

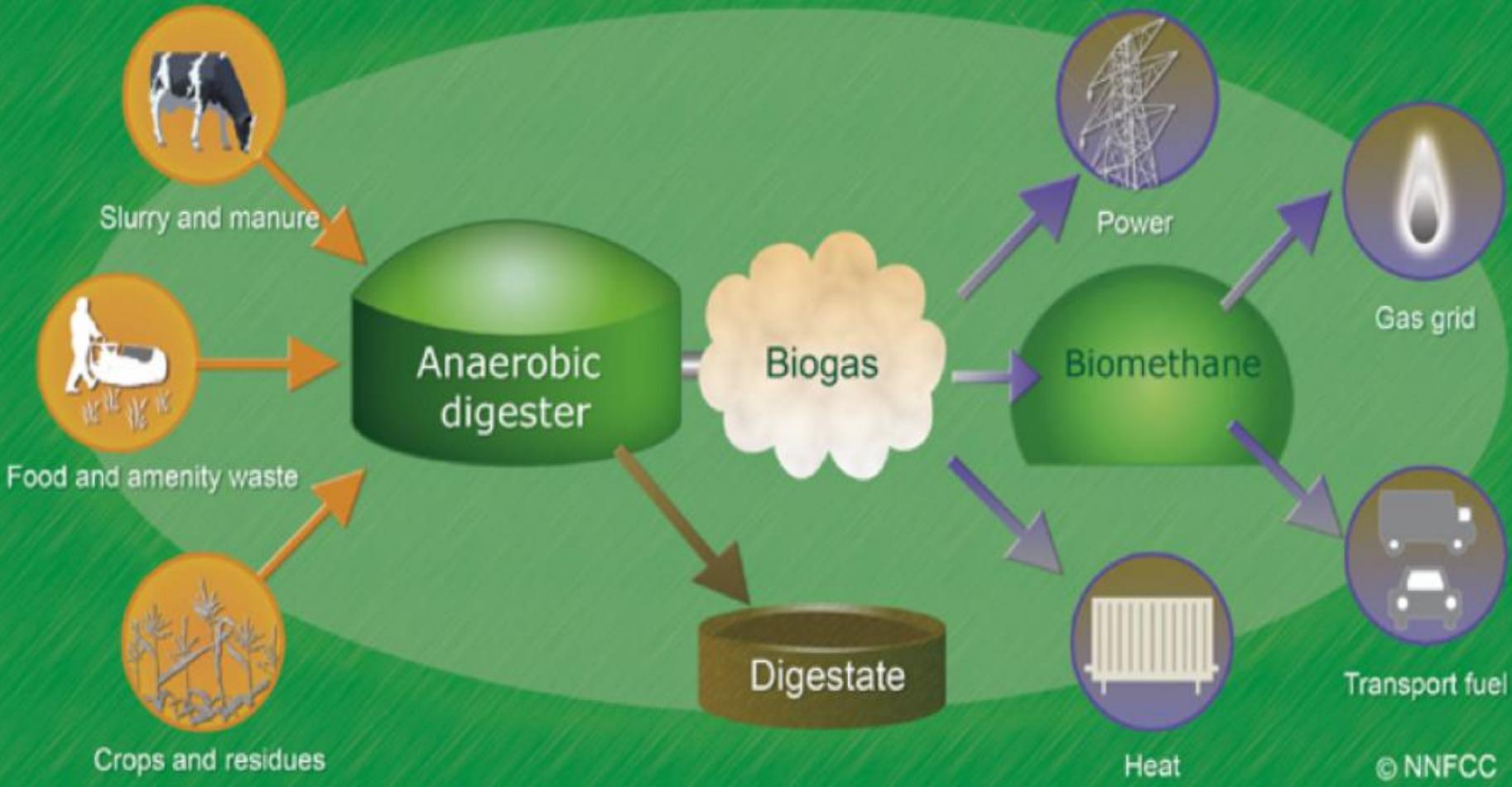
# Greening the gas grid.

