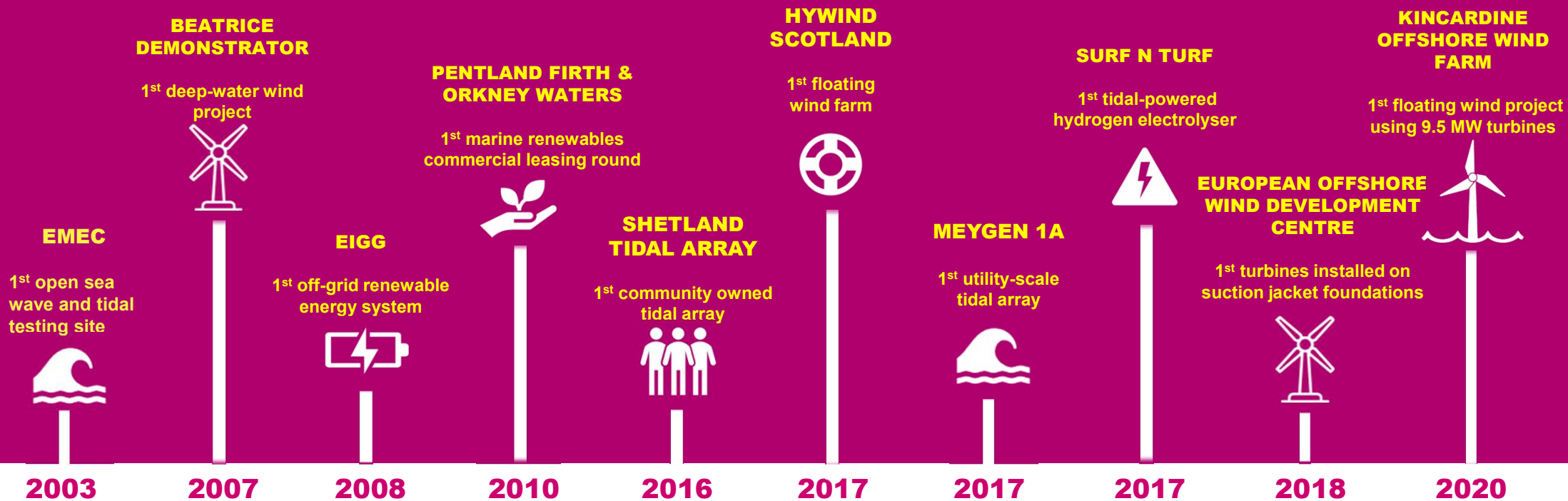
75% emissions reduction by 2030 – the toughest statutory emissions target in the world



Record achievement: 97.4% of Scotland's gross electricity consumption from renewables in 2020

# HISTORY OF WORLD FIRSTS IN RENEWABLES

Scotland has an esteemed history of engineering and innovation. Our pioneering energy sector continues to innovate, evolve and punch above its weight in delivering world first renewables projects that change the world.



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**OFFSHORE  
WIND**



**OFFSHORE  
ENERGY  
INTERGRATION**

# **SCOTLAND'S GREEN OPPORTUNITIES**

**LOW  
CARBON  
HEAT**



**HYDROGEN**

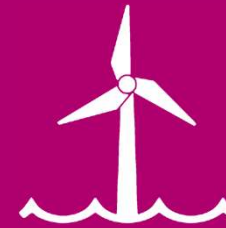


# SCOTLAND'S OPPORTUNITIES

## OFFSHORE WIND

- One of Europe's largest offshore Renewable Energy Zones
- Established offshore wind leaders:
  - 4GW already operational or under construction
  - 6.5GW in the pipeline
- Enormous project pipeline:
  - ScotWind 1 Leasing:
    - additional 25GW of offshore wind by 2033
    - further sites identified for future rounds
  - INTOG (Innovation and Targeted Oil and Gas) leasing round:
    - up to 4.5GW of floating wind for the electrification of oil and gas facilities by 2030
  - UK's Offshore Wind Sector Deal - 40 GW of offshore wind in the UK by 2030

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### OFFSHORE WIND OPPORTUNITIES

- innovative floating wind technologies
- substructures
- mooring systems
- large castings and forgings
- turbine blades
- electrical substations
- export and array cable manufacturing
- construction
- associated supply chains



