

Mapping Energy Expertise

Actors and Topics

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Executive summary

The aim of this study is to help a group of actors from the Stavanger region to map international expertise in the field of energy security with focus on the energy-security and climate-change nexus. This is the first step towards setting up an international think tank to conduct joint studies on EU energy security and climate policy, on the links between European climate policy and future energy supplies, on the patterns of interaction between the EU importers and their main suppliers of oil and gas and the role of technology in enhancing the resource base for oil and gas supplies and in creating new opportunities for renewables and energy efficiency.

The study was commissioned by the University of Stavanger (UiS), International Research Institute of Stavanger (IRIS), Stavanger Chamber of Industry and Commerce, and Greater Stavanger Economic Development, and carried out jointly by the Fridtjof Nansen Institute (FNI) and the Norwegian Institute of International Affairs (NUPI). The study was conducted in the period between February and June 2009 and is based on both quantitative and qualitative analysis of information on energy related research.

In the preparatory phase of the project it was agreed that the study's geographical scope should be limited to the areas of greatest importance to Norwegian energy interests – Europe (including Russia) and North America. It was also decided that the mapping should focus on research institutions that potentially could be invited to partner with the planned think tank.

The report is divided into six parts and has three appendices. The first and introductory part outlines the goals of the project and presents the structure of the report. In the second part, an assessment of the current state of the European debate on energy security is presented. The focus is on how the policy area 'European security of energy supply', has been understood and treated by politicians, both at the EU and national levels. This background chapter informs our conclusion that different problems and approaches to solutions taken by different research actors reflect different political understandings of the problem, and vice versa. The focus is on key policy-makers in Europe, the EU Commission and central member states, as well as Russia as the major gas exporter to the EU (and one major cause of the security of supply concerns in Europe) and the United States, as the EU's main interlocutor on traditional security issues. This chapter starts by discussing the historical background of the European debate – and action – on energy security, and then goes on to a detailed account of the current state of the debate and the contemporary processes that shape the European debate and policies. Part of the chapter is dedicated to the inherent tensions in the formulation of EU energy policy, pointing out the lack of coherence due to the national vs supranational approaches.

In the third part of the report we explain our methodological approach to identifying the most important research institutions in international research on energy policy. A three-step approach was adopted combining both quantitative and qualitative elements. In the first step, we put together a preliminary gross list of 57 institutions that may play a role setting the international research agenda in this area. In the next step, we ranked the web sites of these institutions quantitatively, according to their visibility on the internet. Subsequently we carried out a reputational expert survey of the importance of these institutions in the international research and policy community.

In the fourth part of the report the results of the expert survey are presented. The 19 institutions ranked highest in the survey were the following:

Rank	The top 19 institutions from the expert survey
1	Oxford Institute for Energy Studies, UK
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR), USA
3	The Energy, Environment and Development Programme (EEDP), Chatham House, UK
4	Cambridge Energy Research Associates (CERA), USA
5	Baker Institute Energy Forum, Rice University, USA
	Clingendael International Energy Programme (CIEP), Netherlands
6	Imperial College Centre for Energy policy and technology (ICEPT), UK
	Energy Research Centre of the Netherlands (ECN), Netherlands
7	Wuppertal Institute for Climate, Environment and Energy, Germany
8	Centre for Global Energy Studies (CGES), UK
	Global Climate and Energy Project (GCEP), Stanford University, USA
	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP), UK
9	Energy Security Initiative at Brookings, USA
10	Electricity Policy Research Group, University of Cambridge (EPRG), UK
	Program On Energy and Sustainable Development, Stanford University, USA
11	Centre de Géopolitique de l'Énergie et des Matières Premières, Université Paris Dauphine (CGEMP), France
	UK Energy Research Centre (UKERC), UK
12	Energy Programme, IFRI, France
13	IEA, France/international

We see these as the most interesting institutions to cooperate with in forming a think tank focusing on energy security. We note that there are many US and British institutions among the 19, and argue that this reflects the general tendency for think tanks in any field.

In the fifth part of the report we examine the contents of the web pages of the top 19 institutions in order to identify which ones specialise in areas such as geopolitics, EU studies, emission trading, electricity, law, technology, Norway etc. The results of this analysis are presented in a series of tables.

In the sixth and concluding part of the report we sum up our findings and assess the institutions covered and their possible role in the planned think tank, emphasising their topical expertise and relevance to Norwegian interests. We do not single out a final shortlist of institutions for cooperation, but rather show how relevant the different institutions are to various thematic areas and assess to what extent they might be interested in entering into closer cooperation with a group of Norwegian actors.

Appendix I contains a list of preliminary 57 institutions with their web-addresses and brief information on their research focus. Appendix II contains some details on the expert survey while Appendix III contains a detailed presentation of the 19 institutions that made it to the top of our list. Our research team analyzed thoroughly publicly available information provided by these top institutions, focusing on issues of importance for the planned think tank. We paid most attention to their position in the national and international energy research landscape, their main topics of research, their resources, their output and their relevance for cooperation with Norwegian actors.

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1. Introduction

Security of energy supply now tops the energy policy agenda in the EU and its member states alike. This study explores the research basis for current and future responses to security-of-supply-concerns in Europe, and discusses whether and how this basis feeds into energy policy processes in the EU and its member states, especially those policy processes related to climate change.

The study has been funded by the Stavanger Chamber of Commerce on behalf of a consortium of research-related actors in the Stavanger region,¹ and conducted as a collaborative project between the Fridtjof Nansen Institute (FNI) and the Norwegian Institute of International Affairs (NUPI) on behalf of a Stavanger-region consortium of educational and industrial agents. The basic aim has been to provide background information for plans to establish a ‘think tank’ in Norway’s energy capital Stavanger to work on European energy security issues. The main mandate of the project group was to map the leading institutions conducting research on the topic. Research institutions play an important role in the choice of and framing of the security-of-supply problem, and in providing options for policy-makers.

Policies for ensuring security of supply increasingly have to be formulated against other salient energy-policy objectives formulated by European policy-makers, aimed at containing climate change and at strengthening the international competitiveness of European industry. These three long-term objectives were highlighted when the EU Council of Ministers in March 2007 decided on the more operational and binding 20/20/20 goals: to reduce greenhouse gas emissions by 20%, to reduce energy consumption by 20% compared to a business-as-usual-scenario, and to increase the share of renewable energy in total consumption to 20% by the year 2020.

These three objectives are not automatically reconcilable, and tensions between them often blight energy policies at the national and EU levels. This has been recognised by the prominent energy-policy scholar Jonathan Stern, who has urged Europe to ask itself three questions when determining its energy security priorities: whether to regard it as a problem of becoming increasingly dependent on countries viewed as unreliable suppliers; as a problem of insufficient supply of oil and gas; or as a climate problem tied to the carbon emissions that result from the combustion of oil and gas. The three questions grasp the main dilemmas Europe faces today in the area of energy security, as seen in the interconnectedness between affordable and competitive energy supplies, energy security and climate stability.

¹ University of Stavanger, International Research Institute of Stavanger (IRIS), Stavanger Chamber of Industry and Commerce and Greater Stavanger Economic Development

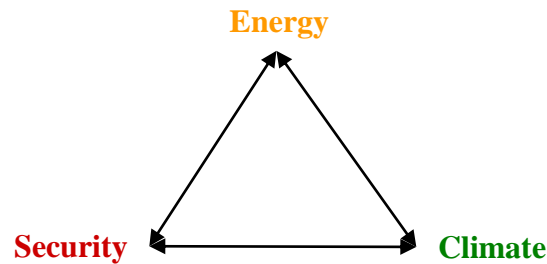


Figure: The energy security and climate change nexus

The relative weighting of these factors in European energy policy will greatly influence any solutions chosen. Some solutions respond to concerns of climate change and security of supply alike: lower imports of fossil fuels, energy savings and increased use of indigenous renewable energy. Also nuclear power responds to both concerns, but this solution is fraught with controversies over nuclear safety issues. Technological developments for carbon capture and storage (CCS) are also being explored as yet another solution that could make indigenous coal resources in Europe more acceptable in terms of climate change.

While some lines of political thinking and discourse emphasise convergent political and technological solutions to climate and energy security concerns, others highlight conflict. When the security-of-supply focus is directed towards energy economising, an international scramble to increase or secure energy supplies makes less sense than if worries about energy security are related to geopolitical or realist ways of seeing global energy supplies in terms of competition between states (and between companies) over scarce resources. In that view, everyone is expected to be out to grab (or secure stable access to) as *much* of the world's energy resources as possible.

Such contradictory lines of reasoning are clearly present in European energy politics. Many actors express concern about the reliability of the Russian Federation as a supplier of natural gas to Europe, either due to claims about Moscow's use of energy as a foreign policy tool or weapon, or due to concerns about Russia's ability to satisfy domestic and EU demand in the coming years. Others, however, would see higher prices of natural gas stemming from curtailed Russian supply as one element that could prompt the development of indigenous renewable energy and help to reduce European climate gas emissions. Similarly, such contradictory lines of reasoning can be found in Norwegian energy policy discourses. While some argue that Norway should expand the exploration and extraction of oil and gas as fast and deep into its Arctic waters as possible in order to secure stable supplies for the EU (and profits for itself), others focus on how the resultant cheap and stable supply of hydrocarbons could obstruct necessary energy system reconstruction in Europe, containing the security of supply problem and making it harder for the EU to cut its CO₂ emissions.

The research community plays into this discourse by providing frameworks for understanding and analysing the problems, and by producing tools for handling them. The aim of this study is to identify and examine some of the main research institutions that will be chartering the waters between energy security and climate change concerns, and thus contribute to the evolution of international policy in this area in coming years.

The number of research institutions dealing with these issue areas is vast, and our study will present only 19 of them in detail. In accordance with the mandate of the project group, we have restricted our study to research institutions in North America and Europe, including Russia. We have first and foremost mapped major institutions with inter-

disciplinary capacities, on the assumption that diversification in academic disciplines (technology and engineering, political and economic analyses) strengthens an institution's ability to analyse the inter-sectoral energy issues in question.

We have employed a series of quantitative and qualitative methodological steps in order to identify those institutions with the greatest impact on international energy policy formulation: first, internet searches and brainstorming among the contributors to this report, to generate a broad list of 57 potentially relevant research institutions; second, ranking of the web sites of the institutions in order to remove the least influential ones; and finally an expert survey to pinpoint the most influential ones. These methodological steps are described in greater detail later in the report.

The research institutions selected are then presented in greater detail on such parameters as number of research staff, major problems formulated and approaches applied in the study of the energy security–climate change nexus. A separate presentation of the relevance of the research institutions to EU–Norway energy relations responds to the mandate to characterise capabilities for contributing to a future think tank in the Stavanger region.

2. Security of energy supply: understandings and solutions framed for Europe

Security of energy supply has always been a component of EU cooperation. Two of the three founding treaties of the European Community dealt with cooperation aimed at ensuring sufficient supply of energy.² The topic has remained high on the EU energy policy agenda, reflecting the general lack of conventional energy resources and dependency on imports, and recurrent international events that have threatened to interrupt the flow of energy into the EU. After the political embargoes of the Arab oil producers in the 1970s hit many EC countries hard, EU energy-related policies during the 1980s concentrated fully on security of supply. In 1986, the common objectives established for Community's energy policy were:

- maximise security of supply and reduce the risks of sudden fluctuations in energy prices through developing the Community's own energy resources under satisfactory economic conditions;
- diversify the Community's external sources of supply;
- improve the flexibility of energy systems and, *inter alia*, develop, as necessary, network link-ups;
- develop effective crisis measures, particularly in the oil sector;
- create a vigorous policy for energy savings and the rational use of energy, with diversification among the different forms of energy.³

Beyond such general policy guidelines, actual *legislative tools* to ensure coordinated EU-level action on security-of-supply issues have remained scant. One exception was the 1975 directive that restricted the use of natural gas for power generation,⁴ – which was revoked in 1991, when establishment of the internal energy market had assumed priority on the EU energy policy agenda.

Security-of-supply arguments were voiced by both supporters and sceptics of the idea of creating an internal market based on free competition in supply. The EU Commission and liberalisation-friendly member states argued that market integration would improve security of supply, whereas several member-state governments feared that the associated cuts in national subsidies to European energy supply (to create level playing ground competition) would aggravate the situation (Lyons, 1992:42).⁵ The Commission acknowledged that, without powers at the EU level to harmonise security of supply measures, creating an internal market would involve problems. A majority of member-state governments nevertheless turned down Commission efforts in the field, such as the proposal to include a chapter on energy in the Treaty (Lyons, 1992:43) and the proposal of stronger EU-level powers to coordinate national oil stock policies after the market turmoil caused by the Iraqi invasion of

² The Treaty establishing the European Coal and Steel Community (ECSC Treaty) was signed in 1951, and the Treaty establishing the European Atomic Energy Community (EAEC or EURATOM Treaty) came in 1957. Early EC energy co-operation revolved around enhancing and improving coal and nuclear supplies in Europe. Extensive R&D resources were channelled through the ECSC and EURATOM Treaties.

³ General objectives set out in the 1986 resolution (OJ/86/C241).

⁴ Directive 75/404/EEC.

⁵ DG XVII working paper on security of energy supply (SEC/90/1248). In this document, the Commission for the first time specified what share of a Member State's electricity generating capacity could be dedicated to indigenous fuel resources or state-supported for security of supply reasons – 20 per cent, in later communications to be reduced to 15 % by 2000.

Kuwait in 1991.⁶

Around 2000, energy security gained new topicality in EU energy policy, due in part to fresh figures showing growth in consumption and greater dependency on imports after the 2000 Nice Summit had opened up for enlargement of the EU to countries from Eastern Europe.⁷ In 2000, a Commission Green Paper announced a new broad strategy for security of supply that acknowledged that simultaneously achieving environmental sustainability and energy security goals would constrain the options available: it would favour those aimed at reducing energy intensity, improving energy efficiency and increasing indigenous and renewable energy sources (Commission of the European Communities, 2000: 13) The Green Paper also acknowledged the likelihood of friction in trying to achieve internal market goals and energy security at the same time.

The internal market in electricity ... has had two opposing effects related to security of supply. First, it has improved the overall efficiency of the energy system and created a market for more energy saving electrotechnologies.... Second, however, it has made investments, which require large capital input or which have long pay back periods less attractive. Investment in research, particularly basic research, and development of new energy technologies may be put at risk. An additional issue is the impact of competition. If this brings prices down, as appears to be the case, demand could rise as a result.... This combination of factors could work to the disadvantage of supply security and consequently lead to price rises or even interruptions in supply, as has been seen in parts of the US market (Commission of the European Communities, 2000: 21).

The Green Paper asked member states to rebalance their energy policies in favour of reduced energy demand and the promotion of indigenous new renewables. It also called for a new analysis of the potential role of nuclear power and for mechanisms to build up strategic stocks and to foresee new import routes for increasing amounts of oil and gas⁸.

Security of supply was now further consolidated as a topic in EU energy policies. International oil prices began their upward hike, fanned by demand growth in China and other fast-growing economies. The '9/11' terrorist attacks on the USA and unrest in the Middle East caused new fears about oil supply. Added to this, a series of electricity grid blackouts in Italy, Sweden and Denmark in 2002 and 2003 gave rise to the question of whether liberalised energy systems would entail greater vulnerability and short-term risks of supply distortions

⁶ Part of the package was a proposal to give the Commission greater power in international negotiations within the IEA framework. Some role was eventually given to the Commission in IEA –negotiations, but far less than proposed by the Commission.

⁷ In November 2000, the EU Commission published the Green paper 'Towards a European Strategy for the Security of Energy Supply', [COM(2000)769]. The Green Paper presented risks of short-term and long-term supply distortions, based on the trends of EU's ever-widening dependence on energy imports, expected to rise from 50 % of its energy requirements to 70 % the next 20 to 30 years if no countermeasures were taken. Energy imports represented in 2000 6 % of total imports. 45 % of oil imports came from the Middle East and 40 % of natural gas came from Russia.

⁸ The Green Paper concluded that the margins for manoeuvre were largest in demand-side measures at the Community level, and hence, that an attempt at controlling the growth of demand ought to be made, notably by encouraging a real change in consumer behaviour through taxation measures, as an example. In the field of renewable energy, the Green Paper established that efforts taken by the EU to promote renewable energy sources had so far been too feeble. In the field of nuclear power, the Green Paper established that without action, the contribution of nuclear energy would decrease, and that reconsideration should be made of its future contribution in light of issues such as global warming and security of supply.

than with the former centrally planned systems. In gas supply, the EU observed with increasing concern the political grip taken on Gazprom by the Russian government and the company's expansive acquisition strategy in the EU energy market. Moreover, EU internal petroleum resources in the UK and Dutch sectors of the North Sea were reported in decline.

Still, the Commission again failed to get member-state approval of legislative proposals for joint coordination of oil and gas stocks and the idea of a specific EU-level agency for this purpose.⁹ The Council and Parliament reiterated that standards for security of supply and the management of oil and gas stocks were to remain national responsibilities.

On the other hand, the Commission had greater success in getting adopted directives addressing the dual aim of energy security and reduction of greenhouse gas emissions – directives tied to the promotion of energy efficiency, co-generation of heat and power, and renewable energy.¹⁰ It saw some progress also in efforts to press for the removal of barriers to free competition in the internal energy market, with new Electricity and Gas Directives adopted by the Council in 2003 that pushed forward the deadlines for full market opening. Moreover, the member states accepted directives adopted in 2004 and 2005 on security of supply tied to European electricity and gas infrastructure. These instructed the member states to define security-of-supply standards for grids and pipelines, and to hasten further development of the grid for the dual aim of security of supply and removal of barriers to competition.

A new shift in the EU energy policy agenda took place when President Manuel Barroso took office in 2005, promising heightened attention to the Lisbon Strategy and to the competitiveness of European industry competitiveness. High energy prices caused by lack of internal energy market competition were identified as a major obstacle to the latter. An energy market inquiry showed that major energy groups had constrained competitors from access to the grids and had held back investments in new connections, to protect their regional monopoly positions. The Commission also acknowledged that the climate-related directives that had been adopted – notably the renewable electricity directive – added to the problem of non-level playing field competition among energy suppliers, by failing to harmonise national support systems for renewables. The Council of Ministers shared this view and asked the Commission to draft a new energy policy strategy for Europe that could better reconcile the three major aims of EU energy policy: industry competitiveness, security of supply, and environmental restructuring.

Drafting took placed with new topicality added to the problems of climate change and security of supply. Late summer 2005, Hurricane Katrina devastated New Orleans and sent a warning of what could be expected from climate change. When, in early 2006, Gazprom held back gas supplies on the pipeline to Europe through Ukraine, allegedly because of disagreement over transmission payments, this caused loss of supply also to some EU countries, and reinforced perceptions of Russia as a non-reliable gas supplier. This further backed up the deep mistrust in parts of Europe as to Russia's motives in European gas supply, not least among many eastern countries that had experienced Soviet Russian dominance

⁹ *Euractiv*, 13/09/2002, 'Commission wants to improve security of oil and gas supply'

¹⁰These included the 2001 directive for the promotion of renewable electricity (Directive xxx), the 2002 directive on the energy performance of buildings (Directive 2002/91/EC), the 2003 Biofuels Directive, the 2003 directive on trade in emission quotas, the 2004 directive on the promotion of co-generation of heat and power, the 2005 directive on energy standards for various products (Directive 2005/32/EC), and the 2005 directive on energy end-use efficiency and energy services (Directive 2006/32/EC).

during the Cold War.

The January 2007 Strategic Energy Review and its associated package of proposals, endorsed by the 2007 Council Spring Summit, set forth the so-called ‘20-20-20’ goals to be achieved by the year 2020: a 20 % reduction in emissions of climate gases, a 20% share for indigenous renewables of total energy consumption, and a 20% reduction in energy consumption compared to a ‘business as usual’- scenario (Commission of the European Communities, 2007a) In order to reach these goals, the Commission proposed new legislation to dismantle monopoly structures in electricity and gas infrastructure as a priority task (among them ownership unbundling of companies vertically integrated in supply and infrastructure). According to the Commission, greater independence of grid operations would lead to more investments – a prerequisite for mass deployment of renewable energy in the European Union. The Commission also proposed a beef-up of energy R&D funding and the set-up of a strategic energy technology plan to maintain the position of the EU as a global industrial leader in renewable energy. Nuclear power should be phased out only take place only if it could be replaced by low-carbon energy sources, and the phase-in of energy efficient products should be speeded up.