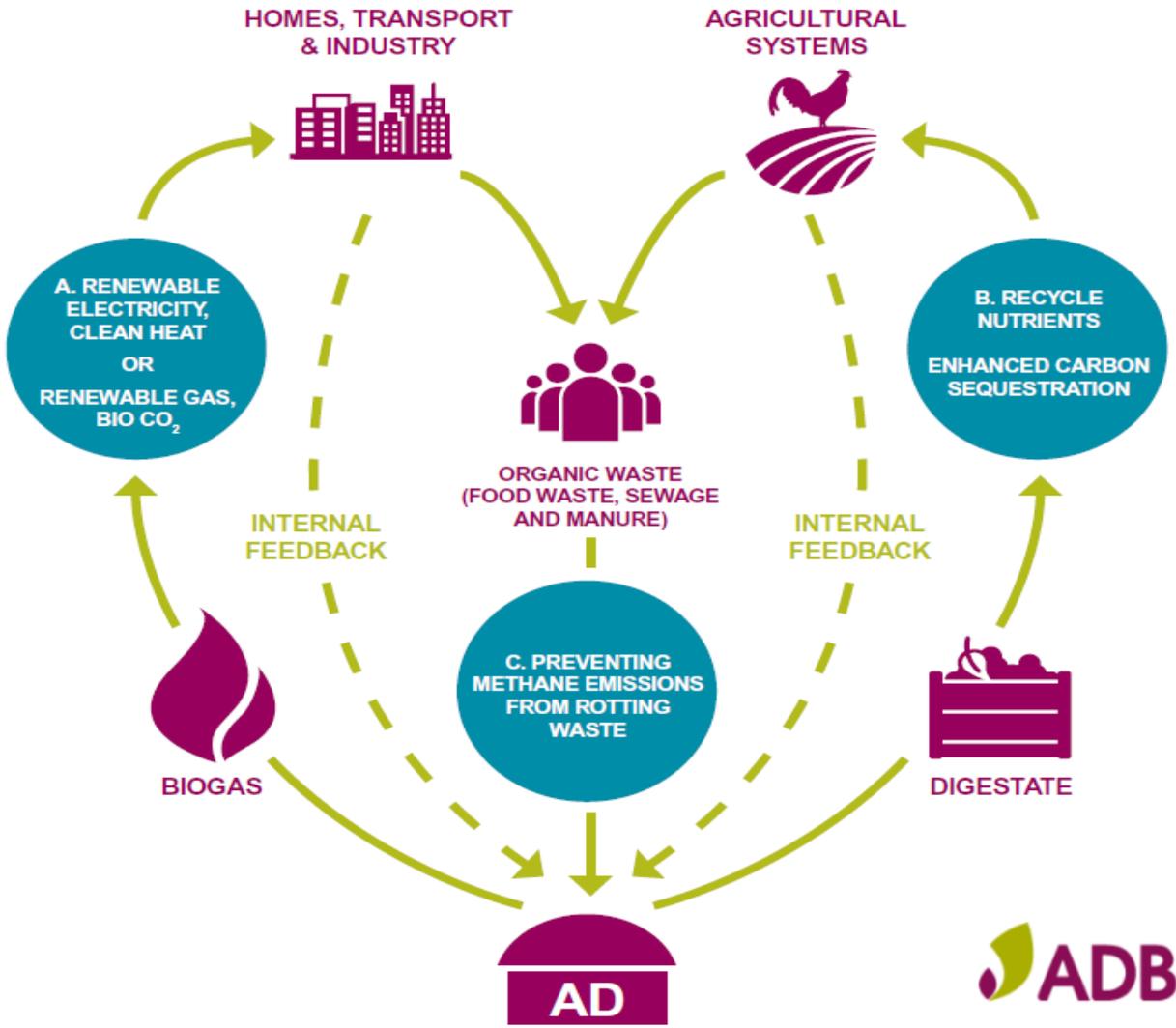
How far can AD take us?



Aims for today.









But how far can AD  
take us?





