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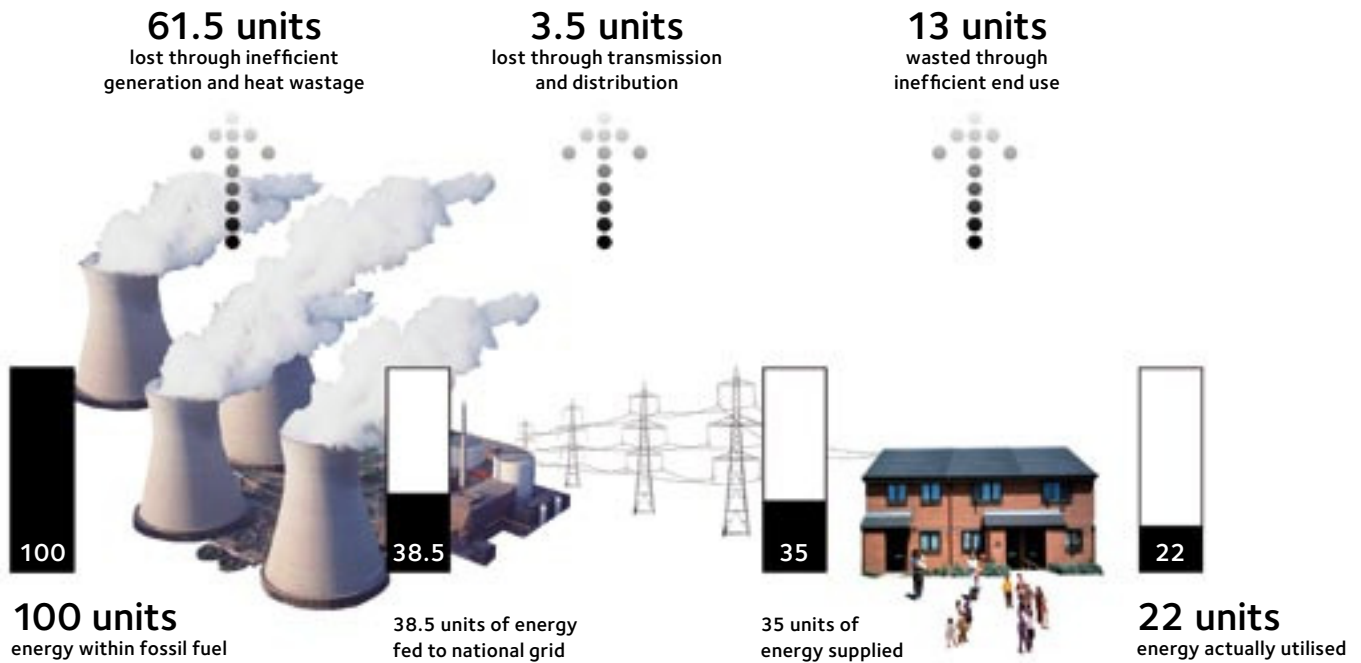
# DECENTRALISING UK ENERGY: CLEANER, CHEAPER, MORE SECURE ENERGY FOR 21ST CENTURY BRITAIN

As we begin a new century dominated by the menace of climate change, we also face a rising demand for electricity from both consumers and industry. How can we meet our energy needs while reducing the CO<sub>2</sub> emissions that cause climate change?

Decisions we make today about how to meet these challenges will determine the direction of our energy development for decades to come. The UK Government is proposing a new generation of nuclear power plants. This is the wrong choice. By supporting decentralised energy instead, the Government could build a genuinely clean energy future that is far cheaper, far safer and far more efficient.

A Greenpeace-commissioned report, *Decentralising UK Energy*, demolishes the myth that nuclear power is the best or only option for the new century, and shows that decentralised energy is a real, more effective and more viable solution to climate change – one that has already proven its worth in Europe.

The results make compelling reading and the conclusions are crystal clear: decentralised energy is cleaner, cheaper and more secure. We do not need nuclear power.



