



# Anaerobic Digestion

## Agriculture, Distilling and Decarbonisation

# We are Acorn Bioenergy Limited

Acorn are Anaerobic Digestion Plant developers and are expected to become the leading biomethane and biogenic CO2 producer nationwide by 2025.

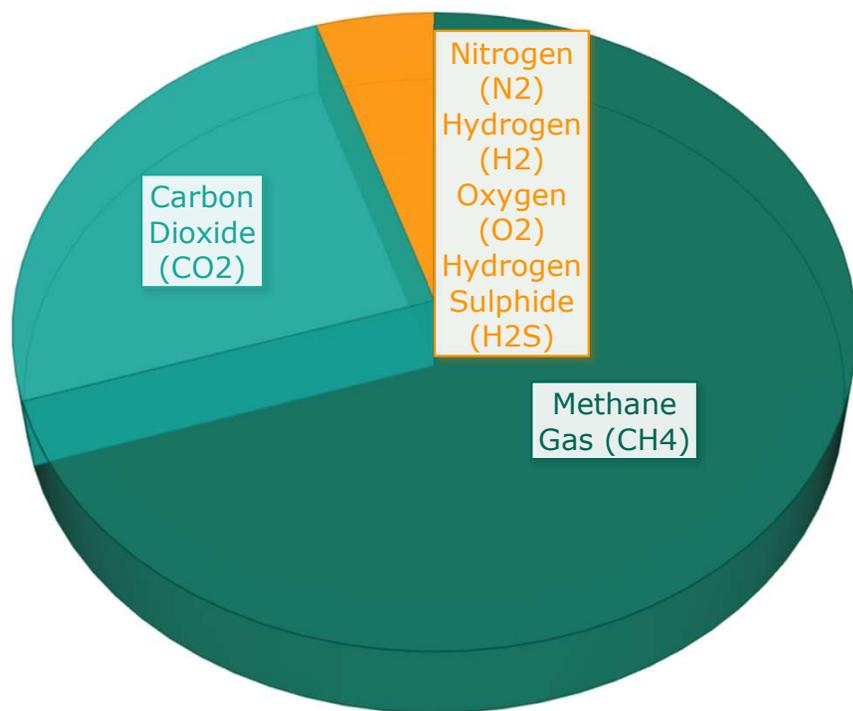
By integrating with our most precious industries, agriculture and distilling, we will accelerate the energy transition to Net Zero through the creation of sustainable biogas.



# What is Biogas?



...is a renewable energy source produced by the breakdown of organic matter and in the absence of oxygen.



Biogas	Fossil Fuel
Produced from living matter, wastes, renewable sources	Produced from geological processes (oil, coal), non-renewable sources
Carbon neutral	Carbon intense – GHG emissions
Tried and tested technology	Risky production methods
Dependant on land availability	Expensive extraction methods, industry decline

# Biogas Production

## Transition to Net Zero



**“There is a tremendous potential for biogas to be a significant building block in the climate and energy plans for the UK, EU and the World...The largest single emission source is by far energy production. Some 70% of global GHG emissions are directly caused by energy generation, and most of that is by burning fossil fuel.”**

*Niclas Svenningsen, Manager, Global Climate Action at UN Climate Change (At the World Biogas Summit in 2019)*

# Biogas Production



## The UK Energy Crisis and Decarbonisation

- The UK is exposed to volatile global gas prices which underscores the importance of the need for the country to generate cheaper, cleaner energy to reduce **dependence on fossil fuels**.
- The more the county can create, the less reliant we will be on expensive gas prices set by international markets. Reliable energy supplies drive economic support.
- To achieve the goals of global, national and local GHG emission levels, energy generation must fall to around 80kg of CO2 per MWh by 2040 – **only renewables provide for this future** (IEA: 2016).

### Biogas can reduce GHG emissions...

#### From Electricity Generation

- balances the intermittent electricity supplies of wind and solar energy
- Biogas can reduce global emissions by 18-20% when fed into the electricity or heating networks or into the grid.

#### In Heat Supply

- Energy used for heating or colling accounts for about half the total world final energy consumption, with around 75% of this derived from fossil-fuel sources (REN21:2016)

#### In Transport

- Currently accounts for 14% of GHG emissions, with 95% of the worlds transportation energy coming from petrol-based fuels.

#### In Organic Wastes

- Capturing emissions from decomposition of organic wastes and then used as a renewable energy source.

