RESPONSE TO THE PROJECT DISCOVERY CONSULTATION BY OFGEM
By Calor Gas Ltd.

We begin by challenging a fundamental tenet of the current energy and climate change strategy upon which the National Policy Statements (NPS) are built. We do this using the Government's own calculations. With an official forecast of fuel poverty rising by 50% to 6 million we question whether the deliberately engineered price rises for fossil fuels to sustain the renewable energy strategy are politically acceptable.

We proceed to challenge and call for testing of a number of other assumptions on which the NPS rest. Then, we propose a positive contribution that will provide a significant part of the solution to carbon reduction while not causing the unacceptable cost, dislocation, pollution, extra mortality, unintended environmental damage, and possible unserved demand implicit in the current policy mix.

ELIMINATING FUEL POVERTY?

The Draft Overarching National Policy Statement for Energy (EN-1) states that the energy and climate change strategy has as one of its aims: "To support the elimination of fuel poverty and protect the vulnerable" (para. 2.1). That does not start off on the right foot.

HMG is committed to ending fuel poverty in vulnerable households in England by 2010 and ending all fuel poverty by 2016 (there are similar targets in Scotland and Wales). The figures have been going in the wrong direction since 2004. The Sixth Annual Report on Fuel Poverty" (October 2008) read: "In 2006, there were approximately 3.5 million households in fuel poverty, an increase of around 1m households since 2005. Around 2.75 million of these were vulnerable households, an increase of around 0.75 million…Projections of fuel poverty in England for 2007…show that prices are likely to have pushed a further 0.7 million households into fuel poverty. Projections for 2008 show a further increase in fuel poverty for England, of around 0.5 million households." On 16th December 2009, an OFGEM presentation admitted 4 million households in fuel poverty and forecast fuel poverty to rise to cover 6 million. It is hard to believe that fuel poverty targets can be hit in 2010 or 2016.

The Impact Assessment of the UK Renewables Strategy published by HMG on 13th July 2009 puts the annual cost of the policies at £4.3bn: this delivers an annual average benefit of £0.3bn (monetised carbon benefits). Over a 20 year period the net benefit of the policy is minus £56bn. The total value of carbon saved over the same period is put at £5bn. Thus, the a combination of the consumer, the taxpayer and the economy is going to have to pay twelve times as much as the computed disbenefit of the carbon to remove it. This does not make sense, particularly at a time of recession and when the taxpayer is probably going to face possible rises in taxation and cuts in public services.

Turning to the future burden on the consumer, the same Impact Assessment makes clear the impact on consumers' bills as a result of adopting the Renewable Energy Strategy: "By 2020, we estimate that the measures set out in this consultation document, taken together, could result in increases in electricity bills of 10% to 13% for domestic and 11% to 15% for industrial customers; increases in gas bills of 18 to 37% for domestic and 24% to 49% for industrial customers" (para. 74). Paragraph 54 admits, "Poorer households are likely to spend a higher proportion of their income on energy and so increases in bills will impact more on them". We do not think it alarmist then to predict a big rise in fuel poverty contrary to all policy intentions. OFGEM has predicted a rise of up to 60% domestic fuel bills (Evidence to Energy and Climate Change Committee 2.12.09). The current climate change and energy strategy is a driver of fuel poverty, not an antidote to it.

THE ASSUMPTIONS BEHIND NPS

The NPS is based on a number of assumptions:

- Around 30% of electricity generation will be from renewable sources by 2020. This will come primarily in the form of large amounts of onshore and offshore wind generation…(EN-1, para. 3.1).
- The demand for electricity in generation in 2020 is likely to be at levels similar to now (around 60GW) – (EN-1, ibid.); and, that peak electricity demand will be between some 50GW and 70GW by 2022/23 (figure 3.1) with a central planning assumption of 60GW.
- That biomass is considered to be a renewable fuel (ibid., para.3.4.3).
- "The combustion of biomass for electricity generation is likely to play an increasingly important role in meeting the UK's renewable energy targets" (EN3-3, para 2.5.1)
- Where operators of biomass plants are seeking to gain ROCs for the combustion of biomass as a renewable fuel, they must undertake annual reporting to Ofgem on sustainability issues relating to the sourcing of the biomass sourced including the volume and type of biomass used, country of origin and previous land use (ibid. para. 2.5.10)
- "Where a proposed modern biomass combustion plant meets the requirements of LCPD and will not exceed the local air quality standards, the IPC should not regard the proposed biomass infrastructure as being detrimental to health" (para. 2.5.40).

