

Biofuels & Bioenergy: Challenges and Opportunities

IEA Bioenergy

Creating a Sustainable Wood Fuel Supply for the South East of England

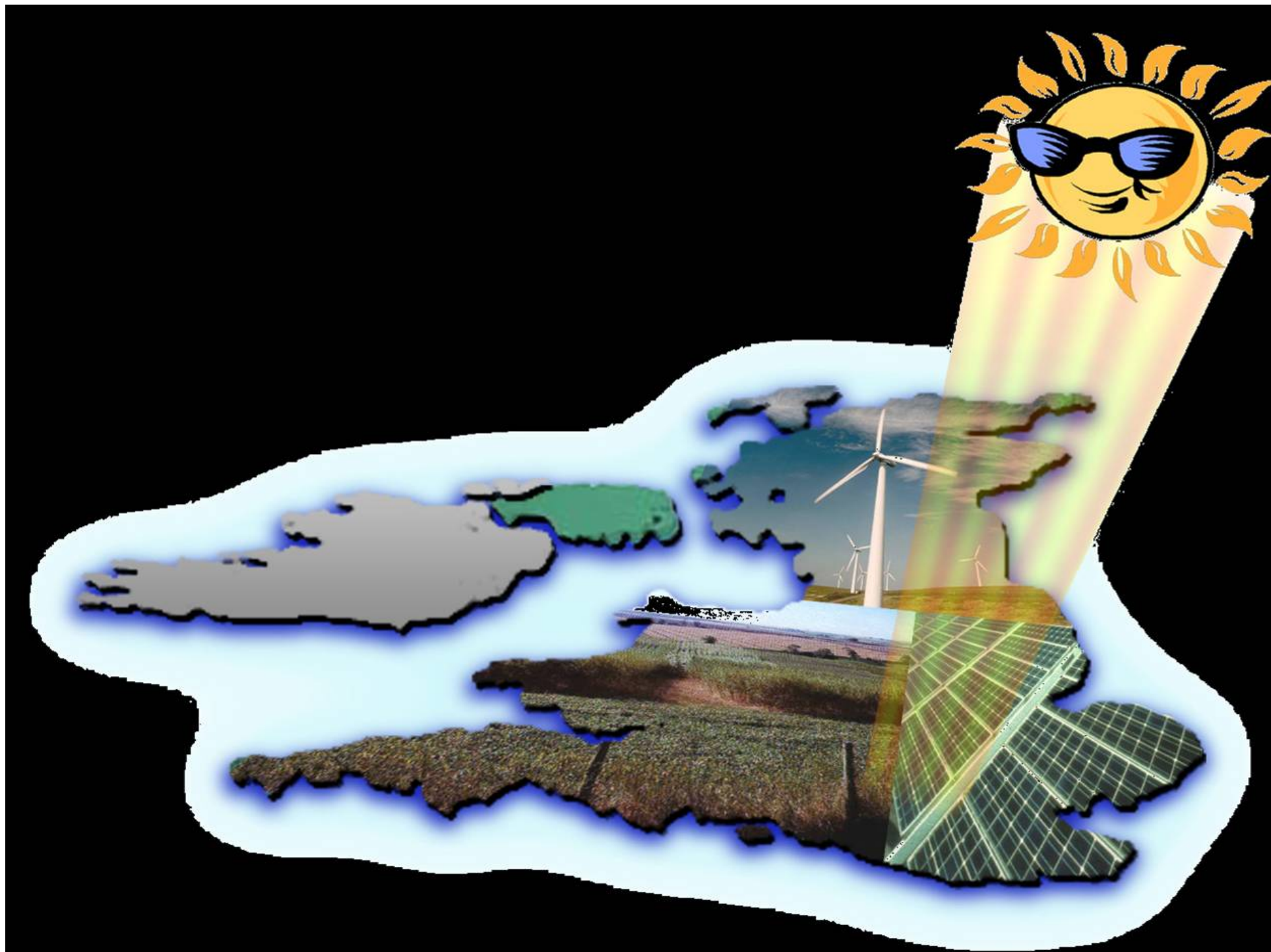
Keith Richards and Jeremy Bolas

28th August 2006

www.tvenergy.org

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My Message!

- Massive expansion of wood fuel production and use expected in the UK
- Driven in part by targets set by central and regional government
- Still considerable barriers to uptake
- Including the lack of a sustainable wood fuel supply BUT
- These barriers are being addressed
- Industry senses the mood and is positive

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Agenda

- Supply side and its ability to deliver
- Drivers
- Understanding the UK mentality (!)
- The developing Market
- The developing Infrastructure

What Do “We” Mean by a Sustainable Wood Fuel Supply?

- A reliable, consistent quality supply of wood (chip, pellet etc.) based on all elements of that supply chain being sustainable including
- Basic production and harvesting/ gathering from a technical and an environmental viewpoint
- Likewise fuel preparation, storage, transport and delivery to end users
- Making sense economically without grants or ‘unreasonable’ fiscal supports
- Providing a reasonable income for those involved in all facets of the supply chain

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What's the Nature and Scale of the Local Resource?

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Regional Wood Fuel resource

- Waste residues, arboricultural, civic amenity
- Saw mills, wood processing
- Thinnings etc. from managed woodland, lop and top etc.
- (Very) Limited energy crops



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So Dealing With a Wide Range of People

- **NOW mostly Tree Surgeons, Local Authorities**
- **Some processors (generating waste)**
- **BECOMING INTERESTED are the Forestry Commission, estates, suppliers to processors**
- **Farmers, growers, estates, Corporates**

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With a Wide Range of Agendas!

- Getting rid of 'waste' and generating cash rather than costs for disposal
- Meeting local and regional targets for carbon reduction etc. (public sector)
- Creating new and diversified markets for an existing resource (forestry and agricultural industries)
- Corporate Social Responsibility

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And Different Takes on What to Them is the Essence of Sustainable!

