

An Evaluation of the European Context for a Transition Towards a Sustainable Energy System

Report Prepared for the VROM-raad (Council on Housing, Spatial Planning and
the Environment) and the Algemene Energieraad (General Energy Council) of
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1 Introduction and Terms of Reference

This thematic scoping essay has been prepared at the request of the VROM-raad (Council on Housing, Spatial Planning and the Environment) and the Algemene Energieraad (General Energy Council) of the Netherlands. The terms of reference and the background for this work were specified in a contract letter 4 December 2003 (Ref: 03/671/O)..Further details are provided in the Annex to this paper.

The immediate context, as referred to in the contract letter from these two Councils is that, in the Fourth National Environmental Policy Plan for the Netherlands (2001), the concept of transition management has been introduced in order to address persistent environmental problems like climate change.¹

“Solving the major environmental problems requires system innovation; in many cases this can take on the form of a long drawn-out transformation process comprising technological, economic, socio-cultural and institutional changes. The period until such a transformation is complete can be seen as a transition. During the transition, objectives are formulated and modified and interrelated policy instruments are applied. Transitions require a type of co-ordination by the government with the concepts of uncertainty, complexity and cohesion at its core. Long-term thinking is the frame of reference in which short-term decisions must be taken. Transition management requires that the government learns to deal with uncertainty, in part by working with scenarios, paying attention to the international dimension of processes of change and keeping options open as long as possible.”

¹ See, for example, F Berkhout, A Smith and A Stirling, *Socio-technological Regimes and Transition Contexts*, SPRU Electronic Working Paper Series No. 106, September 2003, at <http://www.sussex.ac.uk/spru/>. The present author is very familiar with this and related work and has, over the years, contributed to it. But other policy perspectives have also informed this paper. These draw upon the author's 20+ years' experience advising the UK House of Commons, the UK and several foreign governments, and agencies such as the EU, IEA and OECD on the strategic evaluation of energy policy for more sustainable development and lower-carbon futures.

2 Some Key Contextual Reflections for This Evaluation

This evaluation commences by examining four broad themes. Apart from providing insights into the point of departure for the analysis, these themes will influence the judgements made and the answers given to many of the specific questions addressed later. The four themes are: (i) the need for a shift from energy sector to energy system policy; (ii) the core policy imperatives in all EU Member States; (iii) governance, and the respective roles of markets and of policy in achieving desired goals and outcomes; and (iv) the need to identify some broad policy principles, or criteria, for systems innovation and sustainable development.

2.1 The Shift from Energy ‘Sector’ to Energy ‘System’ Policy

The World Energy Assessment argued powerfully that ‘energy is far more than a sectoral issue - it cuts across many aspects of sustainable development and is vitally connected to economic prosperity, social well-being, environmental issues, and security’. As a result, this Assessment urged the need for adoption of what was termed a new, ‘emerging paradigm’ embracing a much more holistic, global and long-term perspective.²

But, as yet, system innovation for transition management to more sustainable development is poorly understood. Indeed sustainable development remains an elusive concept: reality rarely matches the rhetoric in this domain. The concepts themselves, and their profound implications, are not yet widely grasped by most policy makers or by the public at large. But the challenges they pose for governance - at all levels - are great indeed. In my judgement the shift in conception from a focus upon the narrow energy ‘sector’ to the wider energy ‘system’ is a precondition. This evaluation thus commences by examining some relevant considerations that should influence analysts’ and policy makers’ optic in this regard.

Traditionally energy policy in the EU and perhaps all Member States, as elsewhere, primarily addressed *fuel* choice, or *fuel and power station* choice, issues. For long it had a ‘predict and provide’ character; and was thus dominated by ‘supply side’ policy considerations. For this reason such policy was largely conducted via ministries focusing on supply-side concerns. This historic, supply-side emphasis was reinforced by periodic anxieties about actual or potential supply disruptions, import dependence, and hence supply security.

Yet energy demand is a classical case of a derived demand. Final consumers require energy services (heat, light, cooling, movement, communication etc.) rather than units of fuel and power. Thus close attention must be paid to a myriad of primary and secondary factors that influence such energy demand. These include climate, GDP (gross domestic product), life styles, spatial design and urban density, industrial structures, the primary transport modes (and the allocation between them), and the age profile of the embodied stocks of buildings, equipment, appliances and vehicles. This derivation alone casts both the analytical and the policy nets very wide indeed. A much wider - systems - conception is necessary for analysis, and for policy development and integration. Otherwise consistency of approach is most unlikely to be achieved.

Knowledge of the elemental processes of technology diffusion and of capital stock rotation, and the appropriate mechanisms for shifting investment to better or best

² *World Energy Assessment*, United Nations Development Programme (UNDP), United Nations Department of Economic and Social Affairs (UNDESA), and the World Energy Council (WEC), UNDP, New York, 2000, especially pp. 418-419 and Box 12.1, which compares the ‘traditional’ and ‘emerging’ paradigms.

practice, is essential. These processes are at the heart of market transformation. Yet they are hardly understood by most analysts and policy makers.

Despite growing recognition that the demand for energy is a derived one - influenced by the demand for end-use services - the major focus for most strategic policy making on energy has remained on fuel supply and power station choice. Many critical policy fields which have a close bearing on shaping energy demand - such as transport, land use planning, urban design and regeneration, agricultural reform and its implications for renewables - still remain rather remote from the mainstream of energy policy making (as discussed further below). There is thus a premium on effective integration and networking amongst policy makers at all levels.

Privatisation and liberalisation debates across the EU may well be motivated by the wish to empower consumers. Yet the key actors involved have been the coal, electricity, gas, nuclear and oil industries - all on the supply side. As a result governments have again been acutely influenced by supply side considerations.

It would perhaps not be true to say that environmental debates engaging energy production and use have been wholly preoccupied with the energy supply side. EU decisions on CFC removal from fridge-freezers, and the Waste Electrical and Electronic Equipment (WEEE) Directive, are cases in point. But the dominant environmental issues of the recent past (e.g. acid rain, vehicle emissions, CO₂, product standards for boilers and other domestic appliances) have again primarily engaged governments with major fuel and equipment suppliers: electric and gas utilities, oil companies, and vehicle and appliance manufacturers.

In an important sense, smaller energy consumers (if not the larger ones embraced by the Large Combustion Plant Directive and the Emissions Trading Scheme) have tended to be at one stage removed from grand policy design and especially its complex rationales. As yet, consumers are not effectively engaged by the EU or by most Member States. Consumers are unlikely to respond sufficiently unless they feel part of a wider societal endeavour in which companies and governments are also seen to be playing active and consistent roles.

No longer can energy policy be concerned narrowly with the energy 'sector' - with fuel policy and the flow of energy commodities. Rather it is the energy 'system' which must be placed in much sharper relief, harnessing the stock of energy-using capital goods (homes, appliances, vehicles and machinery), energy commodity flows and the energy supply infrastructure (including diversity and storage), for the provision of sustainable energy services.

Some analysts argue that the energy system infrastructure must viewed in even wider terms, especially education, manufacturing capability, RD&D and the knowledge/skills base, given recent erosion of capacity in these important enabling fields.³ After all, these enabling resources are amongst the most critical change agents required for the market transformation processes to achieve low-carbon futures and sustainable development.

Emerging policy frameworks based upon this wider system appreciation and on 'system innovation' should embrace *inter alia* care of the environment, competitiveness and price stability, security and diversity, and social policy considerations.

³ For example, IEA Member State expenditure on energy research, development and demonstration (RD&D) has fallen sharply over the past decade. So has that undertaken by the liberalised electricity and gas utilities.

These frameworks should be precautionary and transparent, and identify accountability for the achievement of outcomes. The need for precaution was established in the UN Framework Convention on Climate Change, which stated in Article 3.3. that 'where there are threats of serious or irreversible damage (from climate change), lack of scientific certainty should not be used as a reason for postponing measures ...'.⁴ Priority should be given to least-cost and 'no regrets' options which satisfy multiple objectives and which contribute clearly to desired outcomes. Only government (at all levels) can manage the trade-offs involved, but it can seek advice and guidance from many sources. Where possible, the aim should be to maintain flexibility without distorting the commitment and slowing momentum. Short-term decisions must pay proper regard to long-term aims.

At least some of the potential conflicts between the main policy pillars are judged to arise because often the objectives are focused not on the final *goals or outcomes* being sought but on the *means* of achieving them. Specification of goals or outcomes, sometimes by indicative targets, is judged by many to be more important than the detailed specification of means.

