THE INSTITUTION OF
CIVIL ENGINEERS

EUROPEAN COMMISSION DG ENERGY & TRANSPORT

GREEN PAPER: TOWARDS A EUROPEAN STRATEGY FOR THE SECURITY OF ENERGY SUPPLY

Response by The Institution of Civil Engineers

THE INSTITUTION OF CIVIL ENGINEERS (ICE)

The ICE is a UK-based international organisation with over 75,000 members ranging from professional civil engineers to students. It is an educational and qualifying body and has charitable status under UK law. Founded in 1818, the ICE has become recognised worldwide for its excellence as a centre of learning, as a qualifying body and as a public voice for the profession.

INTRODUCTION

The Institution would like to thank the HSE for the invitation to take part in the Review and would like to submit the following comments.

SUMMARY

Our key points are:

- Working with the grain of markets is more appropriate than detailed regulation.
- The value of issues such as fuel diversity, building infrastructure and tackling fuel poverty needs to be recognised and rewarded within markets.
- Energy policy should establish long-term frameworks, which will deliver liquid markets attracting large players across the complete supply chain.

- The current regulatory regime in the UK will not necessarily deliver the desired outcome and will need to be reviewed to deliver the new policy aims.

- If a diverse mix of fuels is to be secured, in view of its cleanup costs, coal and nuclear will need support, such as through a 'Coal Obligation' or 'Nuclear Obligation' or similar measure, preferably within the framework of a market reward system, which recognises diversity.

- Renewables will grow initially but further support and targeted R&D will be needed to bring new technologies to the competitive market and to integrate these.

- Networks within and across Europe will need to be developed on a long-term basis. The cost of this must be spread broadly and network operators must be incentivised to secure advantage by investing and operating more effectively in respect of the broad set of energy policy goals.

- Customer awareness of the need for change/action is essential and Governments, in partnership with others, like the major utilities, have a strong role to play.

1. FUTURE ENERGY BALANCE – ICE VIEW

From published information, without further action nuclear output in the UK will decline rapidly over the period 2010-2020. Coal fired generation will progressively cease to be competitive as controls on SO2 and NOx are tightened by the Large Combustion Plants and Ceilings Directive. From 2008 it is likely that only four or five major coal-fired stations will remain operational and that from 2016, due to the requirement to fit selective catalytic reduction, these remaining stations are likely to cease to be competitive.

Renewable energy from onshore and offshore wind is likely to develop over the period to 2010 to a level that enables the Government's 10% target to be met provided planning restrictions are addressed. However, the current buyout level of 3p per kWh for renewables will not be sufficient on its own to incentivise extensive development of other technologies. Further substantial support will be required to achieve this and R&D funding should be targeted at bringing those technologies that have the prospect of being competitive to a stage of development where they can compete in the market.

The take up of energy efficiency measures has been slow. Whilst the UK Government's new Energy Efficiency Commitment and Fuel Poverty Strategy, will have an impact this will not be sufficient to reverse the 1-2% per annum growth in demand nor to impact significantly on the energy replacement requirements of lost nuclear and coal output.

Combined Heat and Power has suffered as a result of increased gas prices and the New Electricity Trading Arrangements. Until electricity prices rise e.g. as a result of coal and nuclear closure, or there is a change in policy, this situation is unlikely to change.

Without modifications to policy natural gas will continue to secure an increasing share of the electricity market, becoming the dominant fuel by 2020. Even with a competitive market and with interconnectors linking to other markets, issues of global political stability would make a dominant gas share a major concern for secure and diverse energy supplies.

2. BROAD POLICY

There are a number of key overriding issues of broad policy that we believe are paramount and these are set out below:

- The future energy policy mix should be market oriented wherever possible. Open markets have resulted in lower energy prices and can deliver reduced costs of compliance with environmental and social goals. However within the current framework markets alone will not necessarily deliver the desired mix of competition, fuel security and CO2 reduction. The proposed Renewables Obligation and Energy Efficiency Commitment in the UK represent good examples of how intervention to achieve a particular policy objective can be managed by a market-based approach.

- A long-term framework is essential in order to make markets effective and to stimulate development. Investment decisions in the energy industry require longer planning timescales than in many other industries and the industry requires clarity and predictability within a market environment in order to operate efficiently and effectively.