Each of these deserves challenging for robustness, and possibly challenging in principle.

Will 30% of Electricity Generation Come From Renewables by 2020?

The wind energy targets – the ascribed primary source for renewables – are "heroic". The 2008 Fells Associates Report, "A Pragmatic Energy Policy for the UK" said that the UK Renewables Strategy would, "Require a monumental shift in investment and build rate for renewables". It still does. The total installed capacity of windfarms in the UK according to the British Wind Energy Association (BWEA) is 3,233MW – 8.2% towards target. In BWEA's, "England's Regional Renewable Energy Targets: Progress Report" (2009) they admitted that onshore wind targets will be missed by 45%: "England's regions are set to comprehensively miss their targets on generating electricity from renewables". The UK Renewables Strategy saw a need for 25GW offshore wind capacity by 2020. Fells (op.cit.) regarded this target as "bizarre". It, "Would mean installing 10 turbines a day from now to 2020 (utilising the average 60 possible working days a year). This is 10 times the best installation rate achieved anywhere for offshore installation, yet the UK has just one suitable heavy-lifting barge available at the current time…(MPI Resolution) capable of installing these huge machines in the seabed, and that cost £75 million". The purpose of our doubt is not to attack wind as a power source but to point out that our already tight capacity margins prior to 2020 need especial attention – of which, more later.

In response to looming gaps in energy supply, Prof. David MacKay, Special Adviser in DECC called for "industrialising really large tranches of the countryside"(11.09.2009 – Times Online) to supply biomass. The renewables strategy depends on doubling the land devoted to energy cropping in every year from 2010 to 2017. The expectations of biomass look as heroic as for wind: "To date there has been a failure to achieve significant planting of woody energy crops in the UK" ("Combating Climate Change, Forestry Commission", 25th November, 2009, para.14.2).

Are We Right to Rely on 60GW Peak Demand by 2020?

As admitted, there is a very significant range in forecast peak demand by 2022/23 – between 50GW and 70GW. This argues for an approach that allows maximum flexibility and less prescription. If the NPS bowls for 60GW and 70GW is needed, what then?

Having cast doubt on the 2020 wind target, how high is the risk of unserved demand? Even with the full complement of wind things are going to be very tight between 2015 and 2027.

Chart 24 of the "Analytical Annex" "Low Carbon Transition Plan" (15th July 2009) shows how the capacity margin in the grid system becomes uncomfortably close from 2015 onwards.