For example, some analysts have suggested different target mixes for the EU or individual Member States' primary energy demand balances, or for the power station mix, or a rather precise mix amongst specific technologies in the renewables portfolio. Many other analysts consider this approach most unwise, as it would constrain the means by which competitive markets could be harnessed to achieve the required goals or outcomes at lowest long-term cost. Thus, whilst setting targets for the reduction in carbon emissions would in principle be acceptable as a goal or an intended outcome, allocation of market shares to specific fuels or technologies would not be.

Some important 'system' changes are also influencing RD&D strategy. At the EU (and World Trade Organisation) level the opening up of procurement within the formerly protected energy sector, accompanied by significant structural realignments through mergers and acquisitions in some industrial sectors (e.g. heavy electrical equipment), may have undermined the logic of using national 'product champions' (whether state-owned enterprises or their major, once nationally-based, equipment suppliers) in the development of national energy RD&D and technology policy. Much nationally-funded RD&D may thus be prey to the 'free rider' effect, with the result that it is difficult (if not impossible) to identify narrow national economic benefits from given volumes of publicly-funded energy RD&D. Whilst industrial realignment amongst equipment and appliance suppliers has served to integrate EU Member States' economies, many such industries are no longer based on the boundaries of single nation states. This may well lead to a change in the balance between national and EU RD&D funding.

The broad objectives of energy-related RD&D and technology policy have been comparatively stable for many years. Much RD&D is industry based and driven by relatively short-term commercial considerations. These include cost reduction, efficiency enhancement, and the search for competitive advantage.

A large volume of RD&D is undertaken by the major energy and energy equipment suppliers, by large users such as electric utilities and the aluminium and steel industries, and by the motor vehicle industry.

⁴ UN Framework Convention on Climate Change (UNFCCC), signed at the Earth Summit in Rio de Janeiro, 1992

The major justifications for public support of energy RD&D include public safety, health and environmental protection; maintenance of the scientific base; employment creation; more general industrial support such as contributions to demonstration projects; security of supply; and, in some countries, long-term 'insurance' via projects such as fast reactors and fusion, or basic geological, seismic mapping and support for enhanced oil recovery projects. The shares of public and private RD&D funding are often masked at the national level by the (now diminishing) degree of public ownership within the energy sector. Government support may be direct or indirect, the latter via publicly-owned energy industries, nuclear research establishments and national research councils. Publicly funded RD&D also derives from international agencies including the EU.

Diversity in national RD&D spending within the EU reflects different energy resource endowments and hence perceptions of national supply security; country size and economic strength; comparative industrial and technological advantages; and different governments' philosophical stances as regards the use of public funds. In the past this diversity has posed difficulties in defining EU-wide objectives for energy RD&D. However, the common threats imposed by environmental impacts provide new opportunities to integrate more RD&D expenditure. Likewise industrial restructuring and achievement of the Single Market may well lead to greater convergence of national objectives with those of the EU.

2.2 Core Energy Policy Imperatives in all EU Member States

Clearly there have been dramatic changes in energy circumstances and perceptions, and also differing policy emphases, over the past 30 or more years. This is true for the narrow energy 'sector' and the wider energy 'system'. Yet a core of policy imperatives has been important in all Member States.⁵

These imperatives are likely to retain continuing significance and to require complex trade-offs between competing priorities. They include the following dimensions. The first three relate to the primary goals of energy/environmental policy making; the remainder reflect the policy fields and broad measures to achieve them.

The provision of low cost, and low price, energy supplies to assist economic competitiveness and to alleviate 'fuel poverty' amongst poorer energy consumers. The latter is a major policy concern in the UK, and perhaps amongst some Accession States. With an ageing population, greater attention is being given in some Member States (e.g. in Ireland and the UK now, and perhaps in some Accession States in time) to the social policy dimensions of energy use for those facing the scourge of 'fuel poverty', social exclusion, and high energy bills in cold weather. As energy use and energy expenditure are regressive in character, this issue may assume greater significance in some Member States if real energy prices increase in future to incorporate environmental externalities.

The provision of adequate, diverse and secure energy supplies to meet a wide range of objectives relating to short-, medium- and long-term security of supply; to ensure diversity of fuel supplies (e.g. in power generation, given the headlong 'dash for gas'); and to stimulate adequate investment in the energy supply infrastructure, especially pipes, wires and storage.

⁵ This section partly draws upon a recent conference paper by the author 'Energy Policy: Space, Time and System', presented at the 2003 British Institute of Energy Economics Academic Conference, St. John's College, Oxford, 25-26 September 2003

Reducing the wide range of environmental impacts associated with energy production and use, including climate change; and a framework of environmental regulation and inspection (e.g. for oil spills, acid rain, lead in petrol, nuclear waste disposal, urban air quality, decommissioning of reactors and off-shore installations; and oversight of carbon or sulphur trading schemes). This framework is increasingly international in character. CO₂ and the basket of other greenhouse gas emissions, now have particular salience. Yet there are many potential environmental 'trip wires' facing national policy makers (e.g. issues of nuclear fuel reprocessing, high-level nuclear waste disposal and reactor decommissioning). The environmental agenda must, in my view, be recognised as very wide. It is also likely to prove a politically unstable agenda - either as 'old' issues resurface to gain media and public attention, or as new issues give rise to concern (e.g. mining subsidence claims, restoration of contaminated sites, and public opposition to the siting of wind farms in some environmentally sensitive locations). As argued earlier, there is also recurrent pressure for very much closer co-operation between *economic* and *environmental* regulatory bodies.

Economic Regulation and a framework of pricing and other financial controls. In liberalised and privatised markets, the *form* of these controls has changed (e.g. the former controls on nationalised industries being replaced by rate of return regulation and/or price caps, and by specific policy measures to deal with stranded assets). Regulatory *agencies* are replacing national or municipal departments in administering some of these controls; and the regulatory *scope* might be reduced to core natural monopoly components, such as pipes and wires. But the key issues will remain of central policy importance. There has been debate in some EU Member States about the shape and responsibilities of the regulatory agencies, e.g. separate industry-specific regulatory agencies for gas and electricity, joint ones, or more wide-ranging general competition and economic conduct agencies. Finally, as mentioned earlier, there is continuing discussion (at least amongst regulatory specialists) of the longer-term validity of essentially *national* systems of energy industry regulation within an increasingly liberalised and converging EU energy market.

Influencing investment through site licensing and/or planning consents for power stations, transmission lines, pipelines, renewable generating schemes, coal mines, off-shore oil and gas fields, and refinery projects. In several EU countries, the results of referenda or the general mood of public opinion effectively prevent further new nuclear plant construction. Another issue that has caused planning difficulties is the siting of wind turbines in environmentally sensitive locations.

Taxation policy e.g. via energy/carbon taxes, Value Added Tax (VAT) and especially taxes and duties on transport fuels. In most EU Member States, taxes and duties on road transport fuels now constitute some 65-85% of final pump prices for petrol and diesel. In those countries with indigenous oil and gas production, taxes are also used to capture for the state a share of rents from such petroleum production. Energy and/or carbon taxes (perhaps euphemistically termed 'green' taxes or 'climate change levies') are being used as market-based instruments to influence the direction of inter-fuel substitution, technology choice, and to curb energy demand growth and energy-derived emissions. Consideration is also being given to the use of differential VAT rates on energy efficient and inefficient goods, to accelerate market transformation.

Measures to stimulate more efficient energy use including building regulations, appliance and vehicle efficiency standards, and more efficient use and re-use of energy-intensive materials and products.

Issues relating to employment, safety and welfare in mines, power stations, nuclear facilities, offshore etc. Special provisions ensure the safe installation, maintenance,

and use of energy-using equipment (e.g. electrical wiring regulations, safety registration of gas engineers). Currently more emphasis needs to be placed on the skills and training agenda, given an ageing workforce across much of the EU energy system.

RD&D and technology choice, as much as instruments for industrial policy as energy policy. In the past there has been a particular emphasis at national and EU levels on *energy supply* RD&D. But perhaps in future there will be more focus upon the *energy demand* side. EU and IEA market transformation programmes, implemented at the national level, are already exerting innovative pressure in fields such as boilers, appliances, buildings, and vehicles. In addition there will be a greater focus upon international, and not merely national or regional, market requirements for energy-related technology and technical services of all kinds. Technology transfer is also critical, whether bilateral, multilateral, or conducted within frameworks such as the Clean Development Mechanism, Joint Implementation, or national overseas aid programmes.

Related industrial policy questions regarding equipment supply (e.g. offshore supplies, the EU Directive on equipment procurement policy). Some measures may be implemented by special programmes, by voluntary agreements, or by regulations. The competitive scramble for new global green technology markets is now stimulating many governments to bolster their support to create new industrial capabilities.

Import dependence and net energy trade and its impacts on the balance of payments and the exchange rate. Adoption of the single currency has clearly modified the impact of some these concerns for the majority of Member States.

