



dti

ENERGY TECHNOLOGIES
INSTITUTE

Prospectus

SEPTEMBER 2006



Probing the internal workings of a fuel cell: Laser Doppler anemometry mapping the flow of reactants inside a channel of an optically transparent fuel cell as performed in Dr Anthony Kucernak's research group, Imperial College London (Blewitt, Brett, Kucernak, Ladewig and Shrimpton). Image courtesy of Dr Anthony Kucernak, Imperial College London.

Foreword



The Rt Hon
Alistair Darling MP
Secretary of State
for Trade and
Industry

Not since the 1970s has energy been so high on the political and media agendas, and a matter of public interest and debate, and rightly so. In just a few decades we must radically transform our energy systems. Not only how we produce our energy but also the efficiency with which we use it and how we manage its transport and storage. The drivers for this are powerful ones, as we strive to assure the secure and sustainable energy that is fundamental to our prosperity and to our way of life, both now and for the long term. There can be no doubt that the challenge we face is a major one, in the UK and globally. But I believe it is also an exciting one, with huge opportunities to be grasped by those with the ingenuity and drive to take advantage.

Research excellence and innovation are central to achieving our energy goals. I believe that the Energy Technologies Institute represents the most important

development in UK energy research and innovation for decades. By bringing together the efforts and investments of both public and private sectors, and by focusing on key energy challenges with a new level of scale and ambition, we have the potential to achieve step-change advances.

For its part, the Government has already announced that it is prepared to provide £500 million in support, creating the potential for a £1 billion Institute over a lifetime of a minimum of 10 years.

This prospectus sets out a high level vision for the Institute and details our proposals for implementation. Its success will depend crucially on securing wider support from the private sector for what will be a true 50:50 partnership.

A handwritten signature in black ink, appearing to read 'Alistair Darling'.

Statement of industrial support

As senior executives of four of the world's leading international energy companies, we offer our enthusiastic support for the initiative taken to establish the new Energy Technologies Institute as a 50:50 public private partnership. We recognise that accessing the best research and technology is of vital importance for each of our companies if we are to provide the products and services that will enable us to thrive through a century in which we will see fundamental changes to the business and environmental context in which we operate.

We are committed to working with Government, with the research community and with other interested companies – large and small – to make the new Institute a success. Participation of additional core industry partners being essential, we invite other companies to join ours in making this unique venture happen.



Paul Golby
E.ON UK



James Smith
Shell



Vincent de Rivaz
EDF Energy



Iain Conn
BP



Introduction

Society's increasing awareness of human impact on the environment, particularly with regard to climate change, is driving business and governments to explore potential solutions. Most societies wish to achieve sustainable, secure and affordable energy that supports their economic development yet also contributes to the stabilisation of CO₂ emissions. Recent investment in energy science and technology has already demonstrated that low-carbon energy sources can be employed and that energy efficiencies can be achieved.

There is in the UK, however, an urgent need to accelerate the pace and the volume of research activity directed towards the eventual deployment of the most promising research results. We must identify the technologies on which to focus by considering their eventual contribution to low carbon, secure energy supplies, identify the R&D gaps in the full innovation chain, and ensure that the necessary research is undertaken.

This Prospectus invites expressions of interest from additional potential core industry partners.

A new Institute to provide focus and pace

“The Energy Technologies Institute will bring a new level of focus, ambition and industrial collaboration to the UK’s work in the field of energy science and engineering, and will exploit the UK’s potential to be a world-leader in energy technologies.” (Energy Review Report 2006)

The Energy Technologies Institute will aim to provide the UK with a pre-eminent, world-class means for delivering energy technology research to underpin eventual deployment. To do so, the Institute will connect the best scientists and engineers working in academic and industrial organisations both within the UK and overseas. The projects these teams deliver will accelerate the movement of industrially applicable innovative energy technologies through the full innovation chain to enable eventual commercial deployment to begin broadly within 10 years. The work of the Institute therefore primarily occupies the middle ground between the longer-term research funded by the UK’s Research Councils and the deployment of proven technologies, although by exception it may undertake small scale demonstration projects.

The Institute will aim to be inclusive, developing projects and partnerships with whoever can undertake the world’s best R&D. Some of the best ideas and research excellence exists within smaller companies (SMEs), such as university spin-offs. The Institute will be structured to welcome and encourage the involvement of such firms, recognising the particular funding and other challenges that they face.