# SCOTLAND'S OPPORTUNITIES OFFSHORE ENERGY INTERGRATION

- the decarbonisation of Scotland's oil and gas industry is instrumental to achieve net zero
- net zero North Sea – emission reduction targets of 50% by 2030 and 90% by 2040
- expansion of offshore renewables through offshore electrification and integrated energy hubs
- acceleration of Carbon Capture Utilisation and Storage (CCUS) opportunities
- blue hydrogen at scale using our existing natural gas infrastructure – potential to decarbonise 30% of the UK's natural gas supply by 2050

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## OFFSHORE ENERGY INTEGRATION OPPORTUNITIES

- platform electrification
- flaring and venting reductions
- digital data management
- data-centric execution and operations
- operational efficiency
- emissions reductions
- integrated energy hubs
- floating wind
- Carbon Capture, Utilisation & Storage (CCUS)
- blue hydrogen





# SCOTLAND'S OPPORTUNITIES

## LOW CARBON HEAT

- Heat is the largest source of Scotland's emissions
- Immediate opportunities in heat pumps and heat networks
- Strong government support including £1.6bn over the next five years
- Ambitious 2024 targets:
  - by 2024 all new homes must use zero emissions heat
  - local authorities must have a local heat and energy efficiency plan
- Access to the UK market:
  - nearly all homes, businesses and buildings need to switch to low carbon heating by 2045
  - estimated 1 million heat pumps needing to be installed annually by the mid-2030s

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## LOW CARBON HEAT OPPORTUNITIES

- heat pump manufacturing
- heat networks
- components
- installation
- servicing
- piping components
- metering
- smart controls
- systems integration



# SCOTLAND'S OPPORTUNITIES

## HYDROGEN

- Ideal location for hydrogen projects:
  - supportive policy environment
  - advanced capabilities in hydrogen R&D
  - extensive energy, maritime and offshore infrastructure
  - skilled energy workforce
- Committed to becoming a world-leading hydrogen nation
- Ambition to become a major exporter – abundant energy resources
- 5 GW of clean hydrogen production by 2030 and 25 GW by 2045

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## HYDROGEN OPPORTUNITIES

- large scale green and blue hydrogen production hubs
- electrolyser manufacturing
- portside facilities
- transportation and distribution



# Scotland: A Perfect Location for Scaling up H2

The Scottish Government has set the ambition to be Net Zero by 2045. Scotland's electricity demand is almost 100% met from renewables, and hydrogen is now central to achieving the clean energy transition:

## Key Markets

- **Mobility & Logistics:** the H2 bus & vehicle fleet in Aberdeen
- **Industry:** scaling up early clean H2 supply with Acorn and Cromarty
- **Heat:** key evidence to deploy 100% H2 for heat with H100 Fife trials

Scotland is now scaling up clean hydrogen production and demand, with target 5GW low carbon hydrogen by 2030. Further scale-up will reduce H<sub>2</sub> supply costs, increase H<sub>2</sub> demand, and accelerate progress to Net Zero.

## GREEN HYDROGEN: 7 REASONS WHY SCOTTISH OPPORTUNITIES ARE AMONG THE BEST IN THE WORLD

1

AVAILABLE  
RESOURCES  
**25%**  
OF EUROPE'S WIND  
IN SCOTTISH  
WATERS

2

UNMATCHED  
SCALABILITY  
ESTIMATED  
**>735 GW\***  
OF OFFSHORE  
WIND  
POTENTIAL

\*ORE Catapult, May 2020

3

LOWER  
COST PER  
MWH  
HIGH FULL  
LOAD HOURS  
BETTER  
YIELD

5

BEST OVERALL  
FRAMEWORK  
POPULAR  
AND  
GOVERNMENT  
SUPPORT

6

BEST OFFSHORE  
KNOW-HOW,  
TALENT POOL AND  
SUPPLY CHAIN  
**40 YEARS OF  
OFFSHORE  
EXPERIENCE**

4

PROXIMITY TO  
THE EUROPEAN  
MARKET  
EXPORT OF H<sub>2</sub>,  
E-FUELS, GREEN  
AMMONIA, GREEN  
CHEMICALS,  
LOHC ...