Capacity Margins (%) under 29% large scale renewable electricity generation

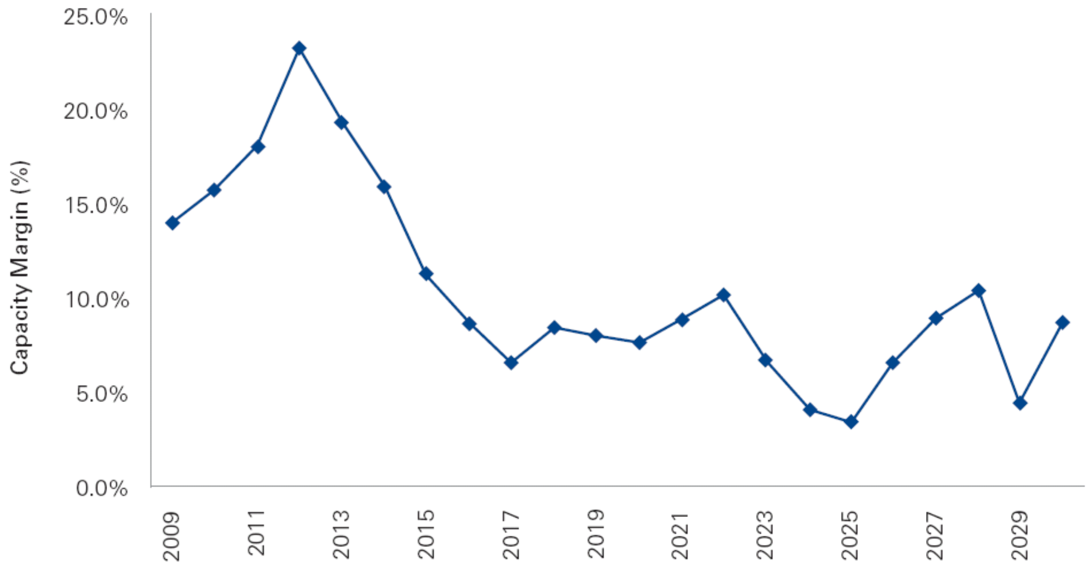


Chart 25 shows the expected energy unserved by the electricity system: 2017 will be the beginning of crunch time for electricity blackouts with 3GWh of electricity demand going unsupplied rising to 7GWh in 2027.

Of course, it is helpful if the wind blows. The Executive Summary of the "Analytical Annex" ibid.) recognized this problem but did not solve it: "In 2020, a larger proportion of renewable generation, particularly wind generation, will create challenges from increased intermittency. Analysis suggests that these risks to electricity security of supply are manageable before 2020, but that after 2020 they could potentially become a problem due to the closure of old gas and coal plants and additional renewable deployment". The Daily Telegraph reported on 12th January 2010 that out of a UK capacity of 5% wind was delivering 0.2% (pB3) during the January cold spell. The wind was not blowing when most needed.

The Committee on Climate Change commissioned a NERA study which estimated that 8.4 million homes could be fitted with air source heat pumps by 2022 ("Renewable Heat Technologies for Carbon Abatement: Characteristics and Potential", July 2009). But such a large scale conversion could place unacceptable demands on our electricity supply. The strain that a large scale move to heat pumps on our generating capacity was analysed recently: "Air source heat pumps in particular have a peak electricity demand of up to 5 kW. This is because these types of heat pumps usually incorporate a resistive heating element to supplement heating requirement under peak load conditions. This could have a profound impact on the electrical capacity needed to meet peak power demands. As an illustration, if 10 million homes replaced their gas boilers with air source heat pumps, each with a 5 kW peak load this would have the potential to create up to 50GW of additional electricity demand. Since heat pumps operate least efficiently and default to resistive heating when the outside temperature is cold and demands for heat also occur when it is cold, 'heat pump peaks' are likely in winter when peak electricity demand occurs. If heat pumps are also operated on a time of day cycle similar to today's central heating timers, the additional demand would coincide with current morning and evening demand increments. Peak demand in Britain is around 60GW (National Grid 2009), so, in the worse case, installing air source heat pumps in around half of all the UK's houses could almost double peak electricity demand," ("Building a Roadmap for Heat, Imperial College, London and University of Surrey, February 2010). Insofar as heat pumps are resorted to as the answer to renewable heat they represent a major headache for planners trying to deliver sufficient electricity generation capacity.

Is Biomass to be Regarded as "Not Detrimental to Health", Renewable and Sustainable?