- A market based energy policy needs to recognise intrinsic value of each major policy element. Wherever practicable these elements should be monetised, included in the cost of supply, and made tradable. The major elements of such a policy should include:

- **A long-term framework** is essential in order to make markets effective and to stimulate development. Investment decisions in the energy industry require longer planning timescales than in many other industries and the industry requires clarity and predictability within a market environment in order to operate efficiently and effectively.

- A **market based** energy policy needs to recognise the intrinsic value of each major policy element. Wherever practicable these elements should be monetised, included in the cost of supply, and made tradable. The major elements of such a policy should include:

  Security of fuel source (short, medium and long term)
  CO2 avoidance
  Avoidance of unnecessary energy use
  Fit with social policy
  Balancing services

- A measure of success of policy will be:

  An increase in the uptake of energy saving;
  An increase in energy intensity;
  A diverse range of fuel sources with no single one predominating; and
  Delivery of substantial CO2 reductions

- Energy policy should establish a long-term framework, which will deliver liquid markets attracting large players across the complete supply chain. Large players are essential for long-term stability in a market environment where short-term shocks are inevitable. While niche markets should be encouraged for smaller players it is essential that a framework is in place that incentivises major players to adopt new technologies with

environmental and social benefits at an early a stage in their development in order to maximise the likelihood of these technologies achieving sustainability. Existing technologies, such as nuclear and coal fired generation, also require large players to be incentivised to invest in plant to ensure a continuing role until new technologies are developed.

- The establishment of a separate agency responsible for energy policy issues should be considered. This would provide consistency and clarity of approach for long-term investment. In other utility sectors such as water and rail there are separate agencies responsible for policy issues, in addition to the sectoral economic regulators. At present there appears to be a gap in the energy policy sector where major issues can be fully and publicly addressed.

3. GENERATION

3.1 Existing Coal

- The Environmental Protection Act authorisations for coal-fired plants, which implement the European Union Ceilings Directive and Large Combustion Plants Directive, limit the total bulk emissions of SO2 and NOx progressively over time and require all but very low load factor plant to fit flue gas desulphurisation for SO2 and selective catalytic reduction for NOx. The latest revisions to timescales require flue gas desulphurisation for SO2 to be fitted to high load factor coal plant by 2008 and selective catalytic reduction for NOx to be fitted by 2016. Plants not meeting the 2008 standard will be able to opt for 20,000 running hours followed by closure.

- Existing coal, once cleaned up, should have a role in the medium term to 2020. Loss of this valuable capacity will exacerbate the shortfall in output and its replacement by natural gas could limit future choice. The value of keeping existing coal, once cleaned up, as part of the medium strategy should be recognised in terms of fuel diversity and security. Coal's value in terms of providing balancing services will also increase with anticipated increases in intermittent output from renewable energy sources and small scale embedded generation.

- While techniques such as gas reburn combined with a trading regime for NOx should enable existing plant to comply with the tightening NOx controls from 2008 to 2016, it is our view that without additional support only four or five major coal-fired stations in the UK will continue to operate until 2016 and will then close due to the requirement to fit selective catalytic reduction.

- Most existing large coal plants were built in the 1970's and are already some 30 years old. These plants could operate until 2020 but major investment will be required in the near future to enable such life extensions. Much retrofitting has been done at these plants to the main process components such as parts exposed to stress from temperature, pressure or rotation, and to wear and corrosion. However, major decisions on these plants will be made in the next few years and if it is not clear to the owners that the plants will have a continuing role beyond 2008 and 2016 then the investments required to extend the station

lives to 2020 will not take place and existing coal will cease to have a role beyond 2016. Without a clear role and support all existing coal stations will close by 2016.

In order to support coal, consideration should be given to the introduction of a Coal Obligation, or similar measure, which would reward coal for its flexibility and storability. This could operate on a similar basis to the proposed Renewables Obligation by requiring all electricity suppliers to purchase a specified proportion of their total requirements from coal-fired generation with a suitable buy-out price if purchases fall below the required level. The money raised by these means would initially be invested by coal-fired generators in their existing plants, for life extension and environmental improvement projects. However, these funds could progressively be incentivised into clean coal technology developments as set out below.

3.2 Clean Coal

For coal to have any role post 2020, it will be essential to develop clean coal technologies. Currently available clean coal technologies have the potential to generate electricity at significantly higher efficiencies reducing CO2 emissions by up to 25% while also eliminating virtually all particulate and SO2 emissions and greatly reducing NOx levels.