More specific directive proposals drafted included the September 2007 third package for new internal energy market legislation and a package of energy and climate directive proposals adopted in January 2008. The former proposed mandatory ownership unbundling of supply and infrastructure operations, but this did not survive the ensuing negotiations among member-state governments. Germany and France headed a group of governments opposing the proposal, which also included the ministers from Austria, Greece, and Luxembourg as well as those of the new EU members the Czech Republic, the Baltic states, Slovakia and Hungary (Eikeland, 2008). These countries still hosted vertically integrated energy groups and lagged behind in implementing existing internal market legislation (Eikeland, 2008). The UK headed the group of countries supporting the Commission proposal, strongly backed also by the Netherlands, the Scandinavian members and others that had already implemented ownership unbundling (Commission of the European Communities, 2008a).

Disagreement over security-of-supply strategies for Europe demarcated the two groups. Governments sceptical to ownership unbundling argued that dismantling their strong national champions would weaken their negotiating power vis-à-vis major foreign upstream companies, thus reducing national security of supply (Eikeland, 2004; 2008). Those in favour argued – like the Commission – that ownership unbundling would secure the independence of transmission system operators, and bolster trade and investments in new infrastructure, so pivotal to security of supply.

We can gain a deeper understanding of the differences by examining the member-state strategies pursued for securing their supplies from Russia. Russia covers more than 40% of EU gas import needs and more than 30% of EU oil imports; and in the case of several EU countries, imports of energy commodities from Russia cover more than 50% of their energy import needs.¹¹ With Moscow using energy resources also for political purposes, the need to

¹¹ In an accompanying report to the 2008 *second* strategic energy review, the Commission thoroughly evaluated fresh figures indicating EU’s growing import dependencies, stating that indigenous production satisfied less than half of the energy needs. Oil comprised the bulk of total EU energy imports (60% of total imported energy), followed by gas (26%) and solid fuels (13%).¹¹ Only 20 % of total oil consumption originated in EU production. Imports from OPECs constituted a share of 38%, followed by Russia (33%), Norway (16 %) and Kazakhstan (5 %). Two thirds of EU gas consumption came from indigenous resources, while four big suppliers accounted for

diversify and to become less dependent on energy supplies from Russia has become an important theme in European debate on energy security.

The German government has accepted Gazprom's acquisitions of shares in national gas infrastructure in return for German acquisitions in Russia, with an underpinning philosophy that cross-ownership, combined with active bilateral diplomacy, would mean joint commercial interests in ensuring stability of supply. Russia, on its part, has shown a clear preference for bilateral cooperation with individual EU states rather than with the EU as a whole.

The strategy supported by the pro-unbundling camp of member countries, and by the EU Commission, has been to bolster EU member-state consumer power towards external suppliers and speak with one united voice in energy-political talks with Russia. De-integration of institutional links on the supply side would be part of such a strategy, compatible also with the creation of a competitive market internally in the European Union. Thus we see how the bilateral cross-ownership strategy endorsed by the German and French governments has stood in contrast to the security-of-supply strategy chosen by the Commission.

In their recent study of the attitudes of various European actors towards Russia, Mark Leonard and Nicu Popescu (2007) divided the 27 EU member states into several categories, ranging from 'Russian Trojan horses in Europe' (Greece and Cyprus), through 'strategic partners' (Germany, France, Italy and Spain), 'friendly pragmatists' (Austria, Belgium, Bulgaria, Finland, Hungary, Luxembourg, Malta, Portugal, Slovakia, Slovenia) to 'frosty pragmatists' (Czech Republic, Denmark, Estonia, Ireland, Latvia, Netherlands, Sweden, Romania and the UK) and the most outspoken critics of Russia, the 'new Cold Warriors' (Lithuania and Poland). Each of these groups of countries represents a specific attitude towards energy cooperation with Russia. These attitudes also influence these countries' views on how the EU as a whole should design and implement its energy policy towards that important supplier of energy, and what role Russia should be given in the future European future energy plans.¹²

As energy resources, in combination with Russia's sheer size and its nuclear arsenals, have proven an effective foreign policy tools, the link between Russian security policy and European debate on energy security is fairly evident. Some countries have chosen not only to politicise their energy cooperation with Russia but even to treat their dependence on energy supplies from Russia in traditional security terms. This group of countries joined the USA in getting NATO to address the issue of energy security in its final communiqué from the Riga

most of the gas consumed in the EU: Russia (42%), Norway (24%), Algeria (18%) and Nigeria (5%). Sources of coal imports were less concentrated – the largest suppliers were Russia (26% of total consumption), South Africa (25%), followed by Australia (13%), Colombia (12%), Indonesia (10%) and the United States (8%). Import dependencies vary considerably among the member states, however. Denmark was fully independent of imports, and Poland and the United Kingdom had low import dependency ratios (close to 20%). At the other extreme, Ireland, Italy, Portugal and Spain had import dependency ratios exceeding 80%, while small countries like Malta, Cyprus and Luxembourg were fully dependent on energy imports. Additionally, the Commission emphasised the problem of high import dependency on one supplier, mainly Russia. The Commission exemplified this with Estonia, Latvia, Lithuania, Bulgaria, Slovakia, Ireland, Sweden and Finland being completely dependent on one supplier for gas imports, while Greece, Hungary, Austria were more than 80% dependent on the same (monopoly) supplier. Lithuania, Hungary, Slovakia and Poland were nearly fully dependent on one oil supplier (more than 95%) while Estonia, Latvia, Lithuania and Cyprus were also almost completely dependent on a single supplier for coal.

¹²Leonard, Mark and Nicu Popescu (2007): A Power Audit of EU-Russia Relations, Policy Paper. Brussels: European Council on Foreign Relations.

NATO Summit in 2006, and pay greater attention to the issue in the work on the Alliance's new strategic concept.¹³ Especially the new NATO and EU members from Eastern Europe, but also the USA, seem to have adopted a cautious approach towards energy cooperation with Russia and towards making Europe overly dependent on Russian energy supplies. The US scepticism can be traced back to the 1980s, when large-scale energy cooperation between USSR/Russia and Europe began to take shape.¹⁴ Although the USA is not heavily dependent on energy supplies from Europe or Russia, the country still seems to have its own energy-security stakes in Europe, with as Europe's growing dependence on energy coming first from the USSR and then from Russia. This development poses a geopolitical challenge to the US position in Europe and to closer cooperation between Washington and its traditional European allies. Additionally, the US stakes in European energy policy stem from its role as main global importer and consumer of energy and as host to major suppliers of energy technology, in competition with European countries and companies.

The EU member-state governments also had their differences when negotiating the January 2008 energy/climate proposals, but they left intact the binding 20-20-20 goals that had been formulated, indicating the strong momentum that had emerged in the EU for renewable energy technologies as a combined solution to problems of climate change and security of supply. The recently published second strategic energy review, which put energy security at the top of EU energy concerns, commanded priority to the rapid implementation of legislation adopted to reach the 20% share of indigenous renewables (Commission of the European Communities, 2008b) A second priority called for was a new EU Energy Security and Solidarity Action Plan to address the growing precariousness of Europe's energy supply security that would persist even if the goal of renewable energy policy should be achieved. The proposed plan set out five areas where the Commission saw a need for additional commitment on the part of member states:

- infrastructure investments and the diversification of energy supplies¹⁵
- joint action in external energy relations
- harmonised oil and gas stocks and crisis response mechanisms
- energy efficiency
- making the best use of the EU's indigenous energy resources.

Accompanying the second strategic energy review, the European Commission adopted a Green Paper to hasten the development of energy networks, seen as a precondition for the EU to achieve its adopted renewable energy goals and to bolster security of supply. Acknowledging that poor implementation of the priority investment projects selected for support under the TEN-E mechanism,¹⁶ the Green Paper recommended reinforcing the policy

¹³ http://www.nato.int/issues/energy_security/index.html

¹⁴ Stern, Jonathan (2006): *The Urengoy Pipeline in the 1980s and the North European Pipeline in the 2010s: parallels and differences over 30 years* at <http://www.harrimaninstitute.org/MEDIA/00493.pdf>

¹⁵ Commission of the European Communities (2008c). The Green Paper on energy networks identifies six strategic initiatives as essential for the EU's energy security: a Baltic Interconnection Plan, a Mediterranean Energy Ring, adequate North-South gas and electricity interconnections with Central and South-East Europe, a North Sea Offshore Grid, a Southern Gas Corridor and effective liquefied natural gas (LNG) supplies for Europe.

¹⁶ The EU has through the so-called Transnational Energy Networks Strategy (TEN-E) adopted in 1996 sought to persuade and assist the development of critical electricity and gas infrastructure in the European Union, first primarily aimed at promoting trade and development of the internal energy market and later, with a view also on security of supply problems.

on energy network development. For example, it requested extended powers to intervene or mediate in cases where public and private parties are unable to move forward on key projects with a European impact; to review the funding framework under the TEN-E system, and to address opportunities for streamlining the planning and authorisation of such priority network projects. The issue of control over critical energy infrastructure has become a major hot potato in EU energy policy. The Commission failed to get Council approval of its recently adopted internal energy market package of mandatory ownership unbundling. This entails that no legislation still exist that effectively prevent the alleged practices of major national energy groups holding back infrastructure investments so as to maintain market dominance. Instead, the Council merely agreed on softer measures aimed at removing such strategic control, and at bolstering new investments in cross-border infrastructure.

Moreover, all the four other priorities listed for the Energy Security and Solidarity Action Plan deal with recurrent themes in EU policy discussions. To prepare for better coordination of EU foreign policies in the field, the Commission announced greater efforts to identify mechanisms necessary for ensuring transparency between member states and the EU. The Commission emphasised that effective cooperation with Norway would be essential for EU energy security; likewise extension of the Energy Community to Ukraine, the Republic of Moldova and Turkey. A new generation of ‘energy interdependence’ provisions was called for in agreement with important producers outside Europe – notably Russia and the Caspian countries – acknowledging that security of supply for Europe has a flip side: security of demand for supplier countries.¹⁷

Concerning steps to make the best out of Europe’s indigenous energy reserves, the strategic energy review called for larger R&D budgets and better coordination of energy technology R&D among EU member states. The Commission promised a new Communication on Financing Low Carbon Technologies, including carbon capture and storage, for support of large-scale demonstrations at the EU level, also mentioning partnership with Norway as important in this respect.

Most R&D funding in the European Union takes place at the national level – which saw a substantial decline in funding of energy R&D from the late 1980s.¹⁸ The EU level has, however, increased its role as promoter of larger R&D- budgets and coordinator of research and development. A Strategic Energy Technology Plan adopted in 2007 seeks to coordinate technology development in key areas for achieving short- and long-term goals in climate gas emissions.¹⁹

¹⁷ Further assessment was also announced for the increasingly important role of Africa in EU energy security, continued efforts in the EU-OPEC Energy Dialogue, and the build-up of relations with other consumer countries to promote a common view on global energy security.

¹⁸ According to the Commission, if EU governments were investing today at the same rate as in 1980, the total EU public expenditure for the development of energy technologies would be four times the current level of investment of around 2.5 billion euros per year (European Commission, 2007)

¹⁹ The technologies focused on for reaching a 20% reduction in emissions by 2020 were “second generation biofuels, CO₂ capture, transport and storage, off-shore wind turbines, large-scale Photovoltaic (PV) and Concentrated Solar Power, smart European electricity grids, efficient energy conversion and end-use devices and systems, in buildings, transport and industry, such as poly-generation and fuel cells, fission technologies, together with long-term waste management solutions.” The short-term technological challenges identified for achieving the 2050 vision of a 50-80 % cut in emissions were: “to bring the next generation of renewable energy technologies to market competitiveness; achieve a breakthrough in the cost-efficiency of energy storage technologies; develop the technologies and create the conditions to enable industry to commercialise hydrogen fuel cell vehicles; complete the preparations for the demonstration of a new generation (Gen-IV) of fission reactors; complete the construction of the ITER fusion facility; elaborate alternative visions and transition

Other means by which the EU has sought to pool European R&D resources include the Research Framework Programmes and the Competitiveness and Innovation Framework Programme, the European Technology Platforms that has brought together stakeholders to define common research agendas and deployment strategies, the European Research Area (ERA) Net to promote common research programming among member states, and Networks of Excellence aimed at strengthening collaboration among research centres.

The EU Commission strongly promotes EU-level coordination as a means to strengthen the competitive edge of Europe vis-à-vis such main global players as the United States and Japan, but also emerging economies like China, India and Brazil, which have been stepping up their efforts to develop and commercialise new energy technologies with a market size and research capacities far exceeding those of most EU member states. As urged by the Commission:

If we fall behind in the intensifying global race to win low carbon technology markets, we may need to rely on imported technologies to meet our targets, missing out on huge commercial opportunities for EU businesses. (Commission of the European Communities, 2007b: 4).

As to the main vehicle for energy R&D funding through the EU level, the annual budget for energy R&D (EC and Euratom) was increased from €574m to €886m from the 6th to the 7th Framework Programmes for Research, Technological Development and Demonstration Activities (Commission of the European Communities, 2007b:12). While formerly grouped under ‘research into sustainable development’, energy was identified as a separate important theme for the 7th framework programme, and the sub-themes all reflected the dual aim of EU energy policy: to reform the energy system towards indigenous, low-carbon solutions.²⁰

strategies towards the development of the Trans-European energy networks and other systems necessary to support the low carbon economy of the future; achieve breakthroughs in enabling research for energy efficiency: e.g. materials, nanoscience, information and communication technologies, bio-science and computation.”

²⁰ Hydrogen and fuel cells technologies; renewable electricity generation; renewable fuel production; renewables for heating and cooling; CO2 capture and storage technologies for zero emission power generation; clean coal technologies; smart energy networks; energy efficiency and savings; knowledge for energy policy making.

3. Methods for selecting top institutions

Many institutions could be included in this report and it would be impossible to cover all of them in detail. To enable a selection of the most relevant and important institutions, we applied a sequence of steps using both quantitative and qualitative methods, described below. First of all, however, we decided to restrict our search to North America and Europe (including Russia), and to research institutes, think tanks and other research-oriented institutions with a potential impact on international policy discussions. Then we applied the following steps:

1) Preliminary brainstorm list

The contributors to the study brainstormed, searched the internet and consulted relevant literature in order to identify as many potentially relevant institutions as possible for a broad preliminary list. In all 57 institutions were included in this list (see Appendix I for the full list).

2) PageRank of institutional websites

Next, we looked up the web sites of each institution and checked the Google PageRank. This is based on an algorithm that assesses the importance of different web pages on the internet. It ranges from 0 to 10, where 10 is ascribed to the most important web pages on the internet. We ranked all the institutions according to the PageRank of their web pages in the last two weeks of April 2009. Those that emerged with a PageRank of 5 or higher were included in our selection for the next methodological step. In total, 48 institutions were selected this way. We considered including only institutions with a ranking of 6 or higher, but that would have excluded institutions in many non-English-speaking countries, so we decided to include PageRank 5 as well, for the sake of geographical diversity. This judicious use of PageRank (only to exclude the bottom 16% of institutions) also ensured that internet presence alone was not given too much weight. An institution with a web site that is not among the 84% most important institutional web sites in the energy research area is unlikely to have major international policy impact.

3) Reputational expert survey

We subsequently compiled a list of 111 e-mail addresses of individual experts on energy issues and of energy-related institutions. The e-mail addresses were garnered from the broad list of 57 energy research institutions. In order to avoid a Norwegian bias we did not include Norwegian e-mail addresses in this list. The list of 48 energy institutions was e-mailed to all of these addresses and recipients were asked to tick the institutions that, in their opinion, could have an international policy impact at the interface of energy security and climate change issues. We also encouraged the energy experts to suggest any institutions they thought were missing in our list. In all, we got 30 responses to our survey. The responses were from genuine experts on energy issues, including a former minister of energy, a former secretary general of a major international energy-related organisation, several institute directors and some of the biggest names in research on energy policy. On the basis of their responses we ranked the 48 energy research institutions hierarchically from those with the strongest reputation to those with the weakest reputation. By allowing respondents to the expert survey to suggest institutions with a lower PageRank that had not been included in our own list of the 48 institutions with the best PageRanks, we provided another mechanism for ensuring that institutions that are not especially good at communicating via the internet but otherwise have a good

reputation could be included in our final survey. In total, the experts suggested 25 institutions that had not been included among our 48. Most of these got one vote only and were thus not included in our qualitative survey, but one got four votes (the Energy Programme at IFRI) and another got two votes (IEA). Both of these were included.

4) Detailed qualitative analysis

Finally we carried out a detailed qualitative and quantitative analysis of the top 17 institutions from the expert survey and the two institutions suggested independently by more than one expert – a total of 19 institutions. We consider these institutions the most relevant ones to this study and to a future think tank dedicated to energy security and related issues. The detailed analysis included examination of the web sites of institutions, their staff and publications and, as necessary, contacting them by phone with further queries.

5) Detailed quantitative analysis of word content

As part of the detailed examination of the top 19 institutions, all the materiel from the institutions web sites that we compiled were saved as individual pdf files. A pdf search engine was then used to search for all occurrences of the strings below in the folder with the pdf files. The number of hits for the different search strings was used to rank the institutions according to the degree to which they focused on such topics as geopolitics, climate change, etc. The following search strings were used: geopol; climat; emiss; market or trade; leg or law or judici; electric; oil or gas; coal; renewable or bio or hydro or wind or solar; europe; techn or infrastr; global

4. Results of the expert survey

Table 1 ranks the 48 institutions on the list for our expert survey according to how many experts voted for them. The top 17 are marked in bold.

Table 1: Expert survey results

Rank	Institution, location	Number of experts who voted for institution
1	Oxford Institute for Energy Studies, UK	24
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR), USA	21
3	Energy, Environment and Development Programme (EEDP), Chatham House, UK	20
4	Cambridge Energy Research Associates (CERA), USA	18
5	Baker Institute Energy Forum, Rice University, USA	14
	Clingendael International Energy Programme (CIEP), Netherlands	14
6	Imperial College Centre for Energy policy and technology (ICEPT), UK	13
	Energy Research Centre of the Netherlands (ECN), Netherlands	13
7	Wuppertal Institute for Climate, Environment and Energy, Germany	11
8	Centre for Global Energy Studies (CGES), UK	10
	Global Climate and Energy Project (GCEP), Stanford University, USA	10
	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP), UK	10
9	Energy Security Initiative at Brookings, USA	9
10	Electricity Policy Research Group, University of Cambridge (EPRG), UK	8
	Program on Energy and Sustainable Development, Stanford University, USA	8
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP), France	7
	UK Energy Research Centre (UKERC), UK	7
12	Canadian Energy Research Institute (CERI), Canada	6
	Center for Strategic and International Studies (CSIS), USA	6
	Energy Research Centre (ERC), United Kingdom	6
	Penn State Institutes of Energy and the Environment, USA	6
	Risø DTU National Laboratory for Sustainable Energy, Denmark	6
	Laboratoire d'économie de la production et de l'intégration internationale, Energie Ressources Environnement (LEPII), France	6
13	Berlin German Institute for Economic Research (DIW), Germany	5
	Chalmers University of Technology, Sweden	5
	Future of Energy at Harvard, USA	5
	K.U. Leuven Energy Institute, Belgium	5
14	Alternative Energy Institute, USA	4
	Centre for Renewable Energy Sources (CRES), Greece	4
15	Austrian Research Centers GmbH (ARC), Austria	3
	British Institute of Energy Economics (BIEE), UK	3
	Center for Energy Research (IMEMO), Russia	3
	Commissariat à l'Energie Atomique (CEA), France	3
	Institute for Energy Research and Policy, University of Birmingham, UK	3
	School for Renewable Energy Science (RES), Iceland	3
16	Centro de Investigaciones Energeticas, Medioambientales y Tecnológicas (CIEAMAT), Spain	2
	Deutsches Windenergie Institut (DEWI), Germany	2
	Deutsches Zentrum für Luft und Raumfahrt E.V., Germany	2
	Energy Institute, UK	2
	Royal Institute of Technology (KTH), Sweden	2
17	Instituto Nacional de Engenharia, Tecnologia e Inovacao (INETI), Portugal	1
	National Technical University of Athens, Greece	1
	University of Delaware Energy Institute, USA	1
18	Elforsk, Sweden	0
	Ente per le Nuove tecnologie, l'Energia e l'Ambiente (ENEA), Italy	0
	Institutions of Gas Engineers and Managers (IGEM), UK	0
	Michigan Memorial Phoenix Energy Institute (MMPEI), USA	0
	Rutgers Energy Institute (REI), USA	0

Table 2: Additional institutions suggested by the energy experts

Institution	No. of experts who suggested institution
Energy Programme, IFRI, France	4
IEA, France/international	2
Centre for Security Studies, ETH Zurich, Switzerland	1
Department of Energy, Polytechnic University of Turin, Italy	1
Ecole de Mines de Paris, Office of Sophia-Antipolis, France	1
Energy and Resource Group (ERG), University of Berkeley, USA	1
FEEM, Italy	1
FINEC University, Russia	1
Fondazione EN Enrico Mattei (FEEM), Italy	1
Foreign Policy Institutions, Sweden	1
GERAD, Canada	1
IER, University of Stuttgart, Germany	1
IFE, Norway	1
Institute for Energy Strategy, Russia	1
Jefferson Institute, USA	1
Kennedy School, Harvard University, USA	1
National Centre for Competence in Research – Trade Regulation (NCCR-Trade), Switzerland	1
Öko-Institut, Germany	1
Pembina Institute, Canada	1
Pew Center, USA	1
Potsdam Institut für Klima-Forschung, Germany	1
Rocky Mountain Institute, USA	1
Swedish Defence College, Sweden	1
VTT, Finland	1
World Resources Institute, USA	1

Table 2 shows institutions that were not included in our list of 48 institutions, but which were suggested independently by the experts.

