5th UK Bioenergy Conference 2002

Hosted by British BioGen
Trade Association to the UK Bioenergy Industry

Central Science Laboratory, Wednesday 27th February, 2002

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Murray	Carter	
Julie	Dowson	Northumberland County Council
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Philip	Good	PricewaterhouseCoopers
Stek	Hans	Profactus Limited
Gerard	Werdmuller	Profactus Limited
Chris	Eley	Profactus Limited
Steve	Parker	Proman Energy
Tamasin	Battell	ReMaDe Kernow
Helen	Richardson	Renew North
Robin	Twizell	Renewable Energy from Agriculture
Rupert	Burr	Roves Farm
Mark	Crawford	RSPB
David	Collins	Rutherford Collins
Elizabeth	Crawshaw	Shell Global Solutions
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Rachael	Mills	The Energy Saving Trust (EST)
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Introduction

Silvan Robinson CBE

Chairman, British BioGen

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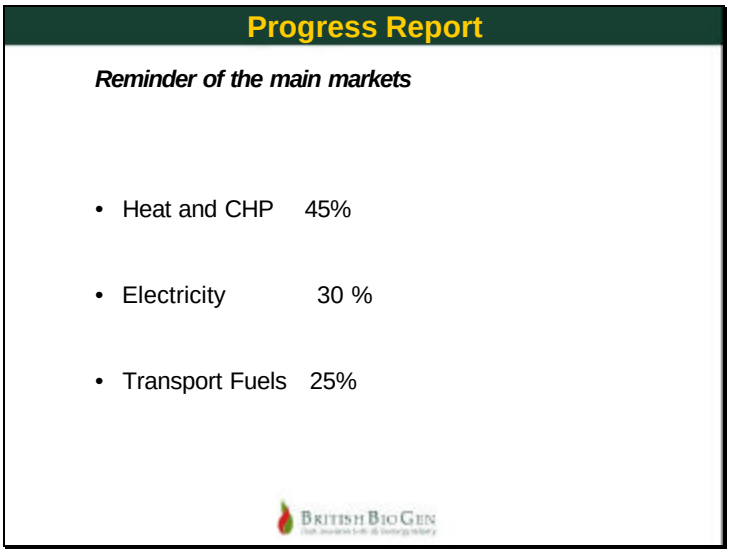
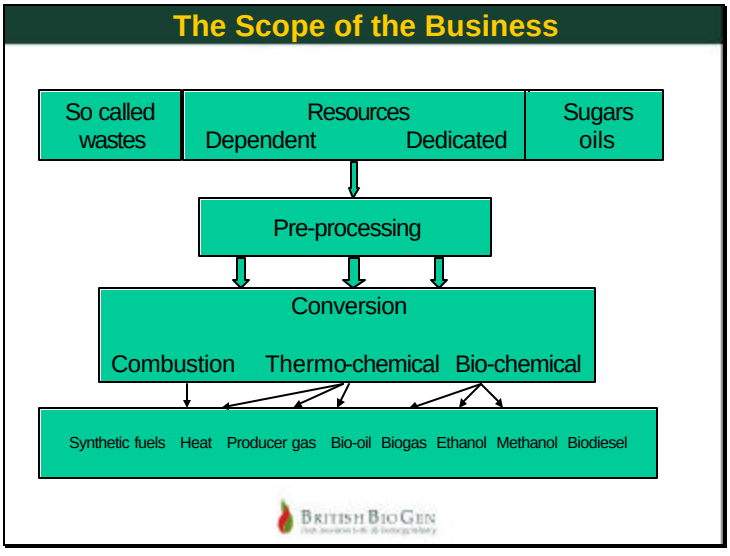
Progress Update

Silvan Robinson CBE
Peter Billins

power from the land



In the UK DTI figures show that biomass for heating already accounts for more energy, (710 thousand tonnes of oil equivalent) than large scale hydro (449 thousand tonnes of oil equivalent).
Overall Biofuels account for about 80% of Renewable energy in the UK, 75% when MSW incineration is excluded.



Heat Market Development

- The grant scheme was widely welcomed
- And will have the desired effect provided
    - Scheme design is not proscriptive about fuel types
    - Or business models eg clusters
- **Who knows best officials in Whitehall or our members on the ground ?**

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Electricity Market development

- Its going to be hard
    - Capital 2.5p
    - Operations 1p
    - Fuel 3p
    - Total 6p
    - Value with a long term contract 5p
- Business reality requires
    - a proven technology
    - a long term sales contract
    - a secure feedstock supply
- Proscription will not work

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Transport Fuels

- Key requirement is for Government to enact the findings of the policy commission
- A tax level of 4.5p per litre
- After all its only parity with LPG
- And the industry is ready and waiting
    - Bioethanol
    - Biodiesel

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Transport Fuels

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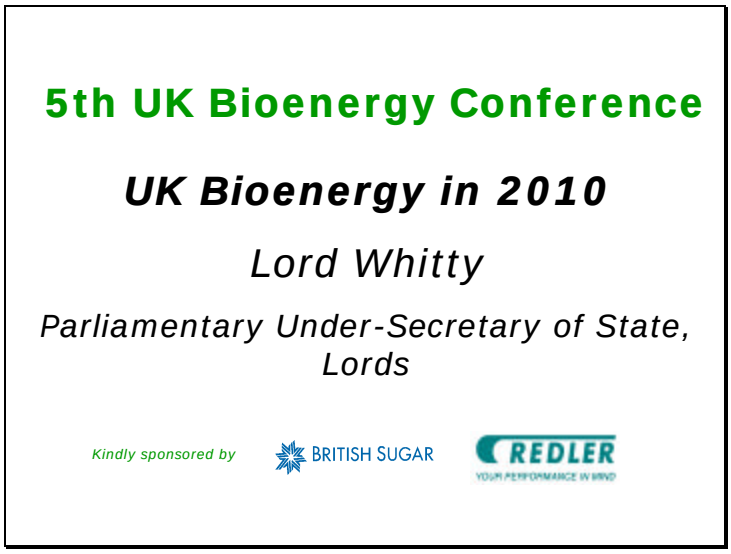
Kick starting Energy Crops via co-firing

- An instant incentive to develop fuel supply chains
- Lead time approx 18 months to 2 years
- Allows industry to focus on fuel supply chain development
  - learn
  - get more efficient
  - to the benefit of all



LORD WHITTY

Introduction

I am delighted to be able to be with you at this conference. Your agenda today raises issues which are important for the Department for Environment, Food and Rural Affairs and for a number of other Departments across Whitehall. These are subjects which also impact on a range of policies and issues affecting agriculture, environment and rural issues. I would like to begin by saying a few words about the context of government policies and objectives.

Policies and Objectives

Crops and co-products from agriculture used in energy production have an important place in the aims and objectives we have in DEFRA. They will contribute to our sustainable farming objective through the prudent use of natural resources. They are one example of diversification into new commercial opportunities which will underpin the future viability of farming. And they have the potential to create and sustain jobs in rural areas.

DEFRA is also responsible for ensuring that the UK meets its climate change targets – both the Kyoto target to reduce greenhouse gas emissions by 12.5% below 1990 levels by 2008-2012 and the Government's domestic goal to cut carbon dioxide emissions by 20% by 2010. We published the UK's climate change programme in November 2000. This set out a range of policies which we estimate could cut the UK's emissions by 23% by 2010. Two key policy areas include making more use of combined heat and power, and encouraging the development of renewable energy crops as a form of energy.

We lead on the Government's plans for the development of combined heat and power in the UK. CHP is a highly fuel-efficient technology and the potential for biomass-fuelled CHP is being enhanced by new and novel technologies.

You are no doubt very well aware of the Government's target to generate 10% of electricity from renewable sources by 2010. An obligation on suppliers is the key mechanism for achieving this. Following significant consultation on the obligation, the Government earlier this month introduced the draft Order to the House. The Government expects that this 25 year Obligation will come into force on 1 April of this year and will create a market for renewables worth at least £750m by the end of the decade.

The need to ensure security of fuel supplies will mean that purpose grown energy crops will be used alongside material supplied from forests. The Government's England Forestry Strategy included a commitment to increase the use of renewable sources of energy. Wood fuel from forests and short rotation coppice offers the potential to help achieve this. DEFRA and the Forestry Commission are working together, in support of shared rural development objectives, to develop a supply chain that is capable of integrating purpose grown energy crops and material supplied from forests.

There is a clear interdependence between the two sources of material. First, there is likely to be the need for a guaranteed woodfuel supply from traditional forests in the early years of any large development, as farmers change their management practices, and as short-rotation coppice gets established. Second, the guaranteed supply from existing forestry sources is crucial to securing financial backing.

Progress to date/current activity
Solid biomass

October 2000 was a significant step forward with the introduction of the Energy Crops Scheme, one of the series of integrated measures introduced in the Rural Development Programme for England. The Rural Development Regulation allowed us to set up a scheme providing planting grants for short-rotation coppice (either willow or poplar) and miscanthus. And we can also pay grants for setting up producer groups for SRC growers to help with on-farm work, develop best practice and improve marketing of the crop.

The Rural Development Regulation, known as the Second Pillar of the CAP, illustrates the way agricultural support is moving towards mechanisms that deliver environmental benefit. The diversification provision allowed us to include miscanthus when we had previously been limited to forestry support. But I accept the Rural Development Regulation is not a perfect mechanism and our aim is to improve it when we can. As part of this exercise we shall also be looking at the future of CAP support for all non-food crops.

Development of any sector has to be market-led. Progress with projects under the Non-Fossil Fuels Obligation has been patchy to say the least. The Government recognised that more was needed and so we allocated at least £36m from the New Opportunities Fund to support the local heat market and large power projects. Following the PIU study on renewables the Prime Minister allocated an equivalent amount of funding to give a further boost to energy crops markets in the heat, combined heat and power and

electricity generation sectors. The Schemes to access this funding are being worked up and will be launched in the near future.

But there is also significant activity by others. Tomorrow sees the launch of the initiative by the Countryside Agency to develop community-based renewables schemes. This is a further example of positive steps to extend the use of wood-fired energy systems at the local level. The Countryside Agency has set a good example in taking this lead and I am pleased that the DTI was able to add to the programme that had been planned.

As part of the Government's concerns about addressing sustainability and renewable energy, we have been looking at ways to improve the planning system. DTLR recently launched a review of the national policy planning guidance for renewables which will take into account the important impact of planning on sustainable energy generation, including the role of energy crops. We have also encouraged regional stakeholders to prepare assessments of renewable energy targets for their areas, as part of the Government's positive and strategic approach to renewable energy. In December last year DTLR published their planning Green Paper "A Fundamental Change" which looks at the practical working of the planning system in England.

On an individual case level all development has to be considered on its merits in the light of all material planning considerations. But we do take the promotion of renewable energy, within the development control system, very seriously, hence the reviews.

Liquid biofuels

We have also seen a lot of activity on liquid biofuels recently. Following the Green Fuel Challenge the duty rate on biodiesel will be reduced by 20ppl, compared to ultra-low sulphur diesel, in Budget 2002. And we have had bids leading to three pilot projects with duty exemptions for hydrogen, methanol and biogas. A further round of the Challenge will be launched in the near future.

The Government/industry Forum on non-food uses of crops included biodiesel and bioethanol in its early case studies. The Forum's role is to look at the development of non-food crops and make recommendations to Government about policy development, research and development and the removal of barriers to progress. There is not universal agreement on the benefits of biodiesel and so, in support of the Forum, we have commissioned a study with Sheffield Hallam University looking at the energy, environmental and socio-economic costs and benefits of biodiesel. We expect this to be available in May and the work will be peer reviewed and published.

This is also an area that the Policy Commission on the future of farming looked at. They recommended that the duty on biofuels be reduced to the level of duty on liquid petroleum gas and compressed natural gas. This recommendation has implications for a number of Government departments and decisions on tax rates are based on a range of economic, social and environmental variables. We shall be considering the recommendation carefully.

One cautionary note is that, on balance, research indicates that some biofuels may have limited benefits in terms of air quality. At this early stage we need to carefully consider the overall environmental impacts of biofuels in relation to cost to the public purse in

order to identify, and promote, viable biofuels for the future energy needs of the United Kingdom.

Finally the EU has also made proposals on biofuels. The proposed directives would set mandatory targets for use of biofuels and make it less administratively cumbersome for Member States to introduce lower tax rates for biofuels. We consider that the Commission needs to take a broader view which looks at the long-term strategic move to a low carbon transport system. To be consistent with the general EU approach to renewable energy the proposal needs to look at setting indicative, flexible targets. Discussions are continuing in Brussels.

Anaerobic digestion (centralised)

I discussed the detail of the renewables objective earlier. Taking on board these principles, there would appear to be potential to use CAD to generate energy from renewable sources such as farm manures. Indeed one such installation has just become operational in Devon, using large volumes of animal manure as its feedstock. Of course in many instances the best environmental option for livestock manures, and the cheapest, is the responsible recycling of the nutrients within them on-farm. My Department, with much assistance from the plant operators, have commissioned a lifecycle analysis of the environmental impact of the CAD plant in Devon, based on throughput, energy production, and actual measurements of emissions at the digestion site and during associated transport. Further details will be released in a forthcoming edition of a Departmental newsletter "Agriculture and the Environment R&D". So please look on the DEFRA website or contact the DEFRA helpline if you would like to be added to the distribution list for the publication.

Although this technology could provide economic and environmentally sound means of utilising manures, there is still a need to remain vigilant over biosecurity when collecting digester foodstuff from farms. Operators will also need to ensure good management of the plant to minimise fugitive losses of methane, which if uncontrolled could quickly negate any overall benefit to reducing greenhouse gas emissions. We would welcome the interest from suppliers, given their location and the co-location of suitable foodstuffs, to consider CAD to deliver more energy through renewables. My officials will monitor progress at the Devon site and provide updates, so in the near future we will have a clearer assessment of the actual environmental benefits of CAD under UK conditions in terms of reducing atmospheric emissions.

PIU Energy Review

The Energy Review, published by the Performance and Innovation Unit on 14 February [as a report to Government], sets out a vision and strategy for future energy policy to 2050. I welcome the recognition this gives to the importance of environmental issues, and to the key role that renewables and energy efficiency will need to play in our move towards a low carbon economy.

The Review recommends that the Government set a target of 20% for the proportion of electricity generated from renewable sources by 2020, and that institutional barriers to renewable investments should be addressed urgently. The Review recognises it will be important for Government to know how well the Renewables Obligation is working

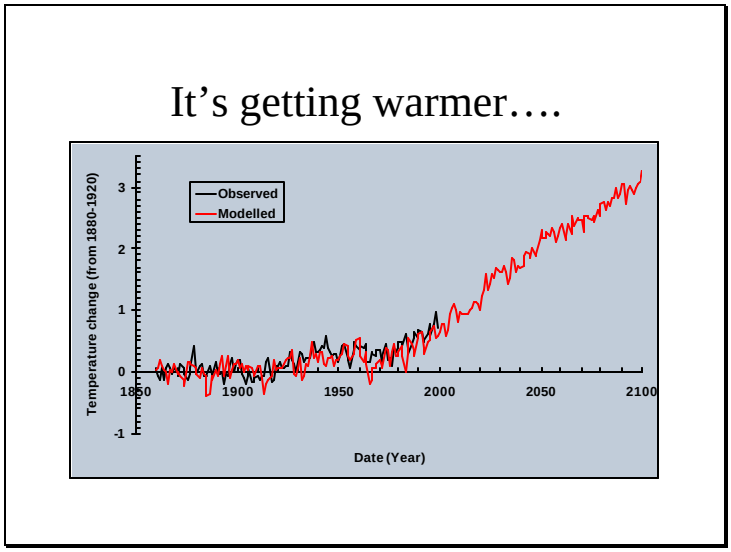
before deciding on the policy instruments to deliver larger post-2010 targets. But it recommends that DTI should establish these mechanisms by 2008.