Centralised energy – yesterday’s technologies: Wasting more than two thirds of the energy available from fossil fuels.  
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**THE POLITICAL CLIMATE**

The Government’s own research recognises the value of decentralised energy systems. The 2003 Energy White Paper concluded that the big questions for the UK’s energy plan going into the 21st Century are how to tackle climate change, how to keep our energy system secure, how to reduce fuel poverty and how to achieve these results at the lowest cost. Both the White Paper, and the large expert panel who wrote the documents that informed it, agreed that the best way to achieve these goals would be a combination of energy efficiency and renewable energy. They found that nuclear power is not the answer, because it is too expensive and because the problems around nuclear waste remain unresolved.

Nothing significant has changed since, other than the urgency of action to tackle climate change. Yet today, within three years of that Energy Review and White Paper, a new Energy Review is being conducted in a political climate where some politicians assume that, contrary to all the evidence, nuclear power is now the only way to meet the energy criteria of reducing CO<sub>2</sub>, creating a secure energy system and doing so at low cost.


Many others continue to see renewable energy and energy efficiency as central to developing our energy future. They also question why nuclear power – whose own supporters often call it the choice of last resort – is now being considered when there is a far better, cleaner, cheaper and more secure option.

**THE FUTURE FOR ENERGY**

Currently in the UK’s big centralised power stations, two thirds of the energy in the fuels used is thrown away as ‘waste’ heat in cooling water, up the cooling towers and then in the electricity transmission wires. So 65% of the energy is lost before it even reaches our businesses, factories or homes. Further, the focus on electricity production ignores the greater part of the energy needs of the country: heat.

By seeing the energy system as a whole and locating energy production close to where it is used, decentralised energy makes it possible to use both the heat and electricity generated and more than double the efficiency of our power stations. Such a decentralised energy system, working hand-in-hand with renewable energy sources and more efficient end use, tackles head on the problems of climate change, pollution, energy security, and cost.

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*Decentralised energy is a highly efficient approach, is better for the climate, more secure, and gives better value for money invested in the energy sector*

The Avedøre CHP plant in Denmark generates heat for 180,000 of Copenhagen's homes and power for 800,000 and more than twice as efficient as power stations in the UK. ©Greenpeace/Reynaers

#### WHAT IS A DECENTRALISED ENERGY SYSTEM?

In 2005, Greenpeace laid out what an ideal decentralised energy system could look like, and how the UK could move toward this clean energy future.<sup>1</sup> A decentralised approach to energy generation makes best use of resources by locating power stations where there is demand, so that energy is generated close to the point of use and both heat and power can be utilised locally. This highly efficient approach is better for the climate, more secure, and gives better value for money invested in the energy sector than a centralised system.

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**50%** percentage of Denmark's electricity generated by decentralised energy systems

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An ideal energy system including decentralisation consists of three main elements:

☀ **Energy generation (heat and electricity) close to the point of use**

This allows the maximum benefit from any fuel used. Two thirds of energy generated in the UK's power stations is thrown away as wasted heat at the power station or in long distance transmission. Better use of fuel reduces dependency on imported gas.

☀ **Renewable technologies**

Renewable energy technologies like wind, wave, tidal and solar power offer climate friendly, carbon free energy and the lowest possible environmental impact. They use no fuel, relying only on endless indigenous resources, like wind and waves, in which the UK is rich.

☀ **Energy efficiency**

Increasing energy efficiency at its point of use in the home, in factories or in businesses is the cheapest and most effective way to cut climate damaging carbon emissions and reduce energy demand. Reducing demand is the most effective way to reduce fuel use and energy dependency. A decentralised energy system, which gives people more active ownership of their energy sources, is a crucial element in effectively stimulating efficiency in the end uses of that energy.

Decentralised energy generation is widespread and mainstream in many European countries, most notably Denmark, the Netherlands and Sweden, but also Germany, Austria, Finland, Italy and Spain.

## CONTRASTING FUTURE ENERGY SCENARIOS

The Greenpeace-commissioned report, *Decentralising UK Energy*, uses a sophisticated economic model to quantify several possible scenarios for the future UK energy system, putting numbers to the options so that the choices can be clearly compared on the most important criteria: cutting carbon emissions, energy security (especially natural gas consumption), investment cost, and the impact on consumers' electricity bills.

The key assessment is a direct comparison between a centralised energy future, where all new capacity is centralised and in which nuclear power is pushed forward at an ambitious rate, and a decentralised energy future, where 75% of new capacity is decentralised.