- Cash
- Ability to carry on with their main business
- 'Ticking' boxes
- Creating a better environment or protecting their existing environment

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Key (Regional) Sustainability Issues

- Wood derived from existing woodlands is insufficient to meet the needs of a growing market
- Better management will increase supply but this alone will not be enough
- We need to invest heavily and urgently in woody energy crops (SRC, SRF)
- However, this will tie up increasingly large tracts of land competing with other land uses including FOOD and DEVELOPMENT
- Or we could import from overseas

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Wood Strategy and Implementation Plan




- Mobilise 2 million tonnes of wood from unmanaged woodland across England
- SE England key area (most wooded) with 26% of woodlands unmanaged – seek 580,000 tonnes from here as SUSTAINABLE yield
- Nationwide possibly establish 3,500 new wood fuel installations utilising 1 million tonnes
- That by 2013

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Cracking the Conundrum

- Classically wood fuel projects have not emerged in the UK and an industry has not been created because ...
- There was no market
- Hence no fuel supply developed
- No fuel supply then
- No market emerging

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**Attempting to
Understand the UK
Attempting to
Understand the Need to
Change**

What is the United Kingdom Made of?

**“It is an island built of coal
surrounded by a sea of oil (and
gas)”**



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What is the United Kingdom Made of?

“It is an island built of coal surrounded by a sea of oil (and gas) **with a nuclear spark**”



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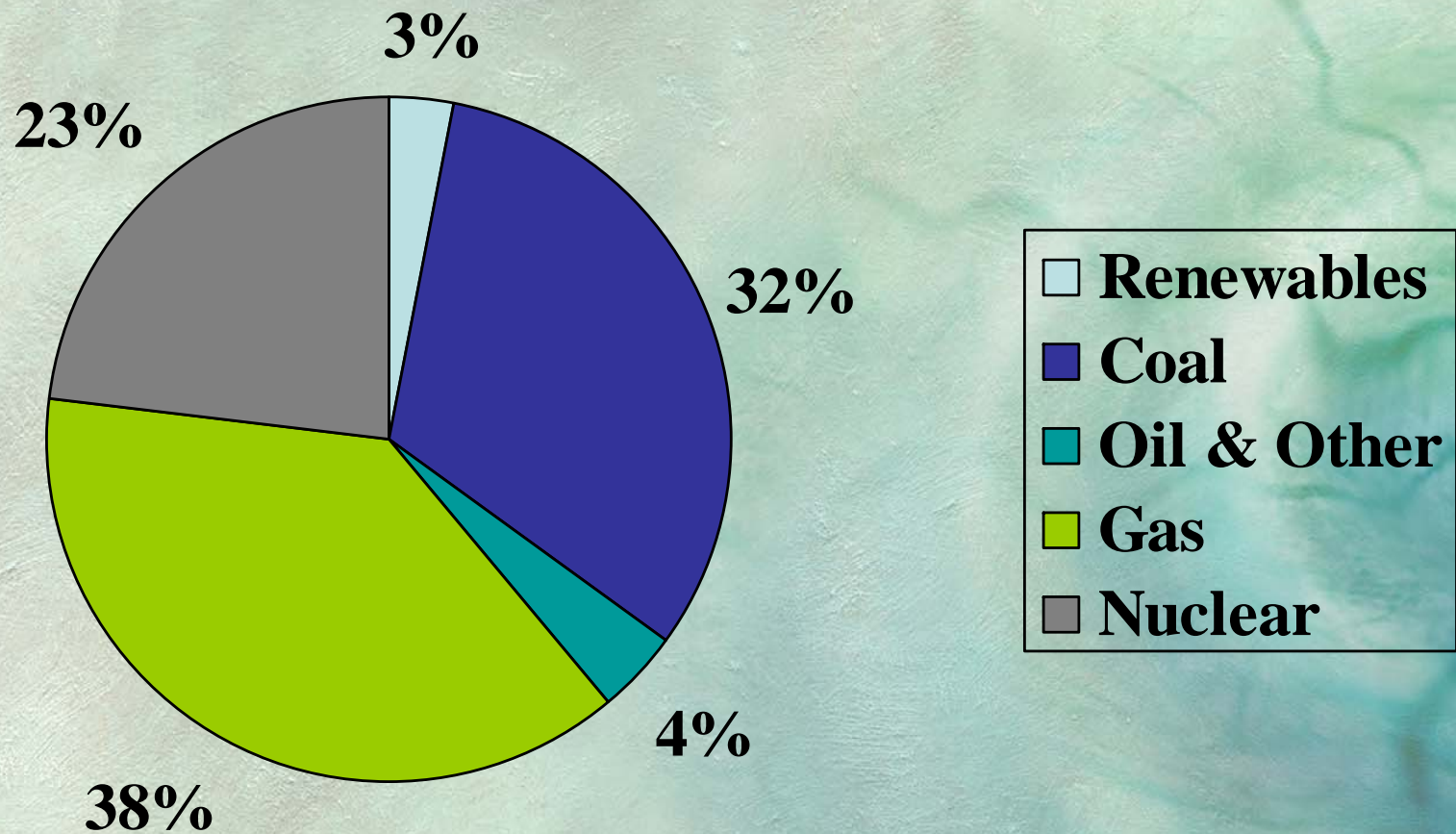
Which is disappointing because the UK is

- “A rather windy, often very wet and sometimes sunny island good for growing crops and trees surrounded by a lot of sea with large tidal ranges”



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Electricity Generation in the UK



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Source : Energy White Paper, 2003. DTI estimates for 2002 on gross supplied basis, based on Digest of UK Energy Statistics, table 5.6

A brown Highland cow is seen from behind, standing in a lush green field. In the background, a white wind turbine stands against a pale sky. The entire scene is framed by a light green, textured border.

**The end
is near...**

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A photograph of two large, hyperboloid cooling towers of a nuclear power plant. The towers are made of brick and are emitting thick white plumes of steam or smoke that rise into the sky. The background shows a clear blue sky and some distant hills. In the foreground, there is a body of water, possibly a reservoir or a river, with some vegetation and a small structure on the left. The image is framed by a green border on the left and right sides.