At a wider level, the Review stresses the importance of technological innovation to create options to meet future challenges, and the need for flexibility and to avoid locking prematurely into options that may prove costly in future. So, while discussing energy crops as one of several renewable options with the potential to contribute most to meeting future energy needs, it does not back this source over the others ([wind, wave & tidal, solar photovoltaic)].

The Government welcomes the Review report as a valuable contribution to the debate on how best to meet Britain's future energy requirements, will consider the proposals carefully, and will respond in the autumn in an Energy White Paper. Before that, there will be a period of public consultation. What does seem clear is that a move towards a low carbon economy will offer real opportunities for innovative businesses.

Conclusion

This is a period of considerable change and challenge for agriculture. Using crops and wood residues for energy is a sector in its infancy which is developing against that background of change. From my speech it is clear that there is a vast amount of activity taking place to take this all forward in the best way. I am very pleased that British Biogen is fully involved in that process and I know that the close links you have with officials in DEFRA have been most beneficial. I hope you will find today's conference useful and fruitful and I wish you well in your deliberations.



IPCC's 3rd Assessment Report noted:
Over the last 100 years, global temperatures have risen by 0.6 degree C.
The last decade appears to have been the warmest in 1,000 years.
CO2 levels have risen by over 30% since the industrial revolution.

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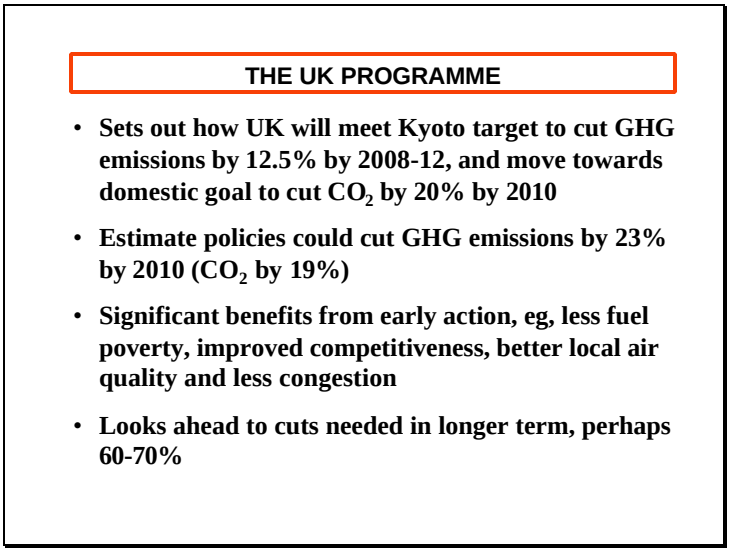
Modelling has shown that human activities have caused a substantial part of the temperature rise.
Global temperatures could rise by 1.5 and 6 degrees C.
In the UK, there could be 20% more winter rain and more extreme rain events (a 1 in 50 year flood could become a 1 in 10 year flood in 50 years time).

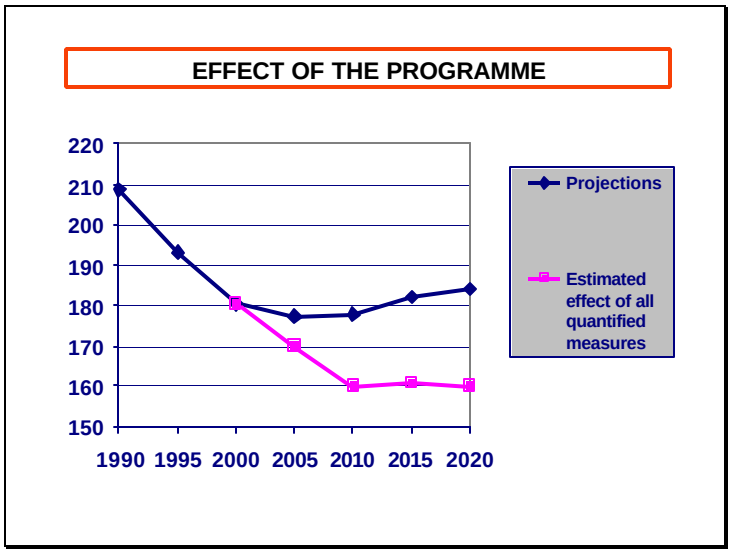


Programme was published in November 2000.
[targets]

Overall, we estimated that the policies and measures in the programme could cut greenhouse gas emissions by 23% below 1990 levels by 2010. This equates to cut of 19% in CO2. Other measures that we could not quantify, eg. action by local authorities, the devolved administrations and better public awareness could mean that we will meet the domestic goal.

We have always been keen to spread the message that action to tackle climate change can bring other advantages, eg…

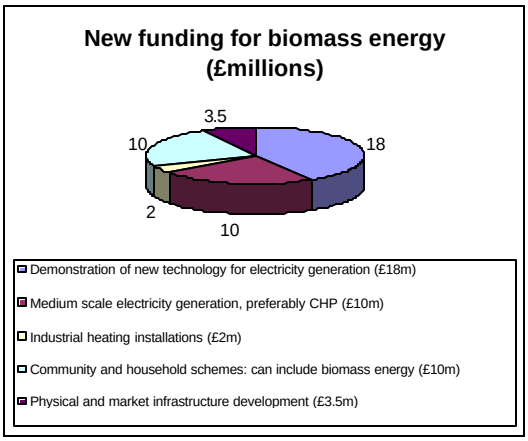
The programme looks ahead to beyond 2010, and at what the UK might need to do to meet future targets. [IPPC - RCEP] It also begins to put in place some policies that should continue cutting emissions in the longer term.

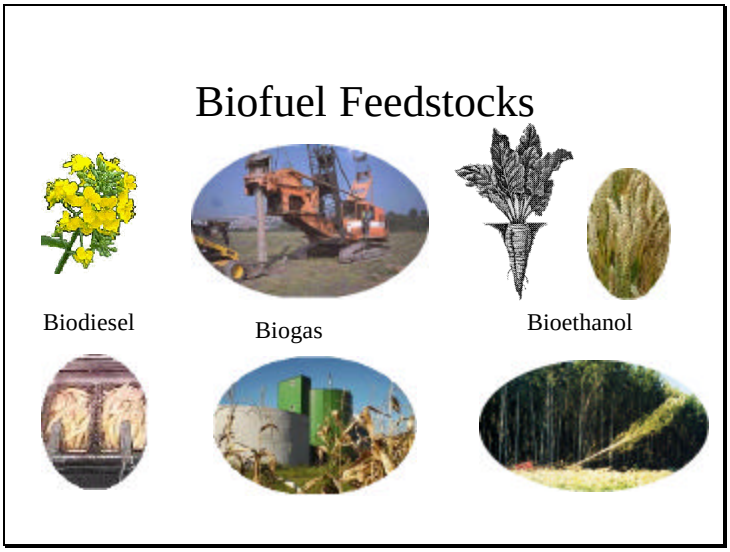


This graph shows the estimated effect of the additional policies and measures to 2010.

MONEY FROM THE NEW OPPORTUNITIES FUND FOR BIOMASS ENERGY PRODUCTION

•Large scale electricity generation	£33m
•Small scale heat/CHP	£3m


New funding for biomass energy
(£millions)
3.5
10
18
2
10
Demonstration of new technology for electricity generation (£18m)
Medium scale electricity generation, preferably CHP (£10m)
Industrial heating installations (£2m)
Community and household schemes: can include biomass energy (£10m)
Physical and market infrastructure development (£3.5m)


Biofuel Feedstocks
Biodiesel
Biogas
Bioethanol

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DEFRA CONTACT POINTS

DEFRA HELPLINE

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•**Postal address**:	DEFRA Helpline Department for Environment, Food and Rural Affairs 3-8 Whitehall Place London SW1A 2HH
•**DEFRA WEB SITE:**	www.defra.gov.uk

PERFORMANCE AND INNOVATION UNIT'S REPORT 'THE ENERGY REVIEW'

The report is available from:

Performance and Innovation Unit
4th floor
Admiralty Arch
The Mall
London
SW1A 2WH

Tel: 020 7276 1416

It is also on the PIU website at www.piu.gov.uk

ENERGY POLICY AND
RURAL DEVELOPMENT

Oliver Harwood
Head of Rural Economy

Introduction

The Country Land and Business Association (CLA) represents some 46,000 members with over 130,000 rural businesses of all types. Many of our members are involved in new and renewable energy projects, and all of them are deeply concerned on the likely effects of climate change. We recently published our own research paper "Climate Change and the Rural Economy" copies of which are freely downloadable from www.cla.org/climatechange.

At the same time, our members wish to see new and renewable energy projects as part of a newly invigorated rural economy: not only providing reductions in greenhouse gases (GHG), but also opportunities for rural businesses to develop new markets.

ENERGY POLICY AND RURAL DEVELOPMENT

BACKGROUND:
THE EXISTING ENERGY MIX

- Electricity
- Heat
- Transport

If we are to be entirely serious in addressing Climate Change, policy needs to deal with all sectors of energy use, and make a formal strategy to address carbon use in each.

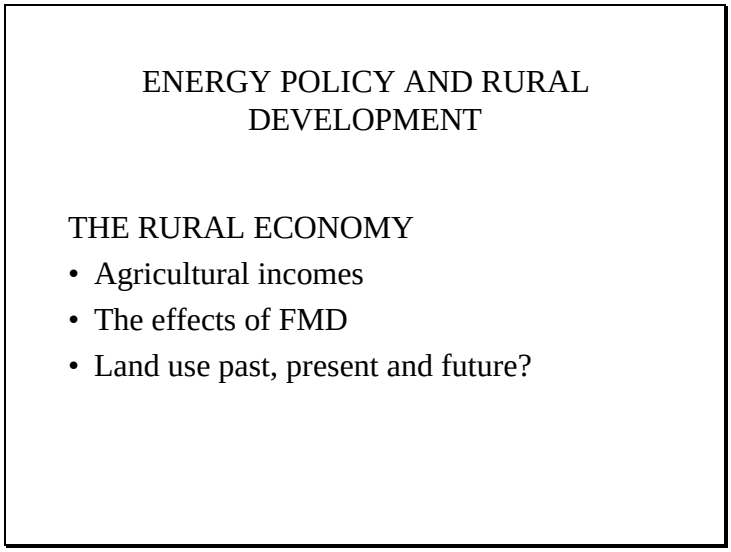
Electricity: Whilst understandable, given the history of a state owned generation and distribution electricity system, and rational, given that it is clearly easier to address a target in a system which is already regulated than to start afresh in other sectors, the concentration to date on electricity production, through NFFO and now the Renewables Obligation, is no longer supportable as a stand alone policy.

It remains a fact that electricity accounts for only a quarter of fossil fuel use, and a similar output of greenhouse gases.

There has been no real strategic attempt to address policy for the contribution of new and renewable energy in either the heat or transport markets, though prospects for this may be brighter following the Energy review.

Heat offers huge opportunities for early gains in reductions of GHG from biomass. The combined GHG output of the domestic and industrial energy use, largely by way of heat, amounts to about 50% of the UK total.

Transport: Other countries, less oil rich, or perhaps less oil driven, have introduced biofuels into the transport sector. This needs to be addressed in the UK. Transport accounts for 25% of current GHG emissions.



There has been a significant change in the rural economy over the last 5 years. Agriculture, which is the major land use, has suffered a swift and savage reversal of fortune, broadly caused by external factors: the strength of sterling (or the weakness of the Euro) and weak commodity markets combined with excessive regulation have reduced farm incomes to a low that is unprecedented in the post war era.

Foot and mouth disease has again demonstrated the linkage between farming and the other businesses that work in the landscape produced by land management. Not only tourism, but service suppliers, professionals, and retail businesses of all types have suffered significant drops in income over last summer: falls of such significance that we have called on government to provide further interim emergency assistance to help prevent many rural businesses going bust over the winter.

We think that biomass, together with other local and regional renewable energy developments, offers a huge opportunity for helping to rebuild the rural economy, both in areas hit by FMD, and elsewhere.

At the same time, biomass production is a low input/high biodiversity form of land use. The crop requires little or no pesticides, and forms a haven for wildlife. Where it displaces intensive cropping, large benefits occur.

It should be remembered energy crops are nothing new: before widescale mechanisation, some 20% of our agricultural land was devoted to fuel production, by way of hay and oats for the horses that powered the transport and farming sectors.

ENERGY POLICY AND RURAL DEVELOPMENT

CURRENT POLICY

- Renewables Obligation
- Climate Change Levy
- Capital grants
- R & D

First, let me outline the major policy instruments, then turn to detail some of the accompanying measures:

The RO has been a long time coming, but is welcome nonetheless. It should be introduced on 1 April.
It only applies to electricity,
The proportion of renewable electricity required under the Obligations will increase between now and 2010
It is proposed that the obligation would account for around 3% in the first compliance period ending 31 March 2003, rising to about 10.4% in the year ending 31 March 2011. To provide long term security for investors, the Obligation will then continue to apply at a minimum of 10.4% of sales until 2027.

The Climate Change Levy applies to the use of energy by all non-domestic (industrial, commercial and public sector) customers throughout the UK. The rate for electricity is 0.43p/kWh until 1 April 2003, thereafter to be adjusted in line with the retail price index (RPI). Renewable generation (excluding hydro over 10MW) is exempt from the CCL. This means that suppliers who sell eligible renewable electricity to non-domestic customers are exempt from the Climate Change Levy for that supply. Some of the resultant savings will be shared with generators

Capital grants are available for a range of renewable investments, and finally

Research and Development funding is also available.

ENERGY POLICY AND RURAL DEVELOPMENT

THE RENEWABLES OBLIGATION

- ROCs
- NETA
- Embedded generation benefits

Renewables Obligation Certificates (ROCs): electricity suppliers will be required to demonstrate compliance with the RO by presenting ROCs to the Gas and Electricity Markets Authority, OFGEM, in respect of generally year-long periods. These certificates will usually be issued to accredited generators for eligible renewable electricity both generated within the UK, & supplied to customers in Great Britain.

If insufficient ROCs are presented to Ofgem by a specified date, a buy-out price must be paid

Under the Obligations, electricity suppliers can comply by buying ROCs from an accredited renewable generator; and / or· buying ROCs from other suppliers / traders who have bought more than they need.

The nominal value of a ROC (the avoided cost of non compliance) is 3p/KWh (£30/MWh) to the electricity supplier. How much of this benefit will accrue to the generator is a matter of concern. Some estimates suggest that, owing to asymmetries in the market, as much as 2/3 may be creamed off by others or lost in the transaction costs. I hope this is proven wrong.

The New Electricity Trading Arrangements (NETA) commenced in England and Wales in March 2001. The key aim of the reform has been to drive wholesale electricity prices down, which it has successfully done by some 20-25%. However, the Law of unintended consequences has meant that so far the imbalance settlement pricing system has discriminated against renewables and smaller generators. Possible remedial measures are the subject of a consultation by DTI, but will struggle to resolve the conflict between the drive for cheap electricity and the costs of renewable generation

Embedded Generation: savings in transmission and line reinforcement costs may be captured by well located generators. A DTI / Ofgem Working Group (the Embedded Generation Co-ordinating Group) is being established to implement the recommendations of the EGWG across Great Britain. Regrettably regulations require amending before this can be out into effect, and this will take time.

