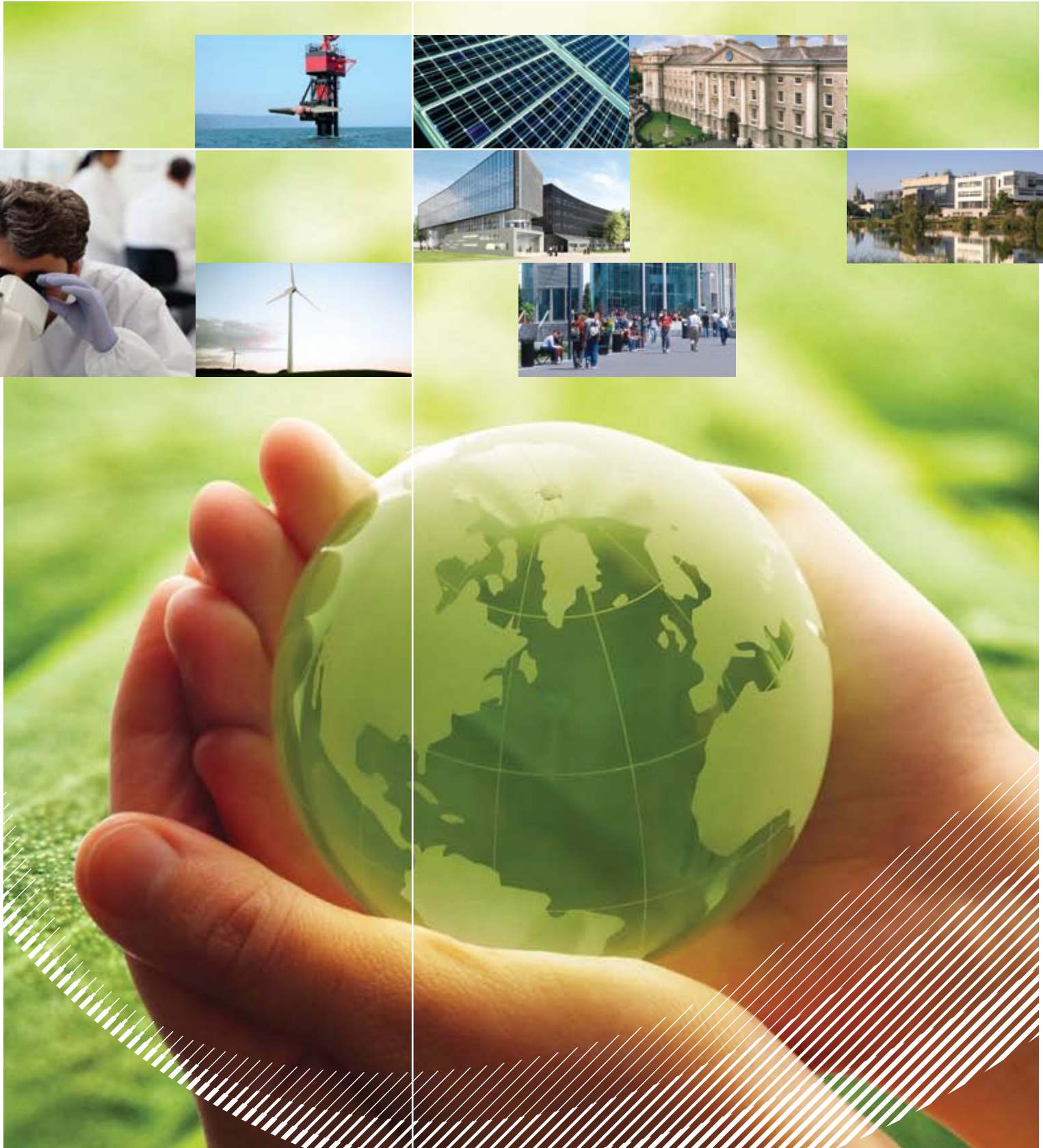


# Contributing to the 'ideas economy':

Stories from sustainable energy innovators



“The careful funding choices made in this Plan seek to protect core areas of economic investment such as education and supports for enterprise and innovation for the development of the smart economy.”

**Ireland’s National Recovery Plan, 2011-2014**

“The objective is to create an exemplary research, innovation and commercialisation ecosystem which capitalises on the Government’s unprecedented €8.2 billion investment in science and technology.

... It will involve creating a similarly R&D-intensive indigenous enterprise sector through the provision of strong supports for start-up companies and entrepreneurs whose companies will provide the employment of the future.”

**Building Ireland’s Smart Economy: A Framework for Sustainable Economic Renewal, 2008**

“Research, development and deployment spending by governments and corporations totaled \$24.6 billion in 2009, with government R&D up 49% at \$9.7 billion and corporate RD&D down 16% at \$14.9 billion. The shifts reflected greater willingness by governments to invest in research on sustainable energy technologies – to help generate economic activity – and also caution on the part of some big corporate players at a time when their profits were under pressure.”