### ☀️ A nuclear scenario

Existing nuclear plants are replaced with new nuclear power stations. Under this scenario, by 2023 18.5% of electricity is generated from nuclear power. Achieving this would require a building programme that would start to see new nuclear plants completed in 2018. Nuclear power requires a centralised grid and therefore necessitates substantial continued investment in renewing and upgrading the long-distance transmission system. Because this scenario assumes such investment, it also assumes that other obsolete centralised plant, such as old coal-fired power stations, is replaced upon retirement by new centralised plant – essentially gas-fired power stations.

This leaves centralised gas-fired generation dominant, accounting for 49% of the total power supply. The scenario sees renewable energy reach 14% of the total UK mix – less than the Government's aspirational target of 20%. This is because, with a major nuclear new-build programme that starts to deliver new capacity on the system in 2018, there is very little new generation capacity that can be accommodated from other sources, and the threat of nuclear power undermines investment in other forms of generation. It is unlikely that other types of generation would be built after 2018 in significant sizes. Nuclear power constrains diversity.

### ☀️ A decentralised scenario

There is no nuclear new build. Retired plant is replaced in part by centralised (ie national grid-connected) wind power – both onshore and offshore – and an increasing share of biomass energy, but predominantly by decentralised generation including gas- and biomass-fired combined heat and power (CHP) and localised renewables.

In this scenario to 2023, 42% of electricity comes from CHP (mainly gas-fired, but also coal and biomass), 24% from centralised gas plant, 7% from remaining nuclear power stations, and 6% from remaining centralised coal-fired stations. Renewables contribute over 25%, of which roughly half is from large wind farms and the rest from biomass and local renewables.

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**3.6%** percentage of the total UK energy demand met by electricity from nuclear power stations in 2004

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Global warming from burning fossil fuels may cause Greenland's ice cap to melt completely. ©Greenpeace/Morgan



Large power stations far from cities waste two-thirds of the energy generated through their cooling towers – equivalent to the total heat demand (eg heating, hot water) of all buildings in the UK. ©Greenpeace/Morgan

## WORLD ALLIANCE FOR DECENTRALISED ENERGY (WADE)

WADE is a non-profit research and advocacy organisation that was established in June 2002 to accelerate the worldwide deployment of decentralised energy systems. WADE is now backed by national cogeneration and decentralised energy organisations, companies and providers, as well as a number of national governments. In total, WADE's direct and indirect membership support includes over 200 organisations and corporations around the world.

The WADE Economic Model compares traditional centralised energy systems to a decentralised systems using local generation under the same conditions of energy growth, costs of fuel and so on. Interest in this approach is growing around the world: the Model has recently been used by the UK Foreign Office to look at China, by the Federal Government of Canada to look at their energy system, the European Commission to look at the EU, and is being used by the German Environment Ministry to investigate the scope and potential in their country.



*The decentralised option could be even more effective if combined with an energy efficiency programme and more ambitious renewables development*

Malmö Harbour in Sweden – 98% of the energy needs of this new development of offices and residential buildings are provided by clean, renewable energy.  
©Greenpeace/Reynaers

### DECENTRALISING UK ENERGY IS THE BEST OPTION

Greenpeace-commissioned report, *Decentralising UK Energy*, assesses both the nuclear and decentralised energy options open to us. The findings are clear: the best way to meet the energy challenges that face the UK are through a decentralised system with renewable energy.

There are many benefits to decentralisation. Specifically, compared to the nuclear power scenario modelled in our report, the decentralised scenario is superior on three key points:

- ☀️ **Cleaner:** CO<sub>2</sub> emissions are 17% lower in the decentralised scenario.
- ☀️ **Cheaper:** The overall capital costs are over £1 billion lower in the decentralised scenario than in the nuclear scenario, and the retail costs of electricity to the end user are lower too. Note that model does not include the cost of managing nuclear waste, so in reality the cost advantage of the decentralised scenarios will be much greater than £1 billion. Recent estimates of the existing nuclear waste cost are as high as £70 billion. Radioactive waste storage may cost another £30 billion.
- ☀️ **More secure:** UK gas consumption is 14% lower in the decentralised scenario than in the nuclear scenario, leading to lower dependency on imports of fuel such as gas.