ENERGY POLICY AND RURAL DEVELOPMENT

THE CLIMATE CHANGE LEVY

- Flaws
- Rates
- Mechanisms

The climate change levy is a flawed policy tool.

First, in that it applies only to business use of energy, and therefore fails to address the very large domestic contribution to GHG emissions.

Second, in that the sectoral agreements mean that intensive energy users have been able to negotiate reductions, but the basis for these has not been transparent

Third, that the revenue raised has not been redistributed evenly, the National Insurance bills of manufacturing being lower than those of the service sector.

Fourth, that the CCL does not apply to heating oil, which is covered by other taxes.

Rates are
Elec: 0.43p/KWh
Nat gas 0.15p/KWh
Solid Fuel (coal coke etc) 1.17p/Kg

LPG 0.96p/Kg

HMCE climate change levy helpdesk Tel 0161 827 0332

In the context of renewable electricity, generators need to seek levy exemption certificates from Ofgem. For direct supply of biomass, or heat contracts using renewables, no levy is payable, which provides a direct saving to the customer. The savings that business customers enjoy may be captured by the energy supplier, or shared with the customer

One of the key issues for potential renewable generators will be whether or not the value they can appropriate from the Renewables Obligation plus the CCL exemption is sufficient for renewables generation to be commercially viable. The buy-out price has been set at a level such that the Government's renewables target should be achievable. However, there is a risk that in the competitive market, renewables generators may not be able to appropriate all of the value of the buy-out price or the CCL exemption. In addition, there is a risk that wider cost reductions may drive down the market price for electricity below the expected level. These risks mean that the viability of marginal technologies is highly questionable.

ENERGY POLICY AND RURAL DEVELOPMENT

CAPITAL GRANTS / FUNDING

- New Opportunities Fund
- Planting Grants
- Enhanced Capital Allowances
- Good Quality CHP
- Other schemes

The most important NOF grant aids for the rural sector are:
£33m for energy crop technologies
£3m for small scale biomass heat

Details of these are not finalised and are to be announced on 1 April

DEFRA has an allocation of £29million for planting grants, payable where growers can show contracts with energy purchasers, at the rate of

£1600 or 1000 /ha for short rotation coppice, depending on land type
£920/ha for miscanthus grasses

up to 50% of the set up costs for forming producer groups

Tax breaks under the enhanced capital allowance scheme give 100% first year write-offs for investments in a range of qualifying energy saving technologies, including CHP, boilers, motors, variable speed drives etc.

In addition, qualifying “good quality CHP”, even if not fired by renewable bio-energy fuels, qualifies for rate relief for plant and machinery used in the process. At the same time, electricity sales up to the CHP equivalent generation limit from good quality CHP made on site, or via direct arrangements not involving a licensed electricity supplier will not be subject to Climate Change Levy. Electricity exports to the grid from CHP will however be subject to CCL, unless renewable fuels are used.

Other schemes of interest include the Community energy funding of £50m which may offer renewable community heat opportunities and The Countryside Agency community renewables scheme which also has funding for local facilitation of renewable projects through the planning process

ENERGY POLICY AND RURAL DEVELOPMENT

THE ENERGY REVIEW

- A Report to Government
- Support for renewables
- Support for institutional changes

The PIU Energy Review is not Government policy: it recommends that DTI carry out early public consultation with the aim of producing its own White Paper by autumn. This is disappointing, given that PIU consulted widely (they has over 400 responses) and the working party was chaired by the Energy Minister.
The only upside of this further unwelcome delay is that it offers the CLA and others a further opportunity to ram home the messages that Government needs to hear.
The report expresses firm support for renewables generally, calling for a doubling to 20% of the electricity target for 2020, and raising a number of issues which I will sketch.
However, it is weak on the market approach to analysis: it deals with supply side issues, rather than looking at sectoral analysis in terms of electricity, heat and transport. This, combined with a market based approach to “not picking winners” means that bio-energy has no special place in their view, and moreover that prospects for heat and transport from bio-fuels are hardly addressed.

On the plus side, it recommends the setting up of a sustainable energy policy unit within government, for DTI to be more explicit in the guidance it gives to Ofgem on the environmental impacts of its work, and for the Treasury to consider carbon pricing to replace the Climate Change Levy, which, whilst a long term aim, will boost the prospects for bio-energy more widely.

ENERGY POLICY AND RURAL DEVELOPMENT

ENERGY REVIEW: RECOMMENDATIONS

- Energy policy generally
- Renewable specifics

The PIU Energy Review recommends that overall energy policy should be "the pursuit of secure and competitively priced means of meeting our energy needs, subject to the attainment of an environmentally sustainable energy system" this new caveat is a welcome proposal.

On specifics, PIU recommends

increased funding for low carbon R&D

the 20% electricity target by 2020

a review of R Obligation in 2007/8 to ensure new target is met

NETA: transitional measures ready for small generators by Jan 2003 in case proposed measures are unsuccessful

Embedded generation recommendations by 2005, with legislation as back up to be in place by 2007 if this doesn't work

Ofgem assurance that future changes to electricity do not discriminate against renewable and CHP generation

DTI to assess need for capital grants after 2005 in time for 2004 spending review

DTI to analyse further possibilities and benefits of mechanisms or schemes to promote renewable heat, plus household and/or community projects

Treasury to ensure that elec used on site treated in same way as that exported

DTLR and DTI to update national planning guidance to make it clear when there is a national case

Regional planning bodies to give greater prominence to renewables

Local plans to have proactive policies for energy developments

ENERGY POLICY AND RURAL DEVELOPMENT

BIO ENERGY AND CURRENT POLICY

- Where are we now?

Electricity production from biomass involves a resource cost not faced by other renewable technologies. Biomass power stations have to buy in fuel, whereas waste to energy plants can charge a gate fee for disposal, and of course wind and solar derive energy directly from the sun.

As against this, biomass power can be stored, and switched on and off with ease, in the same way as conventional fossil fuel generation. This means biomass power stations can be used to reinforce the grid and save transmission costs and losses.

The previous means of support for nuclear and renewable generation, the Non Fossil Fuel Obligation has produced a dozen or so projects, but a quarter have not yet been built owing to major problems in achieving planning consent .

Current technologies can produce electricity for a price in the region of 5.5pence per unit, as opposed to onshore wind at roughly 2 to 3 pence. Biomass costs will fall, perhaps to 4 pence per unit, if development and dissemination continues.

However, with this price differential, biomass generation is not commercially viable compared to other renewables, and so cannot raise the many millions needed for financing a wide scale switch to biomass use.

This matters because without a market for biomass crops, the rural economy and biodiversity lose out in a big way, and without a market for the technology, we risk losing the technical lead that has been built up in UK biomass generation companies.

ENERGY POLICY AND RURAL DEVELOPMENT

POLICY ANALYSIS

- The renewables obligation
- Capital grants
- Energy crops scheme
- NETA

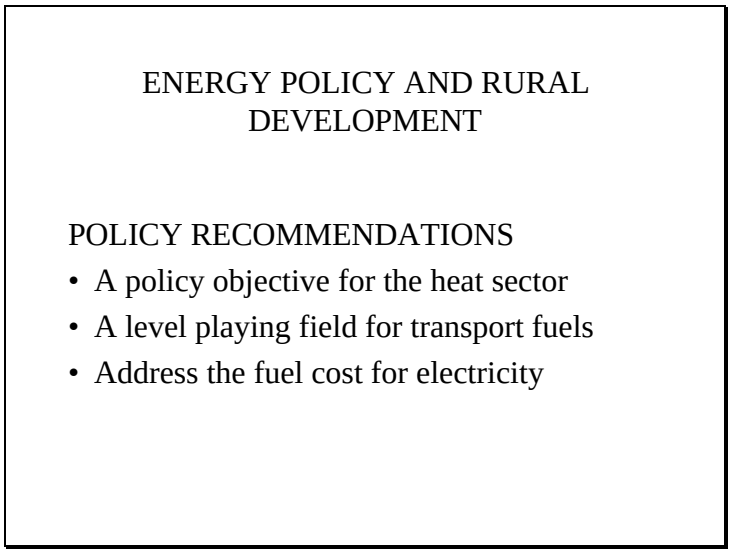
The new Renewables Obligation is based on the idea that all renewable energy sources should compete on the basis of price. It therefore cannot credit the significant positive externalities produced by the growing and use of biomass, that in terms of policy balance negate the additional fuel costs.

We are concerned that the capital grants proposed to make up the shortfall will not meet the fuel cost problem, and the only realistic option to ensure a significant level of biomass generation is to split the Renewables Obligation into two sections, at the first review in 2006/7. All the near market renewables, such as onshore wind, should be in the lower band with the proposed capped price of 3p. Biomass and other renewables that need additional development and dissemination should be in a separate band with a higher buy-out price.

We have welcomed support for planting energy crops under the England Rural Development Plan, but the rules require that energy markets be secured before planting the crops. No power stations, no crops.

The new electricity trading arrangements create difficulties for all smaller generators, even those that can guarantee load as biomass can, and they make CHP less than profitable. Ofgem has already agreed that this is the case, but says that it is not his job to sort it out. Clearly this is a task for government.

Using biomass to generate electricity may add up to 1% to electricity bills generally, at least in the initial stages, but we believe this is a small price to pay for the wider benefits to the rural economy and environment:- Particularly as wholesale electricity prices have fallen by 20 times this amount since NETA

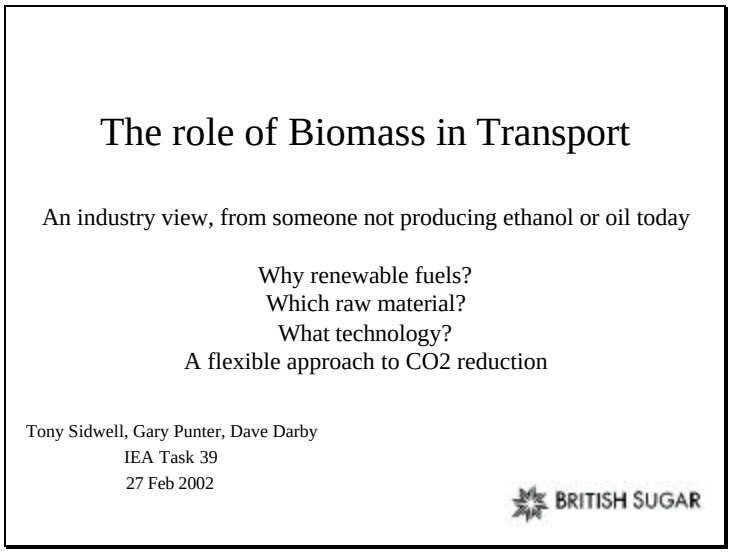


There is a huge possibility here for doing so much good for the rural economy and the environment. Government must not miss the chance, and either expect the market to deliver, or simply fail to recognise the opportunities for win win scenarios at a very low cost to the exchequer.

We call for joined up thinking in the heat sector: encouragement and capital grants for consumers switching to biomass heat, start up help for escos, and consideration of how domestic heat users can be rewarded for going green.

We call for government to adopt a policy commitment to obtaining 10% of transport fuels from renewable resources by 2010, using 10% of available land, by matching the fuel duty rates currently on offer to Calor and CNG.

We call for the Renewables Obligation to be banded at its next review, transferring the costs of biomass generation to the consumer rather than being met by the exchequer, and for planning guidance to be revised to emphasise that biomass power stations must be built in the countryside, close to the fuel source.



A W Sidwell, British Sugar

This presentation is a view from the UK's largest purchaser and processor of crops.

Climate change policy is driving the UK to find processes for reducing greenhouse gas (GHG) emissions. Policies so far have targeted the industry and the power generation sectors. The only energy sector showing growth in GHG emissions is the transport sector. UK government has only recently started to tackle this sector, with little encouragement to develop a British industry.

British Sugar, part of the Associated British Foods group, have been studying the evidence for bio-fuels with regards to carbon dioxide abatement and have looked at scientific papers from around the world. These studies show that bio-ethanol is a fuel that is available now and will significantly help to reduce GHG emissions in at least the short to medium term.

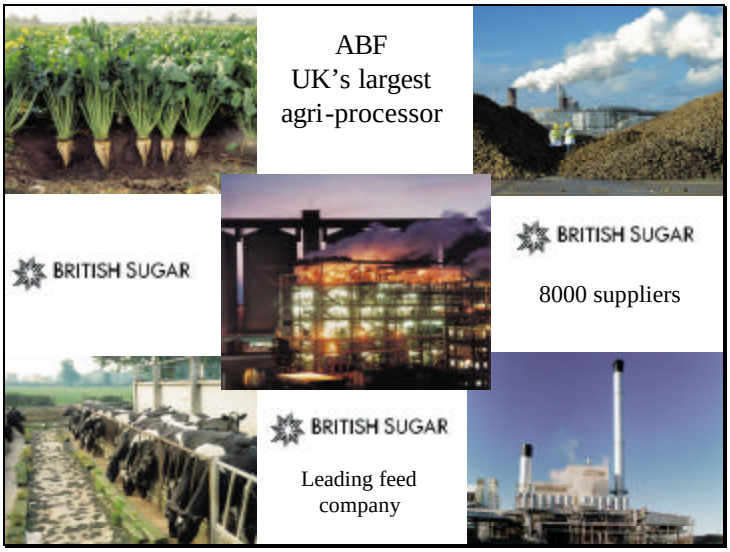
To introduce an industry to the UK there are a number of steps that can be taken, from importing ethanol in the very short term to developing the technologies to turn domestic waste into fuels in the longer term.

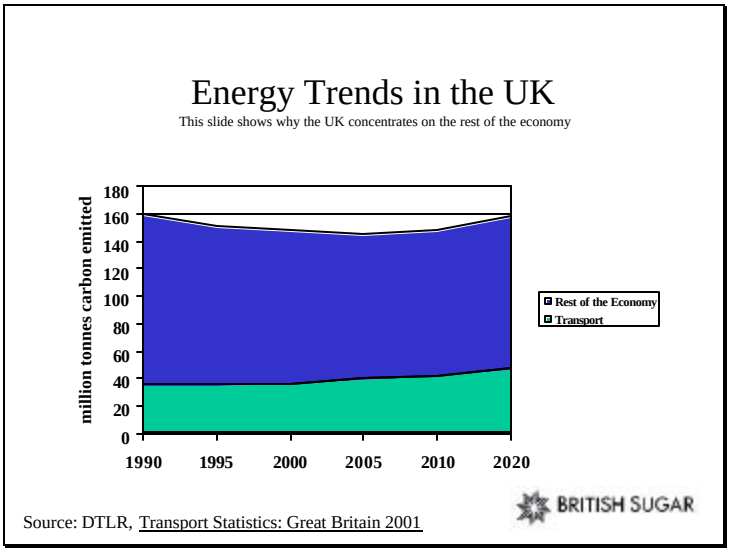
At the same time the infrastructure will need to be developed so that maximum GHG abatement can be achieved. The hydrogen economy is probably 50 years away, so measures have to be put in place utilising the technologies that are available now in a flexible way to allow the development and introduction of the future technologies.

- For sustainable transport emissions we need a balanced approach comprising:
  - transport reduction,
  - improved engine efficiencies and new technologies,
  - the introduction of a number of renewable fuels.

