Economic Assessment of Biogas and Biomethane in Ireland

Background

Ireland has a long term ambition to reduce energy related greenhouse gas emissions by 80%-95% by 2050 as compared to 1990 levels. Sustainably produced biogas and biomethane have the potential to reduce carbon emissions by replacing fossil fuel demand and by increasing the capture of emissions from management of food and animal wastes.This study estimates the potential renewable energy production and carbon savings available, and assesses the economic costs and benefits to society of four scenarios.

Scenarios Examined:

Waste-based Anaerobic Digestion (AD): Maximum use of food and animal wastes as these resources have the lowest cost and offer the highest carbon savings.

Increased biomethane: Increased injection of biomethane into the gas grid utilising the most accessible and least cost injection points.

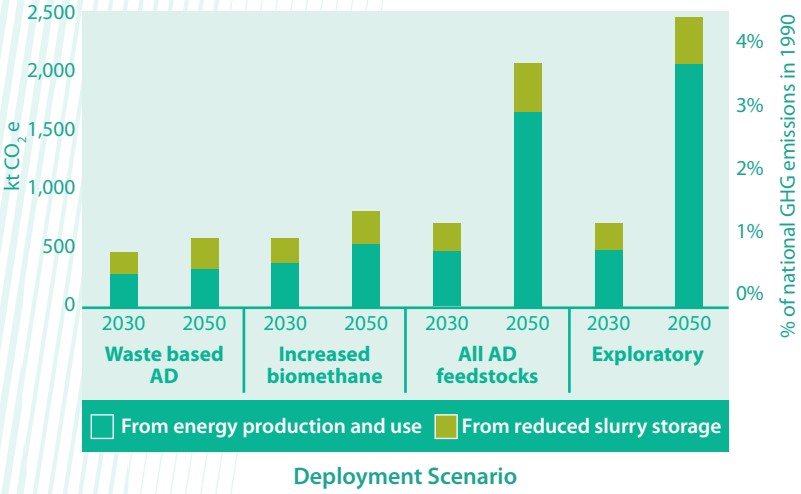
All AD feedstocks: Maximum use of all AD resources, including the potential surplus grass silage resource.

Exploratory: Gasification is a technology which is not yet mature, but could produce large quantities of biomethane from wood chips/ pellets and energy crops. This scenario explores the impact of using this technology to produce renewable gas.

Results

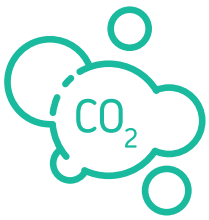
Carbon Savings and Renewable Energy Supply

Carbon savings in 2030 and 2050 by scenario

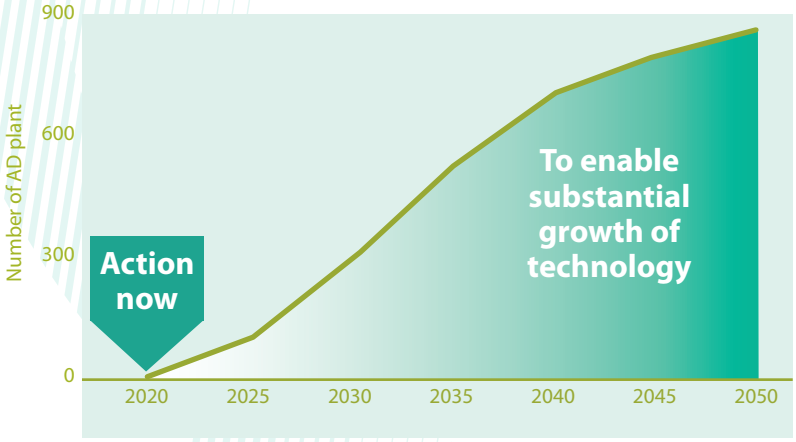


Biogas and biomethane output in 2050 equivalent to 28% of current gas supply

Carbon savings from AD of up to 0.7 Mt CO_2e per year by 2030 and 2 Mt CO_2e per year by 2050



Achieving Deployment



An estimated 900 new AD plants could be needed to deliver these carbon savings

This will need the industry to grow significantly as Ireland has only a few AD plants currently