**60% reduction in
carbon
emissions by 2050**

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The Drivers

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**“Climate change
the world’s greatest challenge”**



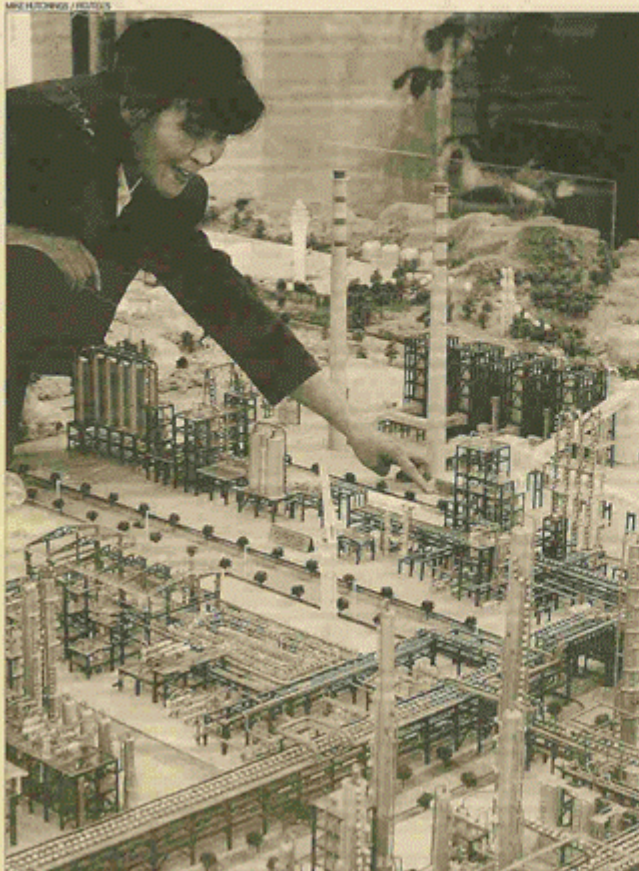
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Security of Supply

THE TIMES THURSDAY JANUARY 12 2006

34C

CHINA INVESTMENT 43



'Find a couple of spare planets or face global oil war'

By Richard Beeston
Diplomatic Editor

THE world faces the real threat of a new conflict over oil as China competes with existing world powers for scarce resources to feed its growing economy, according to a report published today.

The *State of the World 2006*, released by the Worldwatch Institute, says that last year China became the second-largest importer of oil, after the US, while consuming 26 per cent of the world's steel, 32 per cent of rice production, 37 per cent of cotton and 47 per cent of cement. China is set to become the world's largest car-maker in the coming decade.

While environmentalists are concerned about the impact on the world's climate and the drain on its resources, strategists fear that the competition for energy, particularly oil, could destabilise the planet. According to the report, China was nearly self-sufficient in oil in the mid-1990s. But over the past decade its consumption has doubled and it has now overtaken Japan as the second-largest importer of oil, with 3.2 million barrels a day in 2004. It predicts that if the econo-

HUNGRY NATION

- China uses 26 per cent of the world's crude steel
- 32 per cent of rice
- 37 per cent of cotton
- 47 per cent of cement

■ It is the world's biggest producer and consumer of meat; more than half of the world's pigs are in China

■ It has overtaken Japan in oil consumption and is now second only to the United States

■ It uses twice as much fertiliser as the United States

■ In 1996 China had 7 million mobile phones. This rose to 269 million by 2003

China today. It recalls that it was Japan's inability to secure its oil supplies from South-East Asia that prompted its entry into the Second World War. Today Beijing is strengthening its Navy to protect its energy supplies, shipped at great distances from the Middle East, Africa and Latin America.

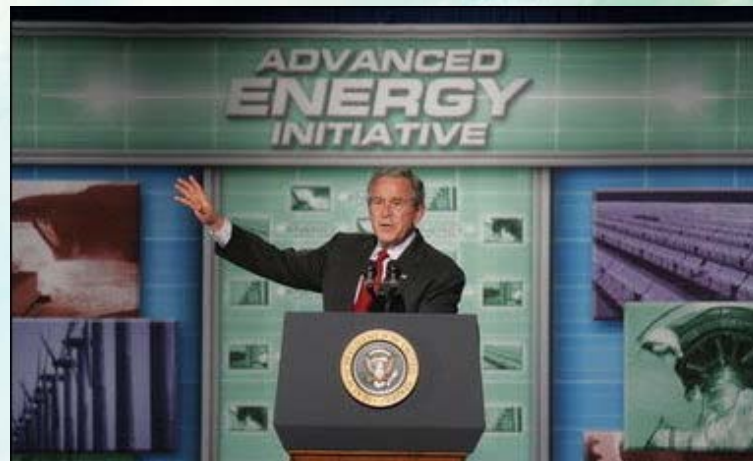
"The prospect of countries ranging from the United States and China to Japan and Saudi Arabia — together with the world's terrorists — vying for physical control of the world's oil does not sound like a prescription for global security," the Worldwatch report says.

The group argues that the rise of China and India as economic powers means that the "resource-intensive economic model" is not capable of meeting the needs of more than eight billion people in the coming century.

"Our analysis shows that if the two countries [China and India] were to use as much oil per person as Japan does today, their demand alone would exceed current global oil demands. And if their per capita claims on the biosphere were to match those of today's Europe, we would need a full planet Earth to sustain these two

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“President Bush's four part plan to confront high gas prices includesinvesting aggressively in alternatives to gasoline, so that we can eliminate the root cause of high gas prices by diversifying away from oil.”



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Consumer shock

Fuel bills race up by £300 per year

By Angela Jameson
Industrial Correspondent

HOUSEHOLDERS face a triple blitz of rising petrol, gas and electricity prices as oil costs are forced higher by Hurricane Katrina.

The 17.3 million consumers who buy gas and electricity from British Gas, the country's biggest energy supplier, face a 14.2 per cent from September 19, it emerged last night.

This represents the biggest single increase from any company this year and will take the average bill

PRICE RISES
Year to July 2005



gas and 32.4 per cent on electricity. Prices rose twice last year, causing more than a million customers to change supplier. The company said that it had been forced to raise prices

4 METRO Monday, February 6, 2006

Anger over '25% gas price rises'

BY AIDAN RADNEDGE

CONSUMER groups reacted angrily last night to claims that gas bills are set to leap by a quarter.

British Gas will announce the price rise this month in letters to its 11 million customers, sources said.