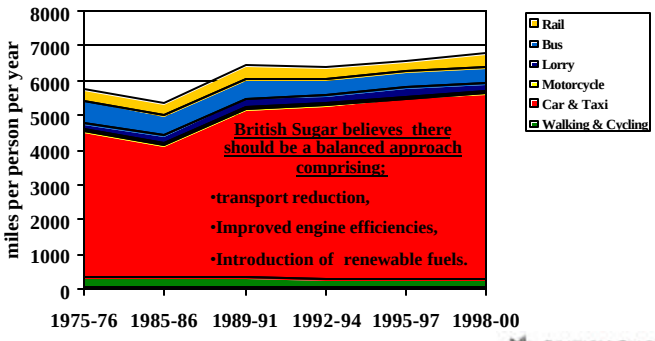
5th UK Bioenergy Conference 2002

- Infrastructure needs to be demonstrated in the short term with the introduction of low petrol blends and conversion of captive fleets.
- Industry needs a change in government policy so that investment can be made now to ensure that the UK will benefit.
- Investment needs to be made in R & D in the UK now for the long term. The UK are probably 10 years behind other countries in their research.
- Strategic partners need to be attracted to the UK now to help to close the technology gap for the long term and to ensure that the UK learns from the experience of other countries.





The Growth of Transport in the UK
Is it Sustainable ?



Source: DTLR, Transport Statistics: Great Britain 2001

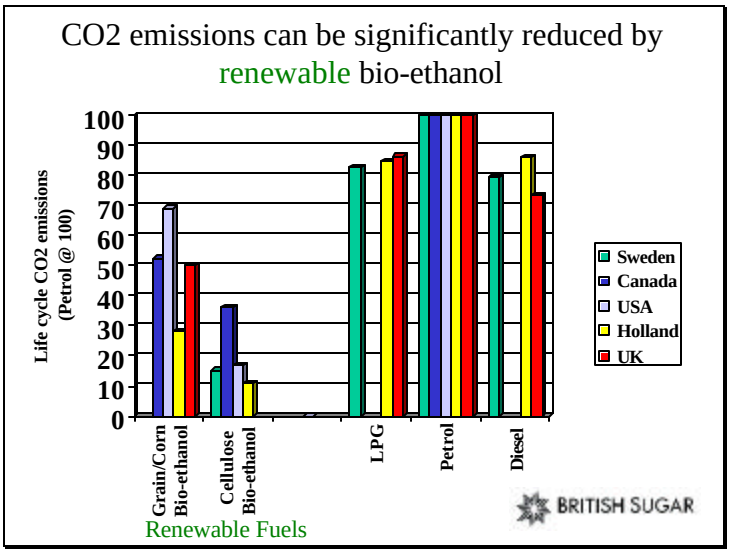
BRITISH SUGAR

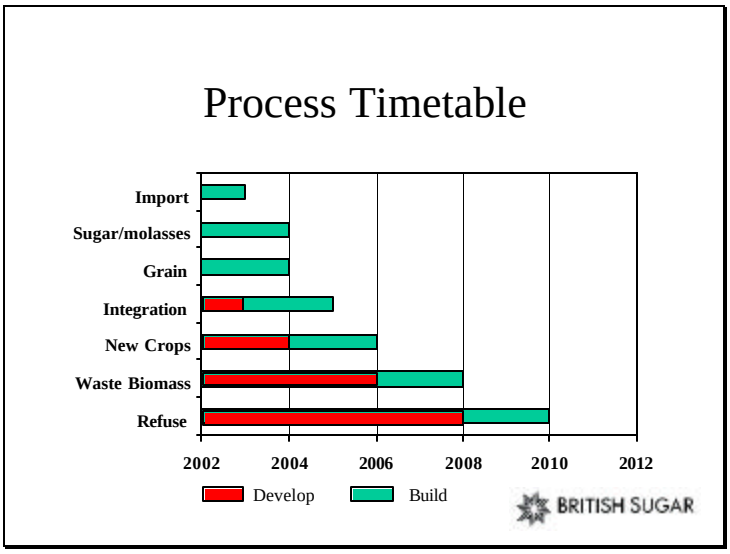
Can bio-ethanol reduce CO_2 ?

	Title	Author	Agency	Date
CANADA	Assessment of Net Emissions of Greenhouse Gases from Ethanol-Blended Gasolines in Canada:Lignocellulosic Feedstocks	Levelton Engineering Ltd. and (S&T)² Consultants Inc.	Canadian Government Dept of Agriculture and Agri-Food.	Jan 2000
HOLLAND	Analysis and Integral Evaluation of Potential CO2 neutral Fuel Chains	Arthur D Little	Novem ,(Netherlands Agency for Energy and Environment)	Nov 1999
USA	Effects of Fuel Ethanol Use on Fuel Cycle Energy and Greenhouse Gas Emissions	M.Wang	Argonne National Laboratory, Transportation Technology R&D Centre, Chicago, USA	Jan 1999
SWEDEN	ELM: Environmental Assessment of Fuel Supply Systems for Vehicle Fleets	Magnus Blinge Chalmers University of Technology, Gothenburg, Sweden.	Dept of Transportation and Logistics, Gothenburg, Sweden.	1998
UK	Alternative Road Transport Fuels- A Preliminary Life Cycle Study for the UK	M.Gover , S.Collings , G.Hitchcock, D.Moon,G.Wilkins	ETSU	Mar 1996

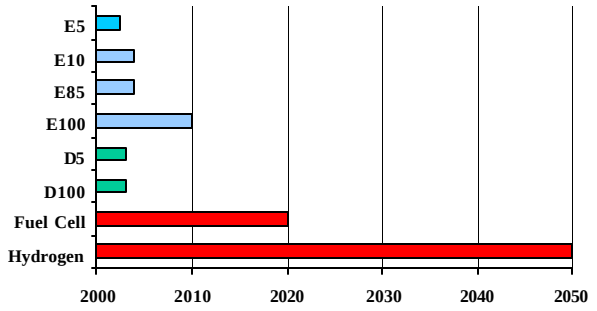
Recent work from national Energy Agencies in 5 countries

BRITISH SUGAR


CO2 emissions can be significantly reduced by renewable bio-ethanol
Life cycle CO2 emissions (Petrol @ 100)
100
90
80
70
60
50
40
30
20
10
0
Grain/Corn Bio-ethanol
Cellulose Bio-ethanol
LPG
Petrol
Diesel
Sweden
Canada
USA
Holland
UK
BRITISH SUGAR
Renewable Fuels


Process Timetable
Import
Sugar/molasses
Grain
Integration
New Crops
Waste Biomass
Refuse
2002
2004
2006
2008
2010
2012
Develop
Build
BRITISH SUGAR

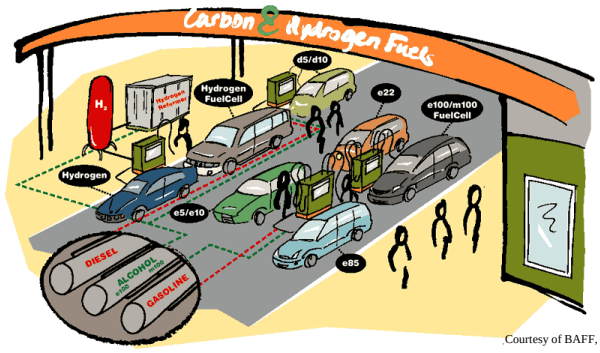
The Market & Technologies



BRITISH SUGAR

No one delivery system, or company, can cover all renewable fuels or give the required supply security

Flexible Infrastructure for the future

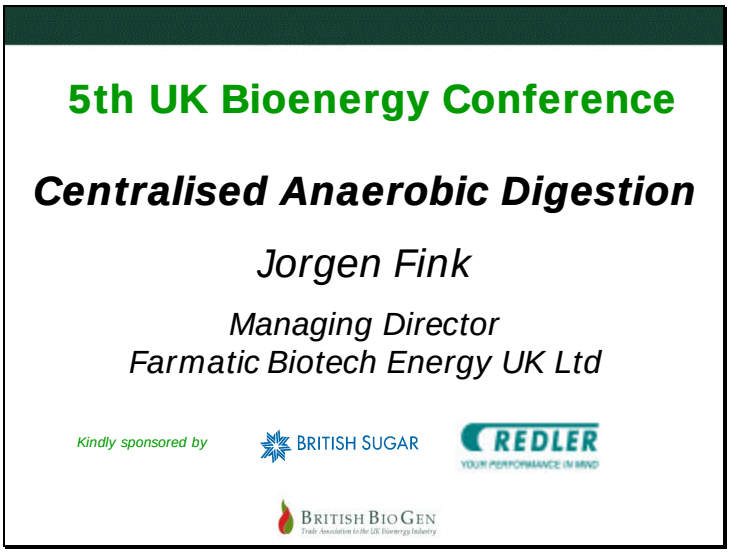


Courtesy of BAFF, Sweden

So what should the UK be doing?

- For sustainable transport emissions we need a balanced approach comprising:
  - transport reduction,
  - improved engine efficiencies,
  - the introduction of a number of renewable fuels.
- Demonstrating infrastructure in the short term
- Investing in the industry
- Investing in R & D for the long term.
- Attracting partners to the UK for the long term.

BRITISH SUGAR



Centralised Anaerobic Digestion

1. Introduction

The term “centralised anaerobic digestion” is used normally to mean large plants where digestion of biomass from different sources is undertaken. For example, manure from several farms is co-digested with other material such as the organic fraction of food processing waste.

Centralised anaerobic digestion (AD) plants are normally much bigger than farm scale or industrial plants. Furthermore, these plants are used for re-distribution of nutrients from farmers or food processors with nutrient surplus to farmers who can use the nutrients in the digestate as a substitute to mineral fertiliser. Therefore, the centralised AD plants are much more than a renewable energy producer. The modern AD plants are today combined environmental and renewable energy plants.

2. Focus on Denmark and Germany

2.1. Denmark

The first large scale biogas plant was built in Denmark in 1984. Today we have 20 large scale plants treating a wide range of biomass, all types of animal manure mixed with different types of organic food waste.

The size of the Danish plants varies from approx. 30 tonnes/day to approx. 450 tonnes/day.

The total amount of manure and food waste treated at the Danish plants is: approx. 1.4 million tonnes/year giving a gas production of approx. 55 million m^3 biogas per year. With an estimated methane percentage at 65 % this corresponds to approx. 358 million kWh per year.

Examples of food waste treated at Danish biogas plants are:

- Slaughterhouse waste (stomach/gut content and fat and flotation sludge)
- Bleach clay
- Fish industry waste
- Dairy waste
- Fruit and vegetable waste
- Brewery waste
- Misc. grease trap waste
- Process sludge from the pharmaceutical industry
- Sewage sludge
- Source separated household waste
- Industrial kitchen waste

The biogas plants either sell their gas to district heating companies with CHP units or they have CHP as an integrated part of the biogas plant. The electricity produced from biogas is sold to the public grid at attractive green electricity prices set by the Danish Government. Furthermore the heat is sold to either existing district companies or newly established district heating companies.

All plants in Denmark have further benefited from capital grants varying from 11 to 45 %. The average over the last 9 years has been approx. 20 %. The selling price of the produced electricity is approx. 5 p/kWh.

A very important role for the Danish plants has been to act as a bio-fertiliser bank where farmers in need of nutrients can benefit from getting bio-fertiliser from farmers with an excess of nutrient. In Denmark there are very strict limitations on the amount of nutrient to be spread on the land. Farmers must keep a nutrient account (both manure and mineral fertiliser) and if they exceed their quota they will be fined. Therefore the Danish farmers have learnt to appreciate the higher nutrient value of the bio-fertiliser compared to raw slurry. This enables them to save money and get a higher nutrient value of their resources.

Some Danish Biogas Plants:

Ribe Biogas Plant, Denmark

The Ribe plant was built in 1989-90 and started operation in 1990. The plant treats approx. 160,000 tonnes per year of manure and food waste. The manure is collected from approx. 70 farmers. The process is thermophilic (approx. 53 º C). The plant was built at the time when the Danish Government introduced the legislation requiring the farmers to have up to 9 months storage capacity of the slurry. Instead of each farmer building his own storage tank, Ribe Biogas constructed 25 decentralised storage tanks with a total capacity of 50,000 m^3 for the bio-fertiliser returned to the farmers. The farmers then pay a rental fee equal to the yearly cost of the tanks. A large number of arable farmers are buying some of the bio-fertiliser. The yearly biogas production is approx. 4.8 million m^3. The biogas is piped via a low pressure gas pipe to a new CHP plant a few miles away in Ribe.

Hashøj Biogas Plant, Denmark

The Hashøj plant started operation in 1994. The plant treats approx. 50,000 tonnes of slurry from 16 farms as well as food waste from local food processors. The process is mesophilic (approx. 38 º C). Before digestion the biomass is pasteurised for at least one hour at a minimum temperature of 70 º C. This will kill all pathogens, weed seeds, and any virus. This means that the plant can treat almost all types of organic waste. The project also includes storage tanks to the farmers for the bio-fertiliser, and some excess bio-fertiliser is sold to arable farmers. The yearly gas production is approx. 3.1 million m^3. The biogas is piped to the nearby CHP plant. The heat is sold to a district heating system which was installed at the same time. The CHP plant has one biogas engine and one combined biogas/natural gas engine.

Nysted Biogas Plant, Denmark

The Nysted Biogas Company is a combined biogas and district heating company. The Nysted plant started operation in 1998. The plant treats approx. 80,000 tonnes per year of manure (mainly pig slurry) and food waste as well as some pre-treated household waste. The manure is collected from 36 farmers. The process is mesophilic. The yearly gas production is approx. 2.9 million m^3. The CHP plant is an integrated part of the biogas plant, and the heat is sold to approx. 150 heat consumers in Kettinge town. The big gas store on this plant as well as a number of other plants (including Hashøj), is installed because the electricity is sold according to a triple tariff system (peak and high tariffs at day times and low tariffs at nights). Thus the gas engines are normally stopped at night in order to increase the income to the company.

2.2. Germany

The first centralised biogas plant was built in the early 80s and today there are approx. 20 centralised biogas plants in Germany. Thus the sector is today at the same scale as Denmark but is still growing since the Renewable Energy Act of the German Government offers incentives for all renewable energy types effective from April 2000. The Government is supporting the development of anaerobic digestion by introducing grant schemes for construction as well as attractive electricity prices for electricity produced at the biogas plants. The increasing environmental concern over green house gas emissions is also supporting this development.

Biogas plants in Germany have received capital grants of 20 – 40 %. Depending on the size of the plants the selling price for the produced electricity is approx. 5.5 – 6.5 p/kWh.

Some German Biogas Plants:

St. Michaelisdonn Biogas Plant, Germany

The St. Michaelisdonn plant started operation in 1995. The plant treats 40,000 tonnes per year of manure and organic industrial waste. The process is mesophilic with a pre-pasteurisation step at 70 º C for one hour. The biogas is used in a gas engine.

Neubukow Biogas Plant, Germany

The Neubukow plant was built and started operation in 1999/2000. The plant treats 80,000 tonnes per year of manure and organic industrial waste. The process is two-stage mesophilic with a pasteurisation unit which heats the biomass to 70 º C or 90 º C

for one hour. The temperature is specified by legal regulations and monitored by the district veterinarian.
The yearly gas production is 3.2 million m^3. The gas is burned in a CHP plant. The electricity is sold to the local power company. The heat is sold to the district heating system in Neubukow town close to the plant.

3. Holsworthy Biogas
Holsworthy Biogas Ltd. was established in 1998. In 2000 farmatic was appointed as the turn-key contractor to build, finance and assist in the operation of the biogas plant. Furthermore, farmatic is a shareholder in the company. The remaining shares will be held by the local community and the supplying farmers (the farm supply agreements include a share option for the farmers to get shares in the future). farmatic will also be responsible for the continuing maintenance of the plant

farmatic started construction in February 2001, and the plant is now ready for start-up. Holsworthy Biogas will start to bring in slurry as soon as the company has been granted the IPPC licence. Full production is envisaged by May/June 2002.