**Global Trends in Sustainable Energy Investment 2010, Bloomberg New Energy Finance and UNEP, 2010**

Report compiled by:  
**Matthew Kennedy and Katrina Polaski**  
February 2011

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## Foreword



Ireland is facing a significant period of economic uncertainty and one of our many tasks, as the national energy Authority, is to both foster innovation and support entrepreneurial culture that contributes to a new smart economy. I believe that the transition to an intelligent, sustainable energy society will be centred on innovation in technologies and behaviours.

We have identified a number of interventions in pursuit of our strategic objectives, one of which involves support for enterprise and innovation. This involves engaging with scholars and start-up enterprises to foster ideas and make commercial product offerings available that stimulate future economic growth.

Economic growth comes from ideas. I believe that investment in our smart economy represents the single best bet for Ireland to lift itself out of recession. Nurturing these sustainable energy ideas, while striving to achieve innovation and bring new product offerings to the market, becomes the key challenge. The drive towards stimulating our economy and promoting competitiveness requires an expansion of supports for enterprise that are transformational in their objectives.

We need to respond quickly so as to implement our ideas and capture new opportunities. Our response to date has focused on encouraging, enabling and empowering start-up clean technology businesses and supporting 18 academics achieve excellence. Significant research and demonstration activities are being carried out, to PhD level, across Ireland's academic institutions. In parallel, Irish entrepreneurs are creating enterprises that are specifically focussed on making low carbon technologies more commercial and deploying them to a wider market. This publication is about highlighting the contribution some of these individuals and businesses are making to Ireland's economy. They are the key actors entrusted with building Ireland's reputation.

This publication also profiles exciting activities and results in terms of the current quality of research and enterprise activity in Ireland. These individuals and companies are making a significant contribution to strengthening our economy, reducing the cost of energy and the scale of our carbon emissions, and stimulating investment in sustainable energy.

I wish to acknowledge our collaboration with the Irish Research Council for Science Engineering and Technology and the various incubation facilities through Ireland's third level institutions. My final thanks go to the individual researchers and companies that agreed to participate in this project.

A handwritten signature in black ink, reading "J. Owen Lewis". The signature is fluid and cursive.

Professor J. Owen Lewis  
**Chief Executive,  
Sustainable Energy Authority  
of Ireland**

## Introduction

Despite what have become exceptionally difficult global conditions, Bloomberg New Energy Finance has estimated that global clean energy investment was \$175-\$200 billion in 2010. Competition for this investment is growing; emerging opportunities in these technologies need to be grasped and many low carbon technologies have not yet reached maturity.

Emerging enterprises and high-calibre academics can help to move the economy along the necessary sustainable energy transition path. Government investment in technology research plays a critical role at the early stages of the finance continuum (see Figure 1).

To date, SEAI's investment has centred on bringing innovative ideas to the market. Our supports are focused on start-up enterprises and the provision of sponsorship to high calibre researchers to PhD level. There are three dimensions to our strategy:

**1 Encouraging** full-time researchers, at the early stages of their careers, and start-up business ventures in early developmental stages, to stimulate research and creative enterprise ideas

**2 Enabling** talented people to follow through on their research and business concepts and, thereby make a significant intellectual contribution to the smart economy

**3 Empowering** by stimulating excellence in energy research and enterprise.

New technology advances and applications remain a key driver to achieving our smart economy (see Figure 2). Governments are now making the connection between the development of a digital economy and new clean technology industries. The ideas being generated from these sustainable energy industries will drive the economy through increased competitiveness.