The 25 per cent jump would be the biggest single increase ever – more than ten times the rate of inflation.

Age Concern warned that higher bills would mean older people on fixed incomes would struggle more than ever to keep warm, which could mean more deaths.

Director-general Gordon Lishman

added: 'The elderly are particularly at risk of illness during cold weather, so it is essential that they do not economise on heating so that they keep warm. Some will choose between heating or eating.'

Price comparison service uSwitch.com said: 'We have been expecting an increase from British Gas, but these figures are shocking. There is insufficient justification for such excessive price rises.'

It called on regulator Ofgem to

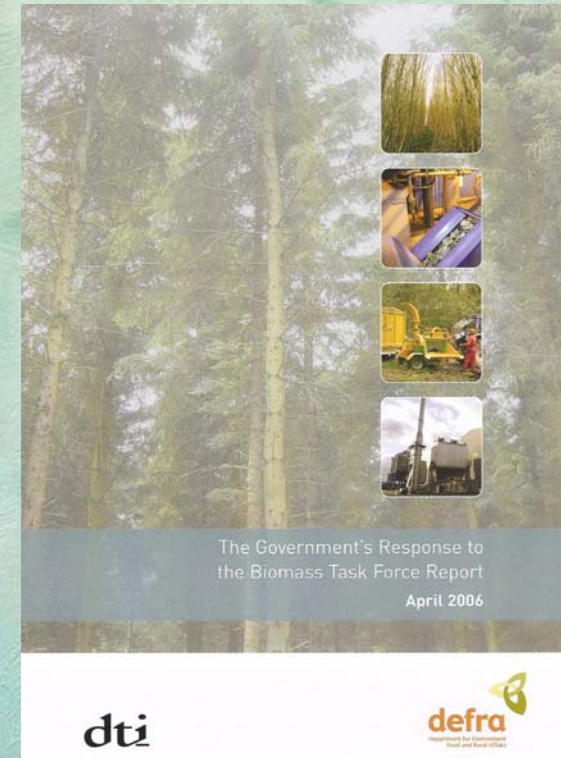
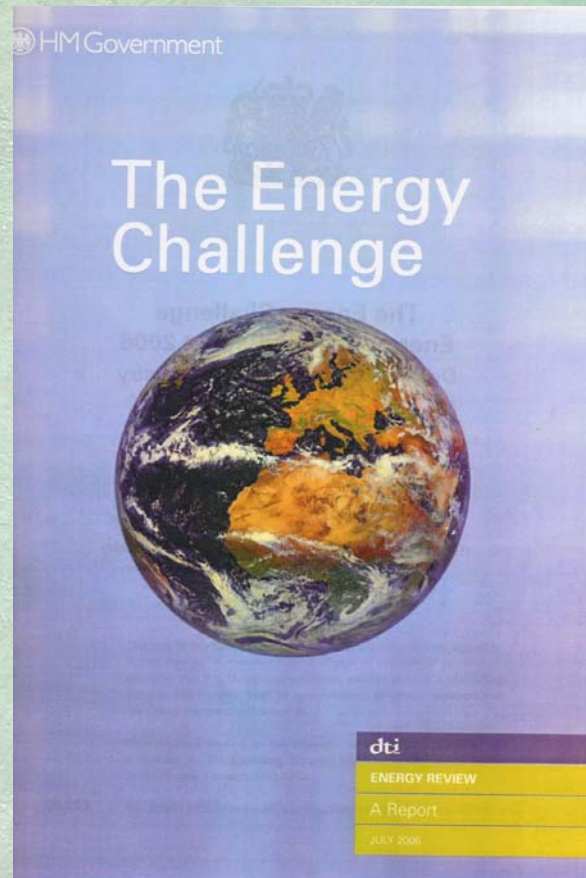
investigate the reasons for the reported increase.

A British Gas insider told a Sunday newspaper: 'Directors have agonised about taking the decision because they know it is going to hurt everybody. But the reality is we have no choice.'

Centrica, the parent company of British Gas, said: 'Wholesale gas prices for 2006 are up about 75 per cent on 2005. Clearly, all suppliers are buying their gas in the same market, therefore we would expect that suppliers will be increasing their tariffs substantially over the next 12 months.'

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Energy Review and Biomass Task Force



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2006 Energy Review

- Diversity in supply needs to be protected
- But a 'low carbon economy' is essential
- New nuclear power back on the agenda
- Renewables to be pushed harder still
- Clean coal technology to be investigated (carbon capture and storage)
- Oil and gas imports to be 'managed' (dependence for gas moves from 10% import now to 90% by 2020)

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The Matter of Targets

- In the UK we have lots of them
- Excellent National targets – both ‘inspirational’ and ‘aspirational’
- Regional and sub-regional too
- Sets the backdrop to public thinking?
- Sets the political agenda?
- Indicates where resources might be directed?



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The background is a textured painting. On the right side, a white wind turbine stands tall against a pale, hazy sky. The bottom half of the image is filled with lush green foliage, including various leaves and branches, rendered in shades of green with visible brushstrokes. The overall style is soft and painterly.

Sustainable Market Creation

Slough Heat & Power



SLOUGH
heat+power

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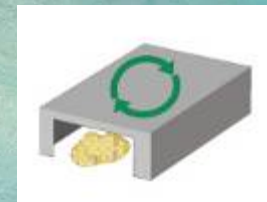
Slough Heat and Power

- Leading example for the South East
- Burning biomass since 2001
- Contributing significantly to the Thames Valley target for Renewable Energy
- Clean biomass supplied through TV Bioenergy



Fuel sources

- Biomass - 3,000 tonnes per week
 - sawmill residues
 - woodland management
- Recycled wood - 3,000 tonnes per week
 - demolition wood
 - doors, pallets, joinery off-cuts
- FibreFuel - 500 tonnes per week
 - non-recyclable paper and card



The Challenge

To develop a market and supply infrastructure virtually simultaneously

1) Slough Heat and Power

Agreed a 15 year supply contract

2) Smaller users

Assisting with drawing down grants, giving technical support, supplying fuel

3) Developing Supply Infrastructure

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Living Rainforest



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Living Rainforest



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The Living Rainforest

- Berkshire visitor centre
- 60,000 visitors/annum
- Desire to be sustainable
- Two oil boilers
- 220kW biomass boiler
- 200 tonnes woodchip/yr
- Fuel sourced locally
- Installation Summer 2005



Curzon C of E Combined School

- Primary school in Bucks
- Owned by Diocese of Oxford
- 60kW boiler
- Funded by Diocese, school and SEEDA
- 30 tonnes woodchip/yr
- Installed in 2005



Wexham Nursery

- Slough BC nursery
- 600kW woodchip boiler
- Replacing 3 oil fired boilers
- Using 300 + tonnes/yr
- Installed in 2005



Case studies in the region

- See-Stats database of renewable energy
- There are already 29 bioenergy installations in the region.