Holsworthy Biogas will eventually process 146,000 tonnes per annum of cattle, pig and poultry manure plus organic food waste. The manure will be collected from approx. 30 local farms within a 5 miles radius of the plant. The food processing waste will be collected direct from food processors in the South West.

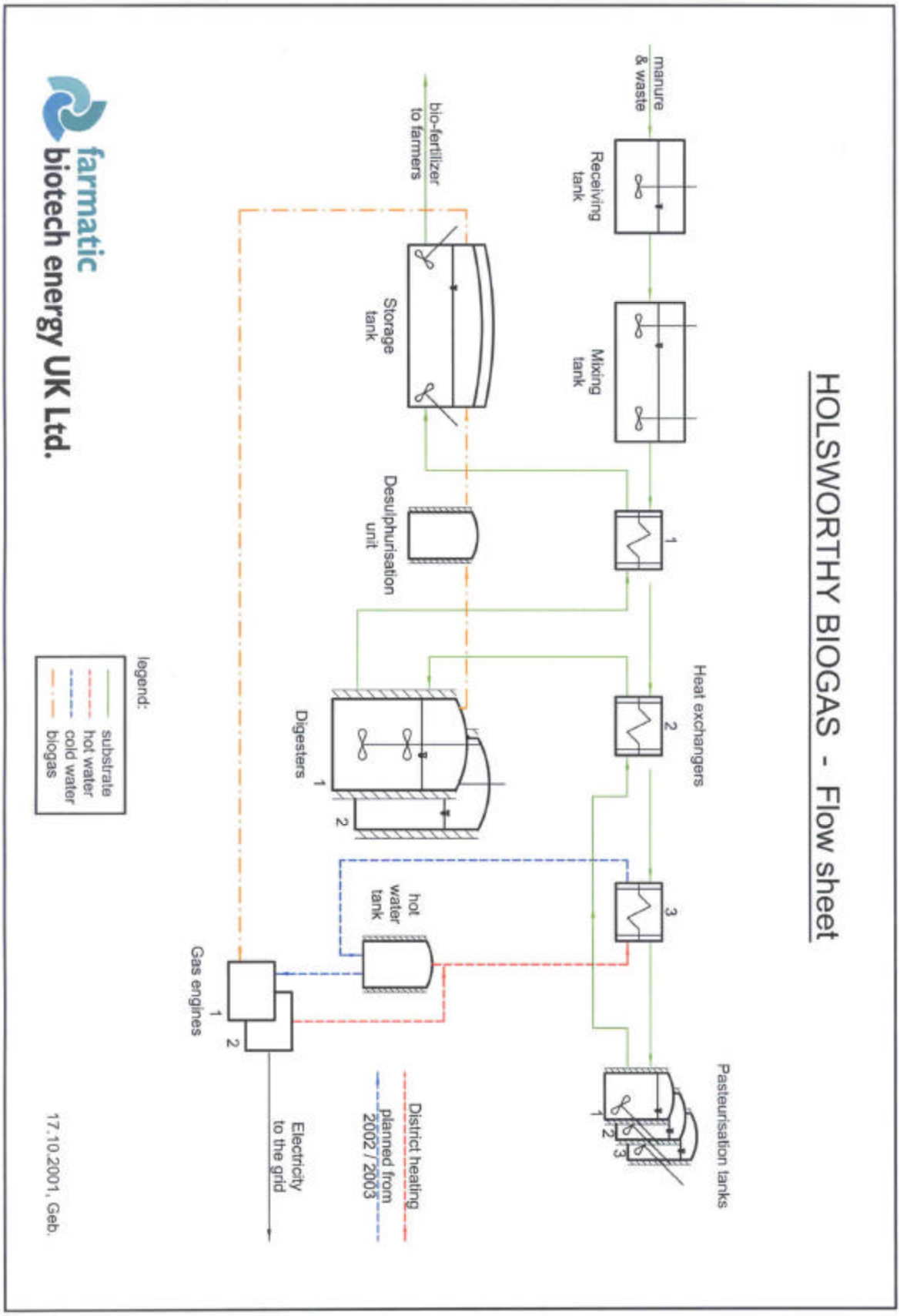
The manure and food waste are first discharged into a reception pit. During unloading a ventilation system operates in the receiving hall. The air taken from the hall passes through a bio-filter in order to reduce any risk of odour.

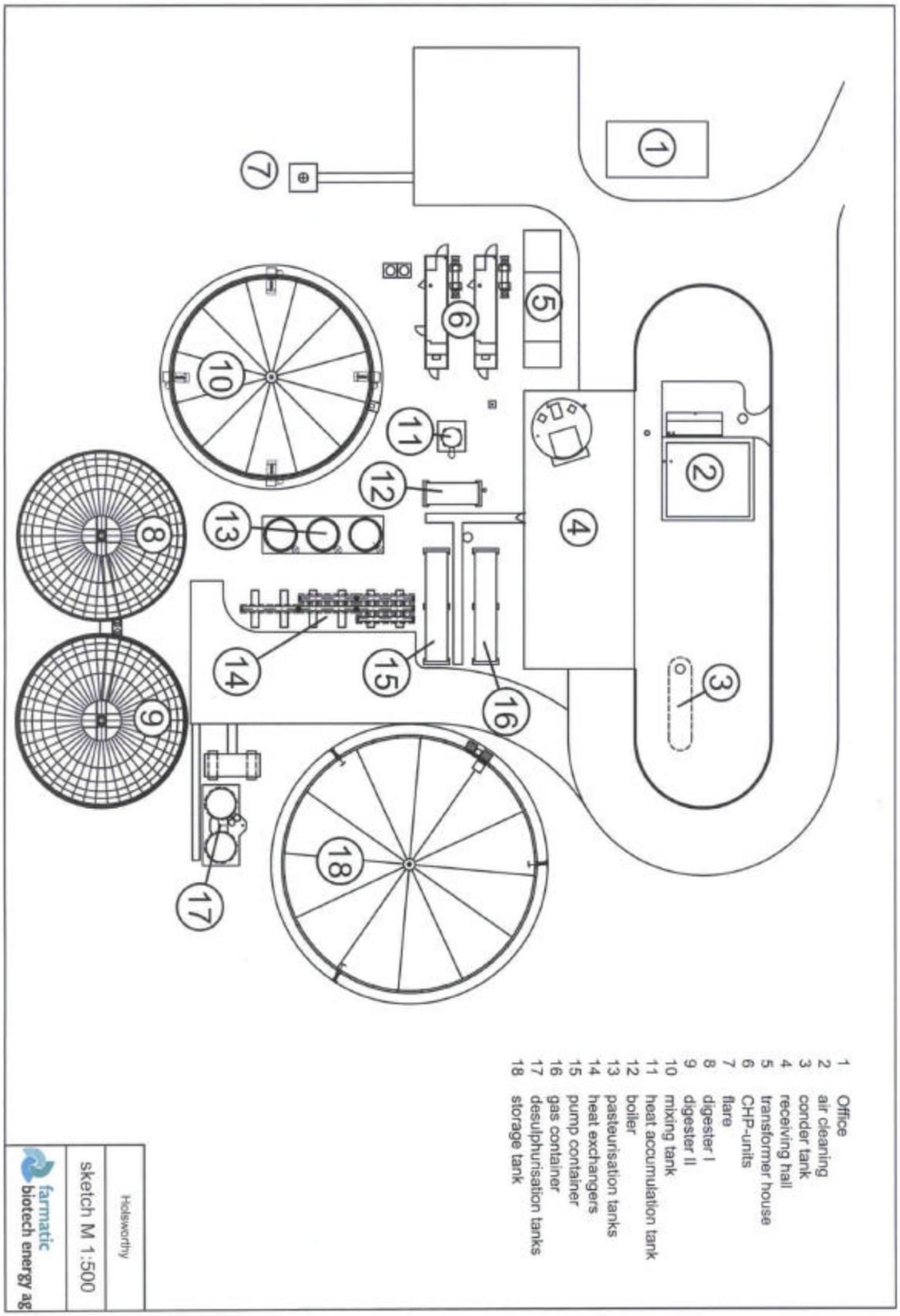
The manure and waste are thoroughly mixed before being discharged into a larger mixing tank. The mixture is then heated to 70ºC through a three-stage heat exchanger. The pasteurisation process takes one hour and kills all pathogens, viruses and weed seeds. The material that eventually leaves the plant is therefore safe for farmers to spread on their fields, since the risk of disease spread has been removed.

After pasteurisation the mixture is pumped through the heat exchanger into either of the two 4000m^3 digesters located at the plant. Anaerobic digestion takes place at 37ºC with an average retention of 20 days in either tank.

The biogas released by the digestion process is methane gas. It is initially cleaned in a de-sulphurisation unit and then stored in a gas holder above the final storage tank. The digestate (the digested waste mixture) is eventually returned to the supplying farmers as a valuable bio-fertiliser.

The principles can be seen on the flow sheet shown at the next page. Furthermore the lay-out of the plant is shown.


HOLSWORTHY BIOGAS - Flow sheet
farmatic
biotech energy UK Ltd.
manure & waste
Receiving tank
Mixing tank
bio-fertilizer to farmers
Storage tank
Desulphurisation unit
Heat exchangers
Digesters
hot water tank
Gas engines
Pasteurisation tanks
District heating planned from 2002 / 2003
Electricity to the grid
legend:
substrate
hot water
cold water
biogas
17.10.2001, Geb.


1 Office
2 air cleaning
3 conder tank
4 receiving hall
5 transformer house
6 CHP-units
7 flare
8 digester I
9 digester II
10 mixing tank
11 heat accumulation tank
12 boiler
13 pasteurisation tanks
14 heat exchangers
15 pump container
16 gas container
17 desulphurisation tanks
18 storage tank
Holsworthy
sketch M 1:500
farmatic
biotech energy ag

The plant will operate its own lorries, transporting the bio-fertiliser to the supplying farms and then returning with animal manure. The new lorries are specially designed for the task with fast loading and un-loading (up to 20 tonnes of slurry in two minutes).

Holsworthy Biogas Ltd. has benefitted from a £3.85 million EU grant from the Objective 5(b) EAGGF programme administered by MAFF (now DEFRA) and their local district council of Torridge. The total project cost will be £7.7m. The balance is financed through banks.

Extra storage facilities to hold the bio-fertiliser are provided on the farms by Holsworthy Biogas. This has been possible because of the EU grant. The bio-fertiliser has a higher nutrient value than the original animal manure which means that farmers can reduce their use of mineral fertiliser. The extra storage capacity provided on the farm means that farmers only have to spread the fertiliser during the growing season. This obviously helps minimise any risk of pollution.

The total gas production is budgeted as 6.0 million m^3 biogas per year (with a methane percentage at 65 %, this equates to 39 million kWh of energy per year). The methane produced by the plant will be used to generate electricity and heat by powering two, V-20 gas engines. They have a combined total power capacity of 2.1 MW whereas the budgeted power production is 14.4 million kWh per year.

The electricity produced will be sold at 5.72p per kWh (2001 price level) according to the NFFO contract (Non-Fossil Fuel Obligation) granted to Holsworthy Biogas. The price is indexed linked and will increase over time according to the Retail Price Index.

It is anticipated that all the excess heat produced by the plant will eventually be sold using a new district heating system which will supply the market town of Holsworthy. The amount of heat available to supply the district heating main will be about 15 million kWh per year. Initially it is planned that the hot water will be used to heat the town's new health centre, hospital, swimming pool, schools, council offices, and some council houses.

The projected income from the sale of the electricity and the gate fee paid by the food processors to Holsworthy Biogas for treating their waste is estimated at approx. £ 1 – 1.1 million. The projected operating expenses (staff, transport, maintenance, consumables, administration and the like) is estimated at approx. £ 450,000.

Holsworthy Biogas will not only benefit the local environment but will also give the participating farmers some benefits. First of all they will get extra storage facilities. Furthermore the bio-fertiliser returned to the farmers will be free of viruses, pathogens and weed seeds, and it will have a better nutrient value. Holsworthy Biogas will analyse the bio-fertiliser for N, P & K. By using this information the participating farmers can reduce their fertiliser bills. Silsoe Research Institute has a contract with DEFRA for performing a monitoring program on Holsworthy Biogas. They will also advise the farmers on using the bio-fertiliser. After 2-3 years there will be made available substantial data. This will also include the actual savings for the participating farmers.

The biogas project will give a considerable reduction in harmful CO_2 emission. The net sale of 13.5 million kWh will substitute the same amount of conventional produced electricity. This will reduce the CO_2 emission by 5440 tonnes/year based on UK baseline

data. When the district heating system is up and running this will give a further reduction in the CO_2 emission.
Furthermore methane emission is 21 times more harmful as a greenhouse gas than CO_2. If all the methane produced at the biogas plant was emitted to the atmosphere from the raw slurry and untreated waste this could correspond to up to 59,000 tonnes CO_2 per year. It is evident that anaerobic digestion is a very environmental friendly way of treating manure and food waste.

4. Why centralised anaerobic digestion

Centralised anaerobic digestion has proven to be the preferred choice within AD plants in a number of countries, especially Denmark. The choice between centralised digestion where a mixture from different sources are digested or individual AD for farmers or food processors depends on a lot of factors. One of the main reasons for centralised plants is that the farmers and food processors prefer to do what they are good at (their main business) and let a separate company deal with the manure and waste. Furthermore, centralised AD has a number of other advantages:

- Economy of scale
- Re-distribution of nutrients (from manure and food residues)
- Professional operation
- Better use of heat
- Possible better price for electricity
- Better platform for new developments

Economy of scale

The construction (and operation) of an AD plant is cheaper per tonne for larger quantities. However, it is important not to increase the transport costs too much. Thus there is also a maximum size depending on the concentration of manure and waste in the local area.

Re-distribution of nutrients

Farmers are normal reluctant to accept slurry from neighbouring farmers because of the risk of spreading diseases from one farm to another. Due to the pasteurisation unit at the centralised plants it is safe for the farmers. Thus farmers with excess of nutrients can "sell" this to farmers who need them. Furthermore the pasteurisation procedure makes it safe for the farmers to use bio-fertiliser from plants where food waste has been co-digested with manure.

The bio-fertiliser will get a declaration of the N, P & K value. Thus the farmers know exactly how much bio-fertiliser to apply to each field. The farmers can get a considerable cost saving.

When farmers join a centralised anaerobic digestion plant there is also an opportunity for them to get cheaper storage facilities when they work cooperatively to share storage tanks instead of each farmer having his own tank. Furthermore there is another opportunity for cost saving when they apply the bio-fertiliser to the land if the tanks are placed close to the fields instead of close to the farms as previously normal.

Professional operation

When farmers join a centralised plant they don't have to spend time and money on operation because the biogas company employ skilled people to run the plant.

Better use of the heat
If a farm is placed close to a large heat consumer, farm scale plants may be able to sell all the heat. However, the experience from Denmark is that is much easier for the centralised plants to find an outlet for the heat.

Better price for the electricity
In UK the biogas plants must sell their electricity in the open market. It will be very difficult for small plants to do this and get a good price for their electricity.
New developments
The majority of the biogas plants produce electricity and heat in the gas engines. The next step which has already started in other countries is to clean the gas and use it as vehicle fuel. This will reduce the emissions from the transport sector significantly. It will be an interesting solution in bigger cities with air pollution problems.