### SEAI'S STRATEGIC OBJECTIVE

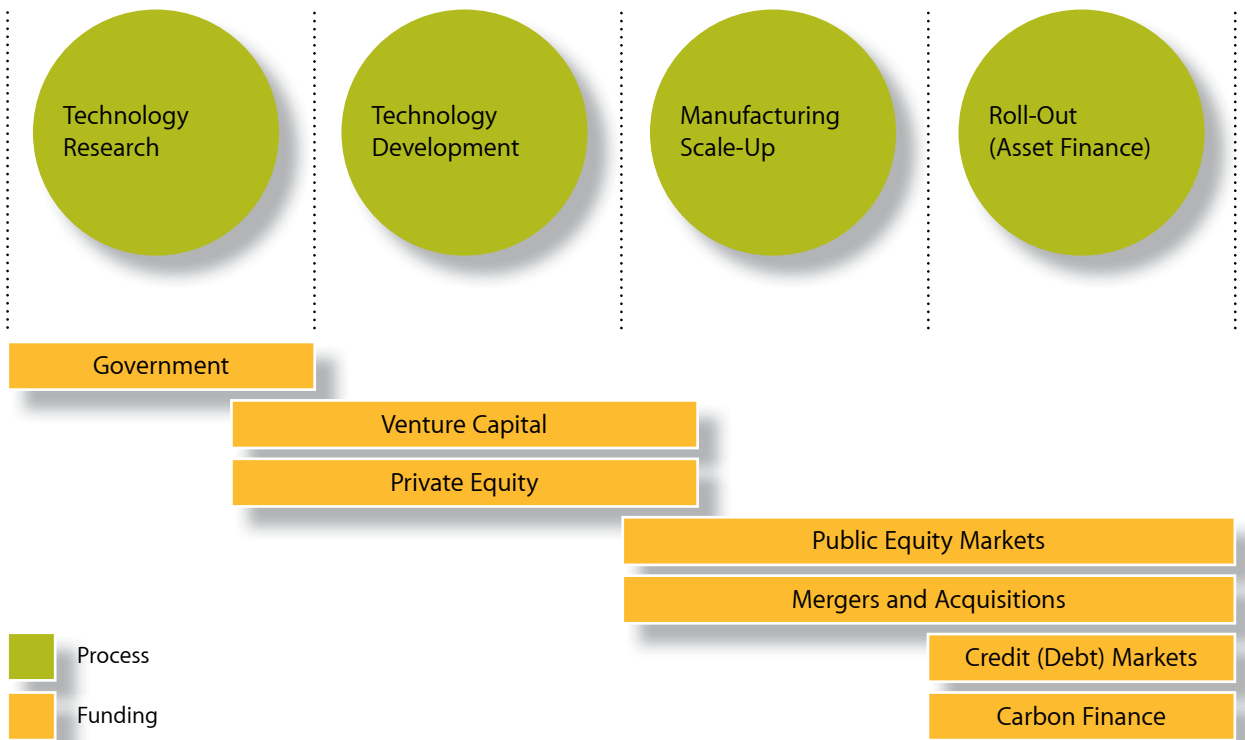
#### ***Innovation and integration***

The transition to a smart, sustainable energy society will be centred on innovation in technologies and behaviours. Change will be driven through integrated action, bringing the right people and organisations together to work flexibly and adapt to new challenges. The interventions required include supports for innovation and enterprise, as well as the identification and delivery of the required policies and infrastructure.

"A smart economy is a low carbon economy, with sustainable development as its ultimate aim."

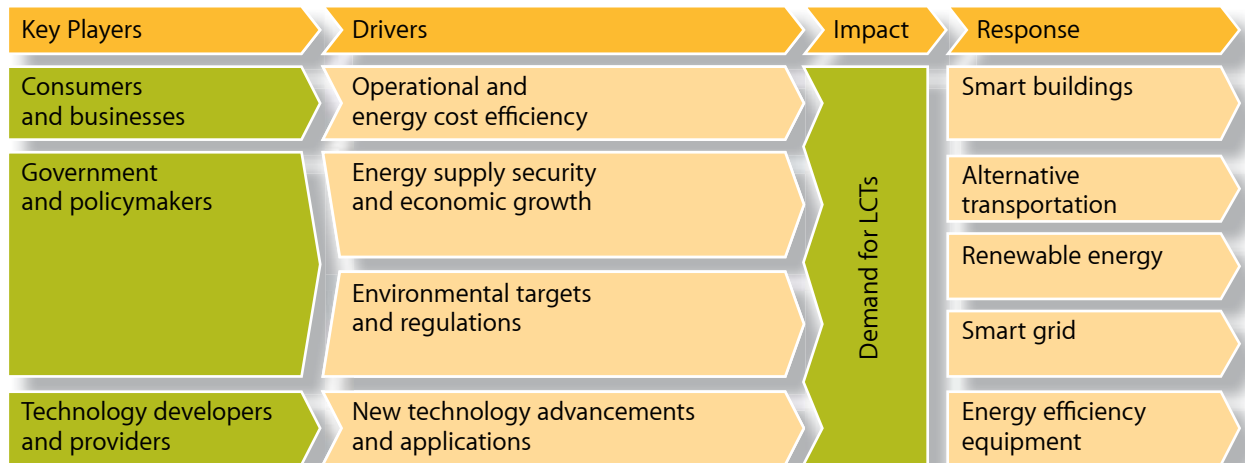
**Building Ireland's Smart Economy, 2008**

**Figure 1: The sustainable energy finance continuum**



© 'Global Trends in Sustainable Energy Investment 2010', Bloomberg New Energy Finance, 2010

**Figure 2: Drivers for a low carbon economy**



© 'Carbon Capital: Financing the Low Carbon Economy', Barclays, 2011

## Academic excellence to the forefront of Ireland's 'ideas economy'

Since establishment in 2002, SEAI has contributed towards building academic capacity in sustainable energy technologies by supporting talented researchers in their early-stage career formation.