In making our final selection of top institutions for the qualitative analysis, we chose institutions that got seven or more votes on the list of 48 institutions distributed for the expert survey. This gave us 17 institutions. In addition, we included institutions proposed by two or more experts themselves (as was the case for IFRI and IEA). These are marked in bold in table 2.

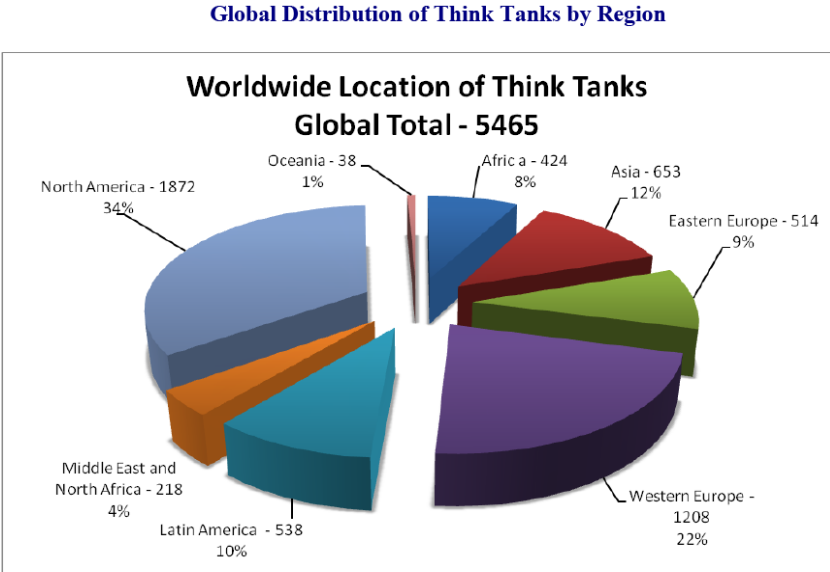
All in all, the combination of procedures yielded 19 top-level research institutions that we believe could be further considered by the Stavanger consortium as partners for a future think tank to study issues pertaining to energy security and climate change in Europe.

Our next task was to map and evaluate these institutions' approaches to and expertise in fields defined as central for the future activity of the virtual research network. In our evaluation we will identify several aspects to be taken into consideration when making final decision on which institutions should be invited to join the network. (A more detailed presentation of the 19 institutions is provided in Appendix III.)

Geographical considerations

Due to several factors, such as the institutes’ networking capacities and skills, their information strategies and access to financing from both state and private actors, and their international reputation, this list is dominated by institutions located in the USA. Such US dominance is not characteristic only of this study – this is a general tendency in the global think-tank landscape (see Figure 1).

Figure 1: Global Distribution of Think Tanks by Region



Created from 4376 Date Established records in the FPRI Global Think Tank Database –August 31st 2008

Table 3 below shows the geographical distribution of our 19 top institutions. US- and UK-based institutions are overrepresented, while there is complete lack of institutions from Eastern Europe, and especially from Russia. In our opinion, consideration should be given to including at least one of the Russian institutions from the preliminary list of 57 institutions. Russia is too important an energy player in both the European and global contexts not to be included. If we were to recommend one of the Russian institutions, the Energy Research Institute of the Russian Academy of Science (ERIRAS) would probably be our first choice.

Further, one should consider limiting the US bias by selecting institutions and research milieus whose expertise and problem understanding is particularly relevant for the planned network. US energy interest in Europe has been driven mainly by geopolitical concerns, with Europe’s growing energy dependence on Russia a recurrent topic. On the other hand, the network is also to examine the role of technology in enhancing the resource base for oil and gas supplies and in providing new opportunities for renewables and energy efficiency, and in this field US-based institutions do play a major part.

Table 3 Geographical distribution

Expert survey rank		Country
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
extra	Energy Programme, IFRI	F
7	Wuppertal Institute for Climate, Environment and Energy	G
extra	IEA	Intl.
5	Clingendael International Energy Programme (CIEP)	NL
6	Energy Research Centre of the Netherlands (ECN)	NL
1	Oxford Institute for Energy Studies	UK
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
8	Centre for Global Energy Studies (CGES)	UK
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
11	UK Energy Research Centre (UKERC)	UK
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
4	Cambridge Energy Research Associates (CERA)	USA
5	Baker Institute Energy Forum, Rice University	USA
8	Global Climate and Energy Project (GCEP), Stanford University	USA
9	Energy Security Initiative at Brookings	USA
10	Program on Energy and Sustainable Development, Stanford University	USA

5. Thematic foci of institutions

In order to map not only the general energy competence but also identify which themes are studied by the institutions we decided to examine the content of their descriptions of their own research posted on their websites. It should be underlined that this analysis is based not on a detailed scrutiny of their publications but on a close examination of the way they present their research on their websites, i.e. what could be described as their own ‘research self-portraits’.

The goal of this examination is to see what those institutions choose to describe as their main areas of expertise in order to identify the research topics they could be interested in if they were to be invited to join the proposed think tank in Norway, and to help put combine institutions with both overlapping and complementary expertise.

This content analysis of the institutions’ own descriptions was undertaken with the help of the programme ‘PDF Search Engine’, which allows for parallel searches in all pdf documents in one folder. Pdf files containing of the 19 institutions’ descriptions were placed in one folder and then contextual searches for the following search strings were carried out: “geopol*”, “climat*”, “emiss*”, “market or trade”, “leg*, law, judici*”, electric*, “oil or gas”, coal, “renewabl* bio* hydro* wind solar”, “Europe* or EU”, “techn* or infrastr*”.

In the next stage a quantitative analysis of the results of searches was undertaken and the results are presented in the tables on the following pages, in which institutions are ranked in descending order according to their scores on the various search strings. Institutions in the shaded part of the table are those with minimum one score, those with no shading have no scores at all. These tables are meant to serve as practical tools for selecting institutions that could be invited to join the think tank.

Geopolitics

Geopolitical factors play a major part in the EU political debate on security of supply, and that has an impact also on the analytical approach taken by the scientific community. Table 4 below ranks the 19 institutions according to their focus and geopolitical approach in their studies (rank in the expert survey is set out in the first column). This geopolitical ranking is based on our content analysis of the self-presentations of these institutions on the internet.

Table 4. Geopolitical focus

Expert survey rank		Country
extra	Energy Programme, IFRI	F
5	Clingendael International Energy Programme (CIEP)	NL
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
4	Cambridge Energy Research Associates (CERA)	USA
9	Energy Security Initiative at Brookings	USA
10	Program on Energy and Sustainable Development, Stanford University	USA
1	Oxford Institute for Energy Studies	UK
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
8	Centre for Global Energy Studies (CGES)	UK
extra	IEA	Intl
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
5	Baker Institute Energy Forum, Rice University	USA
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
6	Energy Research Centre of the Netherlands (ECN)	NL
7	Wuppertal Institute for Climate, Environment and Energy	G
8	Global Climate and Energy Project (GCEP), Stanford University	USA
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
11	UK Energy Research Centre (UKERC)	UK

Climate and energy

The next thematic ranking is presented in Table 5, and relates to the degree to which the institutions focus explicitly on the relationship between energy and climate. Also this ranking is based on our content analysis of self-presentations on the internet. Those with the highest score are shaded.

Table 5. Combined climate/energy security focus

Expert survey rank		Country
7	Wuppertal Institute for Climate, Environment and Energy	G
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
10	Program on Energy and Sustainable Development, Stanford University	USA
extra	IEA	Intl
1	Oxford Institute for Energy Studies	UK
8	Global Climate and Energy Project (GCEP), Stanford University	USA
9	Energy Security Initiative at Brookings	USA
5	Clingendael International Energy Programme (CIEP)	NL
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
extra	Energy Programme, IFRI	F
4	Cambridge Energy Research Associates (CERA)	USA
5	Baker Institute Energy Forum, Rice University	USA
6	Energy Research Centre of the Netherlands (ECN)	NL
8	Centre for Global Energy Studies (CGES)	UK
11	Centre de Géopolitique de l'Énergie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
11	UK Energy Research Centre (UKERC)	UK

Emissions and emissions trade

Within international policies dealing with climate change, emission trading has been set forth as a cost-efficient policy instrument, and the EU has adopted emissions trading as one of the pillars of its climate policy. Table 6 below ranks the 19 institutions in terms of research activity on emissions and emissions trade. Here and in the following tables, those with the highest score are shaded.

Table 6. Climate gas emissions trading focus

Expert survey rank		Country
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
8	Global Climate and Energy Project (GCEP), Stanford University	USA
9	Energy Security Initiative at Brookings	USA
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
extra	Energy Programme, IFRI	F
6	Energy Research Centre of the Netherlands (ECN)	NL
extra	IEA	Intl
1	Oxford Institute for Energy Studies	UK
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
4	Cambridge Energy Research Associates (CERA)	USA
5	Baker Institute Energy Forum, Rice University	USA
5	Clingendael International Energy Programme (CIEP)	NL
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
7	Wuppertal Institute for Climate, Environment and Energy	G
8	Centre for Global Energy Studies (CGES)	UK
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
10	Program on Energy and Sustainable Development, Stanford University	USA
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
11	UK Energy Research Centre (UKERC)	UK

Market and trade

Some of the institutions focus explicitly on energy market and trade issues. Table 7 presents the 19 institutions ranked according to their focus on market-related aspects of energy.

Table 7. Market and trade focus

Expert survey rank		Country
10	Program on Energy and Sustainable Development, Stanford University	USA
8	Centre for Global Energy Studies (CGES)	UK
9	Energy Security Initiative at Brookings	USA
1	Oxford Institute for Energy Studies	UK
4	Cambridge Energy Research Associates (CERA)	USA
5	Clingendael International Energy Programme (CIEP)	NL
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
extra	Energy Programme, IFRI	F
extra	IEA	Intl
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
5	Baker Institute Energy Forum, Rice University	USA
7	Wuppertal Institute for Climate, Environment and Energy	G
6	Energy Research Centre of the Netherlands (ECN)	NL
11	UK Energy Research Centre (UKERC)	UK
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
8	Global Climate and Energy Project (GCEP), Stanford University	USA

Legal aspects

Extraction, production, transport and supply of energy touch upon important issues of international and national law. Table 8 ranks the institutions according to whether they study legal aspects of energy, energy security and energy cooperation.

Table 8. Legal focus

Expert survey rank		Country
10	Program on Energy and Sustainable Development, Stanford University	USA
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
7	Wuppertal Institute for Climate, Environment and Energy	G
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
1	Oxford Institute for Energy Studies	UK
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
4	Cambridge Energy Research Associates (CERA)	USA
5	Baker Institute Energy Forum, Rice University	USA
5	Clingendael International Energy Programme (CIEP)	NL
6	Energy Research Centre of the Netherlands (ECN)	NL
8	Centre for Global Energy Studies (CGES)	UK
8	Global Climate and Energy Project (GCEP), Stanford University	USA
9	Energy Security Initiative at Brookings	USA
11	UK Energy Research Centre (UKERC)	UK
extra	Energy Programme, IFRI	F
extra	IEA	Intl

Sources, carriers and technologies of energy

Research on security of supply may involve a wide range of foci. Here we may mention research on secure supply and transport of oil and gas resources, including technology research for improved recovery of such resources, research on the security and stability of electricity supply systems, on the commercialisation of renewables and new nuclear power technologies, and on making indigenous coal resources better environmentally adapted. Tables 9 to 13 rank the 19 institutions according to whether they include a focus on these options in their research.

Table 9. Electricity focus

Expert survey rank		Country
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
10	Program on Energy and Sustainable Development, Stanford University	USA
1	Oxford Institute for Energy Studies	UK
5	Clingendael International Energy Programme (CIEP)	NL
4	Cambridge Energy Research Associates (CERA)	USA
5	Baker Institute Energy Forum, Rice University	USA
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
extra	IEA	Intl
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
6	Energy Research Centre of the Netherlands (ECN)	NL
7	Wuppertal Institute for Climate, Environment and Energy	G
8	Centre for Global Energy Studies (CGES)	UK
8	Global Climate and Energy Project (GCEP), Stanford University	USA
9	Energy Security Initiative at Brookings	USA
11	Centre de Géopolitique de l'Énergie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
11	UK Energy Research Centre (UKERC)	UK
extra	Energy Programme, IFRI	F

Table 10. Oil and gas focus

Expert survey rank		Country
8	Centre for Global Energy Studies (CGES)	UK
1	Oxford Institute for Energy Studies	UK
10	Program on Energy and Sustainable Development, Stanford University	USA
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
5	Clingendael International Energy Programme (CIEP)	NL
extra	IEA	Intl
extra	Energy Programme, IFRI	F
5	Baker Institute Energy Forum, Rice University	USA
7	Wuppertal Institute for Climate, Environment and Energy	G
4	Cambridge Energy Research Associates (CERA)	USA
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
9	Energy Security Initiative at Brookings	USA
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
11	UK Energy Research Centre (UKERC)	UK
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
6	Energy Research Centre of the Netherlands (ECN)	NL
8	Global Climate and Energy Project (GCEP), Stanford University	USA

Table 11. Coal focus

Expert survey rank		Country
10	Program on Energy and Sustainable Development, Stanford University	USA
6	Energy Research Centre of the Netherlands (ECN)	NL
8	Global Climate and Energy Project (GCEP), Stanford University	USA
1	Oxford Institute for Energy Studies	UK
extra	IEA	Intl
extra	Energy Programme, IFRI	F
4	Cambridge Energy Research Associates (CERA)	USA
9	Energy Security Initiative at Brookings	USA
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
8	Centre for Global Energy Studies (CGES)	UK
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
5	Clingendael International Energy Programme (CIEP)	NL
5	Baker Institute Energy Forum, Rice University	USA
7	Wuppertal Institute for Climate, Environment and Energy	G
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
11	UK Energy Research Centre (UKERC)	UK
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK

Table 12. Renewables focus

Expert survey rank		Country
7	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
8	Global Climate and Energy Project (GCEP), Stanford University	USA
11	UK Energy Research Centre (UKERC)	UK
extra	Energy Programme, IFRI	F
5	Baker Institute Energy Forum, Rice University	USA
1	Oxford Institute for Energy Studies	UK
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
6	Energy Research Centre of the Netherlands (ECN)	NL
extra	IEA	Intl
4	Cambridge Energy Research Associates (CERA)	USA
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
10	Program on Energy and Sustainable Development, Stanford University	USA
9	Energy Security Initiative at Brookings	USA
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
8	Centre for Global Energy Studies (CGES)	UK
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
5	Clingendael International Energy Programme (CIEP)	NL
7	Wuppertal Institute for Climate, Environment and Energy	G
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F

Table 13. Technology and infrastructure focus

Position in ranking		Country
11	UK Energy Research Centre (UKERC)	UK
8	Global Climate and Energy Project (GCEP), Stanford University	USA
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
5	Baker Institute Energy Forum, Rice University	USA
9	Energy Security Initiative at Brookings	USA
7	Wuppertal Institute for Climate, Environment and Energy	G
6	Energy Research Centre of the Netherlands (ECN)	NL
extra	IEA	Intl
4	Cambridge Energy Research Associates (CERA)	USA
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
extra	Energy Programme, IFRI	F
1	Oxford Institute for Energy Studies	UK
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
10	Program on Energy and Sustainable Development, Stanford University	USA
8	Centre for Global Energy Studies (CGES)	UK
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
5	Clingendael International Energy Programme (CIEP)	NL
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F

EU relevance

While all the listed research institutions may produce research relevant for shaping European energy policy, not all of them focus explicitly on Europe, particularly not the US-based institutions. Table 14 shows to what extent the research and projects realised at the specific institutions have focused on European and EU policies. The low ranking of the IEA does not mean a lack of studies on EU energy policy, but rather poor presentation of these among the topics listed as most relevant on the organisations website.

Table 14. EU/European policy focus

Expert survey rank		Country
extra	Energy Programme, IFRI	F
5	Clingendael International Energy Programme (CIEP)	NL
1	Oxford Institute for Energy Studies	UK
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK
11	Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F
13	Energy Security Initiative at Brookings	USA
6	Energy Research Centre of the Netherlands (ECN)	NL
4	Cambridge Energy Research Associates (CERA)	USA
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK
11	UK Energy Research Centre (UKERC)	UK
8	Global Climate and Energy Project (GCEP), Stanford University	USA
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK
5	Baker Institute Energy Forum, Rice University	USA
7	Wuppertal Institute for Climate, Environment and Energy	G
extra	IEA	Intl
10	Program on Energy and Sustainable Development, Stanford University	USA
8	Centre for Global Energy Studies (CGES)	UK

Focus on Norway

Finally, we wished to assess the extent to which the 19 institutions focus on the interests of Norway as a major supplier of energy in Europe. In order to see whether these institutions have taken interest in Norway and how this may influence their willingness to embark on a project involving Norwegian actors, we have examined their websites for mentions of Norway. Table 15 shows the number of occurrences of string ‘Norway OR Norwegian’ on the websites as measured by Google when using the following search: Norway OR Norwegian site:[institutions web address].

Table 15. Focus on Norway

Expert survey rank		Country	Norway mentions
extra	IEA	Intl	2410
4	Cambridge Energy Research Associates (CERA)	USA	753
9	Energy Security Initiative at Brookings	USA	723
6	Energy Research Centre of the Netherlands (ECN)	NL	458
8	Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee (CEPMLP)	UK	216
3	Energy, Environment and Development Programme (EEDP), Chatham House	UK	209
1	Oxford Institute for Energy Studies	UK	178
7	Wuppertal Institute for Climate, Environment and Energy	G	145
extra	Energy Programme, IFRI	F	142
10	Program on Energy and Sustainable Development, Stanford University	USA	107
11	UK Energy Research Centre (UKERC)	UK	88
11	Centre de Géopolitique de l’Energie et des Matières Premières, Université Paris Dauphine (CGEMP)	F	83
10	Electricity Policy Research Group, University of Cambridge (EPRG)	UK	77
5	Baker Institute Energy Forum, Rice University	USA	59
5	Clingendael International Energy Programme (CIEP)	NL	50
2	MIT Center for Energy and Environmental Policy Research (MITCEEPR)	USA	38
8	Global Climate and Energy Project (GCEP), Stanford University	USA	28
8	Centre for Global Energy Studies (CGES)	UK	23
6	Imperial College Centre for Energy Policy and Technology (ICEPT)	UK	3

6. Conclusions

Our conclusions are divided into two parts. In the first part we will focus on the methodological aspects of the study and briefly discuss some of its specific features, while the second part will be devoted to practical challenges related to the planned think tank and possible ways of addressing them.

As mentioned earlier, the main goal of this project was to map energy related expertise and to present a list of potential cooperation partners in setting up a new international virtual think tank working on issues related to energy security in Europe, broadly understood. We were to identify the main topics of energy-related research being covered at the top institutions, identify their methodological approaches and assess the possible role of those institutions in the planned think tank.

Energy markets are still dominated by trade in oil and gas and are of global (oil) and regional (gas) character. Although there are still some strong geopolitical elements present in the current debate on energy security, the debate, especially in the West, is shifting towards a more comprehensive approach. More emphasis is being put on the imminent climate-related challenges our use of energy may pose and on possible technological solutions that could help remedy the whole set of energy-related problems the world seems to face today. In this study we therefore take into account not only those research milieus that may have direct impact on how Europe is to address its energy security challenges, but also those which may contribute to modifying the European energy security dilemma in an indirect manner. This is one of the reasons why many US-based institutions are found on both the preliminary and the short list. With its energy consumption, its role in international energy trade, its R&D potential and the new US focus on all aspects of energy shown by the Obama administration one can expect that the American research community is going to have a significant influence on energy policy in years to come. This will also have direct consequences for energy policy in the EU, which is to be the main geographical focus for the planned think tank.