Another alternative which is investigated in other countries is to clean the biogas to natural gas standard and mix it with natural gas in the natural gas network. This may be an interesting alternative for the UK where the natural gas resources are rapidly running out. In a few years time it is expected that the UK will need to import gas from Russia or the like.

5. Potential in UK and Ireland

UK:
In Denmark we have 20 centralised plants treating manure and a wide source of organic waste. The population in the UK is approx. 20 times bigger than Denmark. The farming sector in the UK and Denmark is different. Thus it may not be so easy to collect the manure as it is in Denmark. But a very moderate estimate would be at least 100 large scale anaerobic digestion plants in the UK. These would either be plants that co-digest animal manure with food waste and household waste or plants that just digest different types of food and household wastes.

If we are to see this number of plants in the UK is very much depending on future prices of green electricity.

Ireland:
In the Republic of Ireland there is a potential for at least 10 large scale anaerobic digestion
plants.

6. Summary

Centralised anaerobic digestion is a very environmental friendly way of both solving a lot of environment issues and producing green energy at the same time. This concept is well known from other countries and it is now also starting in the UK.

If we use the right concept and get the necessary input material to the plants it is possible to make these projects feasible.

The main advantages for the farmers and the environment can be summarised as follows:

- Reduction in the risk of spreading disease
- Reduction in emissions to air, including greenhouse gas
- Reduction in odour problems
- Reduction in the consumption of mineral fertilisers
- Reduction in the need for land-fill with the increased re-cycling of waste
- Reduction in surface and ground water pollution

I hope you have found this presentation interesting. You are welcome to come to Holsworthy to see our plant. You can either contact me or Charles Clarke. Charles who is the Managing Director of Holsworthy Biogas and one of his main tasks next year will be to show visitors round Holsworthy Biogas. We expect the plant to be at full capacity in May/June this year.

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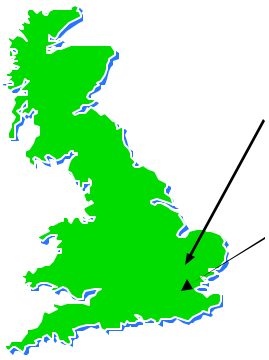
Renewable Generation
and Electricity Distribution Networks

Alexander Bell
Market Development Manager
24 Seven Utility Services Ltd
(email: sandy.bell@24sevenNet.com)

5th UK BioEnergy Conference 27 February 2002

24seven's current UK client base



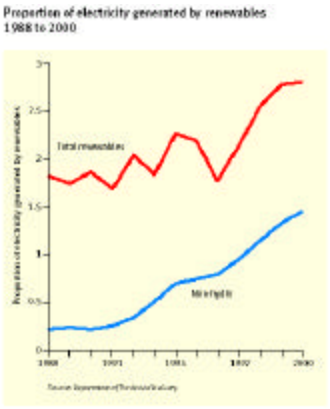
EPN

- 3.2 million end customers
- 20,300 sq. km service area
- 53,900 km underground network
- 35,400 km overhead network
- Tfr Capacity 38,640 MVA
- 6,400 MW peak demand

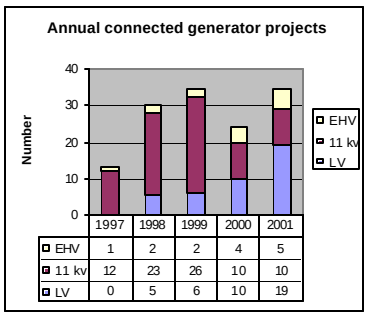
LPN

- 2.0 million end customers
- 665 sq. km service area
- 30,160 km underground network
- 40 km overhead network
- Tfr Capacity 20,370 MVA
- 4,200 MW peak demand

UK Renewable Generation

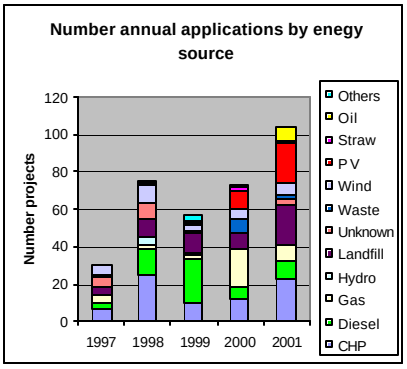


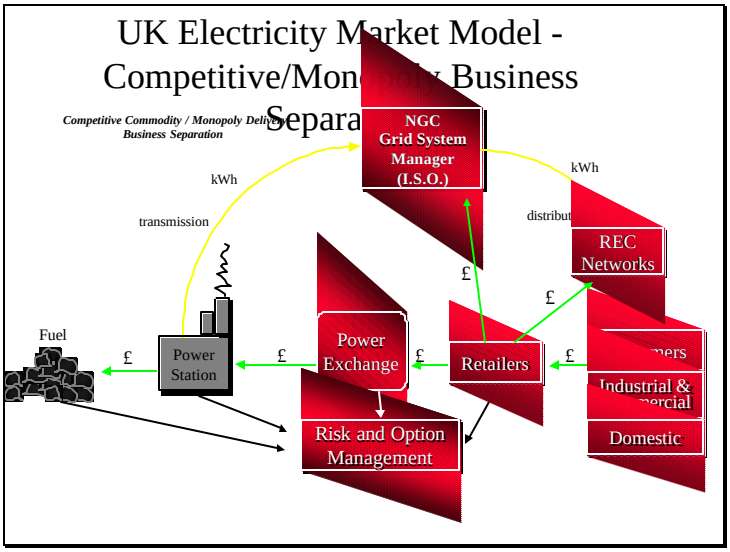
Generation in EPN

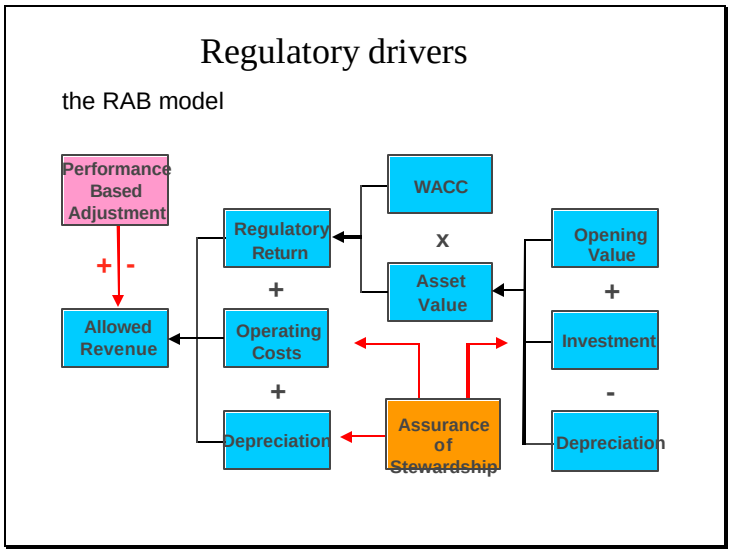


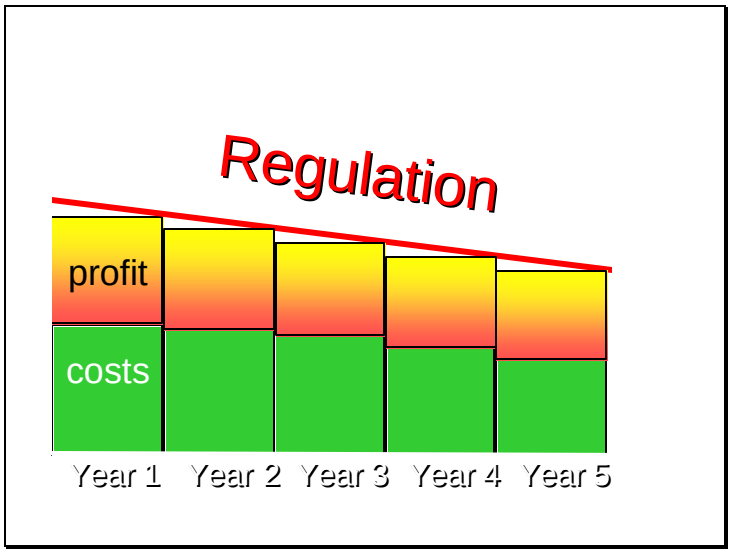
	1997	1998	1999	2000	2001
EHV	1	2	2	4	5
11 kv	12	23	26	10	10
LV	0	5	6	10	19

Generation *Enquiries* in EPN

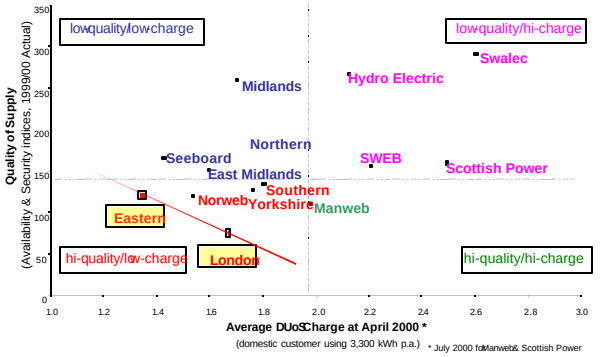





Regulatory drivers
the RAB model
Performance Based Adjustment
+ -
Allowed Revenue
Regulatory Return
+
Operating Costs
+
Depreciation
WACC
x
Asset Value
Assurance of Stewardship
Opening Value
+
Investment
-
Depreciation


Regulation
profit
costs
Year 1
Year 2
Year 3
Year 4
Year 5

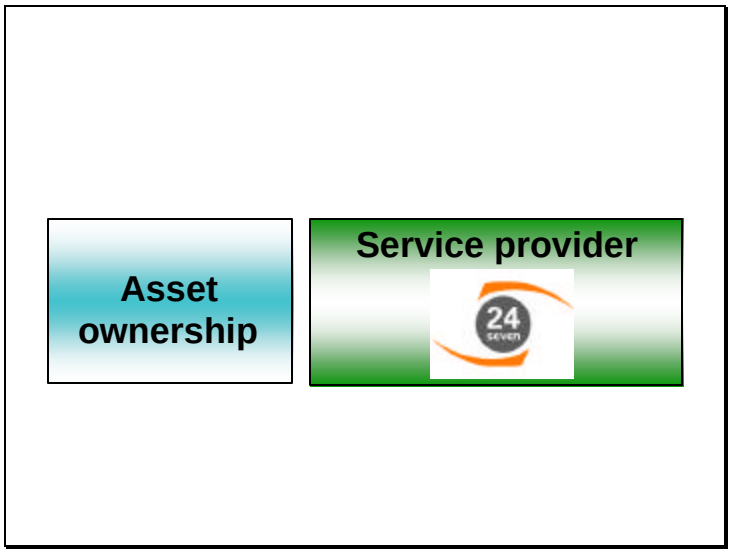
Frontier Performance

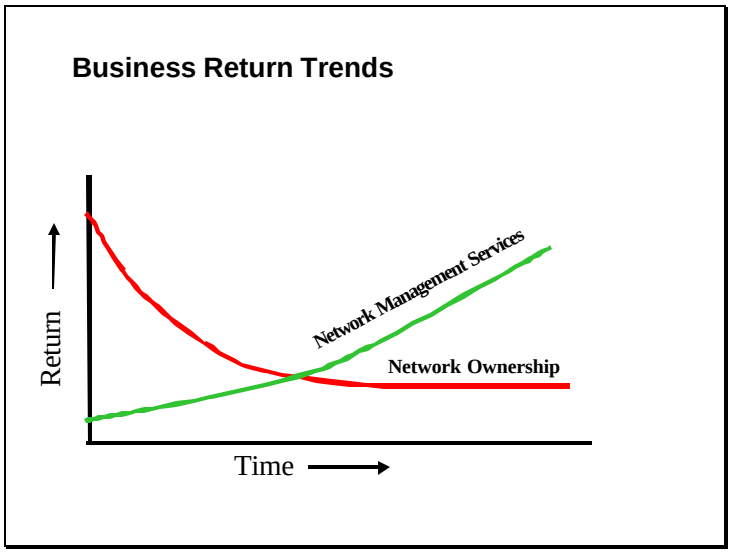


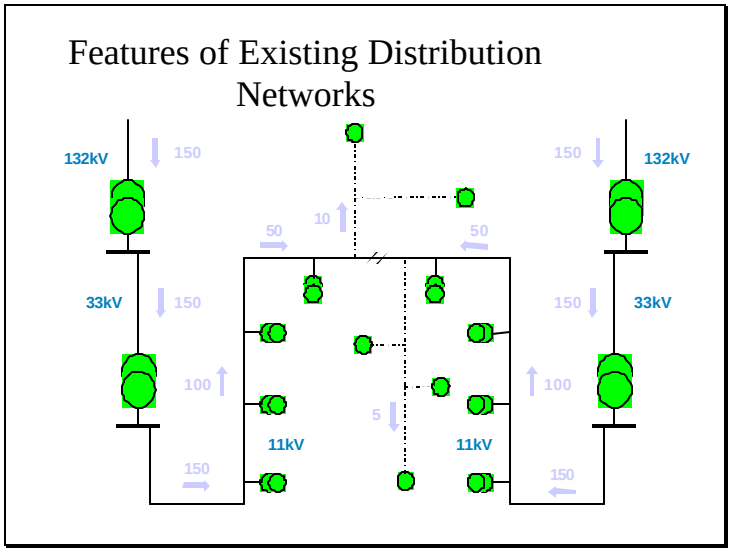
Sources: Quality data from 1999/2000 licence condition 9/6 reports. Average DUoS charges from analysis by Electricity Association

The Escape Route?