However we believe it is important at this stage to incentivise the development of new clean coal generation that also incorporates CO2 capture and sequestration, which is particularly appropriate for the UK and in view of the potential use for CO2 in enhanced oil recovery and life extension of North Sea oil reserves. There could be significant benefits to the European manufacturing industry from exporting clean coal technologies to countries that are heavily dependent on coal for power generation, such as India and China together with significant progress towards the achievement of global climate change targets.

Clean coal technology is a significant component of national energy policy in the US with potential significant funding for new technology coal-fired plant. New coal generation appears attractive both for coal-producing states within the US and for price-concerned customers. Because of natural gas price volatility and significant short-term supply shortage, generation that relies on plentiful domestic coal supplies is seen as an appropriate addition to the resources mix for Europe as a whole.

It is important to avoid a hiatus in coal generation through clean coal technologies not being able to take over from existing coal between 2010 and 2020. A Coal Obligation or its equivalent, as set out above, could progressively become a Clean Coal Obligation. The rate of transfer from coal to clean coal is a matter of judgement. However, existing coal, even cleaned up, is unlikely to have a role from 2020 onwards and thus clean coal should be developed to a stage where it is capable of providing all required coal-fired generation from 2020 onwards.

3.3 Gas/CHP

In the UK gas has gone from being less than 0.5 % of the electricity generation capacity mix in 1990 to in excess of 40% in 2001. This trend is set to rise over the next few years. This is at a time when the UK will in fact become a net importer of gas by 2007. Several key factors require some thought:

- Energy policy must ensure that gas does not become the dominant fuel because of the risks that this would entail e.g. if supplies became dependent on regions prone to political instability. This issue has been recognised in Europe and is one where the UK should make a common case with its EU partners.
- The development of gas storage facilities should be encouraged in view of the diminishing capabilities of the North Sea fields to provide the necessary swing.
- A better climate for CHP investment should be developed.

3.4 Nuclear

In terms of electricity generation, greenhouse gas emissions are produced almost exclusively by fossil fuel power stations. Inevitably emission levels will trend upwards with the predicted growth in energy demand. This trend will be compounded by the closure of the older nuclear power stations particularly as the generation capacity is likely to be replaced by fossil fuel (principally gas powered) generation. Generation capacity based on renewable technologies will not compensate for the effects of the nuclear closure programme even if current Government targets are met.

To meet environmental commitments and future electricity demand, it will be necessary to expand the electricity market share of both renewable and nuclear power generation options. On this basis the proportion of nuclear generation would need to be the larger of the two for practical considerations and to ensure that the required level of reliable generating capacity to act as baseload is met. To maintain the drive for reducing CO_2 emissions, suggested targets would need to be of the order of nuclear 30-35% and renewables 10-15%.

As things stand, nuclear power however is a more expensive option compared to fossil fuels when construction and operating costs are taken into consideration. To promote a nuclear power station construction programme to meet these requirements it would be necessary to provide incentives such as modifications to the Climate Change Levy to establish a 'level playing field' between nuclear and other sources of carbon-free generating technologies. It would also be necessary to streamline the regulatory and planning processes associated with licensing and approval of nuclear reactors design and power station construction.

Failure to positively promote nuclear and renewable generation will inevitably lead to an electricity market dominated by gas-powered generation. As indigenous sources of gas are exhausted there will be an increasing dependence on supply sources located outside Europe (principally the Middle East and Russia). This situation will exacerbate concerns over security and reliability of supplies and potential exposure to fluctuating international gas prices.

Recent world events following the 11 September have brought issues of political stability into sharp focus. These events have heightened nuclear security and a common European (indeed world) approach needs to be advanced with pace for current and future nuclear generation needs.

3.4.1 Nuclear Waste

The issue of nuclear waste is often sited as a major barrier to the continuation or expansion of the nuclear power generation programme. The nuclear industry believes that it has demonstrated that it can safely store spent fuel, or recycle it and condition

the arising waste into forms which can be safely stored for many decades. Interim safe stores already exist and the nuclear industry believes that such wastes can be cost-effectively and safely managed for an interim period, which could arguably extended over a 100 rather than tens of years.

The development of a permanent nuclear waste storage solution must be a long-term goal. An international consensus on future policy (particularly as concerns tend to be socio-political and socio-economic rather than technical) is required, coupled with a visible research and development programme.