One striking result of our research is the predominance of British and US institutions. Out of the 19 top institutions, seven are British and six are US. We have considered whether this result could be due to bias in our approach. In brainstorming to create the preliminary list of 57 institutions we actively sought to include institutions from non-Anglo-Saxon countries. Between us, the authors of this report speak French, German, Russian and Spanish and should therefore have little trouble working our way around the research and policy milieus of countries using those languages. We were cautious in our use of PageRank in order not to discriminate against institutes which are weak on the internet but strong elsewhere, and we also allowed respondents in the expert survey to make independent suggestions afterwards.

Conversely, French institutions tended to score low on the PageRank procedure, but were judged as relatively important by the experts consulted, causing us to conclude that these institutions do not use the internet effectively to communicate with an international audience, and thereby have less impact than they could otherwise have had. Had they used the internet effectively to communicate, they would most likely have scored better not only in the expert survey, but also in the PageRank.

If there is one country that is particularly poorly represented in our report it is Germany. Only one German institution is among our 19 top institutions, and correspondingly

few of our respondents in the expert survey were Germany-based. This seems like an anomaly not least due to Germany's size, its importance for EU energy security, its centrality to EU-Russian relations and its forward-leaning approach to climate change and renewable energy. We are not sure why German institutions did not stick out more. One possibility is that German institutions excel in basic research, perhaps especially in the natural and technological sciences, and pay less attention to policy studies. Another possible explanation is that the German institutions may have adopted a more interdisciplinary approach and carry out their energy-related studies within broader projects. Two good examples to be mentioned here are the two Berlin-based institutions, Stiftung Wissenschaft und Politik / German Institute for Security and International Affairs (SWP) and Deutsche Gesellschaft für Auswärtige Politik/ the German Council on Foreign Relations (DGAP), which both have carried out important research on energy issues within their broader programs on global issues – within the Global Issues research division at SWP, and the Global Challenges Program Group at DGAP. However, further research would be needed to confirm either of these points.

Our conclusion is that the overweight of Anglo-Saxon institutions is not mainly due to bias, but rather due to their visibility – research- and information-wise – in the international energy research community. Although there were relatively many Anglo-Saxons among the respondents in our expert survey, there were also quite a few French and other non-Anglo-Saxons among those surveyed and most of them also 'voted' for those Anglo-Saxon institutions. We believe that the representation of different countries among our respondents is not mainly due to bias, but to the fact that there are many prominent Anglo-Saxon institutions in this area – i.e. it is not the cause, but rather the consequence of the situation in energy research and policy making. In that sense the final list of the institutions to be considered as potential partners reflects their relative weight in the international energy research landscape.

When considering which of these institutions may be prompted to enter closer cooperation with Norwegian actors and decide to join the virtual think tank we have to consider what their motivations could be for taking such a step. Two factors seem particularly important. The first is Norway's presence in the energy markets of the respective countries. In 2007 the United Kingdom, the Netherlands, France, Germany Canada, the USA and Sweden were the main importers of oil from Norway while Germany, the UK, France, the Netherlands, Belgium and Italy occupied top positions on the list of Norwegian gas importers. One can assume that institutions from those countries may be more inclined to embark on closer cooperation with Norwegian actors in addressing issues of common energy interests.

The second factor that may prompt these institutions to be interested in cooperation with Norway may have to do with their research interest in Norway as an energy actor. In order to check to what extent these institutions have an interest in Norway we have gone through their websites and checked how often Norway is mentioned there assuming that the higher number of hits meant greater interest in Norway. This research interest in Norway may result from Norway's specific position on the international energy map. Norway is one of the relatively few major energy producers and exporters with good democracy and social policy record. Norway is the sole Western European energy producer still able to increase its production of energy and is an energy supplier seen as relatively safe in political and geopolitical terms. In addition Norway has embarked on a number of ambitious energy related projects that may help Europe address some of its energy dilemmas, has some expertise on the use of renewables and is an active international actor in the ongoing debate on climate change and ways of addressing this increasingly precarious situation. Cooperation with Norwegian actors may therefore be seen as beneficial by a number of institutions.

Appendix I. Preliminary list of 57 energy research institutions from brainstorm

Institution	Web page	Google Page Rank	Country	Energy relevant expertise
Deutsches Zentrum Fur Luft Und Raumfahrt E.V.	http://www.dlr.de/desktopdefault.aspx/tabid-13/	7	Germany	Developing highly efficient power using renewable and primary fossil energy sources is a fundamental component of DLR's resource-efficient and sustainable energy vision.
Energy Research Centre (ERC)	http://www.ukerc.ac.uk	7	UK	The UK Energy Research Centre is the focal point for UK research on sustainable energy. It takes an independent, whole-systems approach to energy engineering, economics and the physical, environmental and social sciences.
Energy Research Centre of the Netherlands (ECN)	http://www.ecn.nl/	7	Netherl.	The Energy research Centre of the Netherlands is the largest research centre in the Netherlands in the field of energy. The main topics of research are solar energy, wind energy, biomass, coal and environment, energy in the built areas, intelligent grids, energy efficiency in industry, hydro and fossil fuels, policy studies and engineering and services.
Risø DTU National Laboratory for Sustainable Energy	http://www.risoe.dk	7	Denmark	Risø is the National Laboratory for Sustainable Energy at the Technical University of Denmark – DTU. Its main focus is on energy systems, energy consumption and health-related technology.
The UK Energy Research Centre (UKERC)	http://www.ukerc.ac.uk/Home.aspx	7	UK	The UK Energy Research Centre is the focal point for UK research on sustainable energy focusing on demand reduction, future sources, energy infrastructure and supply, energy systems and modelling, environmental sustainability, materials for advanced energy systems and research activity.
Alternative Energy Institute	http://www.windenergy.org/	6	USA	The Alternative Energy Institute (AEI) was formed in 1977 at WTAMU, as an outgrowth of wind energy research that begun in 1970. The institute's emphasis is wind energy, but there is also some focus on solar energy.
Cambridge Energy Research Associates CERA	http://www.cera.com/asp/cda/public1/home/home.aspx	6	USA	Cambridge Energy Research Associates, Inc. is a leading advisor to international energy companies, governments, financial institutions, and other stakeholders. CERA delivers critical knowledge and independent analysis on energy markets, geopolitics, industry trends, and strategy. CERA helps decision makers anticipate the energy future and formulate timely, successful plans in the face of rapid changes and uncertainty.
Center for Energy Research (IMEMO)	http://www.imemo.ru/en/structure/dep/cai.php	6	Russia	The main focus is on energy security of Russia in the context of globalization and its geopolitical and economic advantages in the world. The center covers theoretical and methodological aspects; various aspects of the impact of energy on the world development, and on the development of Russia. The center also tracks trends in the development of the world energy market and Russian energy market; energy projects: development of energy resources, construction of oil and gas pipelines, formation of transcontinental Eurasian energy systems.
Center for Strategic and International Studies (CSIS)	http://www.csis.org/research/focus/energy/	6	USA	With the financial might and global reach of the energy industry, and increasing demand from developing nations for traditional sources of energy, energy has become a strategic commodity inextricably linked with national security and geopolitics. CSIS's Energy and National Security Program focuses on energy issues, the impact of cutting-edge technology on the industry, issues of dependence on and the security of supplies, the increasing demand for energy in the developing world, the global energy balance, modelling and analysis, global risk, and the Middle East, and future trends in energy policy.
Centre for Renewable Energy Sources (CRES)	http://www.cres.gr/kape/energy_eia_politis/energeia_politis_eng.htm	6	Greece	The Centre for Renewable Energy Sources (CRES) is the Greek organisation for Renewable Energy Sources (RES), Rational Use of Energy (RUE), and Energy Saving (ES). CRES has been appointed as the national co-ordination centre in its areas of activity.
Chalmers University of Technology	http://www.chalmers.se/ee/SV	6	Sweden	Chalmers is a university of technology in which research and teaching are conducted on a broad front within technology, natural science and engineering.
Chatham House, The Energy, Environment and Development Programme (EEDP)	http://www.chathamhouse.org.uk/research/eedp/	6	UK	The Energy, Environment and Development Programme (EEDP) seeks to advance the international debate on energy, environment and development policy and to influence and enable decision-makers - governments, NGOs and business - to take well-informed decisions that contribute to sustainable development.
Commissariat à l'Energie Atomique (CEA)	http://www.cea.fr/english_portals/energy/new_energy_technologies	6	France	CEA is a French government-funded technological research organisation and a prominent player in the European Research Area involved in collaborative projects with many partners around the world with main focus on nuclear energy.

Deutsches Windenergie Institut (DEWI)	http://www.dewi.de/dewi/index.php	6	Germany	As one of the leading international consultants in the field of wind energy, DEWI offers all kinds of wind energy related measurement services, analysis and studies, further education, technological, economical and political consultancy for industry, wind farm developers, banks, governments and public administrations.
Electricity Policy Research Group, University of Cambridge (EPRG)	http://www.eprg.group.cam.ac.uk/category/home/	6	UK	Research done at EPRG focuses on the following areas: Regulation and Markets, Technology and Innovation, Governance and Politics, and Energy Policy.
Elforsk	http://www.elforsk.se/	6	Sweden	Elforsk AB started operations in 1993 and is owned jointly by Svensk Energi (Swedenergy) and Svenska Kraftnät (the Swedish National Grid). Its aim is to coordinate the industry's joint research and development. Operations are organized in five programme areas – Hydropower, Electricity Production, Transmission and Distribution, Electricity End-Use, and Strategies and Systems.
Energy Institute	http://www.energyinst.org.uk/	6	UK	With a combined membership of over 13,500 individuals and 300 companies across 100 countries, the Energy Institute (EI) is the leading professional membership body for those working in energy. Providing an independent focal point and a powerful voice to engage business, government, academia and the public, the EI promotes the safe, environmentally responsible and efficient supply and use of energy in all applications.
Energy Security Initiative at Brookings	http://www.brookings.edu/topics/energy-security.aspx	6	USA	Energy Security Initiative at Brookings focuses on economic, environmental and national security aspects of energy. Brookings is uniquely positioned to tackle energy in a comprehensive and integrated manner, guiding effective, pragmatic policies to address U.S. and global energy security in the next decade. Brookings scholars examine three key substantive aspects of energy security: From a strategic perspective the focus is on the role of energy in a range of countries and regions around the world, including the Middle East, China, India, Russia, Europe and Latin America; from an economic perspective the focus is on supply disruptions and price spikes and their effects on the U.S. and the world energy markets; and from a social perspective the focus is on energy wealth and the questions arising from that, for financial markets and national policies; the impact of open and sustainable economic development both in energy-consuming and energy-producing nations; how trade might be affected and how the WTO/others will address it. Looking at the environment, we focus on climate change and greenhouse gas emissions, including an examination of non-fossil supply sources and their management; regulatory, tax and other policy tools that can influence market incentives to pursue various technologies; the political and economic implications of alternative technologies for various industries and constituencies; and the international arrangements needed to cut global energy emissions.
Ente per le Nuove tecnologie, l'Energia e l'Ambiente (ENEA)	http://www.enea.it/com/ingl/News/ingl/activities/clean_energy.html	6	Italy	ENEA, the Italian National Agency for New Technologies, Energy and the Environment is a public undertaking operating in the fields of energy, environment and new technologies to support competitiveness and sustainable development.
Imperial College Centre for Energy policy and technology (ICEPT)	http://www3.imperial.ac.uk/icept	6	UK	ICEPT provides an academic hub for the interdisciplinary study of energy and the environment, specialising in the interface between technology and policy. ICEPT addresses key policy challenges, including climate change, energy security and energy for development. Main areas of research include: BioEnergy, Decentralised Energy, Energy in Developing Countries, Hydrogen and Fuel Cell Energy, Transitions, Innovation and Policy.
MIT Center for Energy and Environmental Policy Research (MITCEEPR)	http://web.mit.edu/ceepr/www/index.html	6	USA	CEEPR promotes rigorous and objective empirical research at MIT on issues related to energy and environmental policy to support decision-making by government and industry. The results of the research are disseminated through publications, workshops, educational programs and other public activities.
Oxford Institute for Energy Studies	http://www.oxfordenergy.org/	6	UK	The Oxford Institute For Energy Studies at the University of Oxford, is a centre for advanced research into the social science areas of energy. Its aim is to promote dialogue between consumers and producers, government and industry, and academics and decisions makers in order to achieve an informed understanding of the factors that influence international energy markets.
Penn State Institutes of Energy and the Environment	http://www.energy.psu.edu/	6	USA	The Institute focuses on the complex energy issues that confront the U.S. such as carbon materials, clean fuels and catalysis, electrochemical energy storage, petroleum and natural gas, stationary power, sustainable energy and transportation.
Program On Energy and Sustainable Development, Stanford University	http://pesd.stanford.edu	6	USA	PESD focuses on six platforms of research: Climate Change Policy; Energy and Development; Geopolitics of Gas; Global Coal Markets; Energy Efficiency; and Energy Companies; Political Economy of Electricity Markets.
The Canadian Energy Research Institute (CERI)	http://www.ceri.ca/	6	Canada	The Canadian Energy Research Institute (CERI) is an independent, non-profit research institute committed to excellence in the analysis of energy economics and related environmental policy issues in the producing, transportation, and consuming sectors. CERI was founded in 1975.
The Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee CEPMLP	http://www.dundee.ac.uk/cepmlp/	6	UK	The Centre for Energy, Petroleum and Mineral Law and Policy at the University of Dundee is the internationally renowned graduate school for research into international business transactions and natural resources and energy law and policy.

The Centre for Global Energy Studies (CGES)	http://www.cges.co.uk/	6	UK	Founded by Sheikh Yamani in 1990, the Centre for Global Energy Studies is a leading energy forecasting organisation specialising in the oil market and the economics and politics of energy.
The Clingendael International Energy Programme (CIEP)	http://www.clingendael.nl/ciep/about/	6	Netherlands	The Clingendael International Energy Programme (CIEP) is affiliated to the Netherlands Institute for International Relations Clingendael. CIEP is an independent forum for governments, non-governmental organizations, the private sector, the media, politicians and others who are interested in and developments in the energy sector. CIEP Research is organised around three thematic areas; Energy markets in the European Union; Energy supply and geopolitics; Towards a low-carbon energy sector
The Future of Energy at Harvard	http://energy.harvard.edu/	6	USA	The Future of Energy initiative is creating a university-wide framework for connecting scholars who work on energy related issues. The initiative is spearheaded by the Harvard University Center for the Environment, in partnership with Energy Policy Research Programs at the Harvard School of Public Health. The aim is to build a research community to solve the energy-climate challenge.
The Global Climate and Energy Project (GCEP), Stanford University	http://gcep.stanford.edu/about/index.html#main	6	USA	GCEP seeks new solutions to one of the grand challenges of this century: supplying energy to meet the changing needs of a growing world in a way that protects the environment. GCEP mission is to conduct fundamental research on technologies that will permit the development of energy systems with significantly lower greenhouse gas emissions.
The K.U. Leuven Energy Institute	http://www.kuleuven.be/ei/	6	Belgium	The K.U.Leuven Energy Institute was created in 1997. Emerging from existing expertise in energy matters at the K.U.Leuven, the Institute is conducting research on global and multidisciplinary energy issues and problems. Their expertise spans four core areas of energy research: technology; economics; legal aspects and, security and the environment. These areas are covered by the four core divisions within the Institute.
The School for Renewable Energy Science (RES)	http://www.res.is/	6	Iceland	RES's main academic objective and goal is to offer excellent education programs in renewable energy science and technologies, and to strengthen cooperation between leading Icelandic and European academic and research institutions in the utilization of renewable energies.
Austrian Research Centers Gmbh (ARC)	http://www.arsenal.ac.at/products/products_en_en.html	5	Austria	R&D activities at Arsenal Research are concentrated into four research areas in order to create an even more efficient structure. In the area of Transport Infrastructure and Advanced Vehicle & Propulsion Systems the main focus is on on transport telematics and intelligent propulsion systems (smart drives) that are to ensure safe, efficient and environmentally-friendly mobility. The research fields of Energy Generation & Distribution in Buildings are creating the basis for a stable and sustainable power supply using renewable energy sources and intelligent networks (smart grids) as well as for a new generation of intelligent and energy-efficient buildings.
Berlin German Institute for Economic Research (DIW)	http://www.diw.de/deutsch/das_institut/abteilungen/energie_und_verkehr_umwelt/26671.html	5	Germany	Department of Energy, Transportation, Environment, Sustainability Policies and Measures develops concrete proposals for the shaping of energy strategies which are economically sound, feasible and politically realizable. Special emphasis is placed on the assessment of policies and measures according to economic and environmental criteria. Empirical Market Analyses focuses on energy and transportation markets and their impacts on the environment are analysed regarding domestic, regional and national developments. General Economic Impact Analyses Department focuses on the general economic impacts of global long-term scenarios investigated with integrated assessment (IA) models and computable general equilibrium (CGE) models. These models are specifically used to assess the effects of German and European climate, energy and transportation policy.
British Institute Of Energy Economics (BIEE)	http://www.biee.org/	5	UK	BIEE's aim is to encourage the study of energy economics and energy policy by bringing together individuals with a wide range of energy expertise, encouraging the exchange of ideas and information.
Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine CGEMP	http://www.dauphine.fr/cgemp/	5	France	The Centre of Geopolitics of the Energy and Raw materials (CGEMP) is a research centre of the University Paris Dauphine. Its main goals are the organisation of conferences, workshops and debates on subjects related to energy and environment, and the training of PhD students on topics such as energy, raw materials and industrial economics. Main areas of expertise are: strategic and institutional dimensions of energy; the energy value chains; geopolitical analysis of the world energy scene.
Centro de Investigaciones Energeticas, Medioambientales y Tecnológicas (CIEMAT)	http://www.ciemat.es/portal.do?IDM=201&NM=2	5	Spain	The CIEMAT is a Public Research Agency for excellence in energy and environment, as well as in many vanguard technologies and in various fundamental research. There are four main areas of energy related research being conducted at CIEMAT: Energy System Analysis, Nuclear Energy, Renewable Energy, Combustion and Gasification.
Institution of Gas Engineers and Managers (IGEM)	http://www.igem.org.uk/	5	UK	IGEM's purpose is to be the independent influential body that efficiently and effectively represents and develops its membership and by which interested parties adds value to the international gas industry.
Instituto Nacional de Engenharia, Tecnologia e Inovação (INETI)	http://www.ineti.pt/dominios/do	5	Portugal	INETI is the largest public sector R&D institution in Portugal, focused on providing services to the private sector. INETI, as a Ministry of Science, Technology and Higher Education, is a key player in the Portuguese R&D system.