#### Agriculture

- Currently accounts for 20% of Scotland's GHG emission, 13% of agri emissions derive from synthetic fertiliser



# Drivers

# Policy

## Sustainability, Net Zero, Decarbonisation



UN Sustainable Development Goals  
Climate Change Targets



Renewable Energy Directive (RED)  
Fuel Quality Directive (FQD)

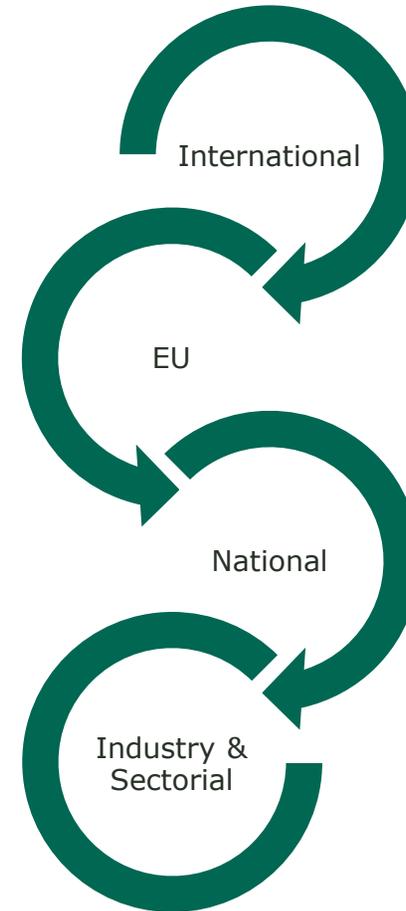


Renewable Transport Fuel Obligation (RTFO)  
Renewable Obligation (RO), Feed-in Tariffs (FIT)  
Renewable Heat Incentive (RHI)  
Green Gas Support Scheme (GGSS)  
National Planning Framework Policy 4 (NPF4)



Waste, Agriculture  
Chemical, Industry  
Construction, Energy  
Transport, Forestry & Timber

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# Climate Change and Agriculture

## Introduction

**Scottish Government want to support Scotland to become a global leader in sustainable and regenerative agriculture. From 2025 onwards this commitment will sit at the heart of a framework which underpins future agriculture support.**

Underpinning values, principles and objectives:

- Ensure that Scotland's people are able to live and work sustainably on our land
- Seek to create a diverse, flourishing industry
- Deliver on targeted outcomes for biodiversity gain and low emissions production
- Develop policy, regulatory and support mechanisms which deliver emissions reduction in line with our climate targets, and contribute to wider government objective and priorities, particularly in relation to our net zero ambitions
- Encourage more farmers and crofters to farm and produce food organically
- Improve business resilience, efficiency and productivity
- Take a whole farm approach to reducing emissions and environmental impact
- Accelerate adoption of approached and measures which minimise, reduce and remove the use of agrochemical inputs and increase the use of non-chemical related actions



# Climate Change and Distilleries

## Introduction



### Scotch Whisky Association ambitions

- Achieve Net Zero emission by 2040 in operations
- Reduce carbon footprint in operations by 40% to 2030 (baseline 2018)
- Generating heat for distillation primary source of emission in the industry.
- Harness existing and new technologies such as anaerobic digestion, biomass, hydrogen, and high temperature heat pumps to move towards Net Zero.
- Decarbonising operation is a priority for our industry.

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7 AFFORDABLE AND  
CLEAN ENERGY