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Wood Boiler Case Study - West Dean Estate

Wood-fuelled heating - West Dean Estate

Status of Project:	EXISTING - Commissioned 1981
Location:	West Dean, West Sussex, PO18 0QZ (Grid ref: SU862126)
Owner / Developer:	The Edward James Foundation
Description:	Woodchip fired boiler and district heating system



Background:

West Dean College West Dean by the Edward James Foundation is a 100-acre estate used for work for over 100 years. The house and its efficiency and the coal's associated entailed problems.

The study confirms of beech woodlands timber was fairly

Other reasons for woodland management biodiversity: bene

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Wood Boiler Case Study - West Dean Estate

Technology / Scope of Project:

The Volund boiler was duly installed by Cubbage Machinery UK Ltd., incorporated into a district heating system connecting the various buildings on-site to the central heat supply. The system can burn wood chips of up to 60% moisture content, though typically it is around 30-40%, allowing for a degree of variability between different storage conditions, weather and storage period lengths. The specification of the automated feed system requires that chips be about one inch in diameter.

Nowadays about 1,200 tonnes of chips are used by the heating system per year. Current practice is to store one year's supply in strategic locations throughout the estate - this is stacked as roundwood, to maximise uniformity of exposure. However, there is also a chipyard which can store two months' supply in chip form if required.

The heat network runs underground and also supplies four houses, the West Dean Gardens visitor centre, the village church and a swimming pool. The network was extended during 2004 to heat an additional 900m² of teaching and exhibition space for the College, and there are plans in the near future to extend further to include a large range of glasshouses and five additional Estate houses. The annual total heat load is circa 2.5 million kilowatt hours, saving the organisation c.£80,000 worth of heating oil each year at current prices.

Importance to the South East:

The reasons originally stated by the management for opting for sustainable wood fuel in the days of 1970s oil crises and coal strikes are interesting for modern times, in view of the returning applicability of the drivers, post cheap North Sea oil and gas. This means that for similar rural communities, farms, businesses and other organisations (particularly but not exclusively those off the gas network) facing major choices about their heating system, the medium to long-term security of fuel price and supply is once again appreciated making wood a viable option.

This is in spite of the extra demands of the technology, which are themselves sometimes exaggerated in people's preconceptions. Many target end users such as farmers, foresters and large estate owners already possess hardware and the personnel systems similar or even identical to the preparatory, operational and demands of wood heating. The West Dean example serves to emphasise the local economic benefits that can arise from integrating resource management with consumption of resources.

With regard to the perceptions, in some ways the West Dean system can be set in contrast to the advancement of the technology over the following two or three decades. For instance, electronic output controls are now commonplace, following the lead of later imported products. However, in other ways this is an early example of progressive design, such as in its automatic stoking system.

The importance of ecological reasons and landscape conservation are now all the more evident than 25 years ago, perhaps especially in the South East with the pressures of its successful economy on land and wildlife. The carbon emissions arguments have never been so pressing, given the development in intervening years of scientific evidence and popular acceptance for man-made climate change.

Acknowledgements: Thanks to Simon Ward (Agent & Secretary, Edward James Foundation), Matthew Woodcock (SE Conservancy Operations Mgr., Forestry Commission) and www.westdean.org.uk for material used in this case study.




Photo: Forestry Commission

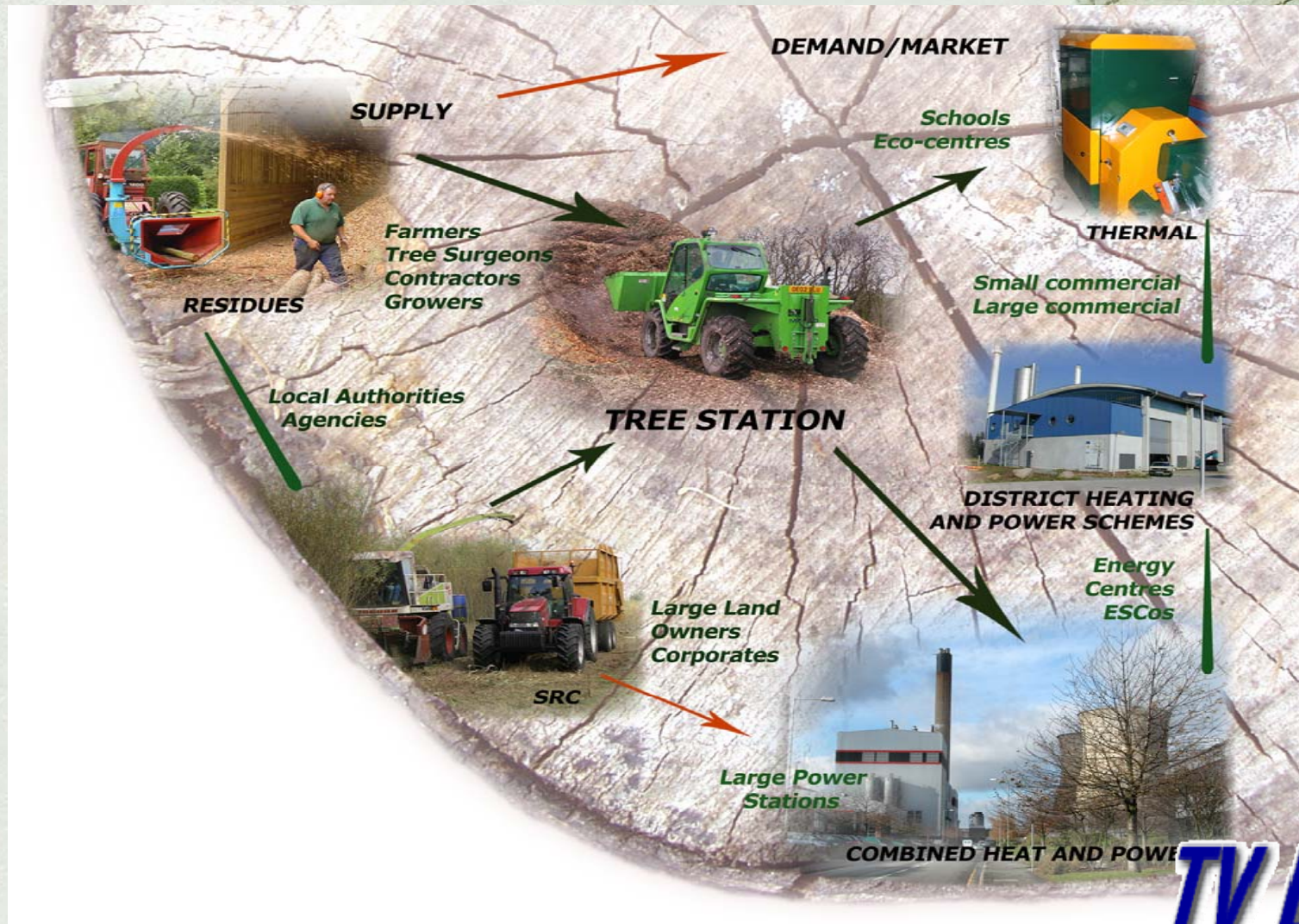
Furnace of the boiler at West Dean College, showing wood fuel