Inovacao (INETI)	minio_frameset.aspx?dom=108			Innovation entity, further serves as consultant for public policies in a diverse range of fields including: energy, the environment, sustainable norms and certification.
Laboratoire d'économie de la production et de l'intégration internationale, Energie Ressources Environnement LEPII	http://webu2.upmf-grenoble.fr/LEPII/spip/spip.php?rubrique40	5	France	LEPII is a research centre funded by the CNRS with main focus on sustainable development, environmental issues, economy of energy, renewable resources, climate policy, governance, social development and political economy.
Michigan Memorial Phoenix Energy Institute (MMPEI)	http://www.energy.umich.edu/	5	USA	MMPEI's mission is to chart the path to a secure, affordable and sustainable energy future by applying their strengths in public policy, business and social sciences to lay the foundation for successful implementation of their scientific and technological achievements.
National Technical University Of Athens	http://www.ntua.gr/renes/renes_grk/Default.htm	5	Greece	National Technical University of Athens (NTUA) is one of the oldest and most prestigious academic institutions of Greece. NTUA has been a long time in education and research activities related to renewable energy sources. Over the years, different groups were formed at different departments working on the full spectrum of renewable sources
Royal Institute of Technology (KTH)	http://www.energy.kth.se/kthec/	5	Sweden	KTH accounts for one-third of Sweden's technical research and engineering education capacity at university level. Education and research covers a wide spectrum – from natural sciences to all the branches of engineering as well as architecture, industrial engineering and management, urban planning, work science and environmental engineering.
Rutgers Energy Institute REI	http://rei.rutgers.edu	5	USA	The Rutgers Energy Institute (REI) integrates Rutgers' expertise in science, engineering, economics, and policy, putting it at the forefront of energy research. Over the long term, innovative research and technological advances can help the United States to reduce its dependence on fossil fuels. Research focuses on energy technologies, biofuels, solar and wind energy, efficient energy use, and energy policy.
The Baker Institute Energy Forum, Rice University	http://www.bakerinstitute.org/programs/energy-forum	5	USA	The Baker Institute Energy Forum is a multifaceted center that promotes original, forward-looking discussion and research on the energy challenges facing our society in the 21st century.
The Institute for Energy Research and Policy, University of Birmingham	http://www.ierp.bham.ac.uk/	5	UK	The Institute for Energy Research and Policy was founded in 2005, recognising the wide range of high-quality research in energy at the University of Birmingham, ongoing for more than fifty years, and the increasing importance of energy for our lives and our environment.
University of Delaware Energy Institute	http://www.energy.udel.edu/	5	USA	The University of Delaware Energy Institute addresses energy challenges through its extensive resources in scientific, engineering, business and policy aspects of energy issues. For nearly four decades, researchers at the University of Delaware have been leaders in energy technology research, including photovoltaics, catalysts for fuels production, lightweight composites for fuel-efficient vehicles, energy efficiency and conservation, environmental policy, fuel cell science and technology, wind power and energy storage.
Energy Research Institute of the Russian Academy of Sciences (ERIRAS)	http://www.eriras.ru/	4	Russia	The Energy Research Institute of the Russian Academy of Sciences (ERIRAS) was established in 1985 to facilitate the fundamental studies, development and implementation of the national energy policy. The ERIRAS is studying the energy industries of Russia and its regions. The Institute has developed and is currently updating the modeling simulation systems based on numerical data thoroughly accumulated over the years. ERIRAS employs 80 people including 50 highly qualified scientists capable of resolving scientific or business research task of almost any complexity.
Forschungszentrum Jülich (FZ Jülich)	http://www.fz-juelich.de/portal/about_us/institutes_facilities/institutes/ief	4	Germany	Forschungszentrum Jülich pursues interdisciplinary research on solving the grand challenges facing society in the fields of health, energy, environment, and also information technologies. With a staff of about 4400, Jülich – a member of the Helmholtz Association – is one of the largest research centres in Europe.
L'Institut français des relations internationales (IFRI)	http://www.ifri.org/frontDispatcher/ifri/recherche/energie_1165405949121?language=us	4	France	The main goal of the European Governance and the Geopolitics of Energy program at IFRI is to integrate European governance and energy research. The program highlights emerging key issues and delivers insight and analysis in order to educate policy makers and influence public policy. The program's objective is to promote a coherent and sustainable European energy policy.
Projektinriktad forskning och Utveckling i Göteborg AB (Profu)	http://www.profu.se/	4	Sweden	Profu is an independent research and consultant company in the areas of energy, environment and waste management. The company was established as an offspring of the research conducted at the Energy Systems Technology Division, Chalmers University of Technology.
TCU Energy Institute	http://www.energyinstitute.tcu.edu/	4	USA	TCU's Energy Institute is a central location for classes, workshops, seminars and research related to the technology and management of energy. Supported by local energy companies, the Institute provides a unique opportunity for individuals to receive energy-related education in geology, GIS, engineering, environmental science and professional land management.
Technical Research Centre of Finland (VTT)	http://www.vtt.fi/services/clus	4	Finland	VTT Technical Research Centre of Finland the biggest multitechnological applied research organisation in Northern Europe.

MGIMO, International Institute of Energy Policy and Diplomacy IIEDP-MIEP	ter7/index.jsp?lang=en http://www.mgimo.ru/study/faculty/miep/index.phtml?text=full	2	Russia	IIEDP) educates specialists in energy policy and diplomacy and international energy cooperation within the corresponding departments of The institute has four bachelor programs: Economics, Management, Law and Public relations and advertising. IIEDP was set up as p University in February 2000 in cooperation with the International Oil and Gas Sector Academy. The institute was the first in Russia to organ study programs in energy policy and geopolitics. The Strategic Research and Geopolitics Energy Centre delivers research and analytic ex cooperates closely with a number of leading European research institutions and five international institutes were set up to facilitate this co Russian-Italian Institute of World Energy (in cooperation with Luigi Bocconi University in Milan), the Russian-German Institute of Ener Economy (in cooperation with the University of Leipzig) , the Russian-French Institute of Energy Diplomacy (in cooperation with Fre Institute), the Russian-Norwegian Institute of Energy Cooperation (in cooperation with Bodø University and High Business School) and Icelandic Institute of Renewable Energy Sources (in cooperation with High School of Renewable Energy Sources of the University of Iceland University of Akureyri).
Asatrem Srl - Applied Systems Analyses, Technology And Research, Energy Models	http://www.asatrem.com/	NA	Italy	ASATREM srl is an Italian consulting company active in the field of Applied Systems Analyses, Technology and Research, Energy Models and uses quantitative methods for evaluating the economic and environmental impact of long term choices in energy supply and demand s
Institute for Energy Economics and Policy – IEPE Grenoble	http://webu2.upmf-grenoble.fr/LEPII/spip/spip.php?rubrique40	NA	France	LEPII-EPE is a mixed research unit with the CNRS and the Université Pierre Mendès France at Grenoble, affiliated to the Economics and UFR (DGES) and employing 14 full-time researchers and about ten associate researchers and doctorate students. Since its creation, it connection with major changes in economic analysis of industries and the power market, public policies and decision-making tools.
The Energy Institute at the University of Pittsburgh at Bradford	http://www.upb.pitt.edu/energyinstitute.aspx	NA	USA	The Energy Institute at the University of Pittsburgh at Bradford will become a primary source in the region for new knowledge that stimulates thinking and the development of sources of renewable energy in order to enhance undergraduate student learning, advance commercial accelerate the regional economy.

Appendix II. Expert survey details

Energy experts and institutions e-mailed as part of the expert survey, by country

Country	Number of addresses
Austria	5
Belgium	2
Canada	2
Denmark	3
EU	1
Finland	3
France	17
Germany	9
Greece	3
Iceland	2
International	1
Italy	4
Netherlands	2
Poland	1
Portugal	1
Russia	3
Spain	1
Sweden	8
Switzerland	1
UK	17
USA	24
Switzerland	1
SUM	111

Experts who responded, by country

Country	Number of experts
USA	8
UK	4
France	6
EU	1
Belgium	1
Netherlands	1
Norway	1
Germany	2
Sweden	1
Italy	1
Canada	1
Russia	1
Finland	1
Switzerland	1
SUM	30

E-mail text used for expert survey

Dear Dr. XXX

We are carrying out an expert survey of research institutions that analyze security of energy supply in Europe and the intersection between energy security and climate policy. We would be very grateful if you could take the time to look briefly at the list of research institutions below. Please put an X by institutions that you think are best positioned to do research bridging the gap between energy security and or climate policy, and that you think have an impact on international policy. It is up to you how many institutions you mark. If you think any important institutions are missing from the list, feel free to add them. Your response will be fully anonymized and will not in any way be traceable to you.

We would be very grateful if you could return the marked list to energy@nupi.no by Wednesday (14 May).

Yours sincerely,

Dr Per-Ove Eikeland, Dr Jakub Godzimirski, Dr Indra Overland and Dr Svein Rottem
The Fridtjof Nansen Institute and the Norwegian Institute of International Affairs

Alternative Energy Institute, USA
Austrian Research Centers Gmbh (ARC), Austria
Baker Institute Energy Forum, Rice University, USA
Berlin German Institute for Economic Research (DIW), Germany
British Institute Of Energy Economics (BIEE), UK
Cambridge Energy Research Associates CERA, USA
Canadian Energy Research Institute (CERI), Canada
Center for Energy Research (MEMO), Russia
Center for Strategic and International Studies (CSIS), USA
Centre de Géopolitique de l'Energie et des Matières Premières, Université Paris Dauphine CGEMP, France
Centre for Energy, Petroleum and Mineral Law and Policy, University of Dundee CEPMLP, UK
Centre for Global Energy Studies (CGES), UK
Centre for Renewable Energy Sources (CRES), Greece
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEAMAT), Spain
Chalmers University of Technology, Sweden
Chatham House, The Energy, Environment and Development Programme (EEDP), UK
Clingendael International Energy Programme (CIEP), Netherlands
Commissariat à l'Energie Atomique (CEA), France
Deutsches Windenergie Institut (DEWI), Germany
Deutsches Zentrum Für Luft Und Raumfahrt E.V., Germany
Electricity Policy Research Group, University of Cambridge (EPRG), UK
Elforsk, Sweden
Energy Institute, UK
Energy Research Centre (ERC), United Kingdom
Energy Research Centre of the Netherlands (ECN), Netherlands
Energy Security Initiative at Brookings, USA
Ente per le Nuove tecnologie, l'Energia e l'Ambiente (ENEA), Italy
Future of Energy at Harvard, USA
Global Climate and Energy Project (GCEP), Stanford University, USA
Imperial College Centre for Energy Policy and Technology (ICEPT), UK
Institute for Energy Research and Policy, University of Birmingham, UK
Institutions of Gas Engineers and Managers (IGEM), UK
Instituto Nacional de Engenharia, Tecnologia e Inovação (INETI), Portugal
K.U. Leuven Energy Institute, Belgium
Laboratoire d'économie de la production et de l'intégration internationale, Energie Ressources Environnement LEPII, France
Michigan Memorial Phoenix Energy Institute (MMPEI), USA
MIT Center for Energy and Environmental Policy Research (MITCEEPR), USA
National Technical University Of Athens, Greece
Oxford Institute for Energy Studies, UK
Penn State Institutes of Energy and the Environment, USA
Program On Energy and Sustainable Development, Stanford University, USA
Risø DTU National Laboratory for Sustainable Energy, Denmark

Royal Institute of Technology (KTH), Sweden
Rutgers Energy Institute REI, USA
School for Renewable Energy Science (RES), Iceland
UK Energy Research Centre (UKERC), UK
University of Delaware Energy Institute, USA
Wuppertal Institute for Climate, Environment and Energy., Germany

This survey has two purposes: (1) to map the research landscape for a scholarly paper on research into energy security and climate policy; (2) to identify possible partners for future cooperation in this area.

Appendix III. Detailed presentation of top 19 institutions

Oxford Institute for Energy Studies (OIES), UK

<http://www.oxfordenergy.org/>

Presentation

The Oxford Institute for Energy Studies was founded in 1982 as an autonomous centre of Oxford University for advanced research into the social science areas of energy issues.

Research carried out at the Institute encompasses the following:

- The economics of petroleum, gas, coal, nuclear power, solar and renewable energy;
- The politics and sociology of energy;
- The international relations of oil-producing and oil-consuming nations;
- The economic development of oil-producing countries and the energy problems of other developing countries; and
- The economics and politics of the environment in its relationship with energy.

Positioning and co-operation

Among the projects being conducted important ones are: Europe's Power Play: A Single Energy Market – How Desirable, How Feasible?, US Energy and Climate Change Policies and European Gas Demand, Supply and Pricing: Cycles, Seasons and the Impact of LNG Price Arbitrage. The list of important projects could be made much longer. The broad research remit covers the social science aspects of energy with a view to stimulating international interaction and understanding between producers and consumers. Areas of focus are economics and politics associated with developing various sources of energy supply, both primary and secondary, with special attention to the sociological and environmental aspects. Emphasis is given to improving understanding of the international and geopolitical forces and tensions that influence government policies and in turn affect investment decisions in the energy sector.

Projects are to a large extent conducted with national and international partners. The Institute is committed to the idea of dialogue – between consumers and producers, government and industry and academics and decision makers. This is reflected in the membership of the Institute and in the composition of its research team, which is drawn from different national, academic and professional backgrounds.

It is conceived as an association of various members, who may be divided into two groups. On the one hand are the University of Oxford and three of its colleges; on the other hand is a selection of governments, public institutions, international and regional organisations from oil-producing and oil-consuming countries. With the exception of the University and its colleges, each member has made a financial contribution to the endowment that provides for the long-term security of the institute. Thus, the list of corporate and academic member makes the institute an important arena with policy relevance and great national and international impact.

Research

The current and planned areas of research and study by staff of the Oxford Institute for Energy Studies are carried out in five fields:

Electricity

Two projects are conducted in this field of research: Electricity Investment in Liberalised Markets and Environmental costs of restructuring the electricity sector in Mexico.

Energy Policy

Two projects are conducted in this field of research: Europe's Power Play: A Single Energy Market – How Desirable, How Feasible? and US Energy and Climate Change Policies.

Environment

One project is conducted in this field of research: Macroeconomic Carbon Correlations: Methods and Empirical Evidence

Natural Gas

Research in this field is carried out in The Natural Gas Research Programme. The Natural Gas Research Programme, launched in 2003, has become one of the foremost sources of independent academic research on natural gas. The programme focuses on natural gas within the disciplines of the institute: economics, politics and sociology, international relations of gas-producing and gas-consuming nations and the environment in its relationship with natural gas.

Oil Markets and Prices

Four projects are conducted in this field of research: Russia and OPEC, The Battle for Russian Oil: Corporations, Regions, and the State, Where does Russia stand? and Sino-Russian Oil and Gas Cooperation

The institute publishes *Oxford Energy Forum*; A Quarterly Journal for Debating Energy Issues and Policies. An important channel for the researchers is The Oxford Energy Comment, published twice-monthly, and written by members of the research team. It may take the form of a market commentary and reflections, or concern aspects of research in progress. Furthermore, researchers at the institute have published books, articles, reports etc. See for example <http://www.oxfordenergy.org/articles.shtml>

In May 2009 there were 50 members (researchers and administrative staff) affiliated with OIES. A list of staff members can be found at: <http://www.oxfordenergy.org/staff.shtml>

Relevance

The Oxford Institute for Energy Studies is one of the leading institutes addressing questions of energy security. Of particular interest is the Gas Programme (see link: <http://www.oxfordenergy.org/gasprog.shtml>). Its main competence is in social sciences. Its commitment to dialogue could make the institute an interesting partner. The institute was also ranked as number 1 in our survey.

Strings *Norway* and *Norwegian* are found 178 times at the institute's website.

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MIT Center for Energy and Environmental Policy Research MITCEEPR, USA

<http://web.mit.edu/ceepr/www/index.html>

Presentation

CEEPR promotes rigorous and objective empirical research at MIT on issues related to energy and environmental policy to support decision-making by government and industry. The results of the research are disseminated through publications, workshops, educational programs and other public outreach activities. Economics research at CEEPR is integrated with engineering and science in collaboration with faculty throughout MIT. The relevance and validity of the research is enhanced through cooperation with government and industry associates in countries around the globe.

Positioning and co-operation

CEEPR plays an important part in shaping debate on energy, not least due to the fact that the list of institutions and organizations associated with the Centre contains many of the key actors in that field, such as Alstom Power, BP, Chevron, Electricite de France, ENI, Schlumberger, Total, Vattenfall, including Norwegian ones, such as StatoilHydro or the Norwegian Ministry of Petroleum and Energy.

The CEEPR's projects focus on five topics: Electricity Restructuring, Emissions Trading, Climate Change, Human Welfare and the Environment, Investment, Finance & Risk Management.

The Centre itself describes its role in these fields in the following manner.

Electricity Restructuring: Since before the Center's inception, Professor Paul L. Joskow has led an extensive and influential research effort broadly focused on the performance and regulation of the electric utility industry. Among the more important results of that work is *Markets for Power*, by Professor Joskow and Professor Richard Schmalensee, a former director of the Center. This book helped shape a decade of debate on deregulation, regulatory reform, and the role of competition in the electric utility sector.

Emissions Trading: As environmental problems have become increasingly complex and the cost of achieving more stringent environmental goals has risen, public policy interest has turned to alternatives to traditional command-and-control approaches to environmental regulation. Since early 1995, the Center has contributed greatly to public understanding of one such alternative through its definitive study of implementation of the U.S. Acid Rain Program, the first large-scale use of tradable permits to achieve an environmental goal. The Center continues this work in its studies of the creation of markets for carbon including the European Union's Emissions Trading Scheme, as well as studies of market approaches to regulation of traditional pollutants.

Climate Change: The Center's most ambitious effort to date is the Joint Program on the Science and Policy of Global Change, which is co-sponsored with MIT's Center for Global Change Science. Through this program, MIT's excellence in physical sciences, engineering, and the policy sciences is focused on a completely integrated approach to the problems of global change.

Human Welfare and the Environment: The Center applies scientific tools to understand the complex relationship between human welfare and the environment in a variety of different contexts, such as the economic impacts of climate change, the costs and benefits of air

quality, the returns to clean-ups of hazardous waste sites, and the role of environmental quality in fostering growth in developing countries, bringing rigorous economic analysis to bear on the design of public policies that govern the environment.

Investment, Finance & Risk Management: Since the mid-1980s, the Center has funded research that has developed practical methods of applying option-pricing techniques to evaluate a large class of risky investments. Current research is directed toward improving our understanding of the use of energy futures, forwards, and other forms of risk management in energy markets.

The Center is jointly sponsored by MIT's Sloan School of Management, MIT's Department of Economics and MIT Energy Initiative. CEEPR itself is one of the two MIT research centers sponsoring The Joint Program on the Science and Policy of Global Change.

The CEEPR, due to its MIT affiliation, should be seen as having an important impact not only on the academic debate but also on actual policy making in the relevant areas of focus both on the national, US level but also in a more global context. Through its network of associates, with a number of key European energy actors on the list, and due to MIT's reputation as one of the leading technology milieus the work done by CEEPR has probably also some impact on the EU approach towards the ways of solving current energy dilemmas.

Research

Five areas of research are defined as central by the CEEPR. These are: Electricity Restructuring, Emissions Trading, Climate Change, Human Welfare and the Environment, Investment, Finance & Risk Management.

MIT is one of the leading actors in the area of innovative technologies and MIT's excellence in physical sciences, engineering, and the policy sciences helps CEEPR address the energy relevant issues also from a purely technological angle and adopt an integrated approach to the problems of global change.

Since 2005 CEEPR has published (by end of May 2009) 71 *Working Papers*, 3 books, and a number of papers, articles and other types of texts on relevant topics. The texts of the CEEPR's *Working Papers* can be downloaded from the Center's website:

<http://web.mit.edu/ceepr/www/publications/workingpapers.html>

CEEPR also provides a good overview of other publications of its staff, some of which can be downloaded from the web pages linked to specific topics, such as Emissions Trading, Coal Study, Cap&Trade Report, Geothermal Study and Nuclear Study.

The CEEPR has a staff of 31, including three directors, 24 staff members and four members of support staff, as well as 13 International Research Associates. More information on the staff can be found at this webpage:

Relevance

The fact that both StatoilHydro and the Norwegian Ministry of Petroleum and Energy are listed as CEEPR's associates can help establish closer cooperation with the Center which would be beneficial for a planned virtual think tank due to the high prestige of MIT in the academic community.

Search for *Norway* OR *Norwegian* produced 38 hits at the CEEPR's web pages.

Contact

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Chatham House, The Energy, Environment and Development Programme (EEDP), UK

<http://www.chathamhouse.org.uk/research/eedp/>

Presentation

Chatham House research is structured around three areas: Energy, Environment and Resource Governance; International Economics; Regional and Security Studies. The most energy and climate relevant programme is the Energy, Environment and Development Programme (EEDP), led by Bernice Lee but energy related issues also are dealt with in other projects realised at the Chatham House, especially in those focusing on regional developments (the Middle East and North Africa and Russia and Eurasia). The EEDP programme seeks to advance the international debate on energy, environment and development policy and to influence and enable decision-makers - governments, NGOs and business - to take well-informed decisions that contribute to achieving sustainable development.

Positioning and co-operation

Among the projects in the field of energy being conducted at the Chatham House the most important ones are: Biofuels and Sustainable Development; Developing the Methodology and Piloting Low Carbon Zones in China; Interdependencies on Energy and Climate Security for China and Europe; Managing Energy: for Climate and Security; Renewable Energy Finance Policy; Trade, Finance and Climate Change: Building a Positive Agenda for Developing Countries; Fossil Fuels Expert Roundtable (FFER); Good Governance of the National Petroleum Sector; Resource Depletion, Dependence and Development.

The Programme works with business, government, academic and NGO experts to carry out and publish research and stimulate debate on international issues in these three thematic areas.

The EEDP programme and the Chatham House in general seek to influence and enable decision-makers - governments, NGOs and business - to take well-informed decisions that contribute to achieving sustainable development.

Chatham House brings together people and organizations with an interest in international affairs. The institute provides an independent forum in which academics, business people, diplomats, the media, NGOs, politicians, policy-makers and researchers can interact in an open and impartial environment. Its mission is to be a world-leading source of independent analysis, informed debate and influential ideas on how to build a prosperous and secure world for all.

The Chatham House has a long list of corporate and academic institutional members, making it one of the important arenas for exchange of views and ideas.

The institute has had great impact on the national and international debate and policy making due to its central position in the institutional landscape and high reputation as provider of impartial analysis.

Research

Research is focused on three main areas:

Promoting Climate Security

Research in this area aims to provide innovative analysis and promote practical policy options that will help facilitate the transition to a low carbon future.