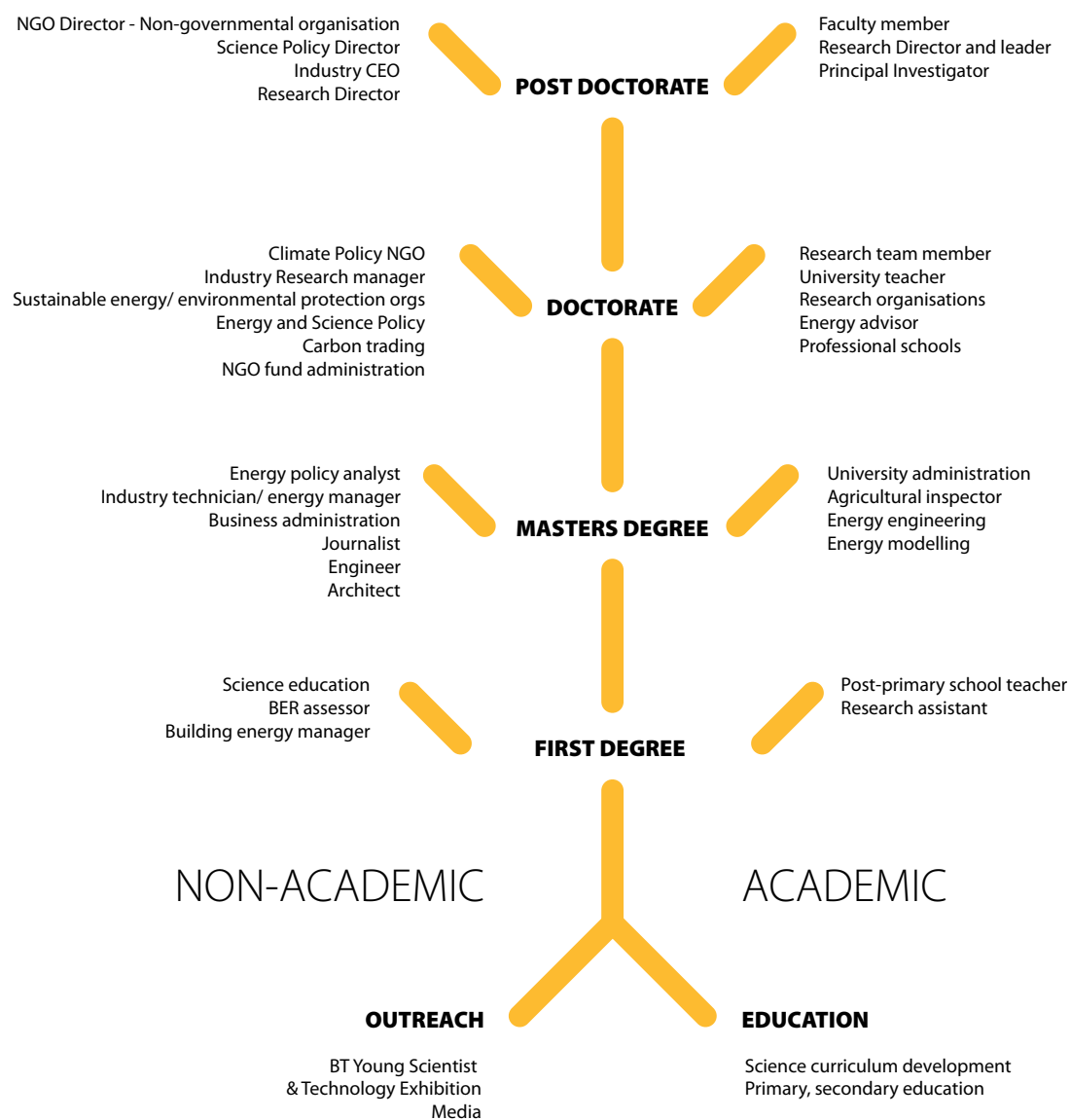
This engagement is made in collaboration with the Irish Research Council for Science, Engineering & Technology (IRCSET). Emphasis is placed on exploratory research aimed at yielding new concepts, findings and innovations within Ireland. The value of each award is €24,000 per annum: a €16,000 stipend per year for the student and €8,000 to meet costs of fees and research expenses. This support is across a series of strictly competitive calls for applicants. Proposals are evaluated based on academic record, supervisors' commentary and the goals of individual researchers. The research themes are

diverse and in line with SEAI's priority technology areas. Selection for funding is based on merit and the decision processes are overseen by independent assessment panels. Scholarships are awarded only to individuals who engage full-time in research during the period of the award.

SEAI has supported 18 doctoral fellows since 2003. This publication provides a profile of nine scholars that SEAI has supported in areas ranging from the grid integration of wind energy to alternative fuel sources.