TVE/GB
13/12/2005

The background is a textured painting. It features a tall, slender wind turbine on the right side, with its three blades extending towards the top right. The lower portion of the image is filled with dense, green foliage, possibly representing a forest or a field of tall grass. The overall color palette is dominated by various shades of green and light blue/white, giving it a natural and serene feel.

Wood Fuel Supply Infrastructure – Local Developments

Wood fuel





23 suppliers – Tree
Surgeons

1,000 – 1,500 tonne chip/
month

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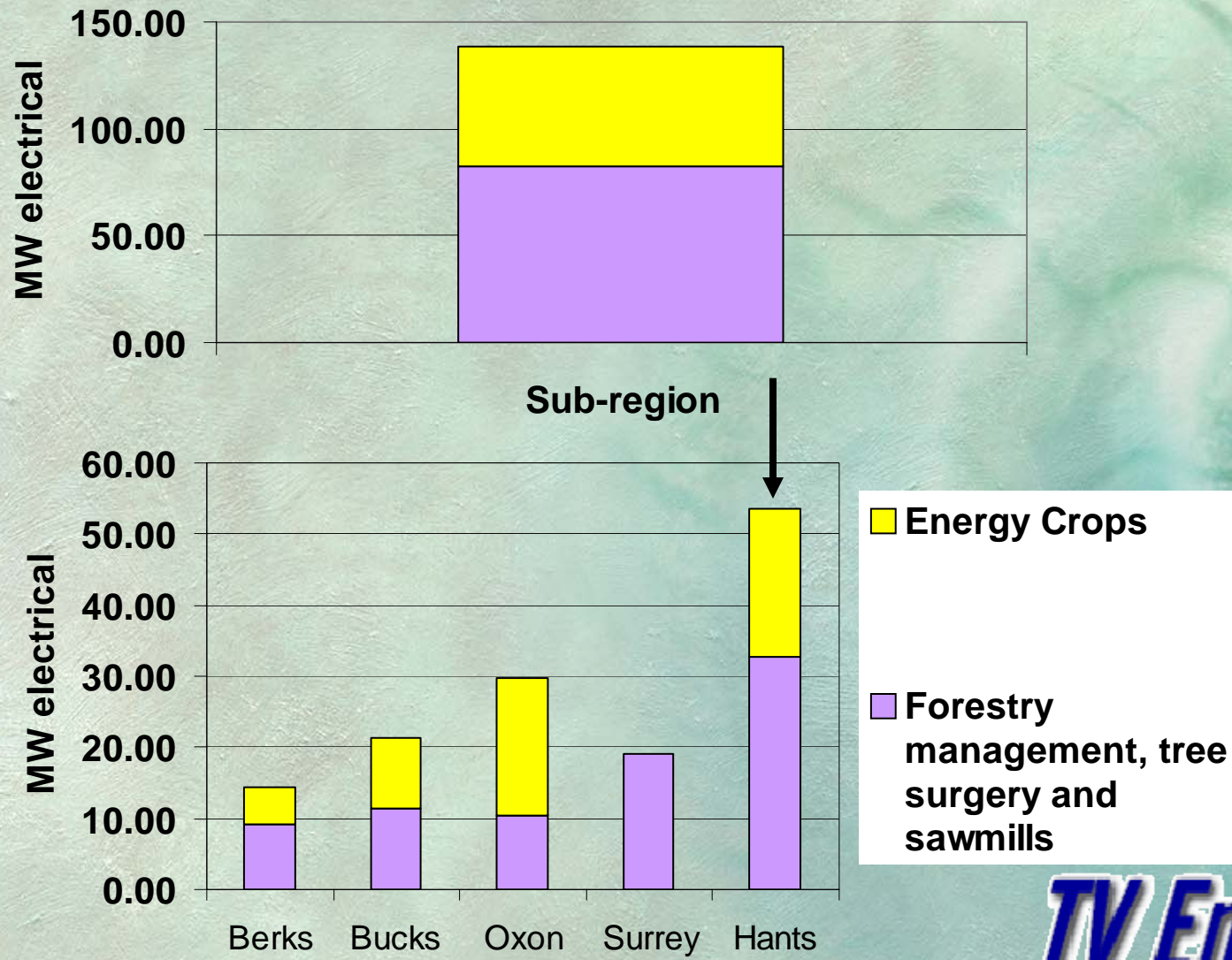
Resource and Economics