# ENERGÍAS RENOVABLES

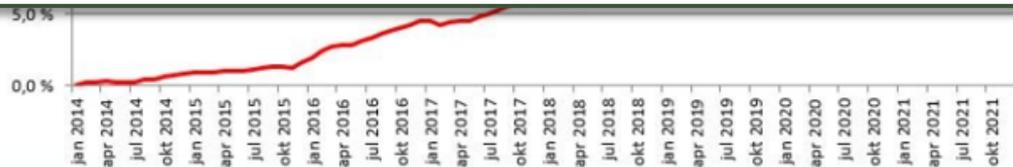
*El periodismo de las energías limpias*



RENEWABLE  
ENERGY MAGAZINE

Celia Garcia-Ceca

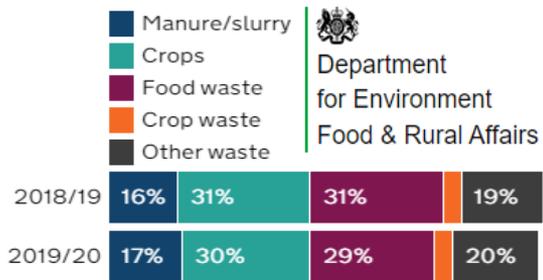
Spanish biomethane could cover 43% of the demand for natural gas in Spain, that is, 100% of households and 48% of industry. The potential of Spain is 163 terawatt hours per year and 2,326 plants (currently there are only five). Castilla y León is the region with the highest production and number of plants (37.78 TWh and 520 plants). But this renewable gas also faces a slow and complex administrative process.



Analysis assumptions prepared in 2021 expect this growth to continue so that biogas will be able to cover 75% of Danish gas consumption in 2030. In 2034, biogas production is expected to be able to fully meet Danish gas demand on an annual basis.



# Four Scenarios.



Business As Usual

BAU + Food Waste

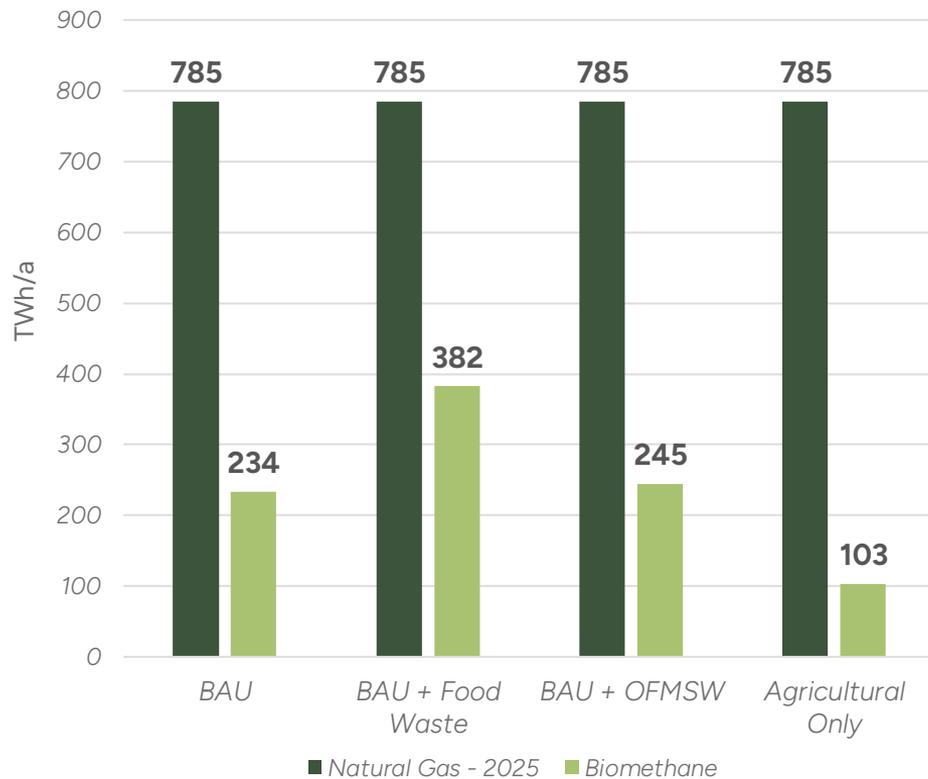
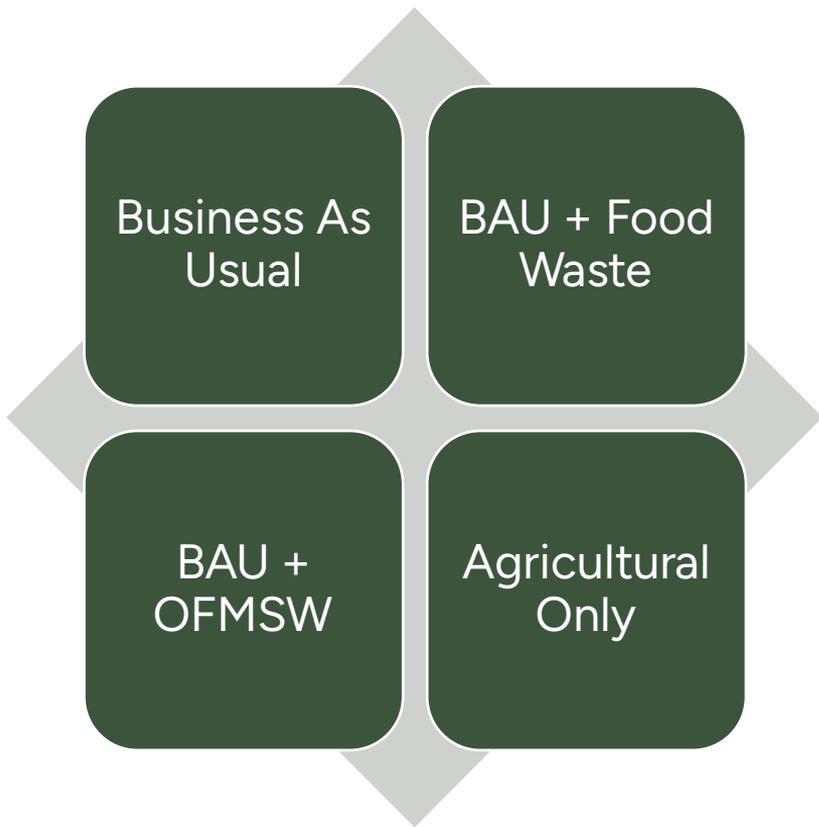
BAU + OFMSW