**Figure 3: Researcher career progression examples**



# Sustainable Energy Academic Investment

## Researcher Overview



### 1. Breiffni Fitzgerald

Wind Energy

Department of Civil,  
Structural and Environmental Engineering

**Trinity College Dublin**

Commencement date: 2009

Supervisor: Professor Biswajit Basu

### 2. Daniel Burke

Wind Energy

School of Electrical, Electronic  
and Mechanical Engineering

**University College Dublin**

Commencement date: 2006

Supervisor: Professor Mark O' Malley

## Research Context

**The global wind energy market is growing fast. Scientists have set a target of halving global carbon emissions by 2050. The International Energy Agency estimates that in order to achieve this target, 17% of all worldwide electricity generation will need to come from wind.**

There is now a pressing need for new, larger wind turbines with greater power capacities. These next generation turbines will have capacities between 5 and 7.5 megawatts (MW) and tower heights and rotor diameters of over 80m and 120m respectively. These turbines have the capability of generating approximately 17 gigawatt hours (GWh) of power a year. There is now a real opportunity to produce wind energy at competitive prices at offshore wind farms.

Structural vibrations can become a limiting factor in the design of turbines with the increased size and flexibility of the tower and blades. Vibration control of larger wind turbines, particularly operating offshore, poses a serious challenge to the further development of such machines and may have an impact on their ability to operate at required levels of reliability.

Breiffni Fitzgerald's work is centred on developing smart vibration control strategies for the next generation of wind turbines. This new area of research will be carried out using the unique experimental facility in the Structures Laboratory at Trinity College Dublin.

## Research Context

**Wind energy has tremendous potential as an indigenous and renewable form of power generation. However, in contrast to most conventional power generation sources (coal, gas, hydro), wind energy is a variable resource. In order to maximise the capability of wind energy and other variable renewable sources it is necessary to reconsider the traditional transmission system planning models.**

Daniel Burke's work is focussed on developing more efficient approaches to system planning with large amounts of wind generation. The research methods and results presented in this thesis pertain to concise and pragmatic representation of wind power's distinctive characteristics in transmission studies, proposing computationally efficient approaches to the resultant large-scale optimisation models, and giving due consideration to related issues within a deregulated power system context.

Daniel's work will help to analyse many of the factors that affect the production of wind energy.

Due to its uncertain nature, modelling wind in system planning models is computationally complex. Even with relatively concise representation of wind power's characteristics, optimisation models of power systems will still be large scale. The analysis and results presented in this research have important relevance for economic wind integration into constrained transmission networks.



### 3. David Cashman

Wave Power

Power Electronics  
Research Laboratories (PERL)  
**University College Cork**  
Commencement date: 2006  
Supervisors: Dr John Hayes and Dr Michael Egan

#### Research Context

**The Double-Fed Induction Machine (DFIM) is widely regarded as the optimal generation system for both onshore and offshore wind turbines and has also been considered in wave power applications.**

Various wave energy converter technologies currently exist with the oscillating water column type converter being one of the most advanced. There are fundamental differences in the power profile of the oscillating water column wave energy converter and that of a wind turbine. This causes significant challenges in the selection and rating of electrical generators for oscillating water column devices.

David Cashman's research aims to provide an accurate per-phase equivalent circuit model of the DFIM by investigating various characterisation testing procedures. He is using novel testing methodologies based on series-coupling tests. These provide a more accurate representation of the DFIM than standard Institute of Electrical and Electronics Engineers' testing methods.

### 4. Eamonn Lannoye

Power system engineering,  
renewable energy integration

Electricity Research Centre  
**University College Dublin**  
Commencement date: 2009  
Supervisor: Professor Mark O'Malley

#### Research Context

**The growing number of different energy sources has resulted in an increase in the proportion of variable renewable energy generation in power systems. These variations mean that system operators and planners will require new methods to provide for changing system flexibility requirements.**

Eamonn Lannoye's research defines and quantifies the need for flexibility in power systems. By investigating the needs, sources and factors that affect flexibility, he plans to provide possible solutions.

Quantifying the requirement for the flexibility and ability of power systems to meet the demands of systems with high proportions of variable generation is a novel area of research in which little work has been done to date. At this stage, it is crucial to develop realistic solutions to ensure flexibility in the future. These solutions, once in place, will require significant changes to system operation and electricity markets.

## Sustainable Energy Academic Investment

Researcher Overview



### 5. Orla Madden

Alternative Fuel Sources

Mechanical Engineering

**University of Limerick**

Commencement date: 2006

Supervisors: Dr Robin Howard-Hildige

#### Research Context

**With oil reserves being depleted and the need for a reduction in greenhouse gas emissions, alternative fuel sources are now required. Rapeseed and other oil seeds, as well as biodiesel, can provide a sustainable alternative fuel for diesel engines.**

Orla Madden's work is aimed at determining some of the chemical and physical differences between existing commonly used seed oils (as well as less tested seed oils) and mineral diesel fuel. Orla's research looks at the combustion characteristics, combustion chamber pressure time curves and storage stability of the different fuels.

The results of this work will provide the information needed to allow for the optimisation of engine settings (fuel injection timing, pressure). In addition, Orla's research monitors the reliability, durability and operability problems that can occur with the use of these liquid biofuels. The work investigates the best storage conditions for seed oils as fuel. The fuels are being trialled across a range of vehicles with a view to determining which fuel/fuel blend is most suitable for use in fleet vehicles.