The problems of biomass are discussed in the 2008 UK Renewable Energy Strategy in (paras. 4.6.14-4.6.25). Biomass boilers without stringent controls will cause significant pollution in urban areas. The resulting pollution is being directed to rural areas because of lower existing levels of pollution in the countryside. We do "not yet well" understand the effect of particulates and NOx from biomass boilers – and, as the boilers age they will pollute more. Government admits that if biomass displaces gas there will be, "Increases in emissions of all major pollutants" (UK Biomass Strategy DTI, DfT, DEFRA, May 2007). An AEA study on biomass boilers ("Technical Guidance: Screening Assessment for Biomass Boilers" AEA, July 2008, table 4.1) tells us that a typical domestic wood burning boiler emit over 30kg of particulates per year per household. The emission of particulates causes 8,100 early deaths a year in Great Britain and an additional 10,500 respiratory admissions to hospital ("Quantification of the Effects of Air Pollution on Health in the United Kingdom", DoH, 1998). Government also admits that the biomass policy would carry an extra health burden of £557m (Written Answer, 26th March 2009 (col. 695/6W) – current policies will damage air quality, lungs and hearts – despite the direction to the IPC to regard biomass as "not detrimental to health". This health burden relates to mortality – the effect on morbidity was not calculated. A further Written Answer expanded on the impacts on mortality: "The mortality health impacts of these scenarios were estimated to be between 340,000 and 1,750,000 measured as the number of life years lost in 2020 from the impact on air quality of increased biomass combustion," (Hansard, 10th November, col.219W).

The consultation paper on RHIs proposes a significant relaxation in emission standards for smaller biomass boilers under 20MW on the spurious grounds that, "They would rule out most currently produced biomass boilers". If boilers cannot be made compliant with stringent emission limits which presumably underlie the calculations of mortality given in the written answers above then those mortality figures should be revised upwards. It is, in fact, an indictment of the policy if biomass technology based on maximum emissions levels of 20g/GJ for particulate matter (PM), and 50g/GJ for nitrogen oxides contributes to costing the UK up to 1,750,000 life years in one year alone, and the Government is considering relaxing those limits to 30g/GJ for PM and 150g/GJ for NOx – increases of 50% and 200% respectively. If biomass boilers cannot be made clean, they should not be made at all. Even the Government is beginning to have its doubts: "This is not a technology in which we can have total confidence at the moment" (Joan Ruddock MP, Hansard, 25th February, 2010, col. 436). If the Government is not confident why is it applying such massive subsidy to biomass?

In 2009 the Government admitted, "The use of biomass for heat and power can pose a significant air quality problem, (Written Answer, 2nd November 2009, col. 671W). It also admitted that it had not undertaken any evaluation of the climate change effects of the black carbon (BC) emitted through biomass combustion. BC is the second largest contributor to global warming after CO_2. The UN's Economic Commission for Europe found that, "Urgent action to decrease (black carbon) concentrations in the atmosphere would provide opportunities, not only for significant air pollution benefits (e.g. health and crop-yield benefits), but also for rapid climate benefits, by helping to slow global warming and avoid crossing critical temperature and environmental thresholds," ((UNECE's Executive Body for the Convention on long-range transboundary air pollution, meeting in Geneva, 15-18 December 2008: Item 13 of provisional agenda. Air pollution and climate change: developing a framework for integrated co-benefits strategies). "Available research suggests that adapting future regulation and policy with a view to limiting BC emissions could significantly slow global warming. It would also yield benefits in terms of human health, reducing the social and economic burden associated with illness and reduced life expectancy as well as the associated costs," ("Black Carbon and Global Warming: Impacts of Common Fuels, Atlantic Consulting, 2009). So, biomass not only IS detrimental to human health, the black carbon it emits contributes to global warming – by how much the Government has made no calculation.

Government wants biomass to "play an increasingly important role" but Governments do not have a good record of picking winning technologies. It is now generally accepted that the emphasis on "first generation" biofuels was misguided – misspent subsidies encouraged the cultivation of non-sustainable biofuels, drove deforestation, and caused rises in food prices and starvation. The danger is that biomass will follow biofuels' walk of shame.