In terms of nuclear waste volumes it is important to recognise that the quantities of waste generated per GW-year by a modern Light Water Reactor (LWR) station are only a fraction of those generated by the older reactor designs such as a Magnox or AGR. It is also important to differentiate between commercial power station wastes and those historic (legacy) wastes that have arisen from the UK military programme.

3.4.2 Safety of Existing and Future Reactor Technology

The safety record of the world's nuclear power industry is impressive and generally continues to improve. This is at variance to public perception, which tends to be influenced by high profile events such as Chernobyl and Three Mile Island. In the case of the former, this involved a design that would not have been licensed in Western Europe; and the latter that did not result in any off-site consequences. In fact reactors built since Three Mile Island have benefited from lessons learned which have led to substantial engineering improvements and associated further enhanced safety and operational performance. These safety improvements already apply to existing Light Water Reactor (LWR) designs whilst future reactor designs will be designed to be passively or inherently safe.

The current large system LWR technology will reach the end of its development evolution within the current/next decade and the market will then move to adopt advanced passive LWR designs such as the Westinghouse AP600/AP1000. For the longer-term (i.e. the second and third decades of this century) gas cooled reactor systems such as the Pebble Bed Modular Reactor (PBMR) and the so-called Generation IV systems such as the small LWR IRIS (International Reactor, Innovative Secure) will be available. Support to expand research programmes should be made to accelerate development of these new technologies, which in term will help revive industrial sectors linked to nuclear power generation.

In the longer-term fast reactors, other advanced systems and fusion may be available but will require extensive long-term development programmes.

Nuclear power policy in Europe needs to be thoroughly reviewed in light of World environmental and fuel security constraints recognising that nuclear have very large fuel reserves located in politically stable areas.

The ability to stockpile national reserves can be easily achieved with nuclear fuel sources

Following the 11 September events, a European wide nuclear security policy must be introduced as soon as possible.

3.5 Renewables

The Institution is committed to significant investments in renewables in the UK, which will improve profitability as well as meeting environmental obligations.

In our view the proposed Renewables Obligation (RO) in the UK represents a good example of how intervention to achieve a particular policy objective can be managed by a market-based approach. It also sets a good example in terms of long term certainty with the proposed level of the Obligation set out to 2011, the proposed minimum level set to 2027 and the statement from the Government that it has no plans to reduce the level of the Obligation once in force. The proposed Obligation, with the current buy-out price of 3p, when taken together with Climate Change Levy exemption will encourage the development of onshore wind generation but further support will be required for other technologies. This should be targeted at those technologies, which have the prospect of becoming competitive to enable them to reach a stage of development where they can compete in the market.

The Commission has set targets for Renewables share of both total energy and of electricity to double by 2010. This will not happen without significant subsidy and incentives. At present subsidies and incentives vary widely between member states and all states will need to do more. There appear to be three different forms of support required:

- Support for research needed to develop each renewable to the point that it can produce energy reliably and on an economic scale. This support has to be in the form of direct grants to research organisations. Some renewables such as wind-power no longer need this support.

- Support to ensure that there is a market for renewables and that they can compete with established forms of energy. This support is likely to be a subsidy of some form. The choice is between direct subsidy, as was provided under the UK government's NFFO scheme, and an obligation to purchase renewable energy, such as the UK government's Renewables Obligation (RO). The former can be used to provide support to individual renewables, whereas under the latter the market will decide which renewables benefit and succeed. Both should achieve the objective of increasing the supply of renewable energy. NFFO allows government to target the support whereas the RO may slow development of promising renewables, which are presently expensive. Therefore a RO should be used in conjunction with direct grants to provide the security that all potential renewable sources will be developed in parallel.

- Support to overcome specific problems, such as lack of the necessary infrastructure to distribute the renewable. It is necessary to provide direct grants to overcome this problem. For example, wave energy cannot develop on any useful scale in the UK unless there is major investment in new electrical grid to carry the power from the source in the North West of Scotland to consumers.

The support for renewables will be paid for by the public, either through tax or by the consumer through increased prices. The disadvantage of grants provided from general taxation is that they provide no incentive to reduce energy consumption. Therefore we recommend that both grants and subsidies are provided as far as is practical through increased prices to consumers. A contribution from existing forms of energy in the form of a carbon

tax, which relates directly to the damage done by each form of energy, seems appropriate and is recommended.