### 6. Ciaran Reilly

Offshore Windfarms

Geotechnical Engineering

**Trinity College Dublin**

Commencement date: 2010

Supervisor: Dr Trevor Orr

#### Research Context

**Wind farms have been constructed off the shores of many countries including Denmark, the United Kingdom and Germany. The foundation systems for offshore turbines can account for up to 25% of a project's capital expenditure. Given the expense of foundation systems, it is important to refine and optimise foundation design in order to minimise cost. Any modification of foundation design must achieve the necessary safety and reliability. As wind turbines get larger and move into deeper waters, new and innovative foundation systems will be required.**

Knowledge gained from the offshore mineral exploration industry has been the main contributor to wind turbine foundation system design to date. However, the loads transferred to foundations from wind turbines differ significantly from those arising from oil and gas rigs.

Ciaran Reilly's research uses finite element methods to model the effect of dynamic loading on a range of foundation systems with different turbine sizes and hub heights. Ciaran's work involves establishing relevant geotechnical parameter values, investigating and analysing the soil-structure interaction that takes place, and investigating the effects of cyclic loading on typical offshore wind turbine foundation systems.

This research contributes to the understanding of foundations for offshore turbines and complements other active research in Ireland. The results will provide guidance to the expanding Irish offshore wind and ocean energy industry.



## 7. Darren Coppinger

Wave Power

### NUI Galway

Commencement date: 2010

Supervisor: Dr Stephen Nash

### Research Context

**Ocean energy is a nascent industry in Ireland. However, given our resource potential, it is anticipated that investment in the industry will eventually produce a vibrant maritime energy sector.**

There are two major obstacles to exploiting tidal energy: the technologies required to utilise marine resources and deliver energy on a scale that meets demand are still very much at a developmental stage; and locating marine renewable energy devices in estuarine and coastal waters will undoubtedly impact on water levels, particularly, on currents, with the potential of having significant adverse environmental and economical impacts.

The objective of Darren Coppinger's research is to develop a generic numerical model, incorporating a nested hydrodynamic model, capable of simulating and quantifying energy extraction from coastal waters via tidal turbines to predict the resulting hydro-environmental impacts.

Due to high computational costs, most hydrodynamic models of coastal waters are resolved at scales much larger than the typical size of tidal turbine rotor diameters. As a result, they cannot be used to accurately simulate turbine energy extraction. Nested models allow high resolution in an area of interest, without the cost of high resolution across the full model domain. The nested model will allow spatial resolution at device-scales enabling accurate assessment of turbine yields and impacts. Darren's proposed model should prove a very useful tool for the tidal turbine industry in the planning, consenting and management of tidal turbine deployments.

## Sustainable Energy Academic Investment

Researcher Overview



### 8. Denis Dineen

Improving Energy Efficiency

Environmental Research Institute

**University College Cork**

Commencement date: 2009

Supervisor: Dr Brian Ó'Gallachóir

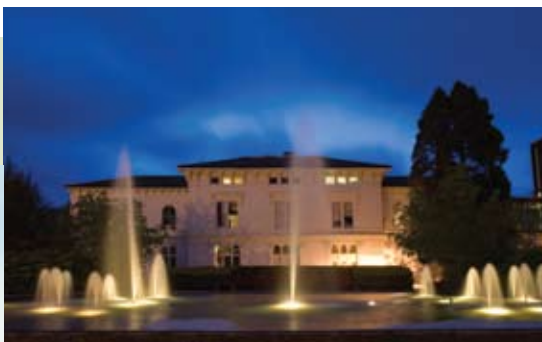
#### Research Context

**The Irish housing sector accounts for 25% of energy demand, while within the EU-27, the residential sector accounts for 26% of energy demand. The European Action Plan on Energy Efficiency identifies residential and commercial buildings as having the largest efficiency savings potential followed by the transport sector and manufacturing industry.**

Each Member State has completed a National Energy Efficiency Action Plan (NEEAP), to plan for a cumulative energy savings target of 9% for the non-emissions trading sectors. The residential sector is typically the largest source of savings within NEEAP, accounting for approximately 30% to 50% of the total. In order to meet this challenge, the need for improved modelling in the Irish residential sector has been identified.

Denis Dineen's research focuses on bottom-up techno-economic modelling of energy use in Ireland's residential sector. It provides an alternative, complementary perspective to existing macro-economic energy demand modelling. By including the engineering aspects of energy end use, this research allows potential energy efficiency measures to be modelled in order to determine their potential effects.

By utilising the Long-range Energy Alternatives Planning System (LEAPs) energy model, Denis' research is investigating the impacts of building regulations on residential space and water heating, while also investigating electricity use for lighting and appliances in the Irish residential sector. Denis has widened his investigation to focus on existing homes and the impact of retrofit on residential space and heating use.