The Environment Agency's *"Biomass – carbon sink or carbon sinner?"*(April 2009) finds that using biomass for generating electricity and heat could help meet the UK's renewable targets but "**only** if good practice is followed…**worst practice can result in more greenhouse gas emissions overall than using gas.**" Tony Grayling, Head of Climate Change and Sustainable Development, at the Agency said: "We want to ensure that the sector's growth is environmentally sustainable and that the mistakes made with biofuels are avoided, where unsustainable growth has had to be curbed (Press Release, Environment Agency, 16th April, 2009). Biomass operators have a responsibility to ensure that biomass comes from sustainable sources, and is used efficiently to deliver the greatest greenhouse gas savings and the most renewable energy. The Government should ensure that good practice is rewarded and that biomass production and use that does more harm than good to the environment does not benefit from public support."

The UK Biomass Strategy made a convenient - but dangerous - assumption: "For all biomass resources no net emissions during production assumed". All the emissions produced during planting, harvesting, sawing up, drying and delivery of these bulky and heavy items are ignored. E4Tech's study on biomass prices ("Biomass Prices for Heat and Electricity", 2010, commissioned by DECC) makes the assumption that for the wood pellet imports (five sixths of wood pellets used in biomass in the UK are imported, the same study admits) there would be 50km of road transport necessary for production purposes, 200km of road transport necessary in the country of origin, sea transport of 1500km and 50km of road transport necessary in the UK. This cannot be written off as equating to "no net emissions". Besides, biomass has to be dried before combustion can take place. Passive drying can take place but it takes much longer and still leaves 25-30% water content. Pellet mills generally require moisture contents of less than 15% to produce stable and durable pellets. Therefore, different types of thermal treatment are applied to biomass to dry it. Environmental emissions result from both the drying process and combustion in the boiler. These emissions typically include particulates, VOCs, and NOx to the extent that a common problem around biomass drying plant is so called noxious "blue haze". Why are these emissions conveniently ignored?

The Environment Agency points out, "How a fuel is produced has a **major** impact on emissions: transporting fuels over long distances and excessive use of nitrogen fertilisers can reduce the emissions savings made by the same fuel by between 15 and 50% compared to best practice". There is thus a risk with biomass of significant and continuing depletion of carbon stocks. The climate change impact of preserving a forest is not the same as burning the same forest. It is a point that the American scientist Timothy Searchinger has made: "Take an acre of forest. "You cut it down, you burn it. You lose all the carbon that is stored in the trunks. You also lose the carbon in the roots. You lose on the order of 25% of the carbon in the soil is also lost to the atmosphere," (Daily Princetonian, 6th February, 2009). Atlantic Consulting (op.cit) makes it quite clear that there is good and bad biomass: "Most carbon footprints assume carbon neutrality of wood or other biomass used as fuel, i.e. biogenic CO2 is assigned a GWP of zero. In recent years, however, this method has come into question. First came the issue of land-use change, which is no longer accepted as automatically carbon neutral. Losses of carbon stock due to land-use change (for instance, deforestation to create cropland) should now be included in most footprints. More recently, researchers such as Rabl (2007), Johnson (2009) and Searchinger et al (2009) have proposed that carbon-stock changes in general should be tracked in biofuels accounting. As Searchinger et al (2009) put it: "Under any crediting system, credits must reflect net changes in carbon stocks, emissions of non-CO2 greenhouse gases, and leakage emissions resulting from changes in land-use activities to replace crops of timber diverted to bioenergy." HMG have yet to apply the carbon stock methodology to biomass.

What then are the sustainability criteria for biomass? The European Commission failed to report on the need for a sustainability scheme for biomass used as energy by the end of 2009 under the EU's new Renewable Energy Directive because of internal dissension. The biomass operators maintain – as well they might - that there is no need for biding sustainability criteria. The Government are awaiting the resolution of the EU sustainability criteria before implementing their own.

AN ALTERNATIVE APPROACH

The real solution lies in reducing household electricity consumption while encouraging citizens to produce their own energy," Philip Selwood, Chief Executive, Energy Saving Trust, "Total Politics", October 2009.

