The Potential for CAD in Ireland

Vicky Heslop – Methanogen Ltd

The Future of Biogas 3 - PROBIOGAS

Background

- Currently no CAD in Ireland
- 1st feasibility study for CAD in 1990
- 2002 EPA Study identified 10 viable CAD sites
- Manure and sufficient non-farm waste
- N.Kilkenny identified as one of 10 sites

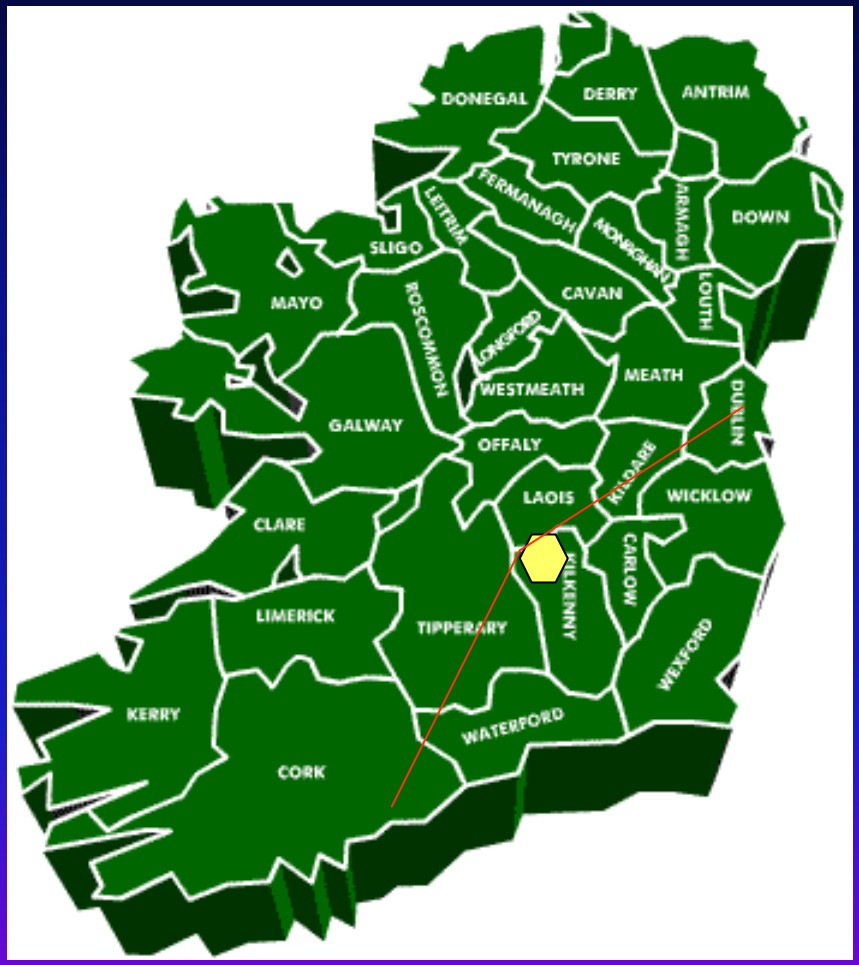
Regulatory Conditions in 2005

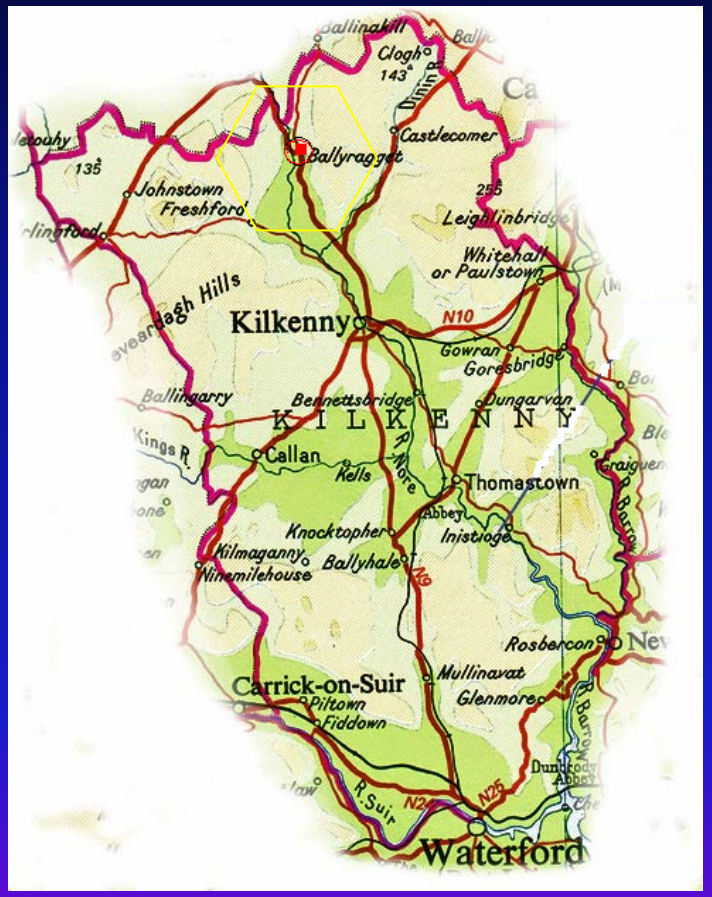
- Draft Nitrates – control of N & P & 4mths storage
- ABP – **no** spread of fertiliser products containing meat
- Waste Stategy – BMW for AD/compost – grow 5x by 2010
- RE – 13% of elec by 2010 – 7.2c/kwh for biomass
- RD&D funding for novel RE – SEI
- NCCS 2008 – 60k tpa manure, 900k tpa fertiliser use
  - large heat users in ETS – carbon credits
- CAP reform – uncertainty for small farms

N.Kilkenny

- Central to Southern Ireland
- Mixed farming, dairy, tillage, pigs
- High incidence of TB in cattle
- Mostly family farms
- Soils are dry/free draining to waterlogged
- Mostly fertile alluvial soils, except uplands
- Large areas gravel topsoil and limestone subsoil
- 2 major rivers, Nore & Barrow
- Small rural towns (250 people) – de-populating
- Good major roads, small country lanes

Site Location





Feedstock available within 7km 143t/day

Biomass	***Amount***	***DM***	***DM***	***Biogas 60%***
	Ton/year	***%***	***t/year***	***CH_4 nm^3/year***
