

## POWERING LONDON INTO THE 21<sup>ST</sup> CENTURY

### NATIONAL CONTEXT

The 2003 Energy White Paper concluded that the key challenges for the UK's energy future going into the 21<sup>st</sup> Century are:

- how to tackle climate change
- how to keep our energy system secure
- how to reduce fuel poverty
- how to keep the UK's energy system cost effective

Both the White Paper, and the expert panel who wrote the documents that informed it, agreed that the best way to achieve these four 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 issues surrounding nuclear waste remain unresolved.

Nothing significant has changed since, other than the urgency of the climate threat and the intensity of lobbying from the nuclear industry. Even so, less than three years since the last Energy White Paper was published, a new Energy Review has begun. The government argues that we must look again at nuclear power because of the scheduled closure of our existing nuclear reactors – and the 'energy gap' this will create - and because of the need to cut carbon dioxide emissions in response to climate change. Despite evidence to the contrary, some politicians have accepted this argument. Others however continue to see renewable energy and energy efficiency as central to the answer. They also question why nuclear power, whose own supporters often call it the choice of last resort, is now being considered when there are far better alternatives; alternatives that are cleaner, cheaper and more secure.

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, cooling towers and then in the electricity transmission wires. That is 65% of the energy lost before it even reaches businesses, factories or homes. Meanwhile, the focus on *electricity* production misses the greater part of the energy needs of the country, which are for heat.

By taking account of the energy system as whole and locating energy production close to where it is used, it is 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 pollution, energy security and cost.

### LONDON LEADING THE WAY

As the capital of the UK and the biggest single demand centre in the country, London has a leading role to play in charting the right direction for national energy policy. London is responsible for around 15% of the UK's CO<sub>2</sub> emissions (50 million tonnes), with its demand for energy continuing to increase. At the same time, the Greater London Authority and many London boroughs are opposed to nuclear power, being Nuclear Free Local Authorities. If London can actively take a role in reducing its energy use and emissions, such that climate targets and energy demand are met without the need for nuclear power as part of the national electricity supply, then it will set an example that other UK cities can follow. This report shows that London can do just that. The report finds that it would be more effective for London, in terms of reducing its emissions, reducing its gas consumption and doing so at less cost, to decentralise the capital's own

energy system, than to depend on centralised national electricity production with nuclear power.

## DECENTRALISING LONDON'S ENERGY

The new Greenpeace commissioned report, *Powering London into the 21<sup>st</sup> century*, demolishes the myth that nuclear power is the best or only option to meet climate and security objectives for London and the UK. The report by international energy experts PB Power shows that a real, more effective and more viable choice is available. The report assesses the opportunity for decentralised energy and combined heat and power in London and models scenarios using this approach to predict the emissions reductions and gas consumption of such an approach when compared to the predicted results for London of a national program of new nuclear power.

This report – which follows two previous Greenpeace reports on decentralised energy (*'Decentralising Power: An energy revolution for the 21<sup>st</sup> century'* and *'Decentralising UK Energy: Cleaner, cheaper, more secure energy for the 21<sup>st</sup> Century'*) – nails the lie that we need big power stations to supply big demand. It shows that the largest city in Europe could slash its CO<sub>2</sub> emissions by adopting a dynamic decentralised energy policy, at the same time as consuming less gas and vastly reducing its reliance on centralised fossil fuel generation – all without any need to rely on new nuclear power. If the largest city in Europe doesn't need new nuclear power, then who does?

**The report's conclusions are clear:**

**Decentralised energy for London is cleaner, cheaper and more secure.  
London does not need nuclear power.**

## WHAT IS A DECENTRALISED ENERGY SYSTEM?

In 2005, Greenpeace laid out what an ideal decentralised energy system could look like<sup>1</sup>. 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. A decentralised approach 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 the best for the climate, is most secure, and gives the best value for money invested in the energy sector.

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. Generating heat and power together increases the value of the fuel enormously. Currently around 2/3 of energy in the UK is thrown away as wasted heat at the power station, with more being lost in long distance transmission. More efficient use of fuel reduces dependency on imported gas.
- **Renewable technologies**  
Renewable energy technologies like wind, wave, tidal and solar power offer carbon free energy and the lowest possible environmental impact. They rely 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 carbon emissions and can reduce energy demand. Reducing demand is the most effective way to reduce