It will be recognised immediately that some of these policy 'ingredients' are quite specific to the traditional energy 'sector'. Others form part of wider, national macro-economic, fiscal, foreign, environmental, housing, industrial, technology, trade, social or transport policy. These dimensions of policy will continue to have a major influence on the evolution of energy markets and the energy 'system' as a whole. Some dimensions momentarily lose fashion – only to re-appear a few years later (e.g. supply security concerns). Others are sometimes delegated to regulators to grapple with, but are then soon back on the mainstream public policy agenda. Certainly, over time, all these energy-related policy ingredients have a habit of haunting policy makers.

2.3 Governance: The Roles of Markets and Policy

Wherever possible the greatest degree of coherence should be sought between the main policy areas or pillars. The process of achieving such coherence essentially involves (i) identifying and promoting synergies; and (ii) mitigating conflicts between the main policy areas.

This is easy to state, but rather more difficult to realise in practice given ignorance and genuine uncertainties over time scales to 2020, 2050 or even beyond. But a timeline, or critical path, towards objectives can be identified and intermediate time horizons chosen to facilitate the process. A key issue, especially for politicians facing regular electoral cycles, is about how to get the balance right between short- and long-term costs and long-term objectives.

Factors such as liberalisation, privatisation, EU procurement and State Aid policy requirements have had a major influence on the rationale, design and implementation of policy – i. e. why and how governments and regulators can intervene, even if they choose to do so. A balance between freedom and regulation encapsulates much of human endeavour.

Likewise, the balance between markets, regulation and other explicit policy intervention in the energy system needs to be kept under scrutiny. As any new 'systems' framework is established a degree of pragmatism is likely to be required as to the form, force, and longevity of such regulation and policy intervention. Pragmatism also applies to the choice, and the precise form and reach, of policy instruments over time - essentially market-based or regulatory, fiscal or physical (e.g. taxes, subsidies, building regulations, minimum performance standards, obligations, voluntary agreements, carbon trading, RD&D). The choice should be influenced by rigorous analysis and concrete evidence, rather than by predilection or prejudice.

The objective here should be to stimulate smooth market transformation towards the chosen goals and pathways; and to avoid abrupt changes in the policy and regulatory frameworks. Barring a major re-balancing of objectives to reflect new market or policy concerns, a broadly consistent course must be steered. Given long asset lives and the capital intensity of the energy system (on both demand and supply sides) the national economic resource costs (e.g. 'stranded assets') of abrupt changes could be very considerable. This means it is imperative to attempt to secure a wide degree of consensus and support, and indeed fuller international agreement, on the chosen framework. This also implies greater harmonisation of policy instruments at the EU level.

As an economist I must admit that market forces are powerful and useful tools. Yet market forces have been described as 'good servants but bad masters'. As a result, in my judgement, they must be shaped by appropriate policy frameworks to achieve desired aspirations, goals and objectives. The market has never shown itself proficient in tackling issues of public goods (such as integrated urban transport provision, or clean air). Indeed, *absolutely limiting boundaries* are often imposed through policy to influence markets (e.g. minimum safety standards, building regulations, buy-back rules for small power producers, codes of practice for advertising, speed limits, proper accounting and audit rules, and minimum environmental standards). Neither, for example, is there any evidence that the market by itself could erect, or police effectively, the complex international safeguards required to limit nuclear proliferation; or that market forces alone could initiate international environmental diplomacy.

Markets are most likely to achieve successful outcomes if they are designed to reflect all the costs and benefits judged important by governments and civil society. These pertain to issues such as the environment, diversity, security, health and safety, competitiveness, social inclusion and many specific 'public service obligations'. Social inclusion in this broad sense embraces issues such as fuel poverty (inability to pay high energy bills), regional development via energy infrastructure projects, and extension of gas pipelines into areas poorly served by gas supplies (e.g. Greece, Northern Ireland and Portugal). However, markets are unlikely to 'internalise' these crucial objectives. Here lies the role of governments. These are the 'policy spaces' to be filled by good governance.

In those Member States where the process has advanced furthest, energy market liberalisation has brought many benefits, particularly lower energy prices. (For example, between 1990 and 2002, real prices for domestic energy consumers in the UK fell 26% for electricity, 20% for gas, 19% for heating oils and 1% for solid fuels. Industrial users have experienced similar falls). But many judge that 'business as usual' - and especially 'business as usual with even lower energy prices' - will not be consistent with more sustainable pathways.

An essential priority for both EU and Member States' policy makers is thus to reconcile conflicting *market* messages and *policy* messages. As the process of liberalisation still

unfolds in many EU Member States, with the prospect of falling real prices, these two crucial sets of messages remain uncomfortable bedfellows!

One of the roles of government is to develop instruments (e.g. to stimulate greater market deployment of renewable energy technologies) which provide a framework as to the intended broad goals and direction, but which do not seek to back specific technologies. This suggests that public support (e.g. for Combined Heat & Power, CHP, and biofuels) should be kept as broad as possible, and not back *specific* technologies within these portfolios. For example the market, influenced by the planning process, will assess which renewable sources and technologies are best deployed at least cost over say a 10-year time frame. Many of these technologies may have benefited from state support in the past 10-20 years.

But governments require longer-term horizons. It is easy to dismiss the need for longer-term public RD&D support. Some analysts have compared the huge *public* support for global nuclear power development with what is often seen as the *private* RD&D which underpinned the relatively recent, successful emergence of combined cycle gas turbine (CCGT) technologies. Yet CCGTs benefited greatly from vast public RD&D support via military and civilian jet aircraft programmes over the past 60 years.

The EU and Member State governments might also wish to assist other technologies with direct support for R&D and demonstration, if only to ensure additional (societal insurance) options are available - over longer time frames - for eventual market deployment. Here choice of technology or fuel is more complex: certainly the record of 'picking winners' has not been a distinguished one. Regrettably, the only significant long-term EU effort in this regard is the fusion (e.g. ITER) programme. In my personal judgement this long-standing fixation with fusion has had high opportunity costs. Partly as a result, a wider portfolio of longer-term options has not been seriously considered, or adequately funded, at the EU level. These broad 'technology portfolios' include fundamental support for areas such as renewables, measurement and control technologies with wide ('generic') application across many end use sectors, and carbon dioxide capture and storage.

Criteria for technology evaluation in this field warrant further review, both at the Member State and the EU level. Although not central to this particular evaluation, such criteria might usefully include the following elements.

Technological and market viability: what is the degree of technological maturity reached in terms of the key stages of research, development, demonstration and market diffusion; what further technological development is required; over what time scale might this be achieved; can development be left to industrial interests (as users or producers of the technology), or is there a residual role for public support - and, if so, in what form; to what extent is the technology viable in economic terms against present or anticipated energy prices; are significant scale economies - and hence cost reductions - anticipated in manufacture as market diffusion occurs?

Impediments to market diffusion: what impediments are there to market diffusion in terms of regulation, safety approval, fiscal obstacles etc.; to what extent can the technology be retrofitted or does it require substantial new investment and capital stock rotation to penetrate the target market; what supporting measures might be required to accelerate market diffusion and exploitation of the technology?

Wider economic and industrial benefits: e.g. what benefits can be perceived in terms of employment creation, industrial competitiveness, export potential or technology transfer? Is the Member State or the EU well placed to exploit the technology in terms of existing industrial capability?

Improvement to energy security: what benefits might accrue in terms of security of Member State or EU energy supplies, energy diversity, and energy import substitution?

Environmental impacts: what environmental impacts are associated with the technology; is the technology likely to reduce such environmental impacts in terms of manufacture, use and ultimate disposal when compared with competing technologies?

Analysts and policy makers must recognise the need to identify more sustainable, low-carbon pathways⁶ over the next 50 years and longer; and to devise means to re-align liberalised economies and their energy systems towards these pathways. One priority, using scenarios, technology evaluations and other tools, is to establish one or more road maps into the future; and, by these means, to identify options, opportunity costs, suitable policy instruments and likely institutional realignments. But the energy system alone - and however widely defined as a concept - should not bear the whole burden of this profound transformation. Many other actors and agencies must be engaged in any truly 'joined up' strategy. Primary agencies include a wider range of government departments (especially those dealing with industry, RD&D, spatial planning, infrastructure development, housing, transport, and fiscal policy), as well as regional and local governments, and economic and environmental regulators. Secondary agencies include non-governmental and voluntary organisations, and the representative bodies for consumer, commercial, industrial and trade union interests.

A fairly clear distinction is apparent between those who place predominant reliance upon the market, over time, to respond to light nudges upon the tiller; and those who judge that the intensity of policy intervention may well need to increase in liberalised markets. Nearly all analysts and policy makers recognise that the market by itself will not wholly satisfy what are variously described as 'public interest obligations', 'externalities', or 'strategic' policy concerns such as environmental impacts, health and safety, international diplomacy, more balanced regional development or supply security. A key issue - even when new frameworks are put in place - is the degree to which competition and market forces are used to deliver the desired responses. Here there is, and will probably remain, healthy debate!