We note that member states of the EC have widely varying policies and mechanisms for support to renewables. Clearly this is unsatisfactory and needs to be addressed by the Commission.

A particular issues for renewables in the UK is gaining planning permission. While the onshore wind farm planning success rate in Scotland (with 66% of wind farms gaining planning permission over recent years) is significantly better than in England and Wales over the same period, this is still a major barrier to development. Government has recognised the important role that planning has to play if renewable energy targets are to be met and renewable energy planning guidelines in Scotland have recently been revised with the aim of striking the correct balance between local environment and Government energy policy. We welcome the progress that has been made but still believe that further streamlining would be beneficial. It is important that any changes to planning processes fully take into account the associated network requirements to ensure that developments are not delayed because the network operator is having difficulty gaining planning permission for overhead line connections.

The issues of planning permissions and network connections require to be resolved if the UK Government's renewables targets are to be met. Planning procedures require to be streamlined and network connection policy should not impose excessive costs on renewables developers.

3.6 Access to the Transmission System

In the UK, Ofgem's recent proposals for charging for transmission access and losses in England & Wales will penalise northern generators in relation to southern generators and thus will discourage the development of new renewable generation in the renewable rich north in addition to severely penalising existing northern generation of all types. These are costly and complex proposals and are not consistent with the Government's energy aims, and therefore a major rethink is required.

Ofgem's current proposals for charging for transmission access and losses have not been properly justified and should be reconsidered in the light of the UK Energy Review and this Green Paper.

4. ENERGY STOCKS

Security of energy supply is critical to the quality of life of citizens in the Community, and an improved policy for energy stocks is essential. The Institution believes that energy such as gas or coal should be stockpiled, in addition to oil where stockpiling is already practised. The Institution recommends:

- In view of the effects of the internal energy market an Energy Stocks Policy should be developed at a Community level, although national governments will have an important role in its implementation.

- The scale of stockpiles required should be determined on a risk assessment basis and should include all energy sources.

- Strategic objectives must be determined and a range of credible scenarios for threats to security of supply in the Community, be produced. Contingency plans can then be developed which will determine the stockpile requirements for each energy source to achieve the objectives.

- To avoid subsidy between states, the supply of stockpiles should be incorporated in the internal market mechanism so that energy supply companies are paid for maintaining stockpiles and this cost is passed on to the consumer.

It is essential that Europe implements a strategy of stockpiling gas and coal.

The energy supply companies should be paid for maintaining these stockpiles, and allowed to pass these costs through to the consumer.

5. NETWORKS

Network charging policies must be fair, cost reflective and consistent with legal obligations. To modify these solely for the benefit of particular classes of generators could increase the charges to other customers. The solution is likely to be a compromise, which also needs to recognise the consequences of altering connection charging principles.

Regulated monopolies are generally regarded (especially by regulators) as low risk, low return businesses. It is essential therefore that changes to policy regarding network connections and reinforcement, especially by regulators, are consistent with this view and recognise the need to maintain the correct balance between risk and return. However, if changes increase risk, then there must be a compensating adjustment to the regulated return.

5.1 Incentives

There is a general concern that although the existing regulatory regime in the UK has been successful in improving operating cost efficiency, it is having a detrimental effect on longer-term investment. Within the context of concerns over security of supply and a desire to accommodate the appropriate mix of generation there is a case for having a robust network that is future-proofed as far as possible. In regulatory terms this means a regime that encourages efficient, desired investment without resulting in over-investment.

The targets for growth in renewable and embedded generation are likely to require significant amounts of network investment. The current regulatory regime in the UK may well hinder this investment because:

- Returns to network operators are low; and
- Network operators cannot on their own justify investments in infrastructure unless there is a clear and immediate need for it and suitable funding arrangements are in

place.

The consequence of these factors is that network operators are forced to develop the network incrementally in order to limit the risks to a level consistent with the low returns on offer. In effect this amounts to a short-term view of network development rather than taking a long-term view. Network operators would prefer to be in the position where they can make investments for the long term and be reasonably assured that such investments will earn a reasonable rate of return and will not run the risk of being deemed imprudent by the regulator at a later date, with the benefit of hindsight.

Enhanced incentives could take many formats, either increasing returns or reducing risks associated with accommodating increased levels of generation. Our initial preference would be for high-level incentives that left the choice of how to facilitate generation connections to the individual network operators.

