



# Biogas

## Irish Demonstration and Market Development Projects

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Funded by  
the European Union



# Gas – backbone of the energy system



<http://www.gie.eu/KC/>



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# Options for efficient use of Biogas

## *Current Irish Policy & development potential*

- **Current Renewable Electricity Feed In Tariff (REFIT)**
  - – only subvention scheme currently active.
- **Biofuel Obligation Scheme (BOS) favourable to Biogas as a Transport Fuel – CNG**
  - Biomethane from Waste eligible for 3 Cert's per diesel litre equivalent.
    - Cert's can be traded with obligated liquid fuel importers for BOS Fine alleviation
      - Fine value is €45 per BOS Cert shortfall
    - Trading value is somewhere less than €45 per Cert or the differential cost of importing Ethanol and Biodiesel
  - Lower Excise Duty assured (relative to diesel)
- **Biomethane to Grid – part of draft Bioenergy Plan**
  - Industrial / Commercial Heat and chp demand is most critical – Large Multi-Nationals primarily.
  - Public Sector renewable heat obligations – biomethane the natural and lowest cost alternative.
  - Both options require subvention supports better than current REFIT
    - - **How would the economics compare?**

# Electricity REFIT v's Gas Grid Injection with RHI

## *The Economic comparison*

- Sample reference case – 100 GWh / Annum Biogas Capacity AD Plant

<i>All Reference Data Annualised</i>					
Reference Model on 100 GWh/yr Biogas capacity AD plant	Biogas Capacity	Less AD Process load	Upgrade & Clean	Gas Engine	Energy Output
<b>REFIT Electricity Gen<sup>1</sup></b>	<b>100,000</b>	<b>90,000</b>	<b>88,200</b>	<b>31,752</b>	<b>31,752</b>
	MWh/yr	90%	98%	MWe/yr	
<b>Biomethane to Grid</b>	<b>100,000</b>	<b>90,000</b>	<b>83,700</b>	<b>n/a</b>	<b>83,700</b>
	MWh/yr	90%	93%		

# Electricity REFIT v's Gas Grid Injection with RHI

## *The Economic comparison*

- Sample reference case – 100 GWh / Annum Biogas Capacity AD Plant

<i>All Reference Data Annualised</i>		Producer		
Reference Model on 100 GWh/yr Biogas capacity AD plant	Energy Output	Market Value	Subvention / Premium	Producer Revenue
			<i>Upper REFIT 3</i>	
<b>REFIT Electricity Gen'</b>	<b>31,752</b>	<b>€ 1,746,360</b>	<b>€ 3,562,574</b>	<b>€ 5,308,934</b>
		<b>€55/MWe</b>	<b>€112.2/MWe</b>	<b>€167.2/MWe</b>
		33%	67%	
			<i>RHI to match REFIT revenue</i>	
<b>Biomethane to Grid</b>	<b>83,700</b>	<b>€ 2,008,800</b>	<b>€ 3,300,291</b>	<b>€ 5,309,091</b>
		<b>€24/MWh</b>	<b>€39.43/MWh</b>	<b>€63.43/MWh</b>
		38%	62%	



# Electricity REFIT v's Gas Grid Injection with RHI

## The Economic comparison

- Sample reference case – 100 GWh / Annum Biogas Capacity AD Plant

All Reference Data Annualised		Producer			Market Supports		Grid	Total Costs to Exchequer / Consumer	Total Market Subvention
Reference Model on 100 GWh/yr Biogas capacity AD plant	Energy Output	Market Value	Subvention / Premium	Producer Revenue	R-Factor, Admin, Shipper O/H & Margin	CAP 05 (standby, peaking plants, etc.)	Grid Re-enforcement Cost - Annualised		
			<i>Upper REFIT 3</i>		PSO	PSO	Net' Tariff		
<b>REFIT Electricity Gen'</b>	<b>31,752</b>	<b>€ 1,746,360</b>	<b>€ 3,562,574</b>	<b>€ 5,308,934</b>	<b>€ 3,135,065</b>	<b>€ 3,384,446</b>	<b>€ 5,000,000</b>	<b>€ 16,828,446</b>	<b>€ 15,082,086</b>
		<b>€55/MWe</b>	<b>€112.2/MWe</b>	<b>€167.2/MWe</b>	<b>€99/MWe</b>	<b>€107/MWe</b>	<b>€157/MWe</b>	<b>€530/Mwe</b>	<b>€475/MWe</b>
		<b>10%</b>	<b>21%</b>		<b>19%</b>	<b>20%</b>	<b>30%</b>		<b>90%</b>
		<b>33%</b>	<b>67%</b>						
			<i>RHI to match REFIT revenue</i>		RHI & Green Certs Admin	n/a	Net' Tariff		
<b>Biomethane to Grid</b>	<b>83,700</b>	<b>€ 2,008,800</b>	<b>€ 3,300,291</b>	<b>€ 5,309,091</b>	<b>€ 600,000</b>	<b>n/a</b>	<b>€ 430,000</b>	<b>€ 6,339,091</b>	<b>€ 4,330,291</b>
		<b>€24/MWh</b>	<b>€39.43/MWh</b>	<b>€63.43/MWh</b>	<b>€7.2/MWh</b>		<b>€5.1/MWh</b>	<b>€76/MWh</b>	<b>€51.73/MWh</b>
		<b>32%</b>	<b>52%</b>		<b>9%</b>		<b>7%</b>		<b>68%</b>
		<b>38%</b>	<b>62%</b>						

- Potential EU fines - RES 2020 Targets ~€150 Million per % shortfall per annum.
  - Net REFIT subvention measures are far higher than scale of potential fine risk
  - However, Biomethane to Grid required subventions are much less than the potential fine -

# Potential scale in Ireland

	Source Feedstock	Recoverable DMT	GWh
2013 Data	Municipal Wastes	376,500	1,242
	Cattle Slurry	1,616,056	889
	Landfill Gas		880
	Straw & crop residue	425,000	468
	Dairy WWT	60,000	231
	Dark Brewers Grains	40,000	154
	Animal by-products	181,000	149
	WWT		110
	Industrial Food Waste	26,000	100
	Spent Mush Compost	105,000	87
	Sheep Slurry	94,335	52
	Pig Slurry	56,488	31
	Poultry Slurry	3,278	2
		<b>4,395</b>	

## Resources

- *Waste:*
  - *Over 8% of Irish Gas Demand*
- *Some 2<sup>st</sup> Generation sources also viable – such as grass from marginal land, and excess silage.*

## Future & more substantive resources

- *3<sup>rd</sup> Generation.*
  - *Algae (Micro & Macro)*
  - *eGas / P2G*