Year	Target of Electricity Production by Bioenergy (MW)	Quantity of wood required to meet target (dry tonnes)	Quantity of wood available from existing woodland (dry tonnes)
2010	215	967,500	551,944
2015	347	1,561,500	551,944
2020	499	2,245,500	551,944

Notes: 2020 targets reflect governments 20% aspiration
Assumed tonnes biomass/MW 4,500. Biomass from
existing sources assumed constant

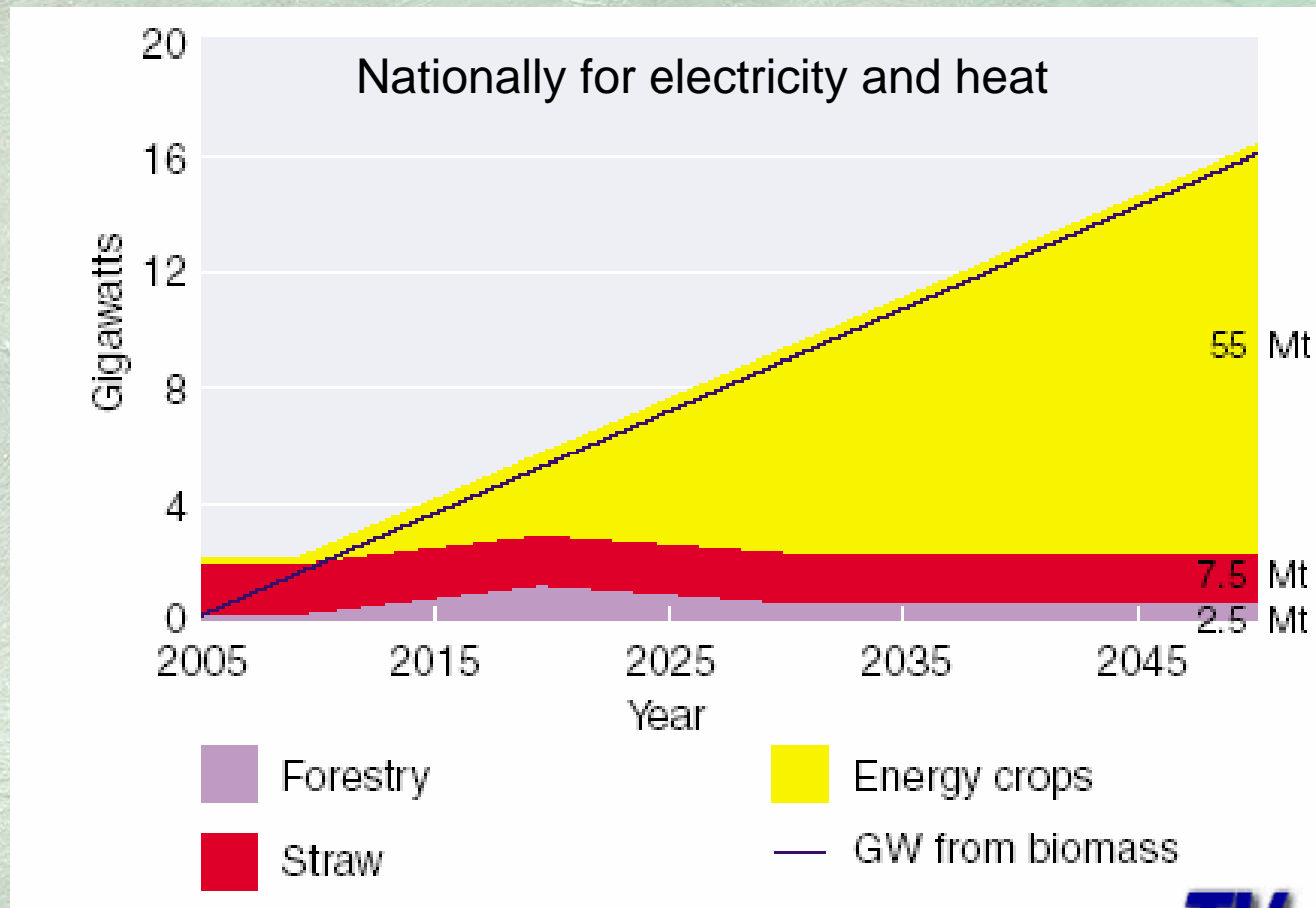
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Energy Crops requirements by 2010



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How much wood will be needed from Energy Crops nationally?



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Resource and Economics

- **Meeting that shortfall with energy crops**
 - 21,000 hectares needed by 2010
 - About **1.7%** of agricultural land in SE
 - Energy crops are currently economically competitive with alternatives for all grades of land (except grade 5)
 - Around £120 per ha per year is typical for SRC (harvested every 3 years)
 - Around £50 per ha per year is typical for Miscanthus (harvested every year)
- **Current level of grant funding must be maintained**

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TV Bioenergy Coppice

TVBC Growers in our sub-region

- 16 existing growers
- Growing 3 – 26 hectares
- Two have been growing SRC since early 1990s
- 250 hectares in total
- Farmers, corporates, academic establishments,



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Waitrose & Colombian Blacktails



Energy Crop Technologies



Step planter-Salix Maskiner



Step planter-Coppice Resources



Turton Engineering planter



Cutback harvester-Coppice Resources



Converted forage harvester-Coppice Resources



Sugar cane harvester (Austoft)

Photo: Forest Research

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The background is a painting with a textured, painterly style. It features a tall, slender wind turbine on the right side, its three blades extending towards the top right corner. The lower portion of the image is filled with dense, green foliage, possibly reeds or tall grasses, rendered in various shades of green with visible brushstrokes. The overall color palette is dominated by greens and light blues, creating a natural and serene atmosphere.

**So what's holding back
wood fuel?**

The background is a painting with a textured, painterly style. It features a tall, slender wind turbine on the right side, its blades reaching towards the top right corner. The lower portion of the image is filled with dense, green foliage, possibly reeds or tall grasses, rendered in various shades of green with visible brushstrokes. The overall color palette is dominated by greens and light blues/whites, giving it a fresh, natural feel.