Enabling Energy Security

Research in this area informs and facilitates debate on energy issues including: changing oil and gas supply and demand dynamics: drivers, global economic and geopolitical impacts and policy responses; strategic (economic, development, security) implications of energy extraction, delivery and use for producing and consuming countries; energy policy-making in a changing world: appropriate responses at national, regional and global level

Strengthening Sustainable Development Solutions

Research in this area analyses new developments, designs global solutions and convenes global stakeholder forums on resource management including timber and fisheries. The relationship between business and sustainable development is also considered.

The Chatham House has its own publishing channels, but the research findings are also presented in other publications. The four most important publications are: *Chatham House Reports*, *Briefing Papers*, *The World Today* and *International Affairs*.

Since January 2005 the EEDP has published 5 books, 19 *Chatham House Reports*, 30 *Briefing Papers*, 70 articles in *The World Today*, 20 articles in *International Affairs* and 82 reports, working papers, transcripts and meeting summaries covering EEDP related issues.

In May 2009 there were 13 members affiliated with the EEDP – 1 research director, 3 members of the administrative staff, 1 project coordinator, 6 senior research fellows and 2 research fellows. In addition the programme had 18 associated fellows and 2 visiting fellows. Detailed information about the staff can be found at this web page:

<http://www.chathamhouse.org.uk/research/eedp/staff/>

Relevance

In 2009 issue of *The Global “Go to Think Tanks”* – a ranking of international think tanks published on 19 January 2009 by The Think Tank and Civil Societies Program at the Foreign Policy Research Institute in Philadelphia – the Chatham House is ranked as number 1 non-US based international think tank.

Strings *Norway* and *Norwegian* are found 209 times at the Chatham House’s website.

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Cambridge Energy Research Associates CERA, USA

<http://www.cera.com>

Presentation

Cambridge Energy Research Associates®, Inc. (CERA®), an IHS company, is a leading advisor to international energy companies, governments, financial institutions, and technology providers. CERA delivers critical knowledge and independent analysis on energy markets, geopolitics, industry trends, and strategy. CERA services are to help decision makers anticipate the energy future and formulate timely, successful plans in the face of rapid changes and uncertainty.

Positioning and co-operation

IHS CERA is an energy consultancy with global reach and offices in the US, Canada, Mexico, Brazil, France, Russia and China. The company has a number of on-going projects and the most important of them are: Flagship Advisory Services that provide continuous analysis and insight into energy markets, industry trends, and strategies that have a direct impact on clients; Focused Advisory Services providing analysis and insight on a key energy segment or region; Industry Forums that are designed to help clients understand the dynamics of rapid change and its impact on their businesses; Multiclient Studies offering extensive and focused analysis on specific critical issues or opportunities facing energy decision makers today.

The company operates not in an academic but mostly in business environment but due to its presence in many countries and central position in the international ‘energy community’ is an important actor and could be interesting as a cooperation partner providing reliable information and giving good insight into and contacts in the energy business community. Information provided by CERA is definitely policy relevant. The company is highly visible in the international and national debate on the future of energy. CERA advises clients on strategies across the full energy value chain, from upstream exploration, production, and power generation to transportation, distribution, and consumption.

CERA organizes CERAWEEK – the annual executive conference for the energy industry that is one of the most important meeting places of this community and arenas for discussion of important energy related topics, also with participation of actors from Norway. Over the last years the CERAWEEK focused on the following topics: 2009: Risk and the Rebuilding of Confidence: Energy Strategies for a Turbulent Economy; 2008: Quest for Security: Strategies for a New Energy Future; 2007: The Quest for Energy Security; 2006: The New Prize: Energy’s New Era; 2005: Rising to the Challenge: Securing the Energy Future.

Research

CERA’s expertise covers all major energy sectors – oil and refined products, natural gas, and electric power – on a global and regional basis.

CERA has a number of publications that are accessible on-line only to its clients. CERA’s Flagship Advisory Services provide continuous analysis and insight into energy markets, industry trends, and strategies that have a direct impact on clients and their decisions. An overview below shows the topical focus of the research being done at CERA and the number of articles under each heading available for the company’s customers: Coal (81), Downstream (191), Environment (226), Financial (265), Generation (249), Geopolitics (200), Industry Structure (231), Infrastructure (112), LNG (217), Midstream (83), Nuclear (23), Policy /

Regulation (698), Politics (249), Prices / Markets (1333), Renewables (113), Stakeholder (62), Strategy (200), Technology (136), Transmission and Distribution (124), Transportation (99), Upstream (395). The company pays lot of attention to the regional dimension of energy with most focus on North America, global issues, Europe/Eurasia and Latin America and relatively less interest in Africa.

CERA's team is headed by Daniel Yergin. CERA has offices in US (3), Canada, Mexico, Brazil, France (Paris), Russia (Moscow) and China (Beijing) with 200 staff worldwide bringing experience from the global energy industry, academia and other sources. CERA's team of research professionals include globally-known experts in business strategy, geopolitics, world economics, demand and supply trends, competitive markets, liberalization and regulation, and asset valuation.

Relevance

CERA's topical focus makes the company an interesting cooperation partner. However, contrary to most other actors in this overview the company seems to have a much more commercial profile and this may make it difficult to motivate them to join as a cooperation partner in a non-profit project.

17 publications with focus on *Norway* are found at the CERA website when CERA's search engine is used, but a Google based search for those two strings produced 753 hits at www.cera.com.

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Baker Institute Energy Forum, Rice University, USA

<http://www.bakerinstitute.org/programs/energy-forum>

Presentation

Established in 1996 the Baker Institute Energy Forum is a multifaceted center that promotes original, forward-looking discussion and research on the energy-related challenges in the 21st century. The goal of the Forum is to serve as a focal point for the exchange of ideas on how to improve understanding of the complex political, cultural, religious, economic and social forces that influence open access to energy resources and their equitable distribution. The mission of the Energy Forum is to promote the development of informed and realistic public policy choices in the energy area by educating policymakers and the public about important trends — both regional and global — that shape the nature of global energy markets and influence the quantity and security of vital supplies needed to fuel world economic growth and prosperity. Energy Forum research adopts a synthesizing approach to these issues by drawing together experts from academia, the energy industry, government, the media and nongovernmental organizations. To develop its energy policy analysis and recommendations, the Energy Forum draws on Rice University's interdisciplinary expertise in environmental engineering, energy sustainability, economics, political science, geology, nanotechnology, architecture, sociology, anthropology and religious studies.

Positioning and co-operation

The Baker Institute Energy Forum has been cooperating closely with other both American and non-American institutions and organizations. The most important of them are the Rice Energy Program (REP) which is a multi-disciplinary program that includes activities addressing energy science and technology policy and research on emerging energy technologies, environmental implications of energy production and use, and sustainable strategies for fulfilling the world's energy needs. The REP is supported by both the Baker Institute and the Environmental and Energy Systems Institute (EESI). The REP promotes collaborative, multi-disciplinary research to address global energy issues. The program currently supports projects in 13 departments and 5 centers in the areas of energy and nanotechnology, carbon capture and sequestration, gas hydrates, and U.S. biofuels policy.

The Energy Forum also has an international research collaboration with The Institute of Energy Economics, Japan (IEEJ) to bring together scholars to conduct joint research on important public policy topics related to the security of world energy markets. The program involves a combination of international research seminars, high-level policy conferences and commissioned working papers on a central theme of importance to international energy policy. In addition in 2003 the Baker Institute's Energy Forum began research collaboration with energy and economic policy think tanks in Japan and China on the Future of Energy Security and Energy Policy in Northeast Asia, China, Japan and the United States.

Research

Drawing on the Rice University's interdisciplinary expertise in environmental engineering, energy sustainability, economics, political science, history, geology, nanoscience, and anthropology, the Forum is involved in several interdisciplinary projects with focus on energy. Topics have included the political, social, and cultural trends in the Persian Gulf, Caspian Basin and Russia, the future energy needs of China, Japan, and Latin America,

energy security, energy industry deregulation, emerging energy technologies, and U.S. energy policy. As a result a number of studies on these topics have been published.

In 2001, the Baker Institute sponsored with the Council On Foreign Relations, a task force on U.S. strategic energy policy. The bi-partisan task force, which comprised 52 prominent Americans from government, industry, and academia, published a major study, *Strategic Energy Policy: Challenges for the 21st Century*, which offered 110 recommendations to the Cheney task force and U.S. Congress regarding steps to build a comprehensive energy policy and national consensus.

In 2002, Palgrave published *Energy in the Caspian Region: Present and Future*. In June 2006, Cambridge University Press published a book *Natural Gas and Geopolitics from 1970 to 2040*.

In May, 2003, the Energy Forum, in conjunction with the Richard E. Smalley Institute for Nanoscale Science and Technology, and the Environmental and Energy Systems Institute began a major initiative on the role nanotechnology will play in the development of clean, affordable energy, whose supply is sustainable and universally available. This nano and energy program has recently focused on the science and policy related to solar energy, electricity storage and transmission, and oil and gas drilling technologies. In 2006, the Energy Forum also initiated a science and policy program on the potential of biofuels.

Energy Forum studies, policy reports and working papers are posted on the Baker Institute's Internet website, www.bakerinstitute.org and are distributed in printed copy to the Baker Institute mailing list of industry and government leaders. Baker Institute energy reports are widely quoted in major newspapers and periodicals in the U.S., such as the Wall Street Journal, the Washington Post, and the Financial Times, and are read by top government and energy industry leaders worldwide. Baker Institute energy specialists are invited to present new public policy ideas at international conferences and many other public forums sponsored by other universities and think tanks, the United Nations, and energy industry groups. Baker Institute scholars continue to publish working papers in a wide variety of academic and public policy journals.

By May 2009 the Energy Forum published 38 Baker Institute Policy Reports, 3 Task Force Reports, 17 major energy studies (with a number of additional working papers), authored or co-authored several Congressional Testimonies and US Government Policy Analysis Reports and published two books.

There are three Energy Forum Fellows, three members of Energy Forum Research Staff, one member of staff responsible for administration and six members of core faculty staff and fellows associated directly with the Energy Forum. In addition there also are 31 researchers and members of the Rice University staff participating in the work of the Energy Forum. Those affiliated with forum represent various academic branches, such as civil engineering, earth science, chemistry, physics, economy, sociology, biology, political science and nanoscience.

Relevance

Due to the topical and geographical scope of its research, its interdisciplinary character and quality the Baker Institute Energy Forum should be seen as an attractive cooperation partner in an international think tank focusing on energy.

Google search for the following string: *Norway OR Norwegian* produced 59 hits at site: <http://www.bakerinstitute.org/programs/energy-forum/publications/> and 100 hits at: www.bakerinstitute.org.

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Clingendael International Energy Programme, the Netherlands

<http://www.clingendael.nl/ciep/>

Presentation

The Clingendael International Energy Programme (CIEP) is affiliated to the Netherlands Institute for International Relations Clingendael. Its stated mission is:

“Through research, the publication of studies, information releases (particularly through the media and internet) and the organisation of courses and training programmes, the CIEP makes a fundamental contribution to the public debate on international politics and economic developments in the energy sector (oil, gas and electricity).” CIEP research and activities agenda focuses on three themes:

- Regulation of energy markets (oil, gas, electricity) in the European Union
- The international economic and geo-political aspects of oil and gas markets, particularly with respect to the European Union security of supply
- Energy and sustainable development

Positioning and co-operation

Among the projects in the field of energy being conducted the main area of focus is the European Union, security of supply and geopolitics and Russian policy. In this work CIEP identifies three main pillars of energy policy - the environment, market regimes and security of energy supply. CIEP considers energy issues using an international and geopolitical approach.

CIEP acts as an independent forum for governments, non-governmental organizations, the private sector, the media, politicians and others who are interested in changes and developments in the energy sector. CIEP organizes seminars, conferences and roundtable discussions. Through such activities the energy programme seeks to set the agenda and be policy relevant. In key areas CIEP seeks to make a major contribution to the energy debate. The Clingendael International Energy Programme is supported by twenty-two institutions from the public and private sector. Among them we find: BP, the Dutch Ministry of Economic Affairs, Exxon Mobil, the Dutch Ministry of Foreign Affairs, Shell Nederland and the Dutch Ministry of Housing, Spatial Planning and the Environment. Such a comprehensive list of supporters indicates that CIEP is regarded as policy relevant.

Research

CIEP Research is organised around three thematic areas:

Energy markets in the European Union

Under this thematic area three projects are conducted:

- Electricity
- Natural Gas
- Dutch Energy Policy 1974-2004

Security of energy supply and geopolitics

Under the thematic area Security of energy supply and geopolitics seven projects are conducted:

- European energy policy
- The Middle East
- International relations, risk analysis and energy
- Russian energy politics
- North-East Asia
- The Caspian Sea
- Reserves project

Towards a low-carbon energy sector

CIEP's research theme "Towards a low-carbon energy sector" is structured into two key areas:

- Global energy power shifts
- EU policy and energy transition

Clingendael International Energy Program has its own publishing channel (Clingendael Energy Publications, Clingendael Energy Papers, CIEP Studies), but findings and analysis are also presented in other publications. See <http://www.clingendael.nl/ciep/publications/> . Recent publications are: Upping the stakes: Some lessons for the EU from the recent Russia-Ukraine gas crisis, Energy and climate: bridging the geopolitical gaps and The European Union and Russia: Perception and Interest in the Shaping of Relations.

In May 2009 there were 16 members/researchers affiliated with CIEP. For more detailed information see <http://www.clingendael.nl/ciep/staff/>

Relevance

Of particular interest in this context is the research at CIEP addressing energy security and the European Union. And its ambition to be a contributor to the public debate and to establish networks could make CIEP a potential interesting partner. Strings to *Norway* and *Norwegian* are found 50 at CIEP's website.

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Imperial College Centre for Energy Policy and Technology (ICEPT), UK

<http://www3.imperial.ac.uk/icept>

Presentation

ICEPT provides an academic hub for the interdisciplinary study of energy and the environment, specialising in the interface between technology and policy. ICEPT addresses key policy challenges, including climate change, energy security and energy for development and is to provide objective research, analysis and policy advice to governments, industry, NGOs, and the public. ICEPT comprises six specialist research groups, and is steered by the ICEPT executive committee. The mission of the ICEPT is to conduct nationally and internationally recognised interdisciplinary research, give policy advice and postgraduate training, at the interface of energy policy and technology. ICEPT is to address key policy challenges including climate change, energy security and energy for development.

ICEPT has become a leading UK Centre for world class research and policy advice, with a particular focus on the interface between energy policy and technology and on expertise in modelling and assessing long term energy transitions, including those associated with climate change.

Positioning and co-operation

ICEPT is an interdisciplinary centre collaborating with Imperial College's new Grantham Institute for Climate Change, with the Energy Futures Lab and with a number of UK based and international researchers. ICEPT brings to bear three long-standing strengths of Imperial College on contemporary energy and environmental problems:

- The science and technology of all aspects of energy production, use and pollution abatement;
- The analysis of the environmental impact of energy-related pollution on climate, ecosystems and human health;
- The economic, legal and institutional aspects of energy and environmental policies that address these issues.

ICEPT is an active participant in national and international research networks, the most important of which are HiDEF- *Highly Distributed Energy Futures*, a consortium of UK universities and industrial partners, *FutureNet*, a consortium of universities researching Future Network Technologies able to support a sustainable energy policy for the UK, *SUE Sustainable Waste Management Programme*, *Consortium XIV: Delivery of Sustainable Hydrogen* and *FlameSOFC* and *Transition Pathways to a Low Carbon Economy*, *TSEC Biosys*.

A number of projects realised by ICEPT have been funded by the EU and by national bodies, such as the Economic and Social Research Council (ESRC), the Engineering and Physical Sciences Research Council (EPSRC) or Natural Environment Research Council (NERC). ICEPT's staff is often invited to give key policy inputs on relevant, energy related issues.

Research

ICEPT's research activities follow two key themes related to environment, energy security and economic development: advanced energy technologies and systems and energy-environmental policies and policy regimes. The research conducted at ICEPT focuses on

bioenergy, hydrogen and fuel cells, decentralised and sustainable energy systems, and transitions to low carbon energy systems.

The projects realised at ICEPT are divided thematically in five groups. ICEPT has been currently involved in realisation of thirty-one projects in the area of *BioEnergy*, four in the area of *Decentralised Energy*, two in *Energy in Developing Countries*, in seven projects in the area of *Hydrogen and Fuel Cell Energy* and in five projects in the area of *Transitions, Innovation and Policy*.

There are 76 publications that have been published by the ICEPT staff since 2005.

There are five members of the academic staff, six senior research fellows, eleven research associates, seventeen visiting fellows, and nineteen Ph.D researchers affiliated with ICEPT in May 2009.

Relevance

ICEPT represents high level of academic research in areas of relevance for the planned think tank with most focus on technological solutions.

Norway is mentioned only three times at ICEPT web page – one of the researchers has been cooperating with Cicero and another one has some knowledge of Norwegian.

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Energy Research Centre of the Netherlands (ECN), the Netherlands

<http://www.ecn.nl/>

Presentation

The Energy research Centre of the Netherlands is the largest research centre in the Netherlands in the field of energy, and employs about 900 people. The researchers move between fundamental research at universities and appliance of knowledge and technologies in practice. In ECN's strategieplan 2007-2011 it is stated that "We develop high-value knowledge and technology for a sustainable energy management and bring this to the market." Energy security revolves around the transition to clean, reliable and affordable energy supplies. ECN's main ambition is to be a leader in the fields of:

- Energy savings
- Renewable energy
- Clean use of fossil fuels.

Positioning and co-operation

The institute is primarily financed from public funds and is design as a "Task Institute, meaning that the institute focuses on issues of future social significance and is determined by the needs of the central government. This is not to say that ECN not get funding from industry and business. Its primary task, however, is to generate knowledge relevant knowledge meeting government needs and is financed primarily from public funds. With a yearly turnover of 122 million Euro (2006) and the Dutch government, European Union, industry (national and international) as its customers the ECN is an important player in the field of energy security. The institute has expanded from 636 employees in 2006 to about 900 in time of writing.

ECN has formulated long-term programs in the fields of: policy studies, energy efficiency in industry, energy in built environment, solar energy, wind energy, biomass and coal, environmental research, hydrogen and clean fossil fuels and intelligent grids. The institute has a large and broad research portfolio. The institute's main field of research is to be found in renewable energy. It has both technical and scientific competence.

The institute is clearly policy relevant. Something which is stressed both in ECN's strategieplan 2007-2011 and in annual reports. ECN wants, however, to strengthen its relationship with universities and is striving for 10-20% AIOs/post-docs in relation to the number of academics at ECN.

Research

Research at the Energy Centre of the Netherlands is structured around 11 programs: Biomass, Coal and Environmental Research, Policy Studies, Corporate, Efficiency & Infrastructure, Engineering and Services, Energy Efficiency in Industry, Energy in the Built Environment, Hydrogen and Clean Fossil Fuels, Wind Energy and Solar Energy.

If we look at the number of publications the list is long. ECN is publishing in a wide range of channels, for example books, scientific articles, conference papers and ECN publications . So far this year (May 2009) 42 articles and reports/conference papers (majority) have been published, addressing questions such as The EU Emissions Trading Scheme, biofuels, wind

and solar energy and CO2 storage. A complete list is to be found at <http://www.ecn.nl/publications/>

Relevance

Due to its size and broad and diversified research portfolio ECN is clearly relevant when addressing energy security both at an international and national level. The institute's main competence is in renewable energy, but we also find research in other fields of interest. Thus, ECN could and should be an interesting partner for future co-operation and knowledge seeking in a wide range of areas. Strings to *Norway* and *Norwegian* are found 458 times at ECN's website.

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Wuppertal Institute for Climate, Environment and Energy, Germany

<http://www.wupperinst.org/en/home/>

Presentation

The Wuppertal Institute was founded in 1991 under the direction of Professor Ernst Ulrich von Weizsäcker. In the presentation of the institute it is stated that “Sustainable development requires an integrated approach to policy and science because many of the issues it raises cannot be addressed within a single department or using the tools of individual scientific disciplines.” Part of the institute’s mission is therefore to take an interdisciplinary approach and work towards systems understanding. Applied sustainability research is the Wuppertal Institute’s stated mission. Research is structured around nine areas: climate, environment, energy, transport, education, consumption, production, material flows and resource management.

Positioning and co-operation

The research at Wuppertal is mainly funded by third parties. Each year they conduct eighty to one hundred projects. The list of projects in the field of energy is long. Some examples are: Technology Cooperation in the International Climate Regime, Away from Oil - Strategies to Reduce the Oil Dependency of the Earthbound Passenger Transport, Security of Energy Supply and CO₂ Capture and Storage (CCS): Potentials and Limits, Chances and Risks for the Gas Industry.