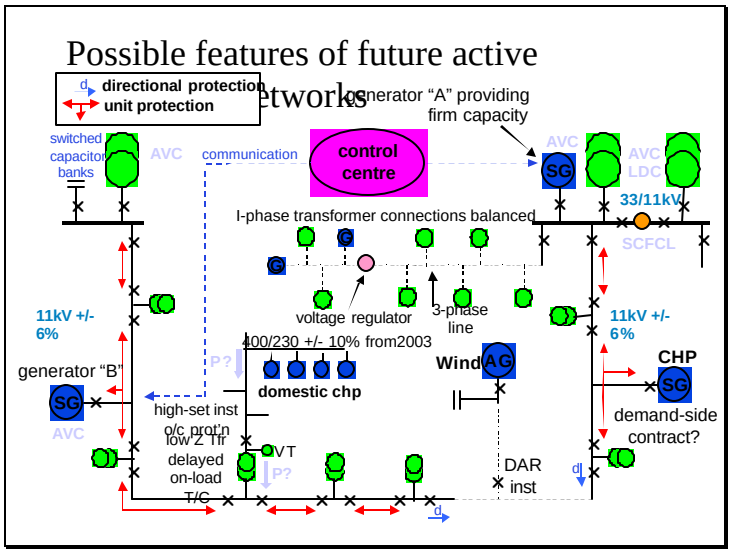
- Escape from direct regulation
- Control costs
- Improve Performance
- Grow the business


Asset ownership
Service provider
24 seven


Business Return Trends
Return
Time
Network Management Services
Network Ownership

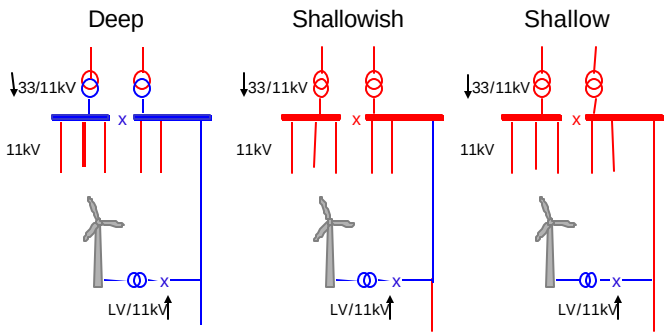


predictable (unidirectional) power flows
demand growth and timing of reinforcement easily forecast
reactive flows - generally manageable
voltage regulation straightforward
capacity matching opportunities (e.g. tapering)
predictable fault-levels
simple protection co-ordination
straightforward outage management and simple network isolation (e.g repairs and maintenance)
passive networks - limited real-time management requirement
predictable power quality
losses easily optimised
local & upstream impact of demand growth - easy to assess

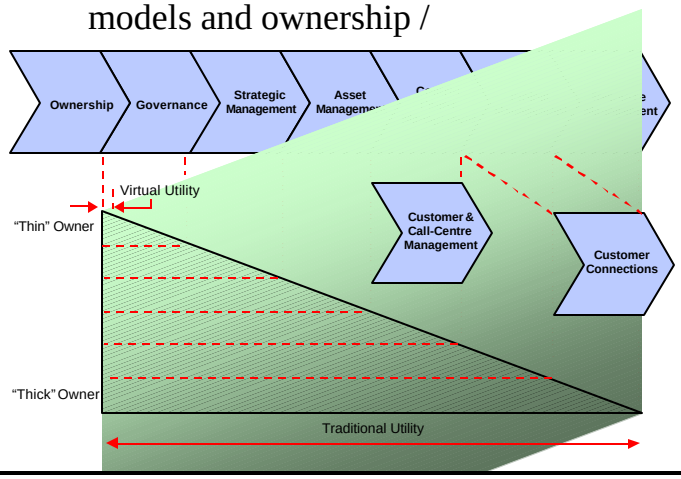


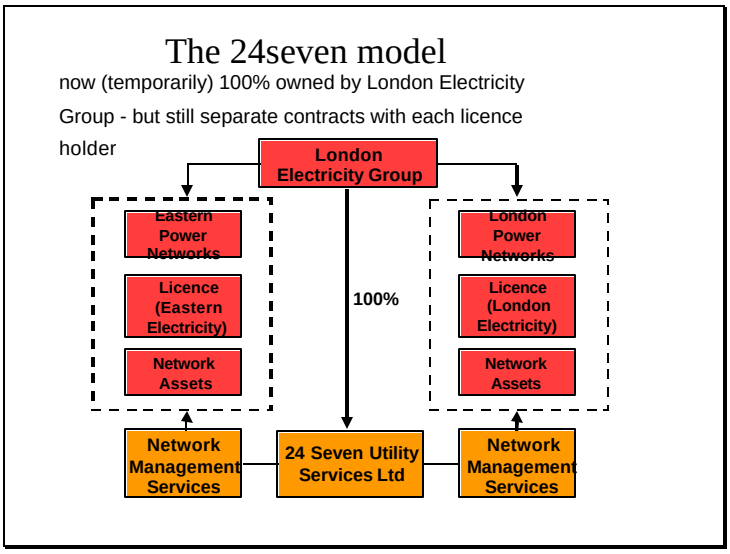
Regulatory and commercial factors

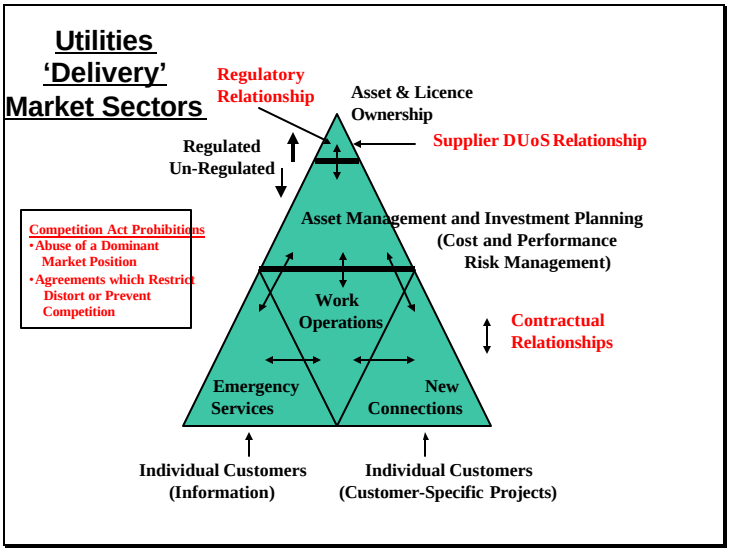
connection costs and D_gUoS charges



Opportunities for new business models and ownership /




The 24seven model
now (temporarily) 100% owned by London Electricity Group - but still separate contracts with each licence holder
London Electricity Group
Eastern Power Networks
Licence (Eastern Electricity)
Network Assets
100%
London Power Networks
Licence (London Electricity)
Network Assets
Network Management Services
24 Seven Utility Services Ltd
Network Management Services

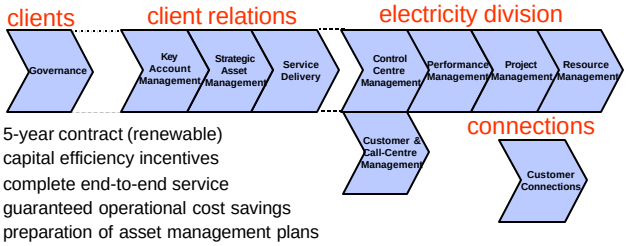

Utilities 'Delivery' Market Sectors
Regulatory Relationship
Asset & Licence Ownership
Supplier DUoS Relationship
Regulated
Un-Regulated
Competition Act Prohibitions
• Abuse of a Dominant Market Position
• Agreements which Restrict Distort or Prevent Competition
Asset Management and Investment Planning (Cost and Performance Risk Management)
Work Operations
Contractual Relationships
Emergency Services
New Connections
Individual Customers (Information)
Individual Customers (Customer-Specific Projects)

The 24seven model
Key Performance Indicators (examples)

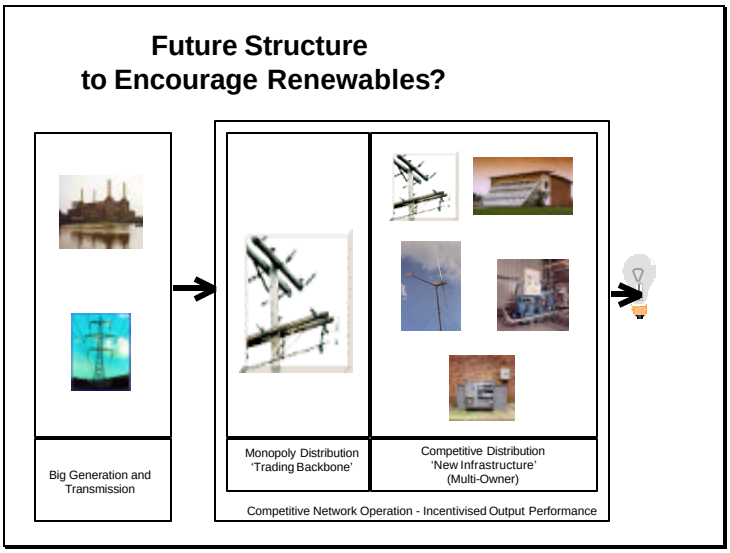
- quality of supply
- outstanding faults
- environmental incidents
- NRSWA performance
- customer / energywatch complaints
- lost-time accidents
- reportable incidents
- GSS / OSS performance
- project delivery

- **performance monitored monthly**
- **incentive / penalty mechanism (asymmetric)**
- **income adjusted quarterly according to performance**
- **weightings applied via criticality factors**
- **escalation factors above defined thresholds**

The 24seven model - summary



- 5-year contract (renewable)
- capital efficiency incentives
- complete end-to-end service
- guaranteed operational cost savings
- preparation of asset management plans
- seamless partnership with asset owner/governor
- call-centre providing world-class customer interface
- key focus on project delivery and network performance
- comprehensive achievement and performance reporting
- penalty/reward mechanism against defined key performance measures
- self-contained customer connections business exploring growth opportunities



The Vision Of A Sustainable-Energy Future.

Alexander Bell, Market Development Manager, 24 Seven Utility Services Ltd

A turbine in every village? Local self-sufficiency in green energy? The end of the National Grid?

Many headlines like these have been printed in the newspapers recently as the government makes its preparations to promote the development of radically different energy supply and delivery systems for the 'UK of the future'. On vital issues such as these, a reliable crystal ball is essential! Decisions about electricity infrastructure must be right not just for next year, or even the next few years. They must continue to deliver good value to the country for the next 50 years!

At last, government seems to be seriously committed to promoting the generation of electricity from renewable sources, rather than continuing to use the last remaining stocks of coal, oil and gas. Apart from the serious environmental damage caused by fossil fuels, with consequences we can still only guess at, it seems at last that we are beginning to recognise that these are resources which are simply much too valuable to *future* generations, for *us* to just burn.

The immediate government target is for 10 per cent of electricity to come from renewable sources by 2010. From April this year the "Renewables Obligation" will penalise electricity suppliers who aren't on target. Government is also investing directly in research and development of the new technologies, many of which are making rapid progress.

The bioenergy industries, along with wind power, have been singled out as holding special promise, and therefore being eligible for particular support. But in addition,

renewable electricity production technologies utilising other energy sources, such as solar and wave power, are developing rapidly. Many of these technologies, by their nature, tend to be smaller in scale than the traditional fossil-fuelled giants, and are therefore starting to exercise the minds of the electricity distribution network operators. Most of these new devices are likely to be connected to the distribution networks rather than the national grid. If government targets are to be met, the distribution network operators will have to expect an increase in generation project enquiries by a factor of at least ten times, for the next eight years.

In addition to promoting growth in renewables, Government has also set a target to increase the energy efficiency of remaining use of fossil fuels, through greater use of CHP. One of the most interesting of these is domestic CHP, where micro-turbine and fuel cell technologies are developing rapidly. If every domestic gas boiler, in future, is replaced with an under-stairs CHP plant which exports electricity to the network at times of low internal demand, the technical and commercial challenge for the network operators starts to become *really* interesting.

End-customer requirements

Retail customers are at last beginning to understand, and get used to, the fact that the UK now has a genuine competitive market in electricity supply. They are exercising their right to switch from one supplier they don't like, to another, in ever-increasing numbers. Apart from a general interest in 'green' matters, most don't really want to know much about the detail of what is happening behind the scenes. They want to pay lowest possible prices of course, and the UK system of competition in supply, with price regulation of the 'natural monopoly' distribution businesses, has certainly delivered significant price reductions in the last few years. But the 'unfettered' market mechanism doesn't take account of environmental damage, nor the interests of future customers. It is therefore up to the government to accept the cost (and any associated political risk) of delivering sustainable energy for the nation. It looks now like the government is prepared to take that risk and that, subject to any cost premium being judged 'acceptable', it *will* happen.

There are, however, some parts of their electricity service that customers take for granted (unless, and until, they go wrong). They are the safety, security, reliability and quality of their supply. Significantly, the commodity producers and retailers play only a part in ensuring that these essential parts of the service are provided for their customers. They just have to collectively ensure there is sufficient electricity available to meet total demand. The great majority of failures of supply (up to now!) are not due to lack of the product, they are down to incidents under the management of the 'monopoly' network operator.

The biggest future challenge and opportunity for distribution network operators is therefore to ensure that the expected strong increase in numbers of generators connecting to their networks can be accommodated without any deterioration in the quality of supply received by the end-user customers. At the same time, embedded project developers will of course expect distributors to offer cheap connection costs, good quality information and advice, and quick and reliable service.

And there does seem to be, in theory at least, the tantalising promise of some potential cost advantages for the network operators. Their networks are being renewed, modernised and extended on a continuous basis. If embedded generation, in addition to producing the commodity, could be utilised by the network operator as a substitute for upstream cables and transformers, would this not save a significant proportion of their capital budgets? If a share of this saving was available to support the generation developer, would this not improve the economic assessment of renewable projects and give the industry a further boost?

It seems like a challenge well worth pursuing. So why is it that the network operators sometimes seem less than enthusiastic about it at the present time?

Some Technical Issues

The existing distribution networks were designed for a different age. Economies of scale determined that power was generated at huge plants, located close to fuel supplies. These are connected to the national grid, which in turn feeds energy to the distribution networks and then on to the customers.

Existing distribution networks are therefore designed to cope with unidirectional power flows. In this configuration, monitoring of demand growth and the timing of reinforcement work is easily forecast. Voltage control is straightforward. As power is delivered, circuits can be 'tapered' with distance, so that capacity matches demand at any point and cost is minimised. The upstream and downstream co-ordination of protection systems, which automatically disconnect faulty plant, is also simple. Outage management and network isolation for maintenance purposes is a unilateral decision by the network operator. The networks are 'passive' meaning that limited real-time management is required and energy losses can be easily minimised. Fault levels (which determine the construction standard of plant and equipment used) are predictable.

Substantial increases in distribution-embedded generation will mean that future networks will have to be much more 'actively' managed by the network operator. As time passes, the expected increase in embedded volumes starts to happen, and perhaps up-stream investment is reduced, the network operator will almost certainly have to negotiate commercial arrangements with the generators to 'constrain-on' at times of local peak demand. But many renewable energy sources are intermittent and relatively unpredictable. If they are to be used for local delivery capacity substitution, they may well have to be combined with some form of local storage. FACTS (Flexible AC Transmission Systems) may be required, to control power factor, improve transient stability and optimise circuit loadings. The transient stability of embedded generation is likely to be low, because of low inertia, requiring high-speed protection possibly arranged to inter-trip with the generator circuit breaker where appropriate.

In short, if supply quality for end-user customers is to be maintained, there are quite substantial and complex technical issues to be resolved. These will require more analysis, network modelling and detailed design, new protection and control systems, real-time communication links and new commercial arrangements with generators. It may also be necessary to upgrade existing network components to meet new performance standards.

Some Regulatory and Commercial Issues

The UK system of regulatory development has required complete separation of the old Regional Distribution Companies supply and network businesses. Ofgem believes this is necessary in order that real competition can develop, and competition will set the level of future commodity prices, whilst economic regulation of the 'monopoly' distributors is required to set delivery prices.

The latest price control on electricity distributors, which runs from 2000 to 2005, was very tough. The system is based on capping the total revenue the distribution companies can collect from the suppliers. Put simply, allowed revenue is set by Ofgem and is designed to pay for 'efficient' operating costs, asset depreciation, and a return on the regulatory asset value of 6.5%. The English companies had their allowed revenues cut in one large bite, by between 19% and 33%, on 1st April 2000. They then have to live with an increase of RPI, but minus 3%, for each of the following four years.

Only if the companies can reduce their operating costs below the (very tough) 'efficient' level decided by Ofgem, can they make a return in excess of the allowed 6.5%. There is therefore a *very* strong incentive to avoid spending money on the revenue account. Capital investment by the companies, unless it reduces operating costs, can also only be expected to produce a return of 6.5%.

At the same time as these revenue restrictions are operating, Ofgem is also, through its Information and Incentives Project (IIP), imposing financial incentives and penalties linked to network output performance. From 2002/03 onwards, up to 2% of a distributor's total revenue is at risk of confiscation if their performance against defined measures of supply quality and customer service falls below targets set by Ofgem. When considered against these targets, individual generators are likely to be judged less reliable than cables and lines. Under this form of price regulation therefore, it seems unlikely that distributors will rush to spend money preparing their networks, their people or their control systems to be fit to accommodate major increases in embedded generation. Under the present system, there is *negative* incentive for them to spend any money for this purpose. They may be under legal or licence obligations, but compliance with such rules often looks and feels very different from active enthusiasm, and Ofgem is strongly opposed to re-opening price controls to change incentives between the set dates.