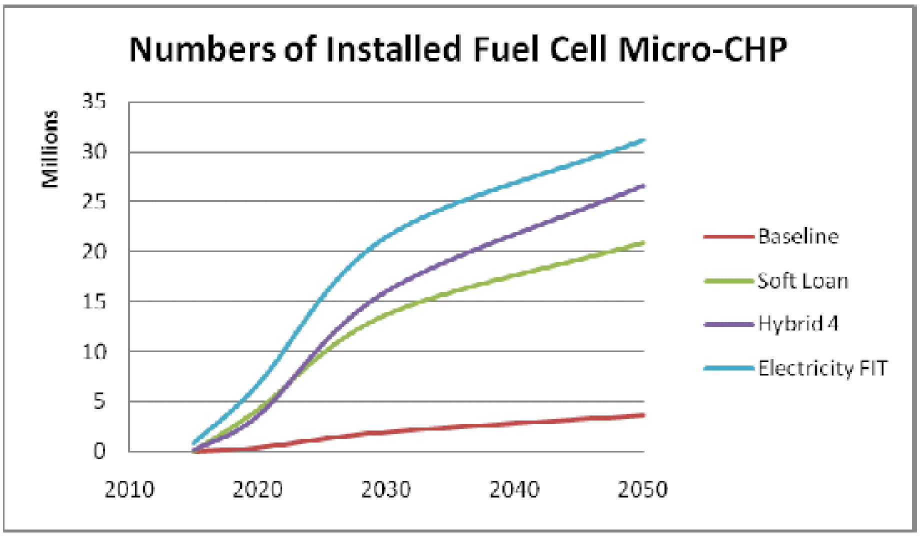
The solution we advance has the potential to deliver 50% reductions in carbon emissions in existing homes. It does not require great subsidies and will not place a burden on the economy. It will reduce rather than increase fuel bills, placing downward pressure on fuel poverty. The technology is practical and commercially viable – it does not carry the risks of Government picking winners. It is based on clean technology – cleaner than oil, coal, and biomass – and it will not worsen air quality or harm human health. It will also provide greater stability to the power supply, providing protection against power cuts. In both urban and rural areas, gas or LPG powered micro-CHP fuel cell boilers allow us to reach the carbon output targets by low-cost, close to market solutions without the need for punitive levies. mCHP fuel cell boilers are simple to operate, easy to install in a majority of UK homes, retrofit in existing homes and maintain, require no changes to the fabric of the home and are designed for ease of deployment and use. Unlike a biomass installation it can be turned on and off as required. It is not only compatible with existing grid infrastructure, but will actually reduce the necessity for capex requirements on the grid network.

LPG is the lowest carbon-emitting fossil fuel available in rural areas and LPG technology continues to develop quickly in response to the UK's low carbon requirements. Calor is investing with the UK company, Ceres Power to bring the next generation of boilers to market by 2012. This high efficiency condensing boiler will heat the property and also generate up to 80% of the electricity required in the property. Generating electricity locally avoids the wasted energy associated with power stations and transmission systems. It will provide a measure of black-out protection since the system can keep the power running during the predicted power cuts. This fuel cell boiler will cut carbon emissions on an average property using oil by up to 50% through an investment of only approximately £2,000 more than a modern condensing boiler. Combined with solar technology and insulation measures a fuel cell boiler should be able to achieve the 80% emission targets that government is seeking by 2050. These boilers will be able to be serviced by engineers with existing skills. Micro-CHP units can reduce total household energy bills by 25%. It will be very cost-effective per tonne of carbon saved. For urban areas on the gas mains, an equivalent technology is being developed by British Gas/Ceres that carries the same advantages as the LPG fuel cell boiler and will be available in 2011.

The CO_2 savings from mCHP are determined by the generating plant it displaces; the displacement is in turn determined by the "merit order". So, mCHP will reduce demand for central fossil fuelled generation, without displacing renewables or nuclear. Relative to a high efficiency condensing boiler and grid supplied electricity each mCHP home can save 1-1.5 tonnes of CO_2 per annum. Since mCHP if adopted en masse reduces peak demand, it will also reduce generation investment requirements, lessening the cost of the climate change strategy.