Cattle *slurry*	31,132	7	2,148	572,828
FYM	3,240	20	648	129,600
Dairy WWTP sludge	18,000	14	2,440	1,152,000
Manure and waste	**52,372**	**10**	**5,236**	**1,854,428**

50 farms with 5,700LSU on 2,300ha grassland & 485ha arable

- Sewage sludge from small rural works
- Household kitchen and canteen waste

Existing management

- 18,000tpa dairy sludge to 9,000ha landbank –grass
- 14%DM, 6.8kg N – 20% to crop (1.4kgN), 7.8kg P
- Spreading controlled by P – 19kg/ha (soil P=3)
- After manure 2,300ha grass needs 31.7tpa P
- Sludge applied to grass = 4,073tpa sludge (2.4t/ha)
- Application rate of Organic-N = 187kg/ha

- 5,700LSU at 170kg N/ha (2LSU/ha) = 2,850ha
- Farms have 2,300+485ha = 2,785ha

Need CAD to process manure and sludge for redistribution

Nutrient equation overall

	Tons pa	Total N	Av % N	Avail N	P
sludge	18,000	6.80	20%	1.36	7.80
slurry	31,132	3.85	40%	1.54	0.73
FYM	3,240	4.50	30%	1.35	1.20
Total	52,372	256,396		76,836	166,188
digestate	49,753	5.16	70%	3.61	3.34

- Available N in digestate is 179,855kg pa

Increased utilisation means 103 tpa of N fertiliser is saved

Value of saved N eutrophication of groundwater is €86,500

Potential NMP

- As digestate manure & sludge used on arable land
- More material used on farms = over 10,000tpa
- Organic matter added to arable land
- Less Nitrogen lost to environment

Why ?