Agricultural Only



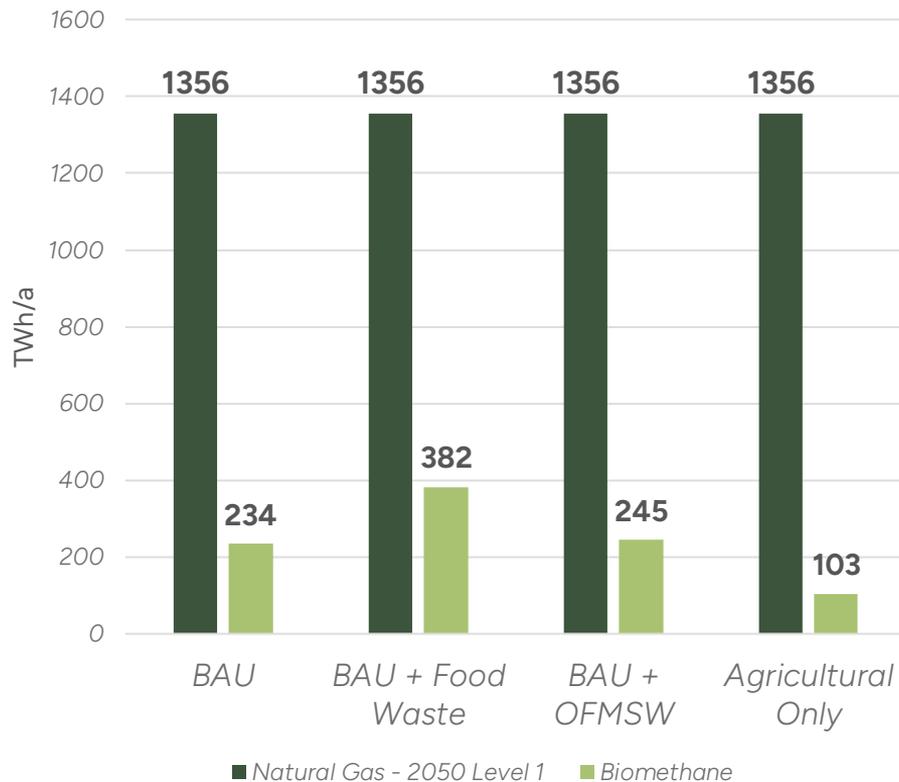


# Four Scenarios – 2025 Gas Demand





# Four Scenarios – 2050 Gas Demand



# DESNZ MacKay Calculator

Example Pathways



reset levers

Lever settings:



Level of ambition

> Transport



> Buildings



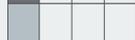
> Industry



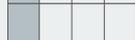
> CO2 Removal & Gases



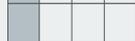
Hydrogen Gas Grid Share



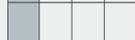
Biomethane Gas Grid Share



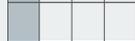
Hydrogen - Biomass CCS



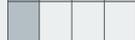
Hydrogen - Methane CCS



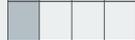
Hydrogen - Imports



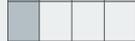
Greenhouse Gas Removal



Bio-Conversion with CCS



CCS Capture Rate



> Electricity Supply



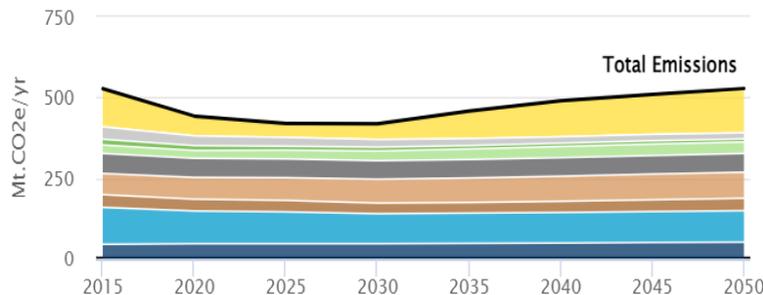
Conditions of Use

switch to 2100 mode

Emissions / Primary Energy

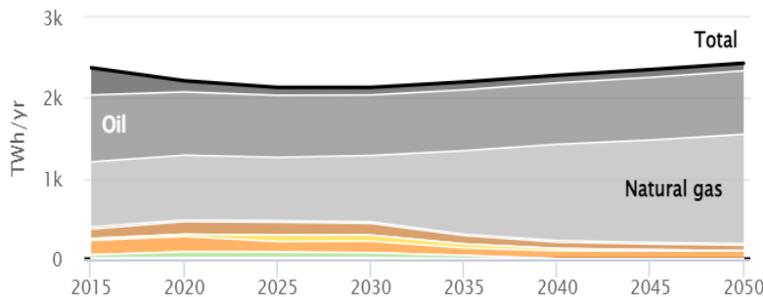
Cumulative Emissions / Final Energy

## Greenhouse Gas Emissions



- Dedicated GHG Removal
- Electricity Generation
- Hydrogen Production
- Other Energy Supply
- Waste Management
- Agriculture & Land Use
- Industry
- Buildings-Residential
- Buildings-Non-Resident...
- Transport-Domestic
- Transport-International
- Total Emissions

## Primary Energy Consumption



- Coal
- Oil
- Natural gas
- Waste
- Bioenergy
- Hydrogen imports
- Electricity imports
- Nuclear
- Environmental heat
- Wind
- Solar

1990

-35%

4



▲ 1/2 ▼

# DESNZ MacKay Calculator

Example Pathways



reset levers

Lever settings:



Level of ambition

> Transport



> Buildings



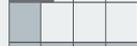
> Industry



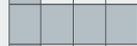
> CO2 Removal & Gases



Hydrogen Gas Grid Share



Biomethane Gas Grid Share



Hydrogen - Biomass CCS



**Savings of 82 million tonnes of CO2.**

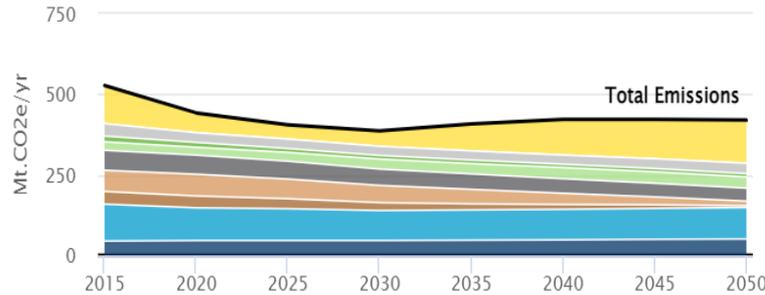
Conditions of Use

switch to Z100 mode

Emissions / Primary Energy

Cumulative Emissions / Final Energy

## Greenhouse Gas Emissions

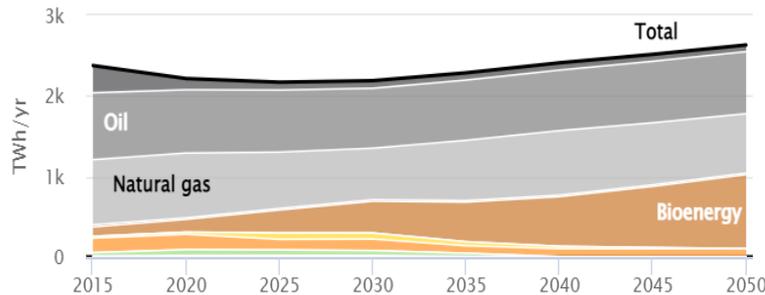


- Dedicated GHG Removal
- Electricity Generation
- Hydrogen Production
- Other Energy Supply
- Waste Management
- Agriculture & Land Use
- Industry
- Buildings-Residential
- Buildings-Non-Resident...
- Transport-Domestic
- Transport-International
- Total Emissions

1990

-49%

## Primary Energy Consumption



- Coal
- Oil
- Natural gas
- Waste
- Bioenergy
- Hydrogen imports
- Electricity imports
- Nuclear
- Environmental heat
- Wind
- Solar

4



▲ 1/2 ▼



# How can we achieve this?



- Awareness
- Economies of Scale
- Hub & Spoke Models
- Regulatory Support
- ?