2.4 Some Policy Principles for Systems Innovation and Sustainable Development

The present evaluation is not intended to review the range, efficacy, and cost-effectiveness of all the policy instruments that might be brought to bear in this field. But, in my judgement, some clarifying policy principles or criteria are necessary to inform the complex, multi-agency, and multi-instrument response that is required.⁷ Such criteria perhaps include the following:

Need for Co-ordination: The need for such co-ordination is accentuated as the policy response focuses less upon the narrow energy 'sector' and much more upon the wider energy 'system'. Core policy frameworks, such as those for economic and environmental regulation, the fiscal regime, and the scientific and technological base, must be integrated much more successfully. Crucially, end-user attitudes and behaviour will be influenced by the effective integration of policy responses by local,

⁶ In this context, sustainability must be understood to embrace the three strands of (i) mitigation of environmental impacts, including climate change; (ii) diversity, endurance, flexibility and supply security issues; and (iii) equity and social inclusion - i.e. the ability of ecosystems and human systems 'to bear up without collapse'.

⁷ These criteria draw upon, and develop, those produced by this author for the Shared Analysis Project, *Economic Foundations for Energy Policy*, published as a special issue of *Energy in Europe* by DG Energy, European Commission, December 1999, ISBN 92-828-7529-6

regional and national agencies responsible for urban design, housing, transport infrastructures, waste recycling, land use planning, industrial and retail location, pollution monitoring etc. Yet such policy integration will severely challenge the flexibility, imagination, innovation and co-operation of very many institutions.

Flexibility: The future remains uncertain. Thus attempting to 'optimise' the policy response, given this uncertainty and the likely somersaults in emerging conventional wisdoms, is a forlorn endeavour. Economic and political uncertainties are great, the mood of public opinion could well shift, and the global energy demand/supply balance is difficult to predict over 2-3 decades or longer. The future will contain many shocks that will reveal the folly of strong belief in any present certainties or projections. History has taught powerful lessons in this regard. Options should be kept open, whenever possible. But, importantly, this desire for flexibility must not be synonymous with inaction.

Feasibility: Political feasibility (or social acceptability) will be an important test of policy packages. There is no doubt that some policy measures (e.g. taxation and tougher regulation) will confront powerful vested interests. But these vested interests, whilst given all reasonable opportunities to voice their concern, must not (as on some occasions in the past) be permitted to exercise any veto. Saying 'no' to policy proposals is not sustainable: well-considered alternatives must be proposed in their place. Many of the other policy measures might well enjoy wide support: information campaigns; introduction of standards and regulations for appliances, buildings and vehicles; and voluntary agreements. The impacts of some other policy measures are as yet available in outline only, such as detailed application of the Kyoto flexibility mechanisms, or the likely second-round effects of the new Emissions Trading Scheme (ETS). Much further work is required before such newly conceived instruments can be fully evaluated by policy makers and stakeholders.

Precaution: Scientific consensus, likely any other consensus, should remain subject to searching challenge and scrutiny.

But, at present, the scientific consensus about climate change and sustainability must be heeded. Hence 'business as usual' is no basis for future policy making. The precautionary principle requires that many policy measures must be examined seriously and that some, at least, are implemented promptly. Priorities include (i) a review of fiscal and other policies seeking to ensure the 'internalisation' of external environmental costs over a wide field of application (e.g. including air travel), and a reduction in any subsidies for fossil fuel production; (ii) any necessary realignment of economic and environmental regulation to ensure the greatest possible consistency between them; and (iii) evaluation of the configuration of electricity transmission and distribution grids to ensure adequate capacity (and removal of any unjustified disincentives) for the potential connection of large volumes of small-scale, distributed generation.

Social and economic equity: Burden sharing across countries, sectors and end-users should be equitable. Inevitably, some instruments will have undesirable side effects, such as on income distribution, employment and personal choice. These side effects must be evaluated with care. In some cases, compensation might well be required to achieve social acceptability (encompassed in the emerging concept of the 'socially just transition'). Packages of measures should aim to ensure that (i) side effects are as low as possible; and (ii) that adjustments are smoothed wherever this is feasible. Abruptness in policy implementation will usually impose higher costs than when individuals and markets are given adequate time to anticipate and to adjust. There is thus no merit in delay, as this may well require later change processes to be compressed into unrealistically short time scales.

Environmental effectiveness and transparency: Policy instruments, individually or in packages, must contribute to the imperative of more sustainable development. The effectiveness of such instruments should be well established, documented and credible; and consistent with a wide range of economic, energy, environmental and social objectives. Such instruments should aim at a hierarchy of responses, such as lowering carbon intensity, increasing energy efficiency, and enhancing penetration of renewables, micro-CHP, and other low-emission and clean technologies. Many environmental impacts, other than merely greenhouse gas emissions, derive from the energy system.

Cost effectiveness and economic efficiency: The policy objectives set by the EU and Member States result from the process of political negotiation, and tough evaluation of trade-offs. Politics is the art of the possible. But the possible must also be evaluated on rational economic grounds. Resources are constrained and desirable objectives are manifold. Especially in newly liberalised markets, policy instruments should - wherever possible - work with 'the grain of the market'. Incentives are more likely to achieve public support than penalties. In the event, both may prove necessary. If so, long established principles of public finance may need to be re-examined, especially those of 'ring fencing' (or 'hypothecating') revenues so that these are re-invested in adjacent policy fields. For example, higher taxes on private transport might be more palatable if the incremental revenues are committed to improving public transport provision. In addition, cost effectiveness is best assessed against a level playing field. This implies the need for fuller harmonisation of measures at the EU level. Otherwise least-cost solutions might not be identified. In particular Member States should be aware that capital allowances for energy efficiency measures by households and public authorities on the demand side might need to match those available for new investment on the supply side of the energy system.

Specifically, at present, investment in 1 kW of generating capacity by a household or local authority in micro-CHP is treated very differently by the fiscal system from similar investment by an established electric utility. Can this make sense, if least-cost solutions are being sought? Perspective is all when assessing cost effectiveness.

Market compatibility: Policy instruments should be based upon market realities such as consumer and market expectations; huge sunk investment in equipment and human skills; slow turnover of energy using capital stocks (aircraft, cars, freezers, power stations); the respect for freely-negotiated contracts, especially longer term ones; the resource losses imposed by stranded assets and contracts; increased competition in EU and global markets; and the possibility of reduced incentives for long-term RD&D by the liberalised energy sector etc. A distinguishing characteristic of the energy supply sector is its long-life assets, often combined with the long planning and construction lead times. The demand side is also greatly constrained by long-life assets, such as the core spatial configuration of urban spaces, population centres and transport networks; 'legacy' assets such as the accumulated stock of buildings and vehicles; and other major energy-using equipment (e.g. domestic and industrial boilers). It is primarily for these reasons that short-term price elasticities are always lower than long-term elasticities. The energy system is characterised by these inherent rigidities.

3 Energy Policy and the European Institutions

At present there is no formalised EU common energy policy. Several attempts have been made to provide a codified and comprehensive legal competence for the EU specifically in the energy policy field. For various reasons, discussed below, these efforts did not prove successful. Yet this lack of formal legal competence has not constrained the EU and the Commission from taking decisive policy action which has had a major bearing on the evolution of the EU energy system.

3.1 The Competence of the European Commission

Although the energy sector was central to two early Community Treaties - the European Coal and Steel Community (ECSC) of 1951, and the Euratom Treaty of 1957 - there was no specific mandate for wider energy policy making by the European Commission in the Treaty of Rome of 1957. The ECSC was abolished in 2002. The Inter-Governmental Conference in June 1997 did *not* reach agreement on the inclusion of an Energy Chapter in the Amsterdam Treaty. Subsequent attempts to date have been no more successful in this regard. However the Amsterdam Treaty established the requirement for Community/EU policy to *contribute to sustainable development*. This commitment has further underpinned the EU's developing policy trajectory in the energy, environment, transport, and other related fields.

The European Commission's formal, legal competence in energy policy thus remains constrained, despite the creation of the Single European Market - requiring the unanimity of Member States in the energy policy field, or the use of others powers (e.g. especially on competition, environmental and climate change policy).

The formal historical record of European Commission initiatives in the energy policy field was set out in a 'Compendium of Legislation' published in February 1995. This large document reproduced, from the Official Journal, all the relevant legislation under five main chapters: General (broad statements of energy policy objectives); Solid Fuels; Gas, Oil and Electricity; Nuclear Energy; and Rational Use of Energy and Renewable Energy Sources.