7

PROVEN TRACK  
RECORD  
LARGE SCALE  
ENERGY  
EXPORTER

## HOW SCOTLAND DRIVES THE EUROPEAN ENERGY TRANSITION

### BLUE HYDROGEN SCOTLAND WILL DELIVER

LARGE  
VOLUME AND  
SECURE STORAGE  
PROVEN  
TRACK RECORD  
IN HANDLING

MAJOR  
CLEAN GROWTH  
CATALYST  
DRIVER FOR  
INNOVATION

ECONOMIC  
ADVANTAGES  
USAGE OF  
EXISTING  
INFRASTRUCTURE

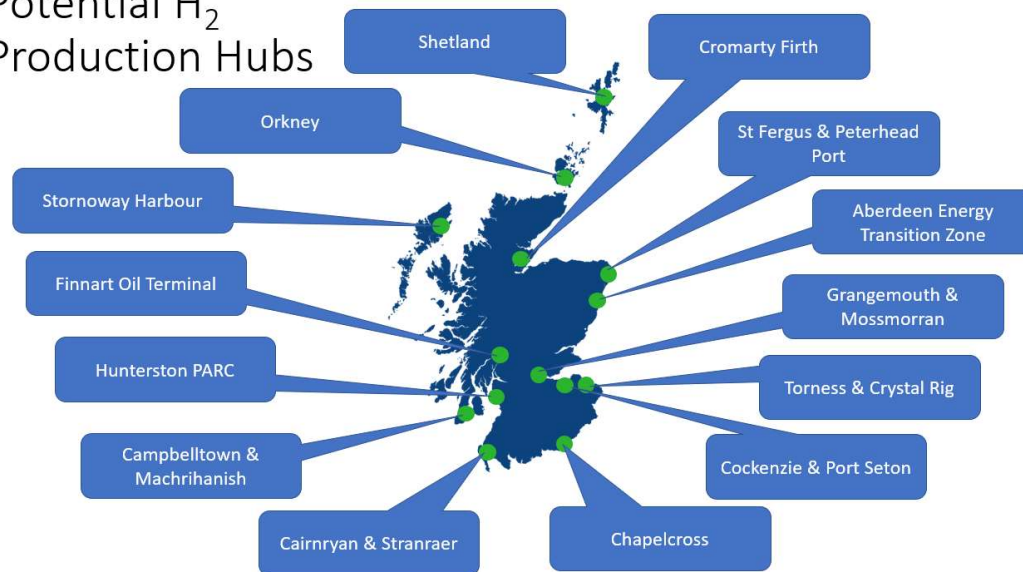
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# Inward Investment Opportunities

## Electrolyser Manufacturing

### Potential H<sub>2</sub> Production Hubs



## Large Scale H<sub>2</sub> Production Infrastructure

# Why is Scotland of particular interest to Germany?

## **SCOTLAND IS READY FOR H2 EXPORT**

**~100% OF SCOTTISH  
ELECTRICITY ALREADY  
FROM RENEWABLES**

## **SCOTLAND HAS THE CAPACITY**

**SCOTTISH WATERS ARE  
AMONG THE LARGEST  
IN EUROPE**

## **SCOTLAND HAS BEST WIND CONDITIONS**

**AVERAGE YIELD  
20% HIGHER**

## **SCOTLAND IS NEAR**

**PROXIMITY TO GERMAN  
H2 OFF-TAKE PORTS**

## **SCOTLAND HAS TALENT**

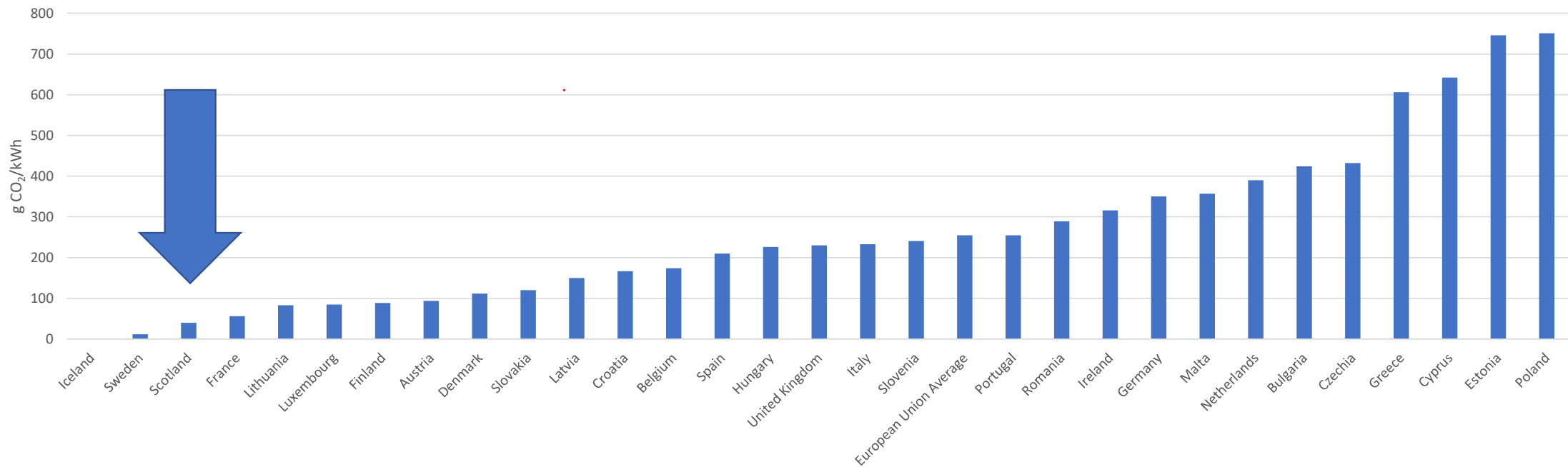
**TALLENT POOL AND  
SUPPLY CHAIN TO  
DELIVER AT  
DEMAND SCALE**