Whole digestate & some liquor to arable

Liquor only to grassland

P concentrated in fibre used in horticulture

Transport equation

Now

- 13,937tpa sludge other land – average extra 15km
- 4,073tpa sludge in area – average run 4km
- 18,000tpa farm spreading of sludge – 0.75km
- 33,587tpa manure spread on farm – 0.75km
- 785tpa manure other land – if available 3km

With CAD

- 31,132tpa slurry collection from farms – 4km
- 3,240tpa FYM to CAD – 4km
- 16,952 tpa extra in delivery digestate products – 4km
- 48,084 farm spreading – 0.75km
- 4,288 fibre transported out of area – 50km

With CAD an additional 190,000km travelled pa

Manure storage

Pre N Regs – farms had 2-3mths storage

- Cattle in for 5 mths mid Oct-mid March
- Spread in Dec/Jan depending on weather
- 2nd spread after 1st or 2nd cut silage

Post N Regs – farms to have min 4mths storage

- No spreading 15th Oct-15th Jan
- Need additional 50-100% more storage
- 60% capital grant
- Could have been for digested liquor

Smells

- Stored manure smells (farmers don't always notice!)
- 14%Dm dairy sludge remains sometime on grassland
- It has a strong and unpleasant smell

Ireland is becoming an urbanised rural community

NIMBY

- Digested products have minimal offensive odour
- In normal conditions no odour after a few hours

Health

- N.Kilkenny has high incidence of TB
- Local vets say slurry spreading doesn't help

AD + pasteurisation will destroy most disease pathogens
Improves plant health & therefore also animal health

BUT not BSE

Ireland Inc. has €7 billion meat export trade
also large meat import trade

- Exempt cat 2 and catering waste with 3 week delay
- All other cat 2 must be rendered
- All other cat 3 needs 3 year delay, spreading to animal use

Greenhouse Gases

		tpa CO_2
• Electricity sales	CO_2	- 1,856
• Heat sales	CO_2	- 1,217
• NPK substitution	CO_2	- 299
• Transport fuel	CO_2	32
• Manure storage	CH_4	- 6.3
• Sludge storage	CH_4	- 189
• CHP unburnt gas	CH_4	273
• Manure/sludge/fertiliser	N_2O	- 446
		- 3,709 tpa

Farmers economy

Arable
- Needs new storage – no grant – 4,000m^3
- Fertiliser – 16tpa P saved – 2tpa N needed
- Addition of organic matter - ?
- Increased spreading costs – 4,500tpa

Grass
- New storage – 60% grant – 13,000 needed anyway
- Farm alterations
- Fertiliser savings – 103tpa N – no change P
- Increased spreading costs – 10,000tpa

Savings in fertiliser more than cover additional costs

The financial details – 143t/day – €4.3m

Costs	€
Capital financing	336,000
Storage financing	22,000
Maintenance	129,000
Labour/admin	118,000
Separation	40,000
Transport	111,000
Other	42,000
TOTAL	€823,000

Revenue	€
Electricity (7.2c)	275,000
Heat (4c)	92,000
Gate fees (€12.50)	230,000
TOTAL	€597,000

Operational loss of € 226,000pa

Summary of socio-economic benefits

- NMP – 103tpa artificial N fertiliser saved – €72,200
- Water eutrophication (25% art N) – 25tpa - €86,500
- Net GHG emission saved – 3,709 CO_2 tpa - €74,180
- Health ?
- Odour - €17,000

TOTAL €249,880

Total revenue earnings - €597,000pa

Socio-economic benefits are 42% of actual revenue

Conclusion 1 – the potential of CAD

- Re-distribution of nutrients in area
- Facilitates compliance with Nitrates Regulations
- Allows farmers to maintain stock numbers
- Improves a declining rural economy
- Protects animal health
- Reduces N loss to water – 25tpa
- Reduces GHG – 3,709t CO_2 pa
- Makes the area more pleasant to live in

Greater benefits if landfill wastes included

Conclusion 2 – what's needed

MORE INCOME

- Financial recognition of socio-economic benefits
- Allow high value waste (ABP)

  – gas, gate fees, socio-economic
- Higher energy value
- Flexibility in N Regs – recognise actual availability
- Better markets for heat