This document is extremely useful; and includes some environmental measures such as those for reducing the lead content of petrol, and the sulphur content of fuels. It does not, however, include all important and wider legislation deriving from the competition, transport, and environmental powers of the Commission which impinge on the energy sector and the wider energy 'system'. As the document only records measures in force as at December 1994, it is now very much out of date.⁸

3.2 Central Objectives of a Coherent EU Energy Policy

The EU's energy policy has, for perhaps a decade, been based on three major pillars aimed to address the complex set of strategic challenges facing the energy sector and the wider energy 'system'. These were confirmed in January 1996 when the Commission published a White Paper on Energy Policy. This document set out three central objectives intended to establish a coherent framework for implementing a Community energy policy in future. These were competitiveness, environmental protection, and security of supply.

Liberalisation of the energy sector as a key component of the Single European Market. This has included *inter alia* the Directives to liberalise the EU gas and electricity sectors; to reduce State Aids (especially for coal) and the market distortions created by

⁸ Much of this work urgently needs to be updated, as does the Commission's web site on energy matters.

them; and creating a more level playing field by attempts to harmonise energy taxes, especially those on oil products.

Protection of the environment and efforts to secure more sustainable development. These efforts have had numerous policy components, perhaps the most important of which (for the energy sector) have been the Large Combustion Plant Directive to combat acid rain; and especially the commitments made via the Kyoto Protocol to curb emissions of a basket of six greenhouse gases and evolving policy instruments, such as the EU Emissions Trading Scheme.

Energy import dependence and security of energy supplies. Whilst this component of policy perhaps received less attention whilst international energy markets were more relaxed in the period since 1986, it continues to retain its policy significance. It will certainly increase in importance given the projected decline of the EU's remaining high-cost coal capacity over the next 10-20 years; the projected decommissioning of much existing EU nuclear capacity - especially after about 2010; and the increasing maturity of the EU's oil and gas reserves, especially in the critical North Sea province.

Other recent initiatives by the Commission have included a White Paper and Directives on Renewable Sources of Energy; a Directive on Cogeneration (or CHP); progress in harmonising taxation of energy products, (though not in introducing a carbon/energy tax); a Green Paper on energy supply security; the Emissions Trading Scheme; development of Trans-European Energy Networks, such as gas pipelines and electricity interconnectors; increased provision of energy loans by the European Investment Bank and use of Structure Funds; significant funding for energy research, development and demonstration under the successive Framework Programmes; and creation of bodies such as an Energy Policy Consultative Committee and expert groups drawn from national administrations. In its communication on 'The Energy Dimension of Climate Change', the Commission underlined the importance of energy efficiency, promotion of cogeneration, accelerated penetration of renewable energy sources, and integration with other policies.

Independent analysts have published many evaluations of Community/EU efforts in the energy field. These record that there have been several attempts to formulate a common energy policy but that these have met with only limited success. The primary constraint has been the continued reluctance of Member States to surrender or to 'pool' sovereignty in this highly sensitive policy area. In the past, the main division was perhaps between energy 'consumer' and 'producer' countries; and the key issue was to keep the Commission *out* of any significant role in energy policy. This was then seen to be a matter largely of national legal competence and sovereignty. In some instances, this remains the case - e.g. relating to the UK and the Netherlands over control over national oil and gas resources in negotiations over the draft European Constitutional Treaty.

3.3 Shifts in Focus over the Past Decade

Over the past 10 years, until recently, driving forces such as market liberalisation, globalisation, more relaxed global energy markets, and the present primary concern about energy-related climate change shifted the focus of policy attention somewhat away from *security of supply* – an issue in which national sovereignty was judged to be of supreme importance by many powerful Member States. Security of supply was a dominant concern in the 1970s and early 1980s, following the two oil price shocks. To the extent that security of supply has been somewhat lower down the agenda since the mid 1980s, but liberalisation and climate change were both higher up the policy agenda, the EU has effectively obtained 'action space' in which to shape policy making.

This is not to say that medium- to long-term supply security issues should be neglected by either Member States or the EU, especially given the prospective reductions in EU energy self-sufficiency over the next 20-30 years. However, neither is supply security likely to be viewed as such a narrowly *national* issue in future. The EU has committed considerable political efforts and investment resources in reinforcing electricity inter-connectors and gas and oil pipeline infrastructures. The ownership and access rights to these are governed by international law or by facility-specific legal instruments or treaties. Were there to be energy market disruptions in future, the very existence of these 'common and shared' facilities would greatly restrict the scope for purely national responses to security threats. In addition, in the event of actual or threatened supply security for oil, national sovereignty is significantly constrained by the support for the IEA's long-established emergency oil sharing arrangements.

More recently an additional dimension of policy has come to the fore - *market liberalisation* - where, in the past, the main division between Member States might be seen as between the 'protectors' and the 'liberalisers'. In this area, some countries see that Commission participation could bring real benefits, essentially by dismantling obstacles to trade and investment in other parts of the EU and hence expanding market opportunities for their own companies (as energy suppliers *per se*, or as energy equipment suppliers).

Another major policy thrust has been *the environmental agenda*. The Commission's interest in the environment is of long standing. This interest grew after the Stockholm Conference when, in 1972, there was a formal Community commitment to an environmental policy. The evolving European environmental policy agenda has extended well beyond the narrow confines of the energy sector (e.g. to include chemical wastes, the quality of drinking water, and waste recycling). But, particularly given the heavy fossil fuel dependence of the EU energy sector, the Commission's measures to constrain energy-related emissions of particulate matter, NO_x, SO₂ and CO₂, have had, and will continue to have, a profound influence on the evolution of the energy system. The important EU-wide status of environmental issues was confirmed in the Single European Act where they were incorporated into a separate chapter of the Treaty. On the other hand, as stated earlier, no political agreement could be secured to include an Energy Chapter in the Amsterdam Treaty or, as yet, subsequently.

3.4 Present Position of the European Commission

In this new era of transformed relationships between energy producers and suppliers, and of changed perceptions of the energy market, the Commission has rarely been better placed to make an impact on policy. Subsidiarity can have little significance when establishing the framework of *common* market rules within a single market especially for basic commodities (energy supply) and mass-produced appliances, equipment and vehicles. Other than building structures, these cover most of energy demand by the energy 'system'. Even buildings themselves have most recently come within the purview of the EU, via the Energy Performance of Buildings Directive.

The EU's diplomatic efforts with energy suppliers have also been increased (e.g. partly through the Energy Charter, but also via more regular dialogue with OPEC, the Gulf Co-operation Council and the Former Soviet Union, FSU, and other states). The recent sustained dialogue with the 10 new Accession countries must be highlighted here. Their membership of the EU later in 2004 will - in due course - have a very significant impact on issues such as EU energy balances, liberalisation, environmental emissions, nuclear plant decommissioning etc.

Particularly through environmental legislation, and as a signatory to the Framework Convention on Climate Change, the EU is now exercising very considerable influence upon the development of both the energy supply and end use sectors. But, in other areas - for example in the national determination of measures to enhance security of supply and diversity - the principle of subsidiarity still remains significant.

Thus the last 5-10 years have seen, in effect, a rejuvenation of the Commission as an institution, following more than a decade of relative stagnation and powerlessness. Together the Single European Act, the Single Market, the Electricity and Gas Directives and political agreement on a Single Currency have been crucial in revitalising the Commission. Although they should not be over-emphasised, these political initiatives have undoubtedly heightened the awareness of the EU dimensions of policy in an ever-wider range of fields.

4 Addressing Specific Questions Posed by the Councils on Possible Energy Policy Developments in the European Union

With the foregoing perspectives in mind, the specific questions posed by the Council on Housing, Spatial Planning and the Environment and the General Energy Council of the Netherlands are now addressed. Several of these have, in effect, been incorporated and addressed in the earlier sections of this evaluation. Some are repeated, or developed further, below.

4.1 Energy Policy and the European Treaty

The draft European Constitutional Treaty remains under development and discussion. One section (Article III-157) of this Treaty specifically addresses an EU dimension to energy policy:

'In establishing an internal market, and with regard for the need to preserve and improve the environment, Union policy on energy shall aim to:

- (a) ensure the functioning of the energy market,
- (b) ensure security of energy supply in the Union, and
- (c) promote energy efficiency and saving and the development of new and renewable forms of energy.'

The current draft of the Treaty focuses mainly on these existing European competencies in the field of energy policy, assembling them in one chapter rather than creating new competencies for the EU. This should not be taken to imply that the EU's ambitions for additional scope in its operating locus are curbed. As demonstrated earlier, policy initiatives continue to be made in areas such as the energy performance of buildings, energy services etc.