5.2 Network Connections

5.2.1 Renewables Connections

The cost to renewable developers of connection to the electricity transmission or distribution network for otherwise suitable renewable generation sites could limit the development of renewable generation throughout the UK. A number of suitable sites have been identified where onshore wind generating stations are commercially viable, with no need for additional financial support, based on the developer paying the costs of local connection to the network. However, in a number of locations, developers have been quoted connection costs that include the full cost of 'deep' reinforcements to the transmission system, which make these projects non-viable.

In order to make these sites commercially viable there are two actions that are required, one short term and one long term:

(a) Non-firm Connections

In relation to many prospective renewable network connections the capacity of the network to absorb additional generation is only limited under certain concurrent conditions. A number of technical solutions are available which will constrain output of a renewable generating station during the times when network conditions limit the generation absorption capacity of the grid. The potential for non-firm connections should be taken into account by network operators in determining the costs quoted for connection to their system.

(b) Network Reinforcement

While non-firm connection quotes can accelerate renewable generation development there is still a genuine requirement in many areas for significant network reinforcement in order to support renewables in the longer term. If these costs are required to be borne by the renewable generators they will sterilise large renewable rich areas throughout the UK through rendering developments non commercially viable with the current levels of support proposed by the Government. This is the case in many situations even if the reinforcement costs are spread across a number of renewable developers.

There are a number of areas throughout the UK where it is clear that significant network reinforcement would stimulate renewable development. For example, certain parts of the UK network are under increasing pressure to accommodate further renewable energy developments and there will come a time when large parts of existing networks simply cannot cope unless a major infrastructure upgrade takes place. The review of energy policy should create the correct regulatory and market conditions to enable such investments to proceed without imposing excessive costs on renewables developers.

5.2.2 Asymmetric regulatory treatment of operating costs and capital costs

The above two options for renewables connections amount to either operating a control scheme (i.e. non-firm connections – Opex) or upgrading a circuit (i.e. network reinforcement - Capex). These are currently treated differently by the UK's regulator. If the operator chooses to upgrade the network, it will be judged as being more efficient (all other things being equal) at the next price review than if it chooses the control solution, regardless of the relative price of the two solutions. The problem may be exacerbated by the fact that some companies are likely to be disproportionately affected by the impact of renewable generation.

We support changes to network regulation that address the asymmetry of incentives associated with capital and operating costs. We would also wish to see the differential impact of renewable generation on distribution companies recognised as a regional factor in price review discussions.

5.2.3 Charging

In the UK there are two possible charging policies operated by network operators for generator connections to its networks: shallow connection or deep connection for its distribution networks. There are advantages and disadvantages to both these methods. Shallow connection charging masks many of the network costs that are provoked by generator connections and can lead to funding uncertainties for the network business and higher Use of System charges for other users of that network. Deep connection charging can appear as a barrier to generation schemes but is effective at providing locational signals to ensure that inappropriate, expensive connections are avoided.

In the UK, the DTI/Ofgem working group recommended examining a number of options for charging, including an option halfway between deep and shallow. This 'halfway' option, which is similar to the method used to charge demand connections at distribution level, carries some cost reflective signals but requires funding by the network operator of some of the deeper elements of reinforcement. The mechanism for recovering these deep reinforcement costs will no doubt form a major part of the discussion. It seems inevitable, however, that the overall complexity and hence costs of networks will increase with increased generator connections. A revised energy policy should be explicit about who is expected to cover these costs, and wherever cross subsidy is involved why this is appropriate.

The correct regulatory and market conditions should be created to enable network investments beneficial to renewables to proceed without imposing excessive costs on renewables developers. The asymmetry of incentives associated with capital and operating costs requires to be addressed. It should be clear who is expected to cover network

reinforcement costs.

5.3 Equitable treatment of customers in different regions

To the extent that generators do not contribute towards the full cost of connection to or reinforcement of the system, the balance will be incurred by the network operator and recovered through use of system charges over the longer term. Some or all of these costs will be recovered from suppliers / demand customers. Therefore, in areas that have a relatively high concentration of renewable generators, customers could end up paying a disproportionate share of the cost of the renewables generation, which GB as a whole benefits from. This could become a significant burden in renewable rich areas such as Scotland where monopoly wires charges are already higher than in England & Wales.