13 CLIMATE  
ACTION

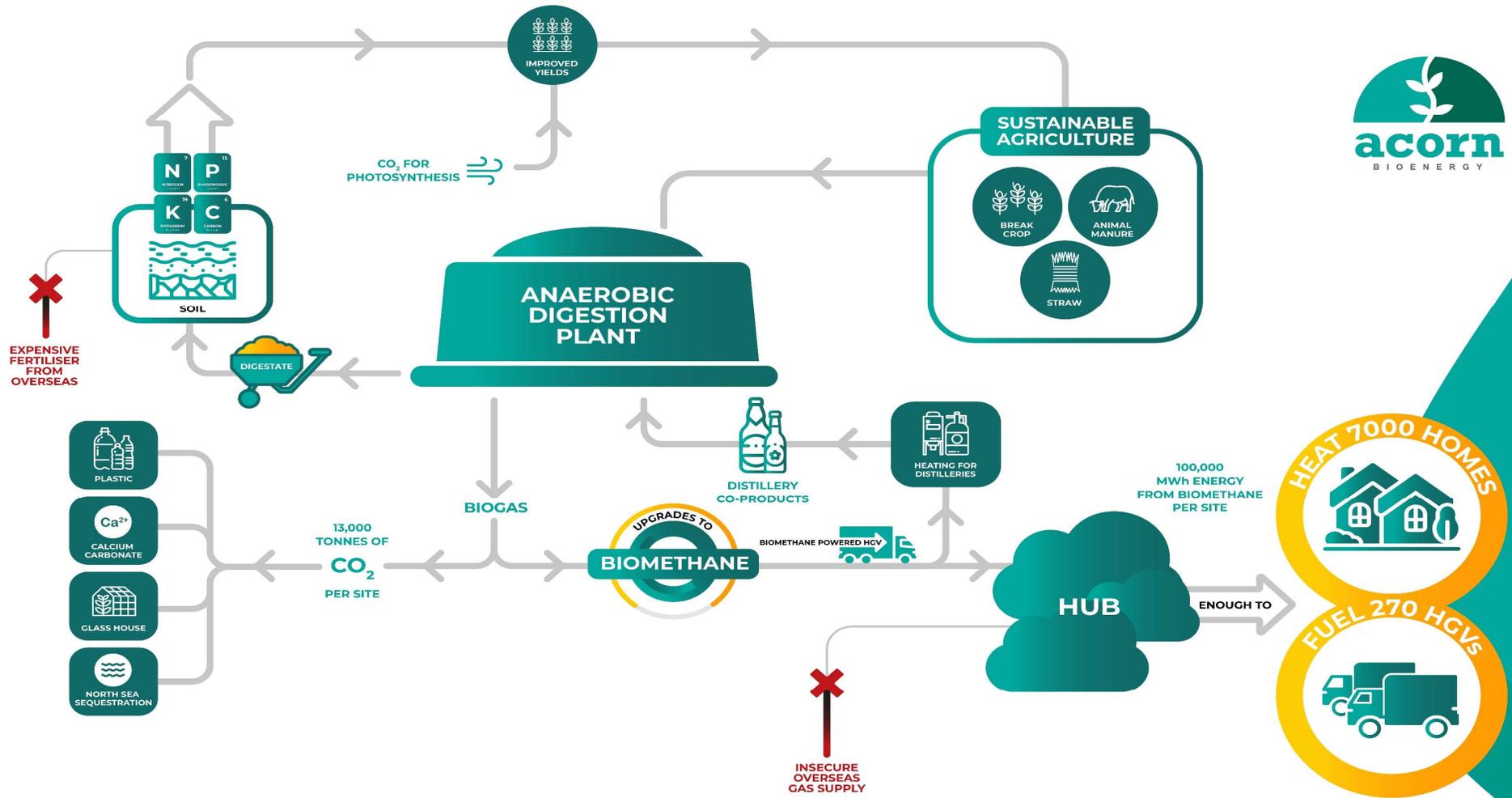


15 LIFE  
ON LAND





# Anaerobic Digestion



# Using Biogas

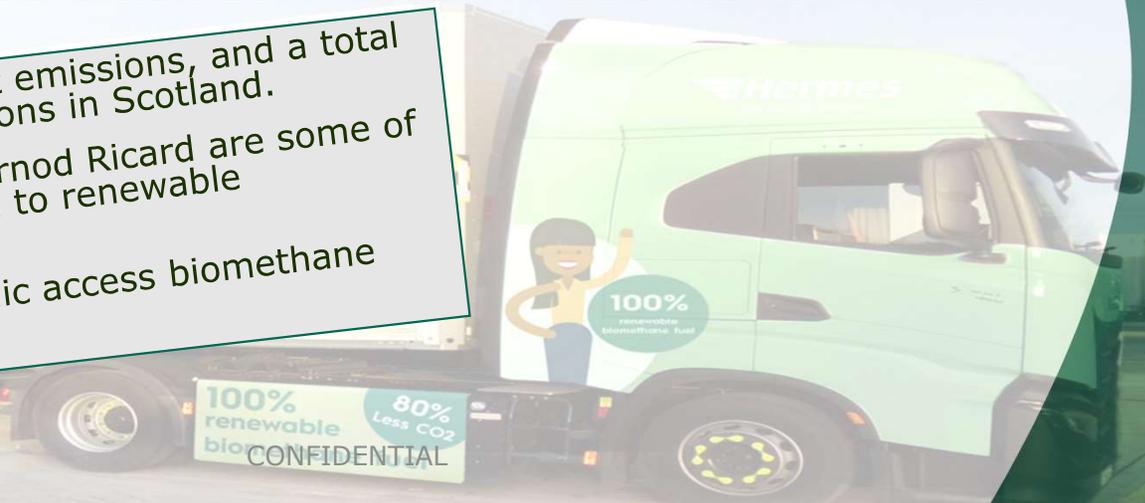
## Transport and Innovation



New Holland launched the T7 Methane Powered tractor, Dec 2022.