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

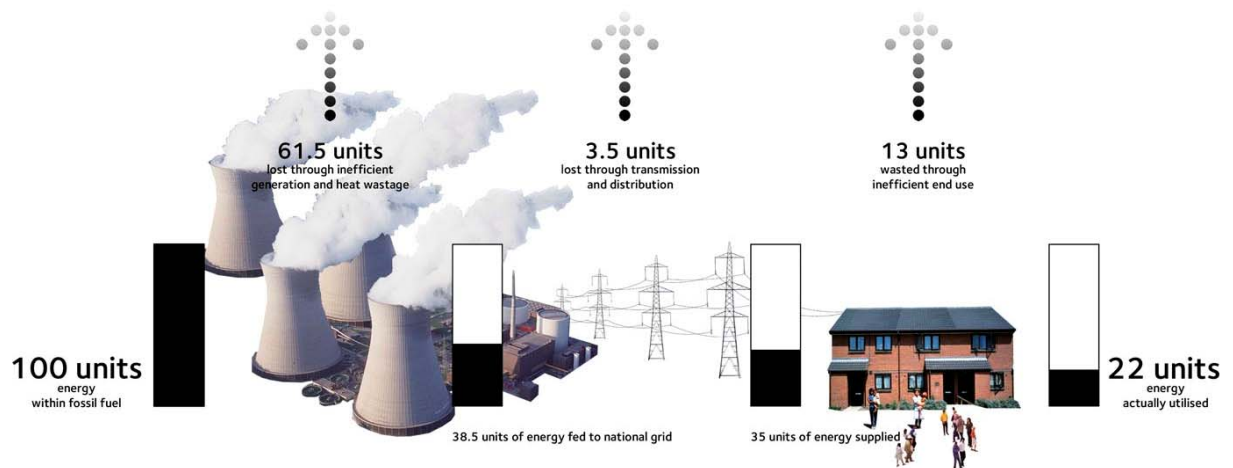
fuel use and energy dependency. A decentralized energy system, which gives people more active ownership of their energy sources, is a crucial element in effectively stimulating efficiency in the end uses of that energy.

The reasons that decentralised energy has such significant 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, because 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.

**GREENPEACE**

### Centralised energy – yesterday’s technologies



Centralised energy infrastructures waste more than two thirds of the energy available from fossil fuels. This accounts for 20% of the UK's CO<sub>2</sub> emissions.

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## **WHAT THE *POWERING LONDON INTO THE 21<sup>ST</sup> CENTURY* REPORT SAYS**

The report clearly demonstrates that there is at least one viable set of options for achieving the Government's key goals of CO<sub>2</sub> emission reductions, a secure energy supply, economic growth, and alleviation of fuel poverty – without the need for a new generation of nuclear power stations. This approach is decentralised energy.

Decentralised energy (DE) is about generating locally, on scales from individual buildings to whole districts, a significant proportion of the energy consumed in homes, offices and shops, so that both heat and electricity can be used. The DE options modelled in the report do not require dramatic breakthroughs in technology: they rely wholly on the use of existing, technically proven solutions largely based on conventional energy sources, topped up by renewable energy generation.

The model which forms the basis of this report has been developed to estimate the contribution that DE systems could make could make by 2025 to supplying London's energy needs, enhancing energy security, ensuring adequate heating in every home and reducing CO<sub>2</sub> emissions from buildings. The model has been used to consider two scenarios for the development of DE:

- a low DE scenario assuming a modest degree of political support which is based on existing technologies and assumptions broadly consistent with current regulations and economic conditions
- a high DE scenario using more advanced technologies and where regulations and economic background are assumed be more favourable to DE.

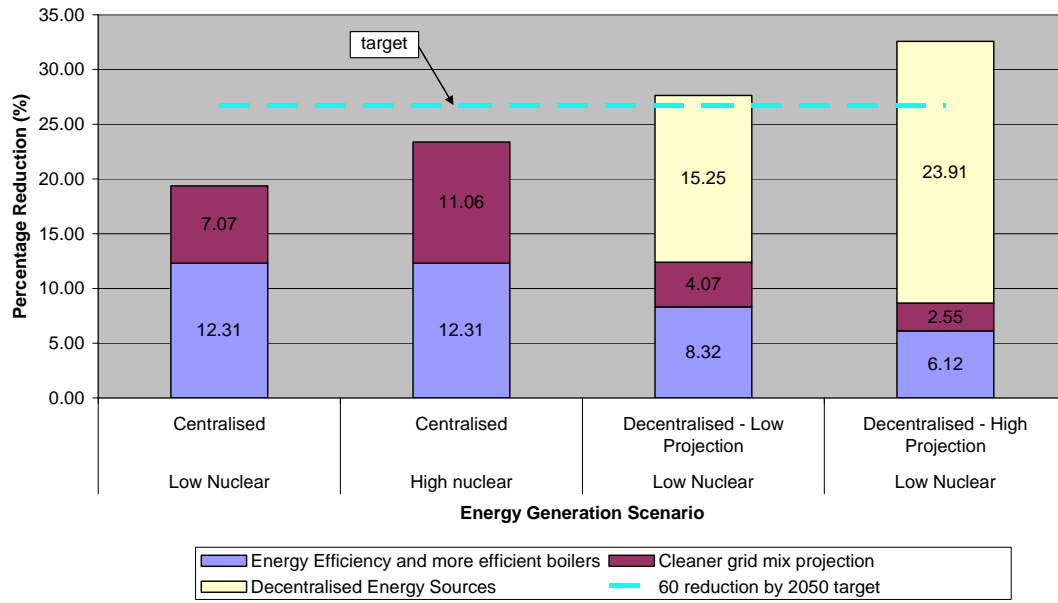
These have been compared with two scenarios reliant on conventional centralised generation – a low nuclear scenario involving no new nuclear power stations to replace retired plant, and a high nuclear scenario in which several new stations are built. In accordance with the government's consultation document,<sup>2</sup> all scenarios assume that large-scale renewable energy developments (mostly wind farms) will contribute 20% of national grid generation and that centralised coal-fired power stations will provide 16%.