At the very least, there needs to be an initiative to record those network related costs of accommodating renewable energy which are not funded by generators themselves. This will be useful for informing future price reviews. Furthermore, a simple mechanism that allows the burden of costs to be shared across GB should be feasible.

5.4 Network security

Whatever the appropriate mix of generation capacity from a network perspective it is important to appreciate that stable, secure networks depend partly upon the generation portfolio attached to the network and, in particular, the services that the generators can provide in the form of reserve, frequency control, reactive power, black start capability, etc.

The correct mix of generation should not, therefore, be driven just by emissions constraints and fuel source diversity but also by the need to have generation that supports a stable infrastructure. While this is not an immediate concern in the UK, we can envisage a situation in the future, when at certain times of the year in certain parts of Europe, the electricity demand could be met by a combination consisting solely of nuclear and wind generation. Neither of these sources are particularly good at providing the network support services referred to above and we would therefore have difficulty in meeting our network operation obligations.

It is important that the a European energy policy does not result in a situation where other forms of generation become non viable and in their absence effective control of the network would become difficult if not impossible at certain times of year.

6. SOCIAL AND ENERGY EFFICIENCY OBLIGATIONS

Over the last few years, the UK Government has developed a more comprehensive view on the social and environmental obligations of electricity and gas suppliers. This has been in an attempt to manage environmental externalities of energy production and to address market failure in the social aspects of energy provision.

However, most of the new obligations that have been brought forward [in the UK] have associated penalties for failure of non-compliance. First consideration should be given to

incentives within competitive market structures in order that national objectives can be met in different, possibly more creative ways.

6.1 Market Liberalisation and Effective Competition

To achieve the best outcome for energy customers, the structure of supply markets should be designed to:

- Minimise energy prices;
- Maximise energy productivity;
- Foster innovation in energy use, and;
- Deliver sufficient standards of quality and security of energy supply.

Since 1990 end user prices for all customers have reduced substantially. Across all parts of the UK, market competition in energy has altered the behaviour of energy suppliers from a position of being producer oriented towards being truly market led.

For retail energy markets in Europe, we strongly favour market solutions where possible, industry co-operation where desirable, and regulation only where necessary.

6.2 Energy Efficiency and Demand Management

Energy efficiency is central to European Commission and the UK Government's programme of measures within the Climate Change Programme.

6.2.1 Domestic Energy Efficiency & Conservation

To encourage energy efficiency and demand reduction in the domestic sector, the Institution believes the following aspects of policy to be of greatest importance:

- **Energy Efficiency Commitment** – In the UK the latest proposal document from DEFRA in regard to the new EEC for the period 2002 to 2005, there are a number of issues in regard to policy, namely: (i) the need to have an overall objective and end-point of the scheme (as there is for renewables in 2010) which can be used to determine when market failure is corrected; (ii) the trade off between environmental and social objectives needs to be fully recognised, and; (iii) the penalty for non compliance is not as explicit as in the proposed Renewables Obligation.

- **Demand side management** – There are gains to be accrued for domestic electricity customers (particularly those with electric space and water heating) related to the introduction of demand side management techniques in domestic properties. In some cases, intelligently controlled DSM can be used to optimise generation plant to minimise the amount of CO_2 emissions further upstream in the energy value chain. Government policies should fully recognise the benefits of this via new regulatory and market incentives.

- **Energy efficiency standards** – The forecast growth in housing in the UK suggests an increase of 1.8m households by 2010 and a further increase of 1.7m by 2020. To arrest the growth in associated energy consumption from these new

properties, it is extremely important that sufficient attention is focused on expanding the Labelling Schemes for Appliances and improving Building Regulations beyond their present levels. To implement any further changes, long term planning and advance notice from Governments is an essential component of policy.

- **Emergence of new technologies** – There is a future role for domestic scale distributed generation, though this should not be over-stressed at this stage. For photo-voltaics, we view this as an important energy source, but limited in scale and scope. In regard to Fuel Cells, we anticipate growth in this technology, but not prior to 2008 for domestic properties. For micro-CHP, we anticipate adoption within the energy market from 2003 onwards, with uptake dependent upon the forecast system costs and market incentives.

6.2.2 Energy Policy for the Business Sector

In examining the energy policy for this sector, there are a number of key concerns that must be accounted for:

- Quality of supply
- Security of supply
- Effective market competition
- Energy efficiency and productivity
- The impact of taxation and market regulation

To encourage energy efficiency in businesses, we believe the following aspects of policy to be of greatest importance:

- **Energy services for businesses** – We support the UK Government's initial objectives in this area via the introduction of Enhanced Capital Allowances for energy efficient technology and the formation of the Carbon Trust (with associated funding).