4.2 Strategic Energy Challenges Identified by DG Energy in 1997

In April 1997, the then DG Energy published an overview of energy policy and actions.⁹ This document commenced by identifying a number of 'strategic energy challenges'. These themes are likely to underpin continuing EU endeavours in the energy policy and related fields over the next decade and longer.

The first of these challenges concerned *managing external dependency* to secure energy supplies, given that the overall energy import dependency of the EU is now nearly 50% and could perhaps rise to 70% for natural gas, 80% for coal and 90% for oil by 2020. In response, it advocated diversification (e.g. via promotion of renewable energy resources); flexibility (e.g. through closer integration of energy markets); and placing more attention on energy policy issues in the EU's external relations. These diplomatic activities need to be sustained. One example is to seek resumption of the (presently suspended) Energy Charter negotiations on a legally binding international agreement on energy transit issues.

The second challenge related to the *integration of European energy markets* to increase competitiveness, especially in the context of globalisation, based upon the principle of open and competitive markets. These efforts must not be too inward looking. Incremental growth in global energy use and emissions will largely occur in developing and industrialising countries (especially the giants, such as China and

⁹ *An Overall View of Energy Policy and Actions*, (COM (97) 167), April 1997

India). This emphasises the need for effective arrangements for technology transfer, including Joint Implementation and Clean Development Mechanism, training, and technology support.

The third challenge was ensuring *greater compatibility between energy and environmental objectives* for sustainable development. The key options proposed here were to increase energy efficiency and the use of renewable energy, and to seek to establish the full costs of energy production and consumption (including external costs) in a transparent way and to reflect these in energy prices. Another is continued effort to seek wider engagement in international environmental negotiations.

The fourth challenge was the development of new, cleaner and more efficient *energy technologies* and their effective diffusion as a means of allowing the (foregoing) priority objectives of energy policy to be achieved more easily. The remainder of the 'Overall View' document developed these themes. Two useful Annexes set out the range of instruments deployed and the main sources of finance for these Community/EU energy actions.

4.3 Liberalisation of EU Energy Markets

The formal political elements of the EU electricity and gas liberalisation agenda will have been played out soon, although questions of detailed implementation will remain prior to and after its completion in 2007. However, there remains a significant omission in the debate so far about liberalisation and the reform of utility regulation. This is the logic of developing *national* systems of utility regulation within the emerging and converging European single market for energy. As stated earlier, subsidiarity continues to hold sway for many EU energy matters. But how long will it be before the realisation dawns that the Commission may need to co-ordinate and harmonise national approaches to utility regulation more effectively - even if detailed administration remains a national prerogative?

4.4 Environmental Problems and EU Energy Policy Making

Environmental imperatives might provide the justification for even further 'reach' in EU policy making, with the Commission seeking to increase its legal competence beyond its existing spheres of influence. The balance of environmental concern may also be shifting - in a modest sense, from production to consumption. An area of major policy impact should be given even greater weight: the more efficient use of energy and energy-intensive materials in the light of their high 'no regret' potentials.

One good example is the Energy Performance in Buildings Directive. Others are the draft Directive on Energy Efficiency and Energy Services, the requirements for Electricity Disclosure, and the proposed Framework Directive on the eco-design of end use equipment, including energy labelling. On the one hand these represent a significant extension of the frontier for the EU. On the other, they reflect increased recognition that it is the wider energy system, not merely the narrow energy sector, which is now thrown into sharper relief by environmental imperatives.

But other action is necessary, too, especially if energy prices provide little incentive for change. This includes *energy* regulation and incentives (e.g. support for emerging technologies); *environmental* regulation and incentives (e.g. information campaigns and appliance efficiency standards); and other instruments such as voluntary agreements and, more controversially, carbon/energy taxation for those sectors of the EU economy initially unaffected by the Emissions Trading Scheme. Specific priorities for the EU over the next 10 years include the continued development of voluntary agreements with vehicle manufacturers further to reduce emissions from the transport sector.

4.5 Harmonisation of Energy and Environmental Regulation

Of much importance in the post-Kyoto period,¹⁰ is the means by which energy (essentially market conduct) and environmental regulation will be more closely harmonised. To date, these two regulatory frameworks have developed largely in isolation from one another. Creative tension between different regulatory regimes is perhaps inevitable. But greater integration is essential for consistency. In the environment field, a clearer demarcation of responsibilities and, perhaps, a greatly clarified 'hierarchy' of regulation may be required. For example, economic regulators could perhaps have a specific primary duty requiring them to 'take note' of wider environmental concerns and of binding international treaty obligations. At present there is still some confusion, and perhaps a lack of consistency, over regulatory objectives.

4.6 Harnessing the Demand Side in Addressing Environmental Issues

Another issue of growing competence reflects increased interest in harnessing the demand side in addressing environmental issues. Given the Single Market, the Commission has made significant progress in the field of product policy, such as appliance labelling and minimum performance standards. Another example is the Auto-Oil Programme and voluntary agreements with EU and other vehicle manufacturers to reduce emissions. We can now witness extensions into buildings (the Energy Performance of Buildings Directive); electricity disclosure (due to be implemented into Member State legislation by July 2004, and showing the generating mix on consumer bills, as enshrined on the second Directive on electricity liberalisation); and the draft Energy Services Directive. At present fuel used by aircraft is either not, or only lightly, taxed. Given rapid incremental growth in air transport, pressure is thus developing for EU (and wider) action to apply the 'polluter pays' principle in this field.

4.7 EU Interest in Infrastructures

Infrastructure choices are very important in the transition towards a more sustainable energy system. Yet not all of these fall within the locus of the EU. Examples would be a shift towards more local, small-scale, distributed (or 'embedded') forms of power generation, and the need to accommodate these by means of 'net metering' and a shift from passive to active electricity distribution systems. Whilst this shift might occur in many Member States over time, it is at present difficult to see whether there is an EU added value here. Some infrastructure decisions are incremental in character (e.g. extension of gas and electricity grids, or reinforcing electricity grids to accommodate renewable generation in areas remote from load centres). Again there appears no particular locus for the EU here.

But, for obvious reasons concerning the Single Market, open access, regional development in less-favoured areas, and supply security, we can expect continuing EU interest in trans-European 'pipes and wires' infrastructures; and also diplomatic engagement regarding the extension of such infrastructures to non-EU Member States. More radical infrastructure decisions might well require EU engagement. One example might be development of hydrogen grids. Another might be concern about the adequacy of aggregate EU oil and gas storage facilities given much higher import dependence in the future.

¹⁰ By post-Kyoto period we mean the period since the Kyoto Protocol to the UN Framework Convention on Climate Change of December 1997 and not that following the first commitment period of 2008-2012

4.8 Accession of 10 New Member States

The accession of 10 new Member States (and perhaps more in future) will require continuing EU engagement in processes such as the harmonisation of environmental and safety regulations, energy taxation, phased removal of State Aids, market liberalisation, adherence to EU procurement rules, regional infrastructure investment, participation in the Framework Programmes for RD&D, training and knowledge transfer etc. Several new Member States are coal intensive, have high specific carbon emissions (per unit of GDP), have comparatively poor track records in energy efficiency, and have caused concern about nuclear safety and environmental degradation. Adjustment to better practice will clearly take some time, but will provide significant market opportunities for cleaner technologies. In addition, wider lessons might be learnt from the differing experiences of these Accession States. As they continue to adjust both their economies and energy systems they have huge scope to experiment with new concepts and policy instruments, as well as to benefit from circumstances which may permit 'leapfrogging' to the latest vintages of technology.

4.9 Further Harmonisation of Policy Instruments

Further harmonisation of policy instruments supporting the transition to more sustainable development is expected. This will arise via two mechanisms, at least. One is by sharing and evaluating experience of the efficacy of measures, singly or as part of policy packages. An example here is of instruments to accelerate market diffusion of renewable electricity. At this early stage, experimentation is not necessarily disadvantageous as it will provide information on successes and failures (on what are comparatively immature policy instruments).

Another harmonising mechanism is the expected progressive re-alignment of at least some policy instruments with the Emissions Trading Scheme (ETS). Examples here might include the benchmarking covenants and voluntary agreements about energy efficiency improvements with energy-intensive industries, such as in Belgium and the Netherlands. Several existing policy instruments in Member States will require revision and harmonisation to become consistent with the ETS, especially as/if its coverage is extended over time to embrace smaller energy users and a wider (non-EU) geographical scope. Conversely, as argued earlier in this evaluation, there are distinct advantages in moving to more 'goal orientated agreements' at the EU level. At a minimum these should cover the 'burden sharing' arrangements agreed under the Kyoto Protocol; and indicative (but perhaps nationally differentiated) targets for energy efficiency improvements and for the share of renewable sources in the overall primary energy mix. Should this shift occur then this would provide greater scope for variations in the specific implementation approach and in instrumental design by Member States.