### **CO<sub>2</sub> emissions reductions from 2005 levels by 2025 for the four scenarios**

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<sup>2</sup> *Our Energy Challenge: Securing Clean Affordable Energy for the Long-term* - DTI January 2006

All Buildings - Percentage CO2 reduction from 2005 to 2025



## RESULTS

- CO<sub>2</sub> emissions from London could be reduced by over **27.6%** from current levels by using a range of existing DE technologies and without new nuclear power stations being built. This reduction is in line with the Government's target of a 60% reduction by 2050, even though it uses a number of conservative assumptions. Meanwhile CO<sub>2</sub> emissions from London could be reduced by nearly **32%** by using a higher deployment of DE technologies and assuming some newer technologies become commercially established, once again without new nuclear power stations being built.
- London's projected heat and electricity demand could be met without assuming any exceptional demand-side energy efficiency gains while using **23.6%** less (low DE scenario), or even **35.5%** less (high DE scenario), primary energy than in the high nuclear scenario.
- Despite the use of natural gas for CHP and the increased use of gas in power stations (without the nuclear contribution) London's overall gas consumption would fall and would be **7%** lower (low DE scenario), or even **14.9%** lower (high DE scenario) than for the centralised high nuclear scenario.
- The proportion of the London heat market supplied through DE would be **27.4%** under the low DE scenario and **43.7%** under the high DE scenario. The installation of CH networks capable of distributing heat from different fuel sources and CHP plants would offer flexibility in meeting heat demand in subsequent decades. There would be scope for still further expansion of DE.
- Electricity generated from DE systems within London would provide **42.3%** of total consumption in the low DE scenario and **63.9%** of total consumption in the high DE scenario. There would be scope for still further expansion of DE.

## CONCLUSIONS

The primary goals set out in the Energy White Paper of 2003, CO<sub>2</sub> emission reductions and increased security of supply, could thus easily be met by adopting the DE approach. It has been shown that CO<sub>2</sub> emission reductions in line with the target of a 60% reduction by 2050 can be achieved, and in fact exceeded, under DE scenarios, whereas with the centralised scenarios (including the high nuclear scenario) this target cannot even be met.

The report also shows that the high efficiency of DE will result in a lower consumption of natural gas and that there will be a wider variety of energy sources, many of which are based on local supplies, thus enhancing energy security. These findings suggest that the most effective way for London to reduce its CO<sub>2</sub> emissions and increase its energy security is by adopting a DE pathway.

DE solutions are highly suited to meeting the energy requirements of densely populated urban areas such as London. The Mayor of London has already set out his intention to move London towards a DE future and has set up the London Climate Change Agency to achieve this. As the majority of the UK population lives in urban areas this approach has a potentially much wider application all across the country.

Ultimately this report 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.

## **WHAT THE GOVERNMENT SHOULD DO**

Replacing existing nuclear power stations with a new generation, which would inevitably prolong the UK's commitment to a centralised system, would lead to higher carbon emissions than would a decision to rule out new nuclear stations and pursue the decentralised route. Further, nuclear new build and its consequences would make the UK more dependent on imported gas than the decentralized route.

Kick-starting the revolution towards a decentralised power system fit for the challenges of the 21<sup>st</sup> 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. Instead of what looks like being a nuclear White Paper, the current energy review should result in a Decentralised Energy White Paper. This White Paper needs to show a vision of 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 should be permitted unless it is combined heat and power.
- All new buildings should be required to incorporate DE technologies and be linked wherever possible to district heating systems.
- All electricity suppliers should be required to purchase surplus electricity from decentralised power generators at rates that will ensure take off of decentralised generation.
- The tax system should be used to reward installers of DE technologies such as CHP systems and micro-wind turbines. Tax incentives could include reduced stamp duty, council tax or business rates.
- A nationwide network of biomass and biogas cogeneration plants should be developed, for example through Regional Development Agencies.