Funding – a public private partnership

Under the model being developed,¹ core funding will be provided on a 50:50 public private partnership basis, with the ambition, when fully operational, to inject some £100 million per year into UK-based energy research. The Government will provide 50 percent of the core funding of the Institute, up to an agreed limit. This represents a significant increase of spend on energy R&D in the UK and will both build on and complement current academic energy research. The Institute will have a lifetime of at least 10 years.

Some of the world's biggest energy companies are already involved in this unique venture and helping to drive the initiative forward – BP, E.ON UK, Shell and EDF Energy. To maximise impact additional private sector support is essential. **We are seeking 10 core industry partners in the final consortium, each committed to making an equal contribution of up to £5 million per year.**

These core industry partners will play a key role in the Institute by shaping the initial research agenda for the Institute so that it accelerates energy technology solutions in critical areas. It will do this by linking academic research to the commercial world and by providing a “critical mass” of private and public sector funding. The Institute will create a framework within which core industry partners will be able to make arrangements to benefit from the intellectual property developed by the Institute.²

¹ This is an innovative approach that is likely to require State Aid clearance, and details may need to be modified to obtain Commission approval.

² The IPR arrangements will be subject to competition considerations and State Aid approval and are likely to be tailored on a project-by-project basis to meet the specific needs of the participants in the project.

Objectives of the Institute

Building on the programmes and initiatives that are already in place, the Government's aim for the Institute is to deliver a step change in the funding, strategic direction and outcomes of UK energy science and technology. As such it will work to objectives that are specific, ambitious and closely linked to the UK's overall energy policy objectives. The Government's four goals for energy policy are to:

- Put ourselves on a path to cut the UK's CO₂ emissions by some 60 percent by about 2050, with real progress by 2020;
- Maintain the reliability of energy supplies;
- Promote competitive markets in the UK and beyond, helping to raise the rate of sustainable economic growth and to improve our productivity; and
- Ensure that every home is adequately and affordably heated.

All of these goals are relevant to the work of the new Institute. The Institute's remit is therefore to accelerate the development of secure, reliable and cost-effective low-carbon energy technologies that can be deployed commercially as quickly as possible. The Institute will play a major role in technology developments internationally in support of the UK's climate change goals.

Objectives for the Institute

- ▶ To increase the level of funding devoted to R&D to meet the UK's energy policy goals, both domestically and internationally.
- ▶ To deliver R&D that facilitates the rapid commercial deployment of cost effective, low carbon energy technologies. Exceptionally this may include small demonstration projects.
- ▶ To provide better strategic focus for commercially applicable energy related R&D in the UK.
- ▶ To connect and manage networks of the best scientists and engineers, both within the UK and overseas, to deliver focussed energy R&D projects to accelerate eventual deployment.
- ▶ To build R&D capacity in the UK in the relevant technical disciplines to deliver the UK's energy policy goals.

Evaluation

Specific technology programmes will have individual project plans with milestones and timelines in order that the Institute can monitor progress towards specific objectives. Where the Institute work focuses on a contributing element, for example materials, progress will be assessed by the potential application(s) of the development and its potential cost impact. In addition, the Institute will identify and agree a methodology for assessing carbon reduction resulting from its work, noting that these reductions will be achieved over a timescale that could be much longer than the life of the Institute.

The Institute will therefore be evaluated against the following performance measures:

- The contribution that its activities collectively make to building research capacity in the UK in the relevant technical disciplines to deliver the UK's domestic and international energy goals;
- The extent to which the Institute can demonstrate practical success in helping to accelerate key technologies towards commercial deployment;
- The extent to which its activities collectively help to deliver the UK's domestic and international energy goals; and
- The extent to which its activities collectively have wider economic benefits.

Initial focus for the Institute

A small number of specific industrially relevant R&D projects, including R&D in support of demonstration and eventual deployment, will be selected from within a framework of the general themes set out below.

Theme 1: Large Scale Energy Supply Technologies

Objective: To develop technologies to improve efficiency of power generation and to develop sustainable approaches to reducing emissions from existing fossil fuel technologies.

Theme 2: Energy Security of Supply

Objective: To develop a mix of energy technologies (excluding nuclear) to increase security and diversity of supply, consistent with helping to deliver the UK's energy goals.

Theme 3: End Use Efficiency/Demand Management

Objective: To increase substantially the efficiency of energy use on the demand side.

Theme 4: Transport

Objective: To develop sustainable transport fuels and transport management technologies.