4.10 Shared European Interest in Energy Transition Management

It is genuinely difficult, in this short evaluation, to assess the degree to which there is a commonly shared interest across the EU in the transition towards a more sustainable energy system. As stated earlier, reality and rhetoric are not always closely matched; and all Member States face regular electoral cycles, suggesting that other more pressing, immediate priorities can be expected to dominate most national and EU policy agendas. Nevertheless there does appear to be growing, and widely based, momentum for more sustainable development and a 'greener' set of societal goals.

4.11 EU Policies for Innovation and RD&D

As regards EU innovation and RD&D policy, there is need to give greater support to 'generic' technologies (i.e. those with a wide footprint), such as metering and control technologies; innovative building technologies; and vehicle-related technologies.

Other priority areas include examining the environmental and economic feasibility of carbon sequestration; direct use of biomass (via combustion, gases or liquids), rather than primarily electrically-vectored renewable technologies, such as wind, tidal or photovoltaics; the system implications of wider adoption of novel vehicle fuels and power trains (e.g. hydrogen, fuel cells, battery technologies); and ensuring adequate intellectual capability is maintained in the energy modelling, forecasting, scenario building, technology assessment and policy analysis fields (e.g. via the European Network for Energy Economics Research, ENER, and other routes). One specific issue with a high research priority is whether internationally-traded energy commodities, largely priced in \$US, might be wholly or partly priced in €. The likely motivations for, and the ramifications of, such a significant switch clearly merit detailed economic appraisal. Finally, as argued earlier, the fixation with fusion merits close scrutiny.

5 The Future of Energy Policy Making at the National Level

The author was asked to consider the scope for national policy making in the light of these developments at the EU level. Some reflections are presented below.

5.1 The Case for, and Limits to, Subsidiarity

The key guiding principle for policy making is that, where economies of scale or scope can be identified, policy should be established at the highest level whenever judged appropriate and politically feasible. This is to minimise distorting trade barriers impinging on the Single Market, often resulting from - for example - inconsistent national appliance safety regulations and equipment standards, or State Aids. This line of thinking would justify the need for policy measures such as energy market liberalisation Directives, appliance labelling schemes and co-ordinated responses to international climate change negotiations to be addressed at the EU level.

Nevertheless the principle of subsidiarity remains of great importance in most EU Member States. Some such States are perhaps better at 'EU rhetoric' than others. Some of those who often claim to be at the core of Europe have poor records in implementing, and enforcing, EU Directives! Whether subsidiarity can survive the full liberalisation of energy markets, and the growing cross-border ownership of energy companies, will be an interesting question over the next decade. This could suggest the operation of some centripetal forces, the effect of which might be to increase the legal competence of EU institutions. Nevertheless, with diminishing overall EU self-sufficiency in fossil fuel reserves, and potentially heightened tensions in the Middle East, those Member States with significant indigenous fossil fuel reserves will be nervous about any increased EU 'oversight' or interference in their development, depletion, taxation or final market allocation.

On the other hand, there is much pressure to identify additional roles for some policy activities at the local or municipal level (e.g. Agenda 21, integrated transport systems, land use and urban planning, integrated waste recycling, or innovative 'climate change cities'). These may assume much greater importance for the implementation of national and EU energy policy goals in the future. After all, 'think global, act local' is the *leitmotiv* of many NGOs and pressure groups. This is an example of the countervailing, centrifugal forces which might be at work to re-allocate primary responsibilities for some dimensions of energy policy formulation. These pressures for devolution and subsidiarity recognise that detailed *implementation* is often best handled at the local or national levels, especially to exploit location-specific synergies or climatic requirements (e.g. town planning, integrated transport, recycling, building regulations). Should the EU approach become more goal orientated, for the reasons advocated earlier, this would reinforce the scope for more detailed national policy design and implementation. But this process is not unconstrained. The ETS will require several existing national policy instruments to be 'dovetailed' into this wider trading scheme.

5.2 The Current Role of Governments in the Energy Field

Within the EU Member States the primary actors, and their roles, differ widely. This is partly because of differing energy resource endowments; industrial structures; ownership patterns; administrative and governance styles or traditions; and the extent of devolved powers. For example, in some countries (e.g. France), public ownership of the energy supply sector has historically been seen as of crucial - even strategic - importance.

There are now heightened pressures upon public expenditure (education, health, pensions, social security), reduced revenue buoyancy, and the (somewhat elastic) discipline of the single currency convergence criteria on budget deficits. These may well cause the insatiable search for incremental revenue to lead over time to partial or full privatisation of these valuable state-owned assets.

In other countries, even though ownership is primarily or wholly in the private sector, very significant shareholdings may be held by the public sector (e.g. in the case of municipal utilities in Denmark and Germany). In yet others, ownership has been transferred fully to the private sector. In some countries, central government departments or regulatory agencies exercise many national responsibilities in the energy policy field centrally. In others much more weight is placed upon regional, or even municipal, autonomy and devolution.

5.3 The Energy Policy 'Space'

In my experience, all governments are conscious of the need to encourage and/or coax energy markets periodically by setting out their own strategic perceptions - particularly over longer time periods than energy markets unaided might normally consider. The post-Kyoto commitments, and the policy measures now being put in place to secure them, remind us of this enduring characteristic of the energy field. Likewise in some countries significant defence expenditure and foreign ministry activity underpins international energy relations – and not just in the Middle East. Environmental diplomacy is growing apace in several forums and several fields, not all of which have a direct bearing on the energy system. The main forums include the EU, the UN and bilateral dialogue with key players such as Russia and the USA.

The key point is that, even though an increasing proportion of EU energy supply sector is in private ownership and operating under competitive liberalised market conditions, national Member State or EU interest in a complex web of energy (and energy-related) policy issues seems unlikely to diminish. Indeed, the 'intensity' of public policy intervention in some areas may well need to increase if market incentives are reduced by lower real energy prices. Policies will also require more integration than has sometimes been true in the past. In any event, environmental (and, in particular, climate change) imperatives and strategic supply security concerns will not permit inaction by governments and international agencies.

5.4 Some Other Remarks

So much for the likely range of issues that, over a period of time, may be recognised as the 'space' for appropriate public policy responses and safeguards at the national level. The width of this agenda does not imply extending the governmental reach of the *energy* policy maker's space, but it does highlight the extent of the necessary policy co-ordination, analytical capability, and shared understanding.

The contract letter required this section to end with some specific conclusions regarding the extent to which Member States, such as the Netherlands, can continue to develop their own energy policy aimed at transition of the energy system. It is hoped the assessments above have provided many pointers as to the considerable scope available to individual Member States; the likely array of core issues which will continue to be addressed at the national level; and some principles which might influence the balance between EU and national competence in this and related fields. As a non-national I am indeed most hesitant to recommend specific courses of action for the Dutch Government and its agencies.

Nevertheless, the foregoing analysis is intended to provide officials with some useful pointers as regards the shifting frontiers between Member State and EU competence.

6 Influencing European Energy Policy Development

The two Councils proposed a specific set of questions to be addressed under this theme. These related to the means by which the Netherlands might play an active role in influencing energy policy development. Again the author is reluctant to be too prescriptive here, especially as the Netherlands assumes the chair of the European Council for the second half of 2004. The Netherlands is a small but highly regarded Member of the EU. It has a strong democratic tradition, stable structures, and a reputation for seeking to build societal consensus. It can deploy these to good effect.

Promote a more consistent approach towards sustainable development: Amongst the priorities, in my judgement, should be an attempt to achieve the shift towards a more consistent, and goal orientated, approach towards sustainable development in the EU. As argued earlier, this should embrace the widest possible view of the energy 'system'; and the ways in which its different elements can be brought to bear in achieving such development. To have real effect, a global, principled and long-term perspective is an essential prerequisite. It would be useful to identify (and even better to agree!) some longer-term goals, with a time line extending to 2020, or even 2050. Earlier sections identified several issues that could be advanced by the Netherlands at the EU level.

Build coalitions among Member States: Without greater diplomatic contact and insights the author finds it difficult to evaluate, in any specific detail, which Member States are likely to favour a common policy to bring about a transition towards a more sustainable energy policy. It would be a brave government that did not sign up in principle to this broad objective; or which publicly stated its opposition to such a move. From my personal knowledge several existing Member States, such as Austria, Denmark, Finland, Germany, the Netherlands, Sweden and the UK, are seeking such a development; but I have less knowledge of the detailed position of other Member States, and especially of the Accession States. As argued earlier, the policy agenda is a crowded one. Thus, to be realistic, not all ministers and governments will have sustainable development at the forefront of their minds at all times.