Wuppertal’s partners and clients include governmental organisations, businesses and business associations, the German government and the governments of the federal states, regions and municipalities, universities and research facilities, local authorities and utilities, foundations, associations and public institutions. The Wuppertal Institute collaborates closely with a numerous of universities and institutes in Germany and abroad. It has formal cooperation agreements with the Center for Environment and Energy Research and Studies (CEERS) in Tehran, the University of Osnabrück and the University of Wuppertal. The Institute also collaborates with numerous universities in Germany and abroad on a project basis.

The Institute communicates research results to many groups: the scientific world, by means of numerous scientific publications, by organising and participating in lectures, symposia, workshops and conferences and by engaging in networks with research partners in Germany and abroad; to decision makers in the realms of policy, business and society, through scientific research and consulting projects, projects that launch innovations (model projects, pilot projects), dialogues with partners from business and industry, and also through publications oriented towards the users’ needs; to the general public, by means of popular-science books, public events as well as articles and reports in the press, on radio and television. This communication strategy makes the institute policy relevant.

Research

The institute’s research is mainly conducted in four research groups:

Future energy and mobility structures

Here researchers examine questions of technology and infrastructure, taking a systems analysis approach. In the fields of energy and mobility it explores what technical and social innovations will facilitate the transition to sustainable structures, what implications this process has and what chances it offers. Alongside dynamic potential analyses it seeks to

evaluate technology with a view to finding coherent paths of development. An important dimension here is carbon capture and storage.

Energy, transport and climate policy

Here focus is on strategies and instruments for effective and integrated energy, transport and climate policies at the local, regional, national and international level. A central theme is the synergy effects of policy strategies that support the sustainable development of energy and transport systems as well as climate protection generally. Policy instruments in the field of energy end-use efficiency are a further focus.

Material flows and resource management

This research group investigates material flows from extraction of raw materials through to final disposal, taking account of the global "ecological rucksack" model as well as the land use involved. It develops concepts, strategies and instruments to improve resource productivity and sustainable resource management from the regional and sectoral levels to the international level.

Sustainable consumption and production

In this research one develops instruments, concepts and strategies to promote the transition to more sustainable patterns of production and consumption. The research centres on the development and market launch of products considered sustainable in terms of their entire life cycle as well as production processes optimised right the way along the added value chain.

Researchers at the Wuppertal Institute publish a majority of their analysis and findings through own publishing channels, see <http://www.wupperinst.org/en/publications/index.html>

The Wuppertal Institute's staff numbers approximately 140. The research staff comes from a wide variety of background disciplines: natural and environmental sciences, geography, systems sciences, engineering, planning, law, economics, political and social science.

Relevance

The sheer size of the institute, its thematic focus and the fact that this is the only German institute to make to the top of the list combined with the importance of the German market in the European energy context and political weight of Germany in shaping common EU energy policy makes the Wuppertal Institute an obvious first choice among the German institutions.

Due to its size and broad research portfolio the institute is clearly a relevant partner in future cooperation. Search for string 'Norway OR Norwegian site:http://www.wupperinst.org' produced 145 hits.

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Centre for Global Energy Studies (CGES), the UK

<http://www.cges.co.uk/>

Presentation

The Centre for Global Energy Studies main competence is in the field of gas and oil. The Centre for Global Energy Studies was founded in 1990 by Sheikh Ahmed Zaki Yamani, Minister for Petroleum and Mineral Resources of Saudi Arabia (1962-1986). The Centre's main objective is to provide independent and objective information and analysis on the key energy issues of the day. Centre for Global Energy Studies expertise lies in the forecasting of oil demand, supply and prices, OPEC policy, the Middle East, Russia and the Former Soviet Union. Areas of specialisation include:

- Oil market forecasting
- OPEC policy
- Strategic hedging
- The politics and economics of the main oil producing regions

Positioning and co-operation

Projects

Among the studies being conducted at the centre we find: The Oil Price Shock and Oil Demand, Annual Oil Market Forecast & Review 2008, The Impact of Geopolitics on World Oil Production 2008, "Stealing Iraq's Oil" - is the Iraqi press right?, Hydrocarbon exploration and field development in Iraq, The Future of Caspian Oil Exports, Iran's Energy Crisis: rising gasoline imports, gas shortages & the nuclear stand-off, Saudi Arabia and Oil Prices: the Kingdom's prospects to 2020, World Oil Supply Overview, Middle East Overview: oil & gas, economics and politics, World Natural Gas: Demand, Supply and International Trade to 2030.

The Centre holds regular energy events and undertakes special advice for clients. Among the analysts and in the governing board we find people with close contacts in the Middle East. Analysts often speak at high level international events. The Centre for Global Energy Studies offers a variety of services to suit client needs. Services range from full oil market advisory packages and oil industry training courses to one-off presentations and reports. The Centre's client list includes: airlines, banks, financial management companies, oil companies, power companies and shippers.

The Centre for Global Energy Studies holds regular executive retreats, symposia, seminars and conferences. Events are attended by executives from the oil, finance and transportation industries as well as governments and other international organisations. The Centre for Global Energy Studies is widely quoted in the international press and is well known for its expertise on the oil market. Thus, its analysis on oil and gas developments has gained worldwide recognition.

Research

Research is mainly focused on oil market forecasting, OPEC policy, strategic hedging and the politics and economics of the main oil producing regions. Research are presented in own publishing channels - GOR Market Watch articles, GOR In-depth articles and FSU Advisory Service bulletins. See: http://www.cges.co.uk/index.php?main_page=index&cPath=17

The governing board has eight members, there are seven key personal (among them administrative staff, director and analysts) and nine associates.

Relevance

Strings to *Norway* or *Norwegian* are found 23 times at Centre for Global Energy Studies' website, indicating that Norway is to a lesser extent a topic in CGES' research. This is not to say that research and analyses conducted at the centre is irrelevant in this context.

Especially their competence on oil market forecasting is relevant.

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Global Climate and Energy Project (GCEP), Stanford University, USA

<http://gcep.stanford.edu/about/index.html#main>

Presentation

Launched in December 2002, GCEP develops and manages a portfolio of innovative energy research programs and has a number of research projects taking place across disciplines throughout the Stanford campus and has started collaborating with leading institutions around the world. GCEP seeks new solutions to one of the grand challenges of this century: supplying energy to meet the changing needs of a growing world population in a way that protects the environment. GCEP mission is to conduct fundamental research on technologies that will permit the development of global energy systems with significantly lower greenhouse gas emissions.

Positioning and co-operation

GCEP is supported by four international companies – ExxonMobil (\$ 100 million), General Electric (up to \$ 50 million), Schlumberger (up to \$ 25 million), and Toyota (up to \$ 50 million) – that also participate in setting its research agenda. GCEP is therefore a unique project with collaboration of the world's energy experts from research institutions and private industry. The Project's sponsors are to invest a total of \$225 million over a decade or more as GCEP explores energy technologies that are efficient, environmentally benign, and cost-effective when deployed on a large scale.

GCEP explores a range of technologies across a spectrum of globally significant energy resources and uses and its primary objective is to build a diverse portfolio of research on technologies that will reduce greenhouse gas emissions, if successful in the marketplace.

By February 2009 there were \$119 million funding allocated to projects realized by GCEP. GCEP was involved in 63 full-term research programs and 16 exploratory research activities, cooperating with 24 institutions both in the USA and abroad (mostly in Europe, but also in Japan and Australia) and with 18 Stanford University departments.

Research

According to GCEP itself its main goals are to identify promising research opportunities for low-emissions, high-efficiency energy technologies; to identify barriers to the large-scale application of these new technologies; to conduct fundamental research into technologies that will help to overcome these barriers and provide the basis for large-scale applications; and to share research results with a wide audience, including the science and engineering community, media, business, governments, and potential end-users.

Following areas are defined as the main fields of research realized at GCEP: solar energy (9 currently realized projects and 5 recently completed), biomass energy (4 and 2), hydrogen (1 and 8), advanced combustion (1 and 6), CO₂ capture and storage (3 and 5), advanced materials and catalysts (3 and 1), advanced coal technologies (1 currently realized), advanced transportation (2 currently realized), renewables, integrated assessment (2 recently completed) and advanced nuclear energy. In addition GCEP plans widen its topical focus to include energy distribution and infrastructure and geoengineering.

By 2009 there were 99 investigators (59 at Stanford, 40 at GCEP-funded external institutions) involved in realization of the projects as well as over 300 graduate and post-doctoral students

affiliated. GCEP staff published 159 peer-reviewed publications, gave 276 presentations and applied for 14 patents.

Relevance

Located at the Stanford University the project aims at playing a major part in finding mostly technological but also systemic solutions to the current global energy dilemmas. As the areas of energy and the environment are important to the future of all mankind, Stanford is committed to investing its resources and energies to develop a significant and relevant presence in these domains. GCEP is to be Stanford's contribution in that field and cooperation with this project would definitely be beneficial for any organization wanting to make a difference in that field. Stanford has a long history of developing strategic relationships with the world's leading technology companies to solve the important problems of the future.

String *Norway* OR *Norwegian* is found 28 times at the GCEP website.

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The Centre for Energy, Petroleum and Mineral Law and Policy (CEPMLP), the UK

<http://www.dundee.ac.uk/cepmlp>

Presentation

The Centre for Energy, Petroleum and Mineral Law and Policy at the University of Dundee is the internationally renowned graduate school in the field of international business transactions and natural resources and energy law and policy.

When the CEPMLP was established some 30 years ago, its research focus was clearly fixed on the then new and booming North Sea oil and gas industry. Its early work, led by the founding Director, Professor Terence Daintith, examined the emerging legal framework of oil and gas law in the UK. In the 1990s and beyond, CEPMLP research focus shifted to the international energy scene, expanding beyond law to include energy economics and policy analysis, particularly in Asia and the Middle East. Issues of regulation and energy market reform in the UK and Europe also figured on the research agenda.

From 2005 onwards, there has been a clear shift of emphasis in the UK energy policy towards the implications of the return to dependence on imported supplies of energy, mainly oil and gas, and how action may be taken to mitigate this. The interface between international and national developments has become more evident since that time. In particular, the policy commitments to make a transition to a low carbon economy have added a new dimension to this interface, whether they are commitments by UK and Scottish Governments or by the European Union or Parties to the Kyoto Protocol.

Positioning and co-operation

CEPMLP states that two kinds of cooperation are essential. Firstly, research will be stronger to the extent that it involves a measure of inter-university cooperation. CEPMLP plans to extend this cooperation to include colleagues in other universities that can - and wish to - contribute to the achievement of the institute's research goals. Secondly, knowledge of several disciplines appears to be necessary to make progress in understanding and analysing issues of energy security and sustainability. For this reason, CEPMLP is working to reinforce their research by building on our institution's current multi-disciplinary character.

In pursuing their research goals CEPMLP emphasis their ambition to try to ensure that the work carried out is independent as academic work should be, but at the same time that it has relevance not only to the worlds of legal and economic practice but to branches of policy-making in which research ideas can be applied. CEPMLP has strategic alliances with American Washington University College of Law and Institut Francais du Petrole, Paris.

The institute maintains its close links with industry through a comprehensive programme of seminars and professional training and do consultancy service to government, companies and international institutions world wide.

Research conducted at the institute is interdisciplinary, in the fields of law, policy, economics, finance and management.

Research

Research done at CEPMLP is organized around five fields:

Cross-Border Issues

New mechanisms of co-operation have been developing at a rapid rate as a result of

international law developments with a view to jointly developing 'shared' natural resources (oil, gas, water) by states. Separately, regional co-operation initiatives have encouraged multilateral arrangements covering transit of energy (electricity, oil, gas). The issues that arise may be studied and critically evaluated from an inter-disciplinary perspective, primarily through the interface of international and national regulatory frameworks.

Role of Government

Selected issues arising from the involvement of the state in the economic development of natural resources are the focus of this research, especially concerning: sustainable development; the operation of markets versus regulation, and the interface between national and international levels. Its aim is to identify practical and pragmatic outcomes to influence policy development.

Security

The predictable availability of and guaranteed access to energy and natural resources is essential for the modern world. Thus energy and natural resources continue to be closely linked with national and international security, both economic and political. CEPMLP undertakes high quality inter-disciplinary research in fields such as security of energy supply, the political and strategic dimensions of energy policy, security of access rights and environmental security.

International Trade

This theme aims at developing awareness of the role of the international trading system in the energy and resources industries and helping both stakeholders and policy makers understand the important issues. Given the importance of the issues, CEPMLP has decided to develop expertise and leadership in this emerging area with a view to influencing policy at all levels.

Energy-Environment Interface

With the advent of climate change policies, and the national and regional legal schemes designed to give effect to them, new issues of environmental law and policy are arising that cut across all energy and natural resource sectors. These, combined with a set of environmental problems related to petroleum exploration and production, require inter-disciplinary research in this field, with particular emphasis on the role of law and economics. Selected issues are being examined with a view to contributing to the wider debate among stakeholders as well as academic circles.

For a list of publications see <http://www.dundee.ac.uk/cepmlp/gateway/index.php?category=8>

CEPMLP has an on-campus staff of 15, and an extensive list of external consultants and honoraries, and one of the largest doctorate programmes in this area of research with over 40 PhD students.

Relevance

The thematic focus of the research conducted at CEPMLP and geographical proximity and common interests in the same energy related issues make the CEPMLP an interesting possible partner in the planned think tank.

Search for *Norway* OR *Norwegian* produced 216 hits at CEPMLP's website.

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Energy Security Initiative at Brookings, USA

<http://www.brookings.edu/topics/energy-security.aspx>

Presentation

The Brookings Institution is a nonprofit public policy organization based in Washington, DC. Its mission is to conduct high-quality, independent research and, based on that research, to provide innovative, practical recommendations that advance three broad goals which are: to strengthen American democracy; to foster the economic and social welfare, security and opportunity of all Americans and to secure a more open, safe, prosperous and cooperative international system.

As energy security is one of the most important strategic challenges facing the United States and the world that cuts across many sectors – economic, environmental and national security – the Brookings Institution decided to focus on that topic. With its Energy Security Initiative (ESI) and other activities, Brookings is uniquely positioned to tackle energy in a comprehensive and integrated manner, guiding effective, pragmatic policies to address U.S. and global energy security issues over the next decade.

Positioning and co-operation

ESI has an advisory group consisting of internationally renowned experts, led by Daniel Yergin, U.S. Senator Richard Lugar, Shirley Jackson and Thomas “Mack” McLarty. ESI’s work is led by Director and Senior Fellow Charles K. Ebinger.

ESI is one of many projects realized at the Brookings Institution. Projects realized by ESI focus on both geographical dimension of energy security (Russia, China, Middle East, Central Asia, Latin America) and on other aspects, such as climate change, environment, foreign policy, infrastructure, regulations, technology, taxes, trade and transportation.

By being a part of the Brookings Institution, one of the leading US and global think tanks ESI has access to many formal and informal networks and plays a central part in the US discussion on energy security and in the shaping of the US policy in that field.

Research

Brookings scholars examine three key substantive aspects of energy security. From a strategic perspective the focus is on *the geopolitics of energy* in a range of countries and regions around the world, including the Middle East, China, India, Russia, Europe and Latin America, particularly to understand the intersection of politics and energy, security risks to the U.S. and other consumers and producers posed by vulnerabilities to key supplies transport routes, and markets; the ways in which energy demand drives national security decisions in countries such as China and India, as well as the opportunities and risks posed by the geopolitics of nuclear power and coal.

From an economic perspective the focus is on *supply disruptions and price spikes* and their effects on the U.S. and the world energy markets; shifts in global wealth and the questions arising from that, for financial markets and national policies; the impact of open and sustainable economic systems on development both in energy-consuming and energy-producing nations; how trade might be affected and how the WTO/others will address these issues.

ESI also focuses on *climate change and greenhouse gas emissions*, including an examination of non-fossil supply sources; demand management; regulatory, tax and other policy tools that

can influence market incentives to pursue various technologies; the political and economic implications of alternative technologies for various industries and constituencies; and the international arrangements needed to cut global emissions.

In addition ESI focuses on the questions of governance and security arrangements and such topics as federal, state and local regulation of various forms of energy; the role of existing institutions in international energy markets and the implications for emerging economies; regional or global energy disruptions; efforts to increase incentives to invest in new and existing resources and technology; achieving greater diversification of the energy mix domestically and globally; security arrangements that stabilize key regions like the Persian Gulf or transport lanes; building institutional capacity to support market mechanisms to curb carbon emissions; and managing disputes between winners and losers as the cost of carbon is reflected in the United States and other economies. Those issues are approached from the perspective of both producing and consuming countries, and the role of the U.S. is specially examined in this context.

There are 29 experts affiliated with the Energy Security Initiative at Brookings. Energy Security Initiative working papers provide a platform for Brookings scholars and other energy experts to circulate their work to the broader energy analysis and policy communities.

There are more than 160 articles and reports on the topic of broadly understood energy security posted at the ESI website since the beginning of 2005 and more than 260 covering that topic in the period between October 1995 and May 2009. Since 2000 ESI organized ca 60 events on the topic of energy security.

Relevance

As Brookings Institution is consistently ranked as one of the most influential, most quoted and most trusted think tanks in the USA and the US is the key actor in the international energy game, cooperation with ESI should be seen as advantageous as this would give access to ESI networks and make it easier to reach policy and decision making communities not only in the U.S. but also in Europe.

So far there has been not so much interest in Norway in the projects conducted by ESI and there was only one recent event with main speaker from Norway – Petter Nore from NORAD's Oil for Development program who shared his insights with the Brookings Institutions' guests.

Search '*Norway OR Norwegian* site:<http://www.brookings.edu>' produced 723 hits.

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Electricity Policy Research Group (EPRG), the UK

<http://www.eprg.group.cam.ac.uk/>

Presentation

The Electricity Policy Research Group (EPRG) is based at the Faculty of Economics and at the Judge Business School, University of Cambridge. The research team has broad expertise in economics, technology policy and political science. Their core research discipline is economics, within a framework that encourages collaboration between experts from different academic traditions, drawing on insights from engineering, political science and law. EPRG Research is structured around four areas:

- Regulation and Markets
- Technology and Innovation
- Governance and Politics
- Climate Change Policy

Positioning and co-operation

Projects

EPRG's research activities are funded through a variety of research grants and projects. There are currently three main funding streams: Towards a Sustainable Energy Economy (TSEC) Programme, SuperGen and Coordinating Energy Security in Supply Activities (CESSA). TSEC programme is a major component of the UK's science and technology strategy in the field of energy. The electricity Policy Research Group states on its homepage that: "The objective of the programme is to find reliable, diverse, affordable, publicly acceptable and safe ways to supply the growing demand for energy, while minimizing the carbon dioxide emissions from burning fossil fuels." SuperGen (Sustainable Power Generation & Supply) is a multidisciplinary initiative that was established to examine the issues involved in developing a system of sustainable power generation and supply in the UK.

The initiative is managed in partnerships between universities and industry, focusing on major programmes of work to help the UK to meet its environmental emissions targets. The first research consortia were launched in 2003. EPRG's involvement in Supergen started in 2003. Coordinating Energy Security in Supply Activities (CESSA) is a research programme financed by the European Union (EC, DG Research) under the Sixth RTD Framework Programme. Together with European partners the main research objectives are to study the Economics and policy interfaces for gas and nuclear in the context of energy security of supply and a future hydrogen economy.

An important arena is the The Energy Policy Forum (EPF). It was established to facilitate knowledge exchange between corporate members and the research group. EPF members enjoy access to the research team, at bi-annual research seminars, international conferences, Energy Policy Dinners and one-to-one discussions. The Energy Policy Forum is supported by stakeholder membership (business and policy associates), leveraging research funding, extending EPRG's international sphere of influence and enhancing their ability to respond to important research questions as they arise.

Research

Research is focused on four main areas:

Regulation and Markets

An important research theme here is how developing market instruments and a strong regulatory framework are essential in order to ensure that energy is delivered reliably and at least cost. EPRG gives this issue attention particularly in light of climate change and energy security challenges, focusing not only on the UK but also on international experience and debates.

Technology and Innovation

In EPRG's work focus is on building a better understanding of the impact of regulation and liberalised energy markets on innovation and technology deployment, and technology policy and technology choice in the UK and internationally.

Governance and Politics

In this area of research EPRG evaluates how key stakeholders perceive energy security and energy technologies, and how these perceptions impact upon the policy-making process and regulation, both in the UK and further afield.