The decentralised option could be even more effective in terms of cutting CO<sub>2</sub> emissions, cost, and security if it were combined with an energy efficiency programme and more ambitious renewables development. Greenpeace's report also models this third scenario under which even more significant advantages are possible by 2023: with bold energy efficiency and more ambitious renewable growth, CO<sub>2</sub> emissions are cut by 30%, gas consumption is cut by 25% and

the total investment cost is £18 billion less,<sup>2</sup> all compared to the centralised nuclear baseline scenario modelled. Retail costs remain the same as the centralised nuclear scenario.

**This shows that the criteria of tackling climate change, making UK energy more secure and reducing costs are best met through a decentralised energy model in which nuclear power plays no part.**

The reasons that decentralised energy has such advantages over centralised generation are threefold:

- ☀️ **Generating electricity near the point of use reduces the electricity network required, so it avoids network losses and reduces the transmission and distribution costs of power plants.** This is especially relevant to the UK, where most demand growth for electricity over the coming 20 years is expected in urban areas like the Southeast. In these areas the national grid is already close to capacity and so significant new investment to upgrade it would be required for new centralised generation.
- ☀️ **The fuel efficiency of decentralised energy is generally higher than of centralised generation, because localised energy generation allows for the use of both the heat and power outputs of the process.** Consequently, a decentralised energy system requires less generating capacity and uses less fuel to meet the same electricity demand.
- ☀️ **Decentralised energy requires less backup capacity than centralised generation because, unlike a system consisting of a few large power plants, a system of many small generators cannot suffer a major impact from the outage of a single generator.** This also means that electricity supplies under a decentralised system are more secure.

## THE UK GOVERNMENT MUST ACT

If the Government pursues the decentralised energy option and rules out a new generation of nuclear power stations, we will produce less CO<sub>2</sub> emissions than if we build a new generation of nuclear power stations, which would inevitably both prolong our commitment to a centralised system and make the UK more dependent on imported gas.

Kick-starting the revolution towards a decentralised power system fit for the challenges of the 21st century requires Government to take the lead. The nuclear option should be ruled out once and for all. Nuclear power is unsafe, uneconomic and unnecessary.

The current energy review should result in a Decentralised Energy White Paper. This White Paper needs to show a vision for a decentralised system, with targets for development and a clear role for different organisations and agencies. It should address all the issues of regulation, financial incentives and development. Its conclusions should include:

- ☼ **No new fossil fuel generation without CHP.**
- ☼ **New building regulations to promote decentralised energy:** All new buildings should be required to incorporate decentralised energy technologies and be linked wherever possible to district heating systems.
- ☼ **Guaranteed market for decentralised energy:** All electricity suppliers should be required to purchase surplus electricity from decentralised power generators at rates that will ensure take off of decentralised generation.
- ☼ **Tax incentives for decentralised energy:** The tax system should be used to reward installers of decentralised energy technologies such as CHP systems and micro-wind turbines. Tax incentives could include reduced stamp duty, council tax or business rates.
- ☼ **Regional government action on energy:** A nationwide network of biomass and biogas cogeneration plants should be developed, for example through Regional Development Agencies.

Greenpeace's clean energy campaign is committed to halting climate change caused by burning oil, coal and gas.

We champion a clean energy future in which the quality of life of all peoples is improved through the environmentally responsible and socially just provision of heating, light and transport.

We promote scientific and technical innovations that advance the goals of renewable energy, clean fuel, and energy efficiency.

We investigate and expose the corporate powers and governments that stand in the way of international action to halt global warming and who drive continued dependence on dirty, dangerous sources of energy, including nuclear power.

April 2006

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## ENDNOTES

1 See report Decentralising Power: An Energy Revolution For The 21st Century at [www.greenpeace.org.uk/decentralisingpower](http://www.greenpeace.org.uk/decentralisingpower)

2 The main reason for the additional cost advantages of this bolder vision (called the Greenpeace scenario in the report) is that the reduction in energy demand through efficiency reduces in turn the overall amount of new capacity needed. So less new power plants are built and the cost is less. Many energy efficiency measures themselves can also have negative cost (i.e. they save more money than it costs to implement them).