Shape the agenda for Council meetings across several DGs: The main windows of opportunity for implementing a common policy for such a transition include the forward shaping of agendas for Council meetings across several of the Directorates General. These agendas are usually full in any event, but opportunities to reflect prospectively and to undertake honest appraisals of progress should be seized. Several more joint sessions would be valuable, involving DGs in related areas. Occasional, but regular, independent 'policy auditing' of the progress being made and the impact of measures should be put in place. This is done by some DGs, in the form of 'groupes des sages' or a 'prospective group' (e.g. in the past, on priorities for RD&D) but its application could become more widespread. Another route is via the European Parliament; but its scrutiny style is generally not as searching as in some Member State Parliaments.

Evaluate policy direction and options by hearings: There is scope for 'European Hearings', engaging a wide range of senior stakeholders in the evaluation of policy direction and options.¹¹ The types of themes addressed in this evaluation might well be judged useful for similar hearings.

¹¹ For example, the Community Hearings on Nuclear Energy, 29 November-1 December 1977, in the *Report on The Communities' Open Discussions on Nuclear Energy*, EUR 6031, Commission of the European Communities, Brussels, 1978. Another series of fascinating hearings was organised by DG Energy and Eurelectric on the theme of electricity and its role in sustainable development in 1996/97

Such events do serve a useful role in bringing together key players from related fields, and in identifying areas of agreement and dissonance.

Joined up policy making in Commission services: An important supportive mechanism for a more common policy for sustainable energy in the EU could be more informal co-operation between the Member States and the Commission. This might take the form of a Sustainable Energy Policy Review Group of high-level officials, building upon the successful track record of the Environmental Policy Review Group of DG Environment.

7 Some Lessons from Other Countries

To answer this topic comprehensively would require a research project beyond the bounds of the present evaluation. What follows is thus inevitably rather impressionistic.

The Sustainable Energy Policy Network (SEPN) in the UK: The UK has undertaken a major review of energy policy over the past three years, commencing with the *Energy Review*, February 2002, prepared at the Prime Minister's request by the Performance and Innovation Unit (PIU, now the Strategy Unit) of the Cabinet Office. This was followed by the *Energy White Paper* of February 2003, Cm. 5761. This ambitious document committed the UK to following a path to a 60% reduction in CO₂ emissions by 2050. Both exercises included very extensive, and generally most successful, stakeholder consultations with specialists and the public. Given the cross-government issues addressed, a Sustainable Energy Policy Network (SEPN) of officials has been created and charged with policy development and implementation.

The Network reports to a Ministerial group, again drawn from several government departments, and is advised by an external, independent, high-level Sustainable Energy Policy Advisory Board. The Network includes senior officials from the key Government departments, including the Cabinet Office Strategy Unit, the devolved administrations (Scotland, Wales et.), industry, environment, planning, transport, foreign affairs and finance. It co-ordinates and oversees development of some 130 commitments given in the *Energy White Paper*, grouped into 11 major work streams.

Whilst SEPN comprises officials only, the broader policy development process involves consultation with a wide range of stakeholders through advisory committees and consultative groups. One strength derives from the commitment of Ministers for success. Another strength is its transparency via web pages on the UK Department of Trade and Industry's web site.¹² Importantly progress reports will be published on a regular basis (e.g. key milestones are updated regularly on the web site), and an annual report on progress in advancing policies set out in the White Paper, and several more detailed implementation plans on energy efficiency, fuel poverty etc. will all be published in April 2004). It is a genuine attempt at more 'joined up' government. Although in its infancy as a mechanism, being less than one year old, it appears to be working well at present. Other recently introduced measures include a Low Carbon Vehicle Partnership and the Carbon Trust's low carbon innovation programme. As ever, time will tell whether these achieve real progress.

Advocating good practice in building regulations: As regards building regulations, Denmark, Finland, the Netherlands and Sweden are usually advocated as examples of good practice; but their experience is not widely available, other than in the most specialist technical literature.

Transport planning and road pricing: The experience of Denmark and the Netherlands is also highly cited in fields such as urban design, integrated public transport, and cycling provision. Experience is developing in other Member States but is perhaps more limited to specific city councils. Most urban transport analysts have judged London's experience with road pricing a significant success.

The Energy Efficiency Commitment (EEC) in Great Britain: Given current discussion on the Directive on Energy Efficiency and Energy Services, there is considerable interest in mechanisms that can assist in both furthering energy efficiency objectives and stimulating market interest in the provision of energy services.

¹² For more details on SEPN, see www.dti.gov.uk/energy/sepn/index.shtml.

One example is the Energy Efficiency Commitment (GB, rather than UK), which replaced the earlier Energy Efficiency Standards of Performance (EESoP) scheme. Following the Utilities Act 2000, the Government took responsibility for determining the form of the EEC for 2002/05 and any future schemes. The EEC commenced in April 2002 and funding is (only notionally) based on the equivalent of £3.60 per customer per year, for each of electricity and for gas. This results in a forecast expenditure by energy suppliers of more than £450 m. over the three years. The current scheme is estimated to produce reductions in carbon emissions of about 0.4 MtC pa by 2005.¹³ The target savings over the whole *lifetime* of measures installed under EEC are 62 TWh. A more ambitious, successor EEC scheme for 2005-08 is currently under discussion.

Market stimulation for diffusion of more efficient boilers and micro-CHP: In the energy efficiency field, interest has been expressed in the sustained package of measures adopted by the Netherlands to achieve high market penetration of condensing boilers (some 75% of the Dutch market in 2002, cf. 12% in the UK). The wider, pan-EU, adoption of such boilers is of critical importance; and the Dutch case was cited as an exemplar in the recent UK *Energy White Paper*. Interest is also growing in the market potential for micro-CHP units in domestic properties, not already served by other CHP schemes. As yet there appears to be no evaluation of emerging EU-wide experience in this potentially important area.

Policy instruments to accelerate the diffusion of renewable energy technologies: Much greater effort has been devoted to the evaluation of Member State (and wider international) experience of policy instruments to accelerate market diffusion of renewable energy sources. As a result there is a voluminous literature. Views still differ as to the relative merits of the two principal policy philosophies (i) support via feed in tariffs and (ii) a market share or portfolio approach, requiring the sourcing of a defined percentage of electricity from eligible renewable plant.¹⁴ A key issue for renewable energy support mechanisms (as for some energy efficiency and environmental fiscal instruments) is the extent to which they would require modification to be consistent with the ETS and other higher-level instruments. Work is in progress on these issues.

Evaluating economic costs of an energy transition towards lower carbon futures: Finally evaluation of the economic costs and benefits of the transition towards more sustainable development and lower-carbon futures has developed significantly in the past few years. Efforts to refine the quantification of carbon abatement curves remains a priority, but it is not yet possible to identify marginal benefit curves for CO₂ emissions reduction. Work by the IPCC, the UK (for the *Energy White Paper*), and by several other governments and academics suggest the costs in industrialised countries for carbon stabilisation at c. 550 ppm are some 0.5-2.0% of GDP in 2050. These estimates should be kept under review, and shared more widely, as data and analytical capability improve. If correct, these analyses identify that the costs of a transition towards a more sustainable energy future are comparatively modest and manageable. The policy approaches outlined earlier in this evaluation are aimed to reduce these costs as far as is practicable.

¹³ See, for example, *Energy Efficiency Commitment Report, 2000-2001*, EST, op. cit., p. 18

¹⁴ For example, the recent review paper by J C Jansen and M A Uyterlinde, 'A Fragmented Market on the Way to Harmonisation? EU Policy Making on Renewable Energy Promotion', *Energy for Sustainable Development*, March/April 2004

ANNEX

Terms of Reference and Key Questions Posed by the Councils

This thematic scoping essay has been prepared at the request of the VROM-raad (Council on Housing, Spatial Planning and the Environment) and the Algemene Energieraad (General Energy Council) of the Netherlands. The terms of reference and the background for this work were specified in a contract letter 4 December 2003 (Ref: 03/671/O).

The contract letter from the Councils added that in several fields, including the energy domain, a start has been made with this approach. It has two main components: (i) putting pressure on the existing regime (tightening standards, CO₂ targets, taxes etc.); and (ii) developing and experimenting with alternative, more sustainable systems.

Given this context for the evaluation, the principal questions the author was requested to address included the following:

To examine possible developments in the European Union (EU) relevant to the development of EU energy policy given that, currently, there is no formal common energy policy.

In the light of these possible developments at the EU level, to examine the future of energy policy making at the national level.

To examine the extent to which individual Member States, specifically the Netherlands, can play an active role in influencing energy policy development at the EU level.

As the Netherlands is not the only country aiming to steer a consistent path aimed at the transition towards a sustainable energy system, to examine some of the major lessons to be learned from other countries which are developing similar policy responses.