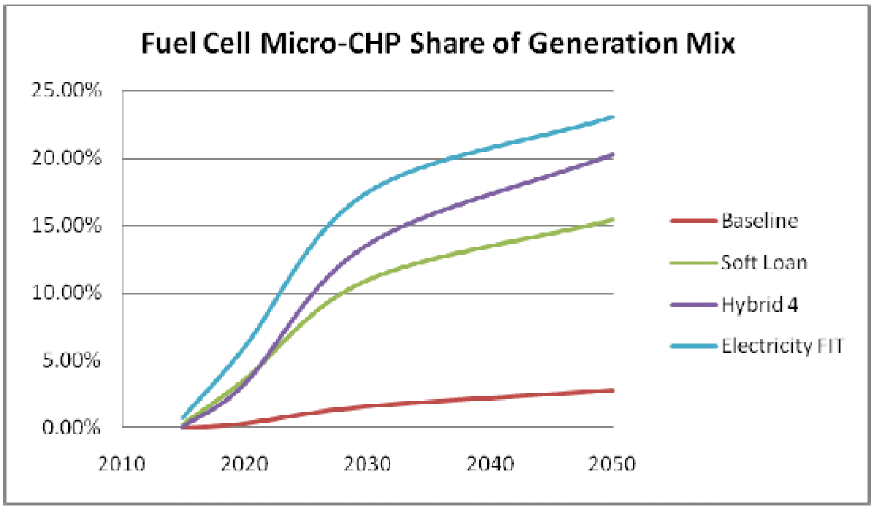
The projections of take up and electricity generation potential by BERR (The Growth Potential for microgeneration in England Wales and Scotland – June 2008) are very impressive, especially if mCHP benefits from FIT:

Example scenarios for UK fuel cell mCHP adoption



Numbers of Installed Fuel Cell Micro-CHP				
Scenario	**2015**	**2020**	**2030**	**2050**
Baseline	6,400	395,000	1,910,000	3,580,000
Soft Loan	6,400	4,190,000	13,700,000	20,900,000
Hybrid 4	73,500	3,520,000	16,000,000	26,600,000
Electricity FIT	803,000	6,690,000	21,500,000	31,200,000

Potential share of UK generation under example scenarios



Proportion of Electricity Generated by Fuel Cell Micro-CHP				
Scenario	**2015**	**2020**	**2030**	**2050**
Baseline	0.01%	0.34%	1.58%	2.78%
Soft Loan	0.27%	3.56%	10.96%	15.44%
Hybrid 4	0.06%	3.19%	13.55%	20.26%
Electricity FIT	0.71%	5.91%	17.45%	23.08%

The NPS is, in contrast, exceedingly disappointing:

"3.3.18 Decentralised and community energy systems could also lead to some reduction in demand on the main generation and transmission system. They can offer significant economic and efficiency benefits, particularly where heat as well as electricity can be put to commercial use, and reduce pressure for expansion of the national transmission system. However, decentralised and community energy systems are unlikely to lead to significant replacement of larger-scale infrastructure. This is because interconnection of large-scale, centralised electricity generating facilities via a high voltage transmission system enables the pooling of both generation and demand, which in turn offers a number of economic and other benefits, such as more efficient bulk transfer of power and enabling surplus generation capacity in one area to be used to cover shortfalls elsewhere. The lead scenario in the UK's Renewable Energy Strategy contains around 4 GW of small scale electricity generation".

As can be seen, the NPS sees mCHP contributing 4GW, whilst the potential, as assessed by HMG is for it to be in the great majority of UK households, contributing nearly a quarter of electricity generation. Given the immense cost and damage to human health involved in the current strategy we would suggest that the Government compares the overall costs of moving down the mCHP route with the trajectory implicit in NPS.