## **SCOTLAND = OPPORTUNITY**

**FOR GERMAN  
TECHNOLOGY  
DEVELOPERS &  
MANUFACTURERS**

# Minimize your Embedded Carbon

BY TAKING ADVANTAGE OF SCOTLAND'S ABUNDANCE OF RENEWABLE ELECTRICITY



Reduce the embedded carbon of your final product by basing your facility in Scotland and taking advantage of Scotland's low carbon and green electricity. In 2020, 50TWh of electricity was generated in Scotland with an average grid carbon intensity of 40.2 gCO<sub>2</sub>/kWh; one of the lowest grid carbon intensities in Europe.

# THE RIGHT TALENT FOR YOUR BUSINESS

## attract and retain a talented workforce

Scotland can help you maintain your competitive edge...



**skilled talent pool** renowned for its manufacturing, energy, engineering & design expertise:

- 46,500 people in low carbon sector
- 102,000 people in the oil and gas industry



**19 world-class universities** with a steady stream of science, technology and engineering graduates



**renowned further education colleges** offering specialist vocational training in low carbon technologies



**flexible learning programmes** to ensure you get the most out of your people



**funded apprenticeships** developed for industry by industry, bespoke to your skills requirements



## FUTURE PROOF YOUR WORKFORCE

Scotland's ambitious skills initiatives will ensure you have the right skills for your business:

- ✓ Green Jobs Workforce Academy
- ✓ The Energy Skills Partnership
- ✓ Climate Emergency Skills Action Plan





# A SUPPORTIVE BUSINESS ENVIROMENT

Scotland is a place where businesses are supported, and the entrepreneurial spirit is strong.

## SUPPORTIVE GOVERNMENT

Scotland is determined to achieve net zero and has ambitious government policies and initiatives to drive the energy transition:



**Energy Transition Fund**  
£62 million to help energy businesses diversify



**Hydrogen Funding**  
£100 million invested over the next 5 years



**North Sea Transition Deal**  
£16 billion invested by UK Government and industry

## INFLUENTIAL ORGANISATIONS

When you choose Scotland, you become part of something much bigger. Our industry organisations are ready to work with you, immediately connecting you to our company base:



# THRIVE IN SCOTLAND WITH **ONGOING BUSINESS SUPPORT**



## **PROPERTY**

SEARCHES AND ADVICE



## **FUNDING, GRANTS & SUPPORT**

UPSKILL YOUR STAFF, DEVELOP NEW PRODUCTS & SERVICES AND ACCESS GROWTH CAPITAL



## **TALENT**

MAXIMISE YOUR HUMAN CAPITAL VIA TRAINING AND SKILLS SUPPORT



## **CONNECTIONS**

TO ACADEMIA AND THE SUPPLY CHAIN



## **PROFESSIONAL ADVICE**

TO HELP YOU GET UP AND RUNNING FAST

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# CONNECTED TO THE WORLD



## 6 AIRPORTS

DAILY DIRECT FLIGHTS  
TO 150 DESTINATIONS  
WORLDWIDE\*



## 130 FLIGHTS

TO LONDON EVERY DAY –  
1 HOUR FLIGHT TIME\*



## FAST AND FREQUENT

RAIL LINKS TO ALL  
PARTS OF THE UK



## CONNECTED MARITIME INFRASTRUCTURE

FERRY PORTS, HARBOURS, 18 DEEP WATER  
PORTS AND 2 CONTAINER PORTS



## BEST CONNECTED

95.5% FIBRE BROADBAND COVERAGE



## 100% SUPERFAST BROADBAND

IN ALL SCOTTISH PREMISES BY 2021

\*in ordinary times

# Inward Investment Case Study – Arcola Energy

Arcola Energy



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Arcola Rail Engineering – Bo’ness



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# Get in Touch

We'd love to hear from you



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