## 9. Paul Doherty

Improving Offshore Structures

School of Architecture,  
Landscape and Civil Engineering

**University College Dublin**

Commencement date: 2006

Supervisor: Dr Ken Gavin

### Research Context

**Offshore pile design, used in the construction of offshore structures, has undergone significant advances in recent years. This is due to a transition from total stress to effective stress design methods.**

Paul Doherty's research involves the investigation of a series of pile tests conducted at a soft-clay test-bed site in Belfast. The testing was designed to assess the uncertainties inherent in common offshore pile design practice in cohesive soils. These factors include: the impact of end condition; cyclic loading; rate effects; and the impact of time on capacity.

Typical database studies usually comprise small diameter closed-ended piles in contrast to the open-ended piles used offshore. This can result in a potential bias due to the end condition. These databases are also largely populated by maintained load tests, whereas offshore piles experience very different loading conditions - primarily cyclic and potentially rapid due to storm events. In addition, offshore structures are usually designed for events that may not occur for a significant period of time after installation and therefore the impact of time on pile capacity also needs to be considered.

Paul's research is based on an experimental investigation of these factors with a view toward incorporating these biases into the design of offshore piles. The results suggest that design equations formulated from closed-ended tests can be used to predict open-ended shaft capacities in normally consolidated clays.

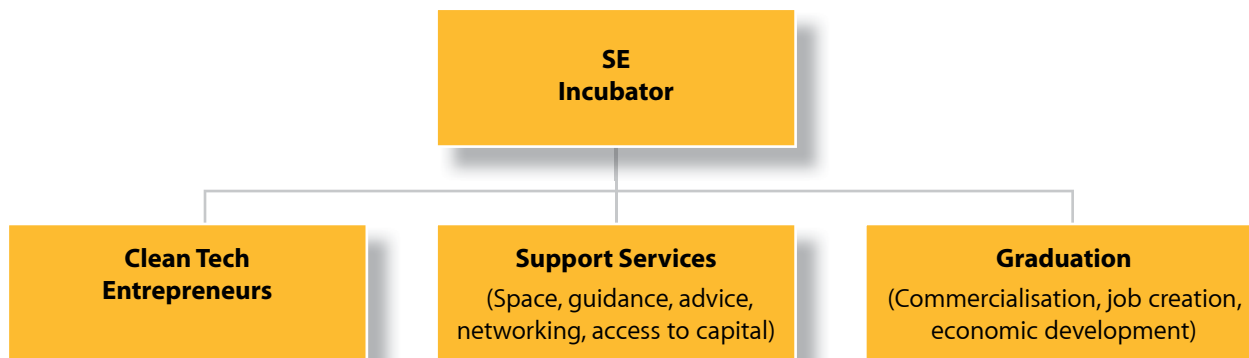
The implication for design is that offshore piles can withstand single rapid events in excess of the static capacity, or can withstand a limited number of high-level cycles above the loading threshold but cannot sustain continuous high-level cycling above approximately 74% of the capacity.

## Enterprise at the centre of Ireland's 'ideas economy'

In order to foster business development, to bridge financial gaps faced by new sustainable energy ventures, and to accelerate the development of a sustainable energy sector in Ireland, SEAI established its Sustainable Energy Incubator Programme in 2007.

There is no standard clean energy incubator model. When SEAI's programme began, sustainable energy start-up businesses were finding it difficult to compete for incubation space with businesses in sectors such as health, biotechnology and ICT. Programme applicants were required to have been already accepted by an incubation centre in Ireland, thereby aligning the programme to the operations and networking activities of the existing incubation units. SEAI funded the annual incubation fees and some supplementary business-support activities. Investment was made on a sliding scale over a two-year period to a maximum of €22,000 per company. The process is outlined in Figure 4.

**Figure 4: The Incubator Process**





**Figure 5: Stages, sectors and public support mechanisms for clean technology development**

Stage of technology development	Early R&D, Proof of Concept	Demonstration & Scale-Up	Commercial Roll-Out	Diffusion & Maturity
Stage of technology development	Advanced battery chemistries Algal biofuels Artificial photosynthesis Fuel cells (automotive) Hydrogen storage Integrated bio-refineries Material sciences Next generation solar Osmotic power Synthetic genomics	CCS Cellulosic biofuels Enhanced geothermal Floating offshore wind Fuel cells (distributed generation) Grid-scale power storage Marine (wave, tidal) Plug-in hybrids Solar thermal electricity Smart grid	Bio digesters Coal-bed methane Heat pumps Hybrids Industrial energy efficiency LED lighting Offshore wind Solar photovoltaics Small-scale hydro Smart meters	Bulking insulation Bicycles Compact fluorescent lightbulbs Condensing boilers Large-scale hydro Municipal solid waste Onshore wind Public transport Sugar cane-based ethanol Traditional geothermal power Waste methane capture
Relevant source of finance	<div style="text-align: center;"> <p>Venture Capital</p> <p>Private Equity</p> <p>Public Equity Markets</p> <p>Credit (Debt) Markets</p> </div>			
Relevant policy mechanism & timing of national financial support	Incubators National-funded venture capital R&D grants	Loan guarantees Project grants	Feed-in tariffs Reverse auctions / requests for contracts Green bonds Soft loans Accelerated depreciation Investment tax credits	National infrastructure funds Export trade credit Microfinance Carbon tax Carbon cap/trade

© Bloomberg New Energy Finance, 2010

The SEAI Programme is producing durable business models capable of replication and provides networking and capacity building opportunities for participating ventures. It targets the first stage of technology development: from early R&D, and proof of concept, to the demonstration of technologies (see Figure 5). Indicative examples of priority thematic areas identified include: bioenergy; ocean and wind energy; micro-generation; energy efficiency and demand reduction; and fuel cells and hydrogen.