Theme 5: Small Scale Energy Supply Technologies

Objective: To develop new and emerging distributed energy supply options using smaller scale technologies that utilise locally available energy sources.

Theme 6: Support Infrastructures

Objective: To develop sustainable energy infrastructure and supply technologies.

Theme 7: Alleviating Energy Poverty (through the provision of secure, clean energy to the poorest communities)

Objective: To develop proven and sustainable energy solutions that can be deployed locally to break the current link between environmental harm and the economic and social development of the world's poorest people.

(Some of these themes, notably Theme 3 and Theme 4, have already been identified by the Technology Strategy Board as priorities for the Technology Programme.)

Organisation and Funding of the Institute

It is envisaged that the Institute would be a joint venture company (probably limited by guarantee) operating independently of its member companies, public sector partners and host institution. The Institute would have a **Board of Management** drawn from the core industry partners and public sector funders, with representation from other participants.

The Institute will have a strong governance structure to ensure optimal allocation of funding to the best projects. Selection of projects will also need to take into account the needs of partners and other funding participants. It is envisaged that the Board of Management will establish a **Research Advisory Group** to advise on the selection, development and assessment of programmes, operating within clear criteria set out by the Board of Management to ensure the objectives of the Institute are addressed across each programme selected. Members of the Research Advisory Group will be selected from the core industry partners, other industry participants, academia and public sector funders, NGOs and advisory groups. Part of its remit will be to ensure that the interfaces between the work of the Institute and other funders are managed to avoid overlap and confusion.³

A **Director** will be selected to provide day-to-day leadership of the Institute. The Director will be a high-

calibre figure with a strong track record in the field of energy research and with industrial experience and high-level influencing skills. The Director of the Institute will report to the Board of Management who will be responsible for governance and administration.

It is envisaged that a leading research institution will host the Institute. The **host institution** will provide research facilities, offices and infrastructure to the Director and support staff. It is expected that the host institution will be a highly respected participant in energy technology research, and will be identified and selected with the full involvement of the Board of Management and the Research Councils. It is envisaged that the Institute will need dedicated facilities that may not exist at present, established in partnership with other organisations.

The following funding profile is currently envisaged, if there are worthwhile projects available. The Department for Trade and Industry is committed to providing 50 percent of these funds:

2006-7	2007-8	2008-9 (and onwards)
£2m	£20m	£100m p.a.

³ In particular, the Research Advisory Board and the Technology Strategy Board will need to work closely together on emerging energy technologies following the Energy Review.

Modus Operandi for the Institute

The Institute will select, commission, fund, manage and undertake, where appropriate, the delivery of research programmes, with a significant proportion of funding focussed on investment in a small number of key technology areas with the greatest promise for eventual deployment on the basis of their eventual contribution to low carbon, secure energy supplies. Competitive mechanisms (with appropriate peer review for quality and for commercial relevance) will be used to allocate funds to specific R&D projects.

The R&D will be carried out in centres of excellence across the UK and, where essential to the objectives of the Institute, overseas. Research teams will be drawn from industry, large and small, and academia, and may include researchers overseas. These collaborators will benefit from the opportunity to leverage their own investment in R&D with that of the core fund, and have access to the Institute's infrastructure and network.

State Aid

Because of the nature of this Institute and the research it will be funding, State Aid clearance is likely to be necessary and we will need to seek approval for the Institute's structure and operating terms, once they have been finalised.

Timeline to Full Operation

Expressions of interest from additional core industry partners	end November 2006
Identification of Institute Director	end 2006
Finalising structure and organisation of the Institute	January 2007
Identification of key academic centres	during 2007
Institute legally established and fully operational	2008

In addition, we are planning an open information event to attract wide participation not only by possible core industry partners but also by those interested in collaborating in the work of the Institute or hosting it.

Invitation

We invite additional private sector partners to participate in establishing the Institute as envisaged above and to commit in principle to funding on the basis set out above.

If you would like an informal preliminary conversation, please contact Paul Williams, Director Research Councils (tel. 020 7215 3943, paul.williams@dti.gsi.gov.uk) or Martin Ridge, Project Director Energy Technologies Institute (tel. 020 7215 2861, martin.ridge@dti.gsi.gov.uk).

We would also like to hear from other public sector funders and other potential business, academic and other participants interested in becoming involved in the proposed work of the Institute.

More information and details of the open information event are provided on the DTI website at:

www.dti.gov.uk/science/science-funding/eti

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