Climate Change Policy

In this area of research EPRG analyse policy options, their past performance and potential future impacts using analytic and numeric models, empirical evidence and broader stakeholder and literature surveys. A stated aim is to contribute to the evidence base informing policy makers and industry.

Researchers at the EPRG produce a wide range of publications. Main outputs are: EPRG Working Papers, EPRG Updates and Newsletters, reports, articles and books. Two recent publications (books) are: *Delivering a Low-Carbon Electricity System: Technologies, Economics and Policy*, published in 2008 and *Future Electricity Technologies and Systems*, published in 2006.

There were 48 members affiliated with EPRG, including research theme, administrative staff, PhD students and associated researchers.

Relevance

Their expertise in economics could open up for a somewhat different research agenda than what is found at the other institutes here in focus.

Strings Norway and *Norwegian* are found 77 times at the Electricity Policy Research Group's website.

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Program on Energy and Sustainable Development, Stanford University, USA

<http://pesd.stanford.edu>

Presentation

The Program on Energy and Sustainable Development (PESD) based since 2001 at Stanford is a multi-year program that draws on the fields of political science, law and economics and whose mission is to investigate how the production and consumption of energy affect sustainable development. PESD studies the world's energy markets and their consequences for human welfare. It sponsors world-class research on the political, legal, and economic aspects of the world's energy system and is catalyzing the creation of a funded, worldwide network of researchers working on these issues. The program concentrates on the interaction of political, legal, and economic factors that affect how markets really operate. Its past research has sought to explain puzzles such as why most countries have failed in their efforts to create truly competitive electric markets and why the development of natural gas infrastructure can be so difficult even in countries with ample gas resources and everything to gain from exploiting them. PESD gratefully acknowledges substantial core-funding from Electric Power Research Institute and BP Oil.

Positioning and co-operation

PESD works closely with a number of other institutions having interest in the same field. The list of PESD affiliates is made up of 20 institutions – five located in the U.S. (of which two at Stanford), four in China, two in India and South Africa, and one from Austria, Brazil, Canada, Germany, Mexico, Thailand and the UK. In addition to sponsoring world class research, the Program leads advanced graduate and undergraduate courses and field seminars in energy policy.

Research

PESD's research focuses on four areas:

Energy and Development, exploring ways to sustainably deliver modern energy to the 1.6 billion people who are currently without it. Since its inception, PESD has sponsored a wide array of studies aimed at improving the understanding of how modern energy services contribute to human development. These studies have included data collection and reports in Brazil, China, India, and South Africa, support for several doctoral theses in the area, and analysis of particular policies that countries have adopted.

Climate Change Policy, focusing on issues surrounding the engagement of developing countries in the international effort to tame carbon. PESD's research is looking beyond the Kyoto Protocol and will produce a series of articles and other major publications that outline a more effective "post-Kyoto" vision for managing global warming.

National Oil Companies, studying the performance and strategy of state-controlled oil companies and the implications for world oil and gas markets. PESD is studying fifteen of the world's most important NOCs, with the goal of understanding the factors that determine their performance and business strategies.

Global Coal Markets, analyzing the exploding international trade in coal, how it links to country-level policies and reforms, and potential business models that could allow carbon capture and storage (CCS) to play a major role in climate change mitigation. PESD is interested in identifying why coal has been the fastest growing major fuel globally over last five years in an era of potential carbon constraints and whether this growth will continue.

PESD's collaborators in DIW Berlin are developing a model of the global coal trade through 2030 to answer broad questions about the structure and dynamics of the global coal market.

PESD has also done substantial work on the reform of electricity markets in developing countries within the program *Political Economy of Electricity Markets*. Within this framework PESD conducted a study on the real experience with the wave of market-inspired reforms that has spread to most of the world's largest electric power markets and released a large study (published by Cambridge University Press) that compared the experiences with power sector reform in Brazil, China, Mexico, India and South Africa. PESD also PESD has published the most comprehensive assessment of the experience with independent power producers (IPPs) in the developing world. In a carefully controlled study, the PESD team in collaboration with PESD partners abroad examined the experience in 13 countries.

PESD also embarked on a project on global gas market labeled *Geopolitics of Gas*. PESD has examined the emerging global market for gas in three ways. First, PESD have released the study *Natural Gas and Geopolitics* that looks over the last three decades and over a similar horizon into the future at the structure of the world's gas market. PESD also supported a Ph.D. thesis that modeled monthly transatlantic LNG flows and released studies of demand for gas in China and India – two potentially large but poorly understood energy markets.

PESD has a staff of 24, including 20 in research positions. The PESD website lists 137 PESD publications published by the PESD staff since 2005 (<http://pesd.stanford.edu/publications/listall/>)

Relevance

In 2009 issue of *The Global "Go to Think Tanks"* – a ranking of international think tanks published on 19 January 2009 by The Think Tank and Civil Societies Program at the Foreign Policy Research Institute in Philadelphia – PESD was ranked as number 8 on the list of Top Ten Environmental Think Tanks.

PESD is definitely an interesting cooperation partner and could make a great contribution if invited to join the planned international think tank. Especially its expertise on the global gas market, national oil companies, link between energy and development, and climate change could be of interest.

Strings *Norway* and *Norwegian* are found 107 times when Google was used to search for the following search string: *Norway* OR *Norwegian* site: <http://iis-db.stanford.edu/pubs/> where PESD publications are stored.

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<http://www.dauphine.fr/cgemp/>

Presentation

The Centre of Geopolitics of the Energy and Raw materials (CGEMP) founded in 1982 is a research centre of the University Paris Dauphine. It is associated to the Master of Industrial Economics which is part of the Doctoral School of Economics of Organizations, Competition, Innovation, Finance (EDOCIF). The main goals of the centre are research activity, the organisation of conferences, workshops and debates on subjects related to energy and environment, and the training of PhD students working on topics such as energy, raw materials and industrial economics.

Positioning and co-operation

CGEMP has established cooperation with a number of French and foreign actors, amongst other with 16 renowned research centres from France (Département Énergie et Politiques de l'Environnement (EPE) du LEPII (Grenoble), CREDEN at Université de Montpellier I, American University in Paris (AUP)), USA (Institute of Energy (Houston), MIT Center for Economic and Environmental Policy Research (CEEPR), Center for International Strategic Studies (Washington, USA)), UK (Oxford Institute for Energy Studies, Royal Institute for International Affairs (London)), Russia (Moscow International Energy Club), China (Fudan University), Japan (Tokyo Institute of Technology), Belgium (European Energy Institute (EEI, Bruxelles)), Brazil (Energy Economics Group - Institute of Economics de l'Université Fédérale de Rio de Janeiro (UFRJ)) and Australia (Center for Energy and Environmental Markets (CEEM, Sydney)), with 7 French state bodies, and 10 mostly French companies with interests in the energy sector (AREVA, Total, Electricité de France, Gaz de France, Conseil Français de l'Énergie, Institut Français du Pétrole, Suez, ATIC Services, la Société Française de l'Énergie Nucléaire (SFEN) et la Société Nationale d'Électricité et de Thermique (SNET), La Poste).

Research

Main areas of expertise are: Strategic and institutional dimensions; analysis of the energy value chains; geopolitical analysis of the world energy scene. Within the first area the research focuses on the institutional changes in a global perspective (regulation, deregulation, re-regulation), on the institutional dynamics and the legal constraints which are associated to it, on the strategies of actors, the transformation of the relations between the state and enterprises, on the financial constraints and the dynamics of the financial flows and the relations between financial and physical markets. When it comes to the study of energy value chains the research focuses on the structure of the costs and their evolution, the dynamics of the marginal costs of long period, the irreversible costs, the failed costs (*stranded costs*), the social costs relative to the various fields, the inter-energy problems of replacement (electric motor car, for example), and on the problems of price, fixing of a price scale and tax system. When studying geopolitical aspects of the international energy game CGEMP focuses on the risks and the possibilities of break of supply, critical analysis of existing scenarios and forecasts, on certain sensitive zones (the ex-USSR, the Middle East, China, Mediterranean Area, Eastern-European countries). This research also covers the environmental constraints and their possible impact on economic decisions.

CGEMP has a staff of 10 – eight research fellows and two administration officers. There are also five visiting professors and a dozen of PhD students affiliated with the CGEMP. Between January 2005 and 2009 the CGEMP staff published more than 40 articles, three books, and organized 46 conferences and seminars on the topics the Centre does research on.

Relevance

If the international think tank to be set is to include actors from France, especially those focusing on political and security aspects of energy, CGEMP would be one of the best possible partners, not least due to the growing Norwegian presence at the French gas market and cooperation between French and Norwegian companies in some energy projects with relatively high level of political and technological risk, such as the Shtokman gas field. However, having in mind France's special focus and expertise on nuclear energy, which is underrepresented at CGEMP, one could also consider other options when choosing a French partner.

Search for string '*Norway OR Norwegian* site:<http://www.dauphine.fr/cgemp/>' returned 83 hits.

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UK Energy Research Centre UKERC

<http://www.ukerc.ac.uk>

Presentation

Established in 2004 the UK Energy Research Centre is the focal point for UK research on sustainable energy. It takes an independent, whole-systems approach, drawing on engineering, economics and the physical, environmental and social sciences. The Centre's role is to promote cohesion within the overall UK energy research effort. It acts as a bridge between the UK energy research community and the wider world, including business, policymakers and the international energy research community and is the centrepiece of the Research Councils Energy Programme.

Positioning and co-operation

UKERC is a central part of the £28 million cross-Research Councils programme Towards a Sustainable Energy Economy (TSEC) and is funded by three research councils: the Engineering and Physical Sciences Research Council (EPSRC), the Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC).

UKERC is to provide technology and policy assessment, be a meeting place, set up a research register and become an energy data centre.

The UKERC Research Register, provided by the Science and Technology Facilities Council, gives access to information about publicly funded Energy R&D in the UK.

The UKERC Energy Data Centre provides an outward-facing energy data service to the UK energy research community, datasets or pointers to data generated from any source, long term data curation facilities for data generated by current and future Research Council funded projects and added value to existing data sets by establishing and supporting long-term data sets, or hosting scenario models and supporting data sets.

UKERC is a central element and key actor in the National Energy Research Network (NERN), an umbrella network for energy researchers in the UK that is to network all energy disciplines, giving members visibility of a wide and multifaceted area.

By providing technology and policy assessment UKERC is to meet demand from policymakers, industry and other stakeholders for independent, policy-relevant assessments that address key issues in the energy field.

Research

Research at UKERC is organized along the following 6 themes: *Demand Reduction*, *Future Sources of Energy*, *Energy Infrastructure and Supply*, *Energy Systems and Modelling*, *Environmental Sustainability*, *Materials for Advanced Energy Systems*. Under the heading *Demand Reduction* 5 meeting reports, 5 working papers, 2 quick hits, 2 conference papers, 6 presentations and 3 other articles are referred to. Under the heading *Future Sources of Energy* a more detailed overviews of the programs realized in the following 7 fields are provided: Solar PV, Bioenergy, Carbon Capture and Storage, Marine Renewables, Fuel Cells, Advanced Nuclear Fission, Nuclear Fusion. The main aim of the *Energy Infrastructure and Supply* (EIS) program is to research future electricity and gas infrastructure requirements and their alternative developmental paths in the UK. When it comes to *Energy Systems and Modelling* (ESM) the main goal is to maintain and develop comprehensive UK capacity in E4 (energy-economic-engineering-environment) modelling, notably the technology focused energy systems model family, and the macro-econometric MDM-E3 and E3MG models. Research in

the field of *Environmental Sustainability* focuses on the following 4 topics: Bioenergy, Carbon Capture and Storage, Transport and Ofshore Energy Systems. In the last field of research - *Materials for Advanced Energy Systems* – the focus is on the technological aspects in areas such as nanotechnology, interface science, and materials modelling. The goal is to get a better understanding how these developments can be applied in the area of the sustainable energy.

In addition there also are four cross-cutting projects being realized currently at UKERC. Those are: *UKERC Energy 2050* aiming to show how the UK can move towards a resilient low-carbon energy system over the next forty years; *Micro-generation* focusing on the suitability of various types of micro-generation technologies for application in domestic buildings; *Energy Technology Learning Rates and Learning Effects* analysing innovation processes (or 'learning effects') for emerging energy supply technologies, and the representation of these processes in 'learning rates'; and last, but not least *Life Cycle Analysis*, that examines the lifetime environmental impacts associated with different energy supply technologies.

Relevance

UKERC has to be seen as an attractive potential partner in an international virtual think tank focusing on energy security and ways of coping with national and international energy dilemmas. Being a national energy research hub UKERC gives good access to the UK energy research community and may become an arena of a fruitful exchange of views on topics of interest to both Norwegian and British energy communities. What makes UKERC an even more interesting partner is the fact that Norway is becoming more visible at the UK energy market and faces challenges similar to those the UK energy sector – especially its petroleum branch – has been facing over the last years.

Search for string *Norway* produced 88 hits at www.ukerc.ac.uk.

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European Governance and the Geopolitics of Energy Program at IFRI - Institut français des relations internationales, France

http://www.ifri.org/frontDispatcher/ifri/recherche/energie_1165405949121

Presentation

The main goal of the program is to integrate European governance and energy geopolitics. The program highlights emerging key issues and delivers insight and analysis in order to educate policy makers and influence public policy. The program objective is to promote a coherent and sustainable European energy policy. The development of a single European market for energy requires new and coherent strategies at both the European and national levels to ensure the security of energy supplies. At the same time, new environmental concerns call for broader policy objectives. For a better approach of these issues and their impact on price efficiency, energy security and competitiveness

Positioning and co-operation

IFRI Energy *European Governance and the Geopolitics of Energy Program* aims at conducting the cutting edge research, and at fostering discussion, opinion formation and decision-making among energy experts and European policy makers. In order to achieve this goal the Program organizes monthly meetings of representatives from leading businesses, academia, the public policy community and senior government officials participate in Brussels, at an event that is called the Ifri Energy Breakfast Roundtable. These meetings provide a platform for debating European energy policies (at both the European and national levels) where energy, geopolitical issues, and their impact on European foreign & energy policies can be analyzed and discussed. In addition the program delivers policy papers aimed at decision makers and analysts and makes concrete proposals on energy and the environment in preparation of the G8 summits. An Annual Conference of the Ifri energy program is to be an arena where IFRI is to share the program's findings with energy stakeholders. The long-term goal of the program is to publish a *White Paper on European Energy Policy* by the end of the program's three year period.

Research

Energy Program at IFRI is one of the 13 programs realized at the institute. Some of the programs – like Africa, Middle East, Russia and NIS, Turkey – have purely geographic focus, while others – like Energy Program, Space, Migration, Identities and Citizenship, Security and Defence or Health/Environment – focus on specific issues.

Following areas of research are defined as central by the program:

Energy supply security and geopolitics

The focus on geopolitical aspects of energy has much to do with the fact that Europe's own energy resources are limited and that many of the resources available to Europe are located in highly instable regions of the world. Energy security and need for diversification of supply are strategic challenges for almost all member countries of the European Union and the research in that field is to provide policy makers with deeper insights in that field and help them find a common voice on energy policy in order for EU to become a respected actor on the world energy scene.

CO2 and greenhouse gas emission concerns

The fight against global climate change is a priority area for European policy makers. The European emission trading scheme (ETS) is exploring new territory using market-based

instruments for environmental policy objectives. The program explores the potential market consequences of ETS implementation and how investment decisions are affected.

Probability of a progressive decline in oil and gas resources

Increasing global demand for energy services based on hydrocarbons (most notably electricity and transport) has put pressure on ever more inaccessible reserves requiring larger investments. These investments frequently take place in environments bound with environmental, human and political risks. The program examines how this challenge affects investment, prices and security of supply.

Energy and Public Opinion

The program studies public opinion regarding energy. The implementation of a coherent European energy policy will depend on the maintenance of public support. It is therefore of prime importance to understand the motivations of negative public reactions to proposed energy development.

Technological abilities and the impact of prospective developments

The program addresses the emerging challenges of renewable energy sources (wind, solar, wave, tidal, biomass) and alternative transportation fuels. It will also look at the potential for efficiency improvements in the use of conventional energies (clean-coal, oil, gas, nuclear fission and fusion). The program explores which technological developments are likely to improve the production, transport, storage and consumption of energy systems in the years to come.

The program has a staff of 6 – 5 of which are research fellows. In addition the program has its own Steering Committee and independent Scientific Committee. The Energy program also draws on a wide network of European scholars and energy experts which contribute to its different activities.

Since January 2007 the program organized 25 seminars and panel discussions, 6 conferences and 1 lunch seminar. Program's director was also invited to take part in 3 events outside of the institute. In the same period the program researchers and invited guests published 30 articles in IFRI's on line series *Actuelles de l'Ifri*, 16 in *Notes de l'Ifri* series and 10 other energy related publications at IFRI.

Relevance

European Governance and the Geopolitics of Energy Program at IFRI was originally on our long-list of possible cooperation partners but did not make to the short list that was sent to energy experts. However, the Program got the highest number of 'points' among those that were not on the short list but were proposed by surveyed experts as the most promising potential partners among those that were not on the list they received. The program has established itself as one of key actors in the French and European debate on energy security, especially its geopolitical aspects, and those that have the greatest importance for shaping of the EU common energy policy. Having this in mind one should consider the program as one of the potential partners that could open access to both the French and EU audience with interest in energy matters. The program has already published an extensive study on Norway's role in the European energy context (*The European Gas and Oil Market : The Role of Norway* by Florentina Harbo, from NORISS) and another study on similar topic, with focus on both Norway and Russia, was also published by another program at IFRI (*Russia and NIS - High Stakes in the High North : Russian-Norwegian Relations and Their Implications for the EU*, by Jakub M. Godzimirski (NUPI)).

Search for string *Norway* OR *Norwegian* at www.ifri.org. returns 142 hits.

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The International Energy Agency (IEA), International

<http://www.iea.org/index.asp>

Presentation

The International Energy Agency (IEA) is an intergovernmental organisation which acts as energy policy advisor to 28 member countries in their effort to ensure reliable, affordable and clean energy for their citizens. Founded during the oil crisis of 1973-74, the IEA's initial role was to co-ordinate measures in times of oil supply emergencies. Founding objectives were:

To maintain and improve systems for coping with oil supply disruptions, to promote rational energy policies in a global context through co-operative relations with non-member countries, industry and international organisations, to operate a permanent information system on the international oil market, to improve the world's energy supply and demand structure by developing alternative energy sources and increasing the efficiency of energy use, to promote international collaboration on energy technology and to assist in the integration of environmental and energy policies. Its mandate incorporates the "Three E's" of balanced energy policy making:

- Energy security
- Economic development
- Environmental protection.

Positioning and co-operation

Current work at IEA focuses on climate change policies, market reform, energy technology collaboration and outreach to the rest of the world, especially major consumers and producers of energy like China, India, Russia and the OPEC countries. Research is coordinated through three directorates; Directorate of Energy Markets and Security (EMS), Directorate of Global Energy Dialogue (GED) and Directorate of Sustainable Energy Policy and Technology (SPT). The agency has a global outreach exemplified through co-operation with 28 member countries and the fact that information on the website is found in both Russian and Chinese.

IEA holds regular events and workshops. These activities underscore the agency's ambition to be an international forum for sharing information and ideas on the rational management of world energy resources. Yet another example of IEA's relevance is the work done for G8. In 2005, G8 leaders invited the IEA to their Summit in Gleneagles, Scotland. In their resulting Plan of Action, the G8 asked the Agency to develop concrete recommendations to achieve a "clean, clever and competitive energy future". Since then, the IEA has participated in the annual G8 meetings, submitting reports and findings from its three years of work for the G8.

Research

Researchers at IEA analyse and give recommendations in a wide variety of fields. IEA information is categorised by the following keywords: coal, CO2 capture and storage, climate change, demand analysis, electricity, emission trading and CDM, energy efficiency, energy market reform, energy policy, energy projections, energy security, environment, fusion power, greenhouse gasses, G8, natural gas, non-OECD countries, oil, renewable energy, sustainable development, technology and transport.

With a staff of around 190, mainly energy experts and statisticians from its 28 member countries, the IEA conducts a broad programme of energy research, data compilation, publications and public dissemination of the latest energy policy analysis and recommendations on good practices. There are 122 publications published since 2005

available for free download from the IEA's website. A complete list of recent and forthcoming books, articles etc. can be found at:

<http://www.iea.org/Textbase/publications/index.asp>

Relevance

IEA is an important actor when addressing questions of energy security and climate change. With its broad research portfolio and close ties to 28 member countries IEA should be considered as a most interesting partner.

Since 1997 IEA has published 5 in depth studies of energy sector in Norway, and Google search for the following string *Norway OR Norwegian* site:<http://www.iea.org> produced 2410 hits.

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