  Generally, the policy instruments appear to be in the right direction. However, if the Government has serious ambitions for customers, with the Climate Change Levy Agreements to undertake investment in energy efficiency, it must scale its commitment accordingly. In practice, this means that the current £100m being recycled from CCL funds should be increased towards a figure of £250m or more to make a reasonable impact.

- **Environmental taxation** – The introduction of new levies and taxes for business customers must be managed very thoughtfully. Industry research suggests that the overall elasticity of demand for energy use is low, other than for selected applications and customer types, and tax increases in themselves are unlikely to have a desired affect of reducing demand. Any new environmental taxation proposals must consider the impact on competitiveness for UK industry and the compliance costs for suppliers and customers alike and their ability to meet initial objectives (often CO_2 reductions).

- **CCL Agreements & flexible mechanisms** – The Institution supports the introduction of emissions trading initiatives to help towards more sustainable

forms of generation. The flexible mechanisms developed in the future can also be designed to include the active participation of suppliers and customers as part of their energy supply agreement – even outwith those industries with CCL agreements. To enable this, customer information, carbon weighting of fuel, administration and trading must be made as simple as practically possible.

- **Carbon Trust** – In the UK, we welcome the creation of the Carbon Trust. As the trust rolls out its operations, we anticipate that one of its key functions is to facilitate market transformation programmes to improve the uptake of current energy management technologies as well as new ones. The scope of activities for the Carbon Trust should be spread across the entire business sector rather than simply the needs of larger energy users. This would enable prospective customers to have a simple one-stop shop for energy management needs and act as a good focus for all government programmes looking at energy productivity in business.

- **Small and medium-sized enterprises** – One of the key policy challenges for energy productivity is the ambivalence of small and medium sized enterprises to engage in efficiency and conservation measures. To make inroads to this challenge, small businesses require easy access for assistance from a body such as the Carbon Trust, good quality information for decision-making and grants and incentives to make investment decisions straightforward.

- **Demand Management & Distributed Generation** - The government may also wish to keep under review the advantages and disadvantages of the separation of supply and distribution businesses. Important to the deployment of some new technologies for distributed generation and demand side management is ease of access to information and the management of control and monitoring systems in regard to the distribution system.

- **Practical energy savings** – Within the PIU papers for Energy Productivity, it is outlined that there is a very large opportunity to gain savings from the commercial and industrial energy sector. In theory, we agree with this position. In practice, however, to unlock these savings requires creative customer solutions in energy services, full coverage of all parts of the business market and economic incentives, as suggested above.

The Institution is keen to see the creation of energy markets that can provide suppliers and customers the option of a seamless energy services product able to deliver energy needs, safely and efficiently – should they wish it. To realise this potential in the energy market, we believe that policy can be constructed in such a way to a deliver a new structure, regulation, penalties and incentives to allow lower UK emissions, lower overall customer costs, and an improved supplier profitability.

7. CONCLUSIONS

The Institution's views can be summarised as follows:

Broad Policy

- Governments should be encouraged to work with the grain of markets, which is more appropriate than detailed regulation.
- The value of such issues as fuel diversity, building infrastructure and tackling fuel poverty needs to be recognised and rewarded within markets.
- A European energy policy should promote long-term national frameworks, which will deliver liquid markets attracting large players across the complete supply chain.
- The current regulatory regime in the UK will not necessarily deliver the desired outcome and needs to be reviewed to deliver the new policy aims.

Generation

- If a diverse mix of fuels is to be secured in the UK, in view of cleanup costs, coal and nuclear will need support, such as a "Coal Obligation" or "Nuclear Obligation" or similar measure preferably within the framework of a market reward system, which recognises diversity
- Renewables will grow initially but targeted R&D will be needed to bring new technologies to the competitive market and to integrate these.

Networks

- Networks need to be developed on a long-term basis. The cost of these must be spread broadly and network operators must be incentivised to secure advantage by investing and operating more effectively in respect of the broad set of energy policy goals.

Social and Energy Efficiency Obligations

- Customer awareness of the need for change/action is essential and Governments will have a strong role to play, in partnership with others such as the national utility companies.