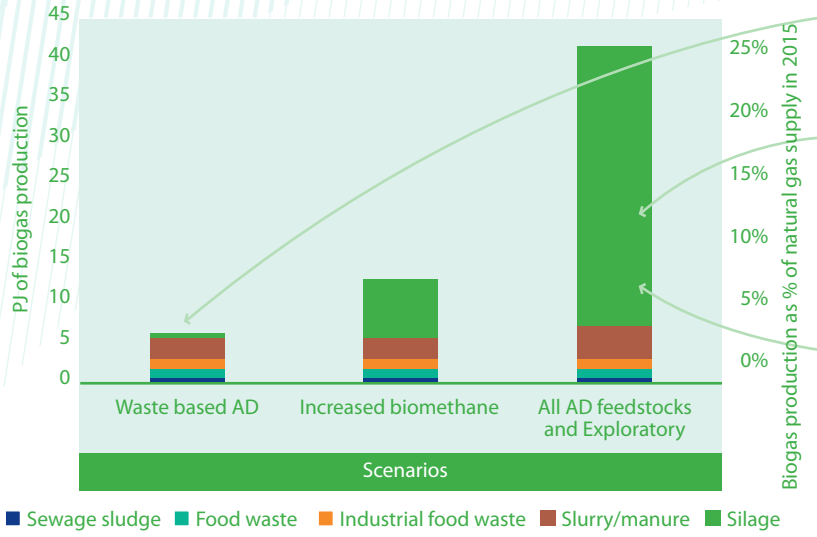
At current energy prices financial incentives are required to encourage deployment

Policy must also address other non-financial issues which could be a challenge to development

Action is required in the near term if the long term benefits identified are to be achieved

Feedstocks

Use of AD feedstocks in each scenario



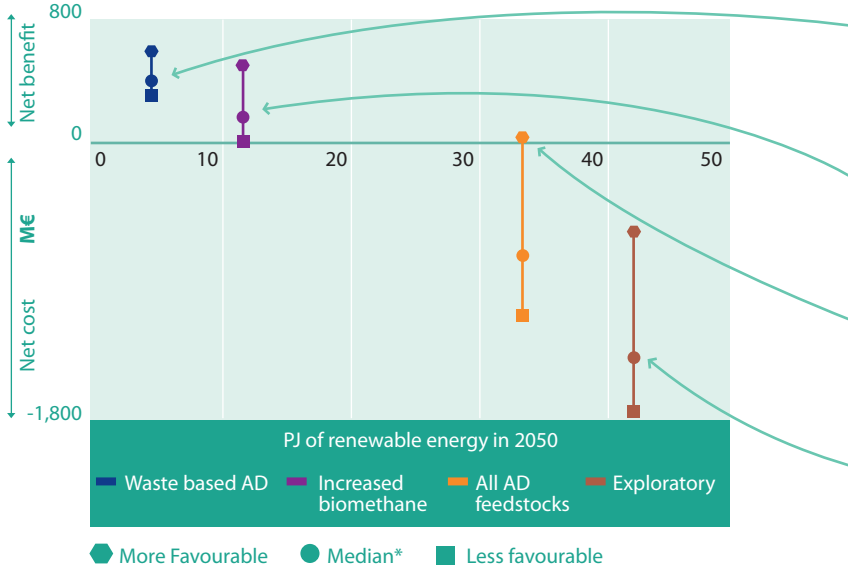
Animal and food wastes are often available at low cost or can even command a gate fee.

The additional grass silage is a key potential feedstock accounting for 86% of the renewable energy potential.

Grass silage has a production cost that makes the energy produced more expensive. Optimising production methods could minimise this cost in the future.

Economics

The cost of deployment and the benefits from carbon savings are compared to a scenario where the same energy is delivered from fossil fuel. Future fossil fuel and carbon prices, and other key variables are uncertain. This chart shows the sensitivity of the results to more and less favourable conditions for biogas and biomethane.



Using waste resources results in a net benefit to society across the range of price sensitivities examined.

Increasing production to inject gas at easily accessible points on the grid also shows a net benefit.

Maximising the use of the grass silage delivers a net benefit under favorable conditions. This includes reducing the cost at which silage is produced.

At current cost levels, the use of gasification technology to produce biogas does not yield a net benefit.

* Median conditions are based on projections of fossil fuel prices from the department of Business, Energy and Industrial Strategy in the UK, shadow prices of CO_2 from the Public Expenditure Code published by the Department of Public Expenditure and Reform and silage costs from McEniry et al., 2013

Wider Benefits and Future Development

Estimated 3,000 permanent jobs by 2050 as well as ~5,000 jobs in the construction phase

Further research into gasification and Power to Gas technologies can offer ways to increase biomethane supply substantially and to reduce costs. Power to Gas can also help the electricity system to become more flexible.

This study, delivered by Ricardo Energy and Environment in partnership with Dr. David Wall, was overseen by a steering group, comprised of representatives from a range of relevant Government Departments, regulatory bodies and academic experts, and managed by SEAI. Stakeholder consultation, including a stakeholder workshop in September 2016 in Dublin, was an important component of the study. **To read the full report, visit www.seai.ie**

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