- 4x increase in fuel capacity
- Same power and torque as a diesel tractor
- No need for ADBLue
- 30% lower running costs

HGV's account for 16% of UK transport emissions, and a total of 48% of total greenhouse gas emissions in Scotland. Waitrose, Hermes, Warburtons and Pernod Ricard are some of the latest brands to switch from diesel to renewable biomethane to cut haulage emissions. (CNG Fuels, built Scotland's First public access biomethane HGV refuelling station)



# Acorn Scottish Locations

## Hub and Spoke Sites



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# Benefits

# Impacts

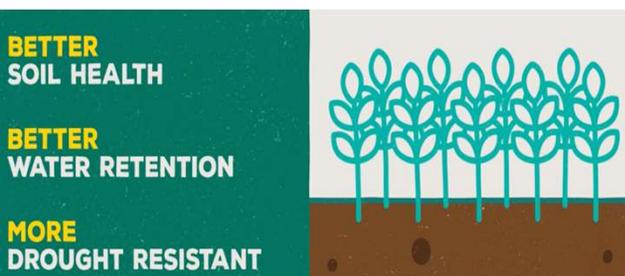
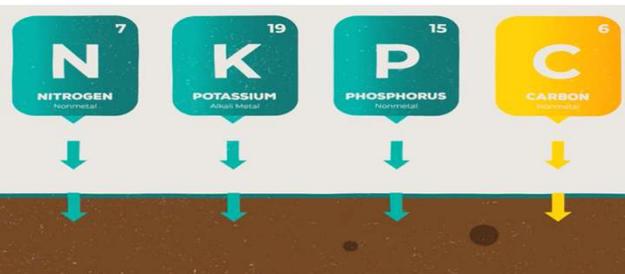
## Acorn Anaerobic Digestion Plants Regional Benefits



- Capital Investment
  - Highland Region = £30million
  - Moray Region = £50million
  - Aberdeenshire = looking for investment opportunity
- Increasing biomethane capacity in the Scottish National Gas Grid by 36%
- Supply chain benefits in the region of £27million.
- Construction effect is £57million, or £34million is GVA terms.
- Each plant will generate 100 jobs during construction with circa 80 additional jobs in supply chain with a total salary effect of £3.7million.
- Operational expenditure of £11.4million per annum will provide 5 onsite jobs onsite, a further 10 offsite and 35 in the supply chain, with an annual salary effect of £1.3million.

# Climate Change and Agriculture

## Acorn Benefits



- Establishing a circular economy for local agriculture
- Diversification of agriculture through incorporation of break crops and use of wastes
- Offering security of income
- Providing a reliable source of high quality, green fertiliser (digestate)
  - Improves organic matter
  - Provides carbon capture
  - Vital nutrient values supplied

More than five tonnes of carbon dioxide are emitted for each tonne of nitrogen fertiliser produced. So when digestate is used in place of factory-produced fertiliser, the factory emissions are avoided.

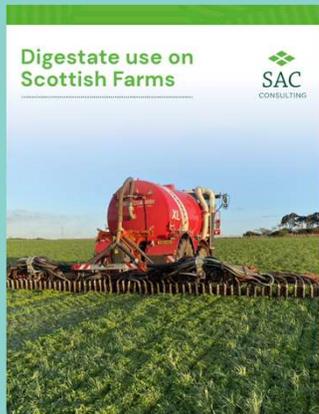
Methane produced by manure and slurry is one of the hardest sources of UK and global emissions to avoid. But AD can ensure this major source of agricultural emissions is avoided.



**DID YOU KNOW?**

# Recommended Reading / Listening

## Guidance Document



## Podcast



## Podcast



These documents were created by SRUC, funded with support of the Universities Innovation Fund (UIF), from the Scottish Funding Council (SCF)

<https://www.farmingandwaterscotland.org/soil-nutrients/anaerobic-digestion-digestate/digestate-use-on-scottish-farms/>





# Thank you.

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