Connection charging arrangements are another substantial barrier. Although network operators have a legal obligation to connect both new loads and new generation, at present they receive no revenue for connecting generators, apart from the charges for connection. They therefore, at present, charge what is called 'deep' connection costs, which includes the cost of any consequential upstream works arising from the connection. This can be a substantial financial deterrent to many generation projects, particularly the first one to arrive in any location. Many administrative and logistical difficulties arise over second and subsequent projects in the same location, which in theory should be asked to bear a share of the costs already paid by the 'first-comer'. One argument put forward by distributors is that 'deep' charges provide strong locational signals which, in turn, steer prospective generators towards those distribution networks that can most readily accommodate them. However, this is essentially an academic argument, the reality is that renewable generators are geographically constrained by the localised nature of their fuel source; road transportation of low-density fuels is nether economic nor "environmentally" acceptable.

As a result of the recommendations of an Embedded Generation Working Group, Ofgem are proposing shallower connection charges for generators in the future, with the balance of costs being recovered in a form of generator DUoS (Distribution Use of System) charge. But there would be no change, for the time being, for existing generators who have already paid 'deep'.

Determining a charging structure for embedded generators, which recognises both the costs *and the value* which generation brings to the network, as an integrated network component, is a critical and urgent task for Ofgem. If they cannot point the way forward on this within a few months, the chance of meeting renewable generation targets will be seriously diminished. As always, the process of change from where we are now, to where we need to be in future, will be difficult and contentious.

Some Structural Barriers

The pressure on network businesses arising from the UK system of RPI-X price regulation has therefore caused many utility companies to consider major re-structuring, to reduce their costs. The two major cost components for network utilities are the cost of capital, and their operating costs.

Many Utility Companies, led at present by the UK water sector, are now looking to reduce the cost of financing their asset bases by replacing equity with debt. The Glas Cymru / Dwr Cymru model has taken this idea furthest forward. Glas Cymru is a "company limited by guarantee", created in April 2000 for the sole purpose of acquiring Dwr Cymru / Welsh Water. Glas has no share capital and its constitution limits its purpose strictly to that of financing water assets in the DCWW area of appointment. In effect, ownership of the water assets is by the customers connected to them. Day to day operation of the assets is out-sourced to a developing market for service provision, a system designed to make use of competition to minimise operating costs for the licensed authority and improve service standards for customers.

Debate about the value of similar kinds of structures in electricity distribution is also just starting to develop. It is certainly possible to envisage a future situation where the common-carriage distribution assets (low-risk, low return) are owned by an entity which is designed to minimise financing cost. The regulator might be asked to withdraw from a position of 'hands-on' price and performance control, and give up the principle of RPI-X price regulation, which may now have achieved its objectives and run its course. The new role for Ofgem might be one where it takes more of an advisory role to 'mutual' asset owner entities, and over-sees the integrity of the new end-to-end structural framework. The provision of network co-ordination, operation, asset management, new-build and maintenance services would be competitive and procured by either the asset owner or the licensed network operator. In this situation, the network operator would go to the *market* for the most cost-effective and network performance-enhancing solutions to investment requirements. It seems much more likely in this kind of scenario that equal weight would be given to new delivery assets, the network capacity contribution of embedded production and/or storage devices, and perhaps even demand-side mechanisms, as solutions to network issues where new investment is required.

Reaching a position where market forces are allowed to become the driver of both further operational efficiency improvements, and broader-based investment

decisions, in the previously 'natural monopoly' network businesses, means firstly accepting the principle of high-level separation between asset ownership and network management. Those at the fore-front of debate about how to overcome institutional barriers, slowing the change to a more sustainable energy future for the UK, are therefore currently showing great interest in the 24seven business model.

The 24seven Business Model

The decision to form 24seven, initially a joint venture company owned 50% by TXU-Europe and 50% by London Electricity Group, was made primarily in response to the financial pressure of the Distribution Price Controls imposed on Eastern Electricity and London Electricity for the five year period commencing 1st April 2000.

The two owners agreed to separate their workforces from the assets and merge the people organisations together in order to focus more clearly on achieving the economies and performance improvements required. This was done by setting up the new company, 24seven, and transferring most of the people into it.

The licensed distribution companies still exist (although their names have now been changed to LPN and EPN) but as from January this year they are both owned by LE Group. LPN and EPN continue to own the network assets, and they are also the holders of the new distribution-only licences. LE Group also bought TXU's 50% share of 24seven, which manages and operates the two sets of assets under two separate five-year contracts. It is important to understand that the scope of 24seven's management and operations role is very wide and includes the development of network strategies, investment plans, emergency response, customer relations and the arrangements for new connections – the so-called 'thick asset management' model. 24seven's core competencies are targeted at achievement of world class standards of performance in asset and operational risk management and response.

Cost reductions have been achieved through removing duplication of structures and processes and by applying leading asset management principles to both networks. Real productivity improvements and changing the culture of the business to give a more commercial focus, are essential ingredients. The contracts with the two main customers are complex, involving 26 fixed price services and 7 variable cost project categories. The fee structure is pre-set for each year of the contract's duration. Quality of service is measured through a further 29 Key Performance Indicators, whose results determine financial penalties for under-performance by 24seven, and some incentive for exceeding expectations. It is this healthy 'contractual tension' that differentiates the 24seven business model and, in our experience, ensures performance levels far exceeding those that can be achieved under 'in-house' service level agreements.

Having introduced this performance-based model and seen the advantages it generates for all stakeholders, it soon became clear that there are significant prospects for growth. Based around its core competencies, 24seven now has ambitions to become the world's first multi-utility, multi-national, competitive network management services provider.

Opportunities for future Partnership Approach to Sustainable Generation Projects

There is little doubt that competitive and market forces are the most powerful drivers of change. If the government is to achieve its environmental targets, these must be harnessed to the cause and the right incentives must be put in place quickly.

24seven has emerged from two of the most forward thinking of the traditional distribution businesses, but is now a competitive company, and one which has available to it all the traditional skills of the best electricity network engineers and managers in the UK. We understand how to comply with monopoly network regulation, because we manage it and live with it on behalf of our clients, but we are not, ourselves, directly subject to it. Because of increasing competition in connections and new infrastructure development, our skills can now be deployed to help with projects throughout the UK.

The commercial viability of future sustainable generation projects will *not* just depend on the success of the new technologies themselves and the value of the electricity they produce. It will also depend on the design of low cost but reliable connection arrangements, negotiation of best possible commercial terms with the network operator, and making whole-life value and risk assessments for the project. To achieve this, it will be essential to be able to understand and forecast both commodity value and network capacity and security value, for the life time of the project.

The way forward in this area is likely to be through partnership, perhaps Joint Ventures, or through other innovative approaches designed to make the most of any new incentives becoming available. Certainly, the role and approach taken by the network operator will need to be high on the list of concerns to be addressed by sustainable generation project managers.

24seven's environmental credentials are already in place. Our ISO 14001 accreditation is one aspect of this. But our desire to *actively* help drive forward the changes in electricity network management, vitally necessary to encourage and support sustainable electricity generation, is probably still something unique amongst UK network operators!

BIOFUELS MARKETING

Andrew Owens MBE
Managing Director
Green*ergy* International Limited

Bio-fuel Opportunities

Today

- **Green*ergy* Activities**
- **Future market drivers**
- **Carbon-Certification**
- **Commercial realities**

Activities

The Green*ergy* process

OEM's	Publish requirements
Market innovator	Solve the benefits challenge
Committed corporates	Brings scale and credibility
Government support	To extend take up
Fast track market	
Repeat	

Innovators provide a solutions filter

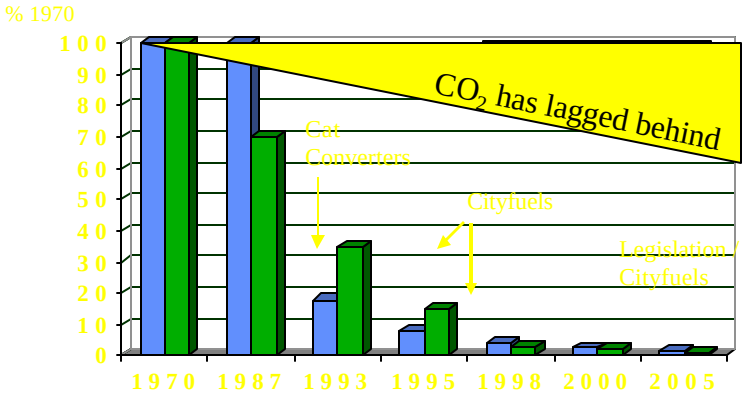
- **Only rational and objective solutions make progress in free market environment**
- **Politically correct, or interest group driven solutions "wither on the vine"**
- **Provides valuable quality control check for public policy and energy industries**

Innovators think differently

Conventional	Consideration	Greenergy
No	Premium value	Yes
No	Benefit marketing	Yes
Yes	Dumbdown	No
No	Customer interest in environmental performance	Yes
No	Interconnectivity with other issues	Yes
Push	Core competence	Pull
Government NGO's	Agenda setters	Customers

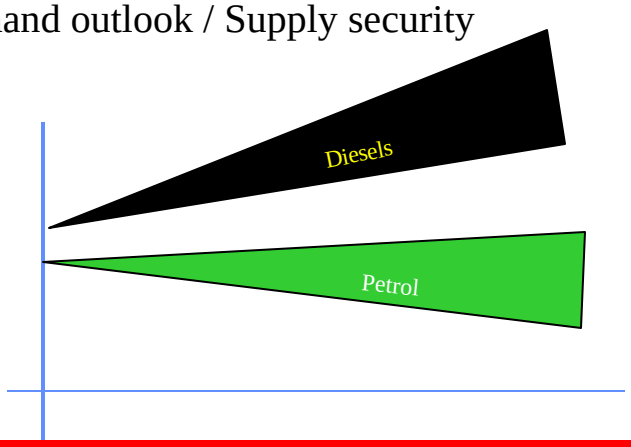
Future Market Drivers

Emissions from the conventional internal combustion engine (new)



Equivalent CO_2 improvements through alternative energy Bio-fuels have a CO_2 role to play

Demand outlook / Supply security



Supply security drivers are more convincing for bio-diesels

Future fuel market drivers

- Move from local to Climate Change driven concerns
- Supply security
- Integration with other technologies

  Bio-fuels / traffic management / waste.
- Integration with Carbon Asset Management plans and Carbon trading systems
- More consumer choice and engagement

Key issues for bio-fuels are supply security and CO_2

- The bio-fuels industry has made good arguments around supply security
- The industry has wasted time arguing for local air quality benefits which are not convincing
- Industry has not quantifiably argued the CO_2 case
- Carbon-Certification is a strategic opportunity for the bio-fuels industry

Carbon-Certification

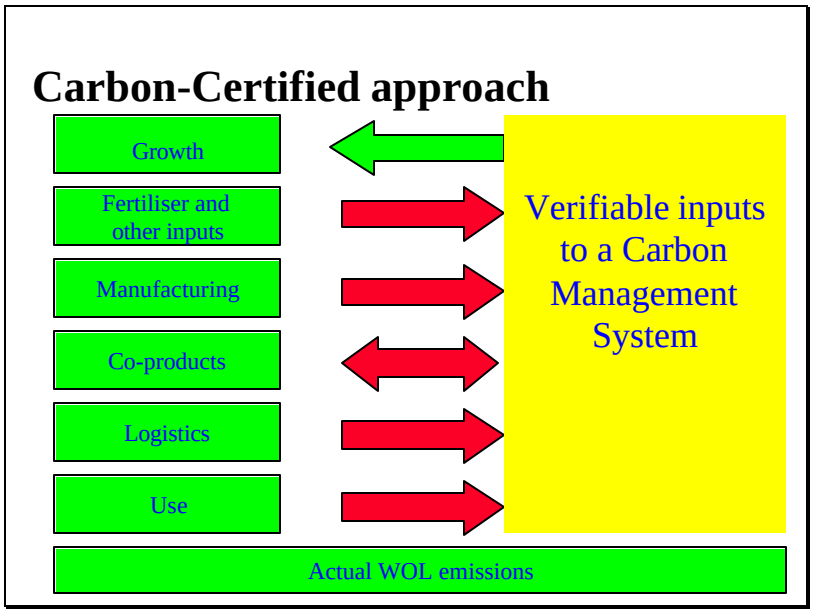
Nominal whole of Life CO_2

- Growth
- Fertiliser and other inputs
- Manufacturing
- Co-products
- Logistics
- Use
- WOL emissions

Typically defined by a series of bi lateral contracts throughout the supply chain

CO_2 Benefits defined by "one size fits all" academic studies

No WOL quality assurance or drivers to improve performance



Implications for bio-fuel industry

- Reveals certified Whole of Life benefits of bio-fuels
- Replaces boundary debate and “one size fits all” with case by case objectivity
- Enables client, conventional fuels and supply chain integration and maintenance
- Eliminates the flaky options
- Hydrogen et al. “found out”

Benefits for bio-fuels industry

- Supply of alternative / renewable fuels will be integrated with conventional fuels reducing competitive threat, enhancing commerciality and achieving higher net penetration
- Provides a framework from within which it is possible to positively influence emissions and increase supply chain value

Commercial Realities

e.g. RME emission benefits

Item	ULSD	100% RME	5/95 Blend
CO	Base	-20%	No change
Nox	Base	+15%	No change
Sox	Base	-90%	-4%
Pah	Base	-50%	-2.5%
Particles	Base	No change	No change
CO2 WOL	Base	-75%	-4%
Toxicity	Base	-75%	-4%
Operability	Base	Poor	Nc/better
Fuel economy	Base	-2% (worse)	Nc/better

e.g. other RME concerns

Item	100% RME	5/95 Blend
Intensive farming	Specify	Specify
GM / Bio diversity	Specify	Specify
Co-products / waste	Benign	Benign
Water pollution	Benefits	No change
Availability	Limited	Robust
Supply security	Benefits	Benefits
Logistics	change	change
Governmental / NGO	Supported	Supported
Engine Warranty	No	Yes

Blends are commercially and environmentally stronger than pure products

Accreditation of Installers of Renewable Measures

Rachael Mills
Energy Saving Trust

Background

- EST is developing a blueprint for an accredited installer scheme for the DTI
- Driven by PV Grant Programme
- Considering PV, solar thermal and biomass
- Consulting with industry
  - Interviews
  - Seminar
  - Questionnaires

Possible Model for Biomass

- Technical Prerequisites
  - CORGI/HETAS
  - Additional training for biomass heating
- Institutional Prerequisites
  - Code of Practice
  - Registration of Fuel Suppliers

Possible Model for Biomass

- Product Standards
  - European Standards
  - British BioGen pellet standards
  - Clean Air Act
- Branding
  - Umbrella brand or individual brands?

What Happens Next?

- Report to be submitted tomorrow!
- PV grant scheme only a few weeks away
- Expect biomass funding to follow
  - Installer scheme will then make an impact

EST Plans

- EST believes that renewable heating schemes should be supported
- Want to work in partnership with industry
- Will be developing possible activities / programmes over the course of the next year

Energy Saving Trust

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5th UK Bioenergy Conference

Grants for Bioenergy

Peter Billins, British BioGen
Gary Shanahan, DTI
Helen Earner, New Opportunities Fund

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5th UK Bioenergy Conference

Closing Remarks

Peter Billins

Chief Executive, British BioGen

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