# Challenges to overcome.



Seasonal Demand



Network access



Sourcing Food Waste

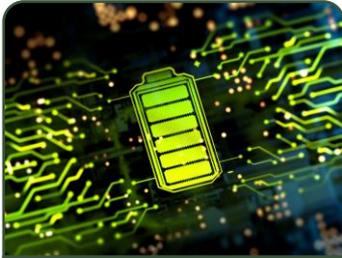


Fertiliser Management





# Benefits.



Energy  
Security



Organic  
fertiliser



Green  
Credentials



UK  
reputation

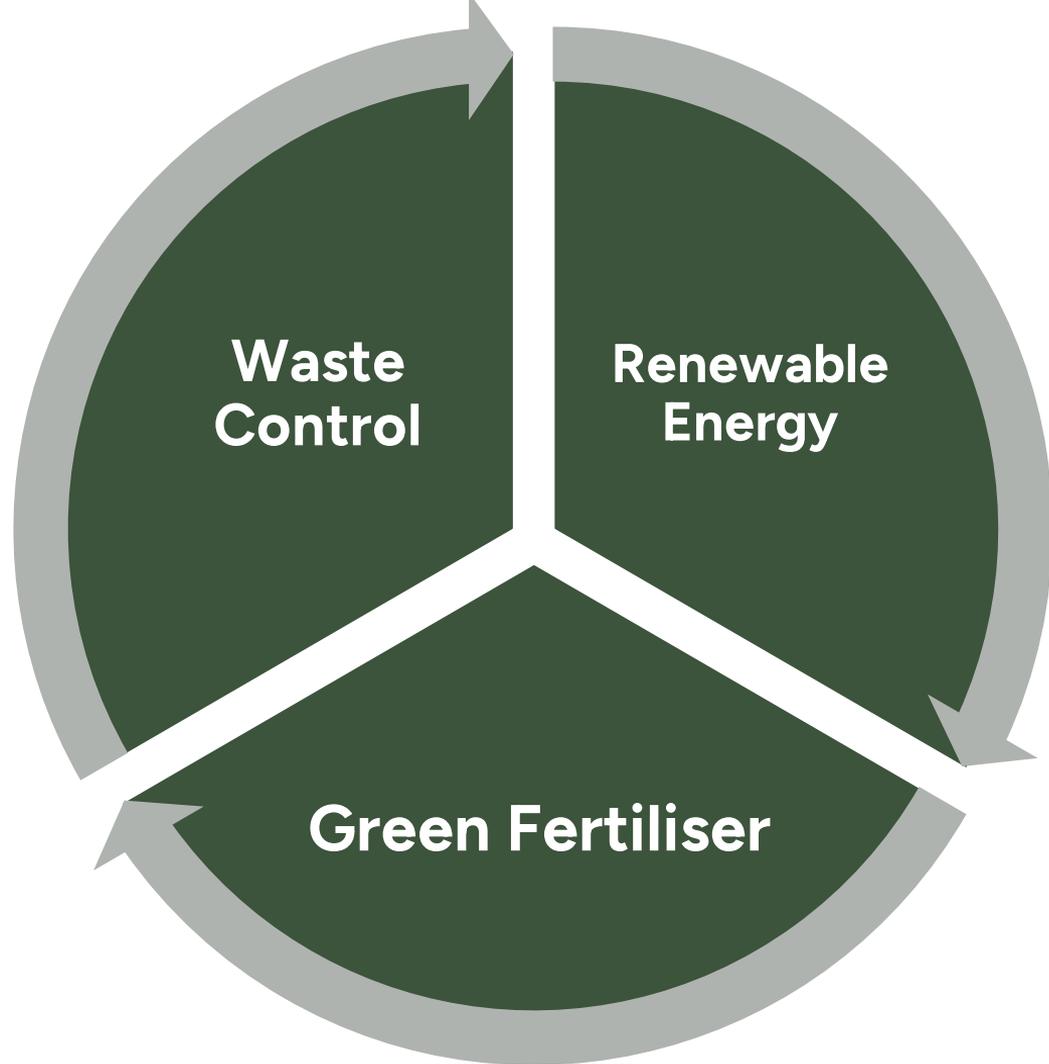


Environment





The end results?



# Technical Support



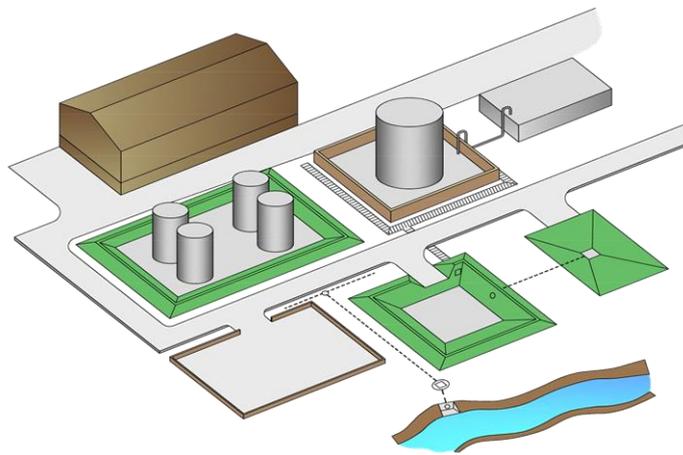
**Services:** Process Engineering and, Civils Engineering, as well as:

Permitting & Planning, ESIA, Hydrology, Land Quality & Remediation, and Sustainable Waste Management

**Location:** UK and International

- The Crofthead AD site processes 99 ktpa of agricultural wastes.
- It exports 500 m<sup>3</sup>/hr of biomethane (7.5 MW heat).
- Over years of design, construction and commissioning, SLR has fulfilled the role of Owner's Engineer, including:
  - **Process design reviews.**
  - **Safety support (HAZOPs).**
  - **Civil engineering support.**
  - **Commissioning and Performance Test management.**
  - **Contractual management.**

# Regulatory Support



**Services:** Process Engineering and, Permitting & Planning, ESIA, as well as:

Civils Engineering, Hydrology, Land Quality & Remediation, and Sustainable Waste Management

**Location:** UK and International

SLR have expertise in giving various regulatory, planning and permitting support, including:

- **Ciria 376 Bund assessments**, for sites falling under Waste Permits.
- Drafting full **planning applications** for new developments.
- Support with **permit applications** and responses, including CAR and Reg-61 (B.A.T) responses.



Making  
Sustainability  
Happen

SLRCONSULTING.COM



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