**Market Creation Not
Without Its Problems!**

Barriers - Non Technical Mostly

- People!
- The planning system
- The economics
- Techno-fear and reluctance to change
- Lack of competent installers
- Lack of 'joined up' government
- Public procurement
- Inability to deal with risk

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NIMBYism

Newbury Weekly News

LAMBOURN V



Protesters at Sheepdrove on Sunday

Ref: 11-2806]

Protest over wind turbine proposal

Lambing day targeted by opponents of plan

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NIMBYism

BRACKNELL
Nice Neighbourhood

Help Bracknell Residents stop the Spoiling of Our New Town Centre

From Trees and Grass to visual eyesore The council want to turn the green area of the 3M roundabout into an industrial energy plant. Don't be mislead

Here are the facts

- It is proposed to be 2000 to 4000 sq metres (21,500 foot to 43,000sq foot) •
- The Flues will be up to 30 metres high (9th floor of old 3M building) •
- It will pump out up to 3360 tons of additional CO2 and other gases •
- Up to 12 x 25 ton truck trips in and out of the plant per day •
- Increased noise 24 hours a day •

- Emotional response to energy centre plans – attempts to frighten people
- Based on incorrect information or even disinformation
- **Not uncommon – counter with the facts**

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Planning system

- Adversarial
- Slow to adapt to needs for change
- Biased toward the very local at the expense of the strategic

19 August 2005
£2.35
www.PlanningResource.co.uk

PLANNING

Guidance blasted over wildlife gaps

Expert queries housing data interpretation

A housing expert has played down latest government figures showing an increase in housing delivery, claiming that they result from a rise in flat building.

Development consultant Roger Hunter said this week that the CDPM's house building figures for the second quarter of the year embody the "change in product mix" being offered by developers.

The figures show that from April to June there were 48,800 housing starts, up two per cent on the same quarter in 2004. This upward trend represents "a huge increase in flat developments in comparison to conventional housing", Hunter said.

He predicted that starts would begin to dwindle because flats take longer to sell. This could hold up house builders' future applications, he added.

The Campaign to Protect Rural England welcomed the figures. But policy director Neil Sinden warned that they correspond to a rise in private sector starts.

The ruling (Planning, 17 June, p3) indicated that "the development plans should be assessed under the directive. The RSE argues that this would save local authorities and developers time and expense. A final decision from the court is expected soon."

But an CDPM spokeswoman said: "Amendments to regulations must take the exact wording of such court judgments very carefully into account. It would not be useful to anticipate them."

PPSR Biodiversity and Geological Conservation can be viewed via
www.PlanningResource.co.uk

Temperature hike spurs energy policy

News that London has suffered from the highest summertime temperature increases in Europe over the past 30 years has prompted calls for mayor Ken Livingstone to move faster on sustainable energy schemes.

The World Wildlife Fund (WWF) has analysed summer temperature data from 16 European Union cities over the past three decades. It found that London's average maximum summer temperature has risen by 2°C since the early 1970s. Athens and Lisbon came a close second with rises of 1.9°C.

The report warns that climate in heatwaves, droughts and rainstorms. The WWF called on the power sector to reduce carbon dioxide emissions as being vital.

The London Assembly's Green group called on Livingstone to move quickly on investment to promote cycling, walking and car

London: experiencing Europe's highest rise in city temperatures

in heatwaves, droughts and rainstorms. The WWF called on the power sector to reduce carbon dioxide emissions as being vital.

The London Assembly's Green group called on Livingstone to move quickly on investment to promote cycling, walking and car

Planners' home help
South East and East of England planners set to be named key workers **Page 2**

Renewables reworked
Scottish ministers look to reassess targets crafted for renewable energy **Page 7**

Design coding judged
Does design coding have a serious role to play in creating better places? **Page 14**

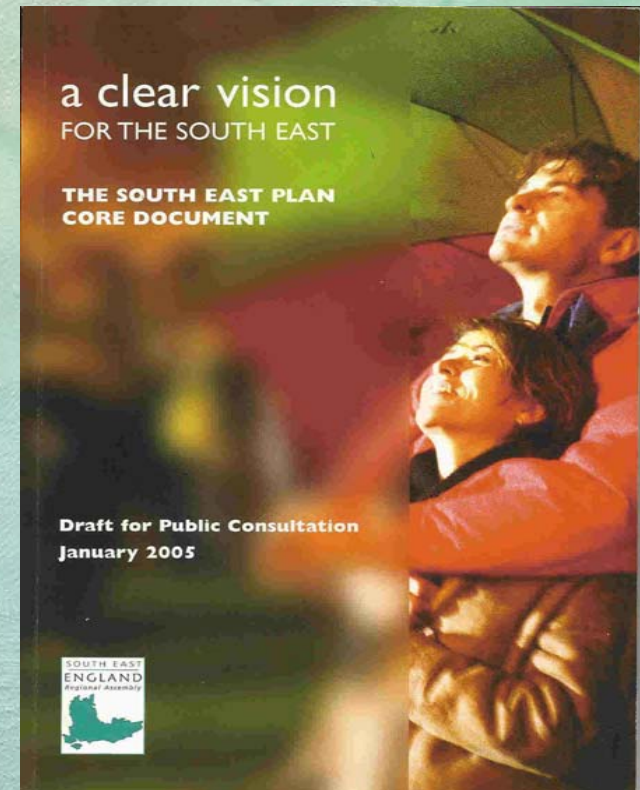
Job of the week
Colin Buchanan is looking for a director of planning — £100,000 **Page 41**

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SE Regional Plan & RPG9

Policy EN1

- All large housing (>10 dwellings) and commercial developments (> 1,000m²) should seek at least 10% of energy from renewables
- Attainment of high energy efficiency ratings
- Builds on energy white paper and PPS22



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Mission Creep in New Buildings!

- 50 Local Authorities adopted 'Merton 10%'
- A further 100 preparing to do so
- North Devon DC is demanding 15% carbon reduction through renewables
- Kirklees MC demanding 30% of energy demand to come from renewables

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One has a warm feeling beneath one's royal feet

- [illegible]

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www.tvenergy.org



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**“A tree’s a tree. How many
more do you need to look at”**

President Ronald Reagan

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