The following section will highlight a number of the high-potential new and existing ventures that SEAI has supported through its incubation, or business accelerator process since 2007.

# Sustainable Energy Incubator Programme

## Company Profiles



## Wirelite

"Coming at a time when we were trying to launch our company with our own private money, the SEAI Incubator support was invaluable. It helped fund our office costs, visits to some trade shows, and allowed us to avail of financial and investment advice, all of which were key to our successful funding and launch of Wirelite Sensors."

**Michael Phelan, MD, Wirelite**



For more information visit:  
[www.wirelitesensors.com](http://www.wirelitesensors.com)

### The Company

Wirelite provides wireless-intelligent energy management solutions for businesses to ensure that they maximise the return on their energy usage. Its initial focus is on retail and food companies that have high refrigeration, lighting and Heating, Ventilating, and Air Conditioning (HVAC) loads. It provides a solution to retrofit energy management demand controls and responses for commercial and industrial companies.

### The Entrepreneur

When Michael Phelan set up Wirelite in July 2007, he had a background that included 22 years' experience in engineering and project management, product management, general management, and sales and marketing management. Before Wirelite, Michael had worked in Philips, Microsol, PCAS and Duolog; companies that were active in the hardware, software and industrial and utility automation businesses. These had given Michael a thorough understanding of Smart Building and Smart Grid technologies.

### The Technology Focus

Through monitoring and controlling major energy-consuming devices such as HVAC, lighting, and refrigeration devices, Wirelite automates the control of a business' energy spend. With real-time monitoring of key environmental data (usage, temperature, humidity, CO<sub>2</sub>, etc), Wirelite responds to the environment rather than using pre-programmed timings or inaccurate manual settings.

By integrating intelligent demand control and response software, the company can provide a service to customers and to the grid by allowing each to respond to future energy demands while generating revenue for customers. It integrates the control systems of large energy consumers, using open protocols such as Modbus, or controlling the devices directly using relay outputs. Wirelite also plans to provide electricity suppliers and grid operators with advanced tools to manage their electricity demand curves.

The company is working with the Tyndall National Institute, funded by Enterprise Ireland, on an R&D Innovation Partnership programme. This programme has projects in each of its initial target markets: supermarkets, hotels and convenience stores.



## ResourceKraft

“SEAI’s incubation support assisted us in investing in research and development activities. The SE Incubator programme is a very timely and focused initiative for the renewables and energy efficiency sector in Ireland.”

**Frank Casey, CEO, ResourceKraft**



For more information visit:  
[www.resourcekraft.com](http://www.resourcekraft.com)

### The Company

ResourceKraft is a supplier of highly sophisticated energy cost control systems. By enabling management control over energy costs, customers can achieve 20% energy savings in just 12 months. The ResourceKraft advisor delivers quick results for businesses that do not want energy management to become a full-time job. ResourceKraft helps businesses to focus on the areas that bring the biggest and easiest savings.

### The Entrepreneur

Frank Casey, ResourceKraft’s CEO, has a background in new business development, marketing, communications and management in a variety of international companies. Frank believes that although the cost and quality of electricity can significantly affect operations and profits, it has traditionally been accepted as a non-negotiable business expense. He started ResourceKraft to challenge this convention and profit from providing businesses an alternative.

### The Technology Focus

ResourceKraft’s product offering uses a combination of metering hardware and software to monitor a retail premises’ electricity usage and identify inefficiencies. On the functional side, managers can efficiently monitor energy usage in real time to increase productivity and improve efficiency. On the business side, senior management, accountants and energy managers can review the historical consumption data provided to predict energy usage for the month, allocate costs by function (e.g. coffee dock, in-house bakery, administration offices, production lines), and identify wastage. A detailed understanding of a facility’s energy requirements over time can also help managers spot recurring trends, simulate alternative rate structures, and negotiate better tariffs with suppliers.

## Sustainable Energy Incubator Programme

Company Profiles



# Renewable Power Generation Ltd.



For more information visit:  
[www.r-p-g.ie](http://www.r-p-g.ie)

### The Company

Renewable Power Generation (RPG) LTD. is an Irish owned renewable energy business focused on developing and operating wind powered electricity generation plants on suitable industrial sites and selling this electricity directly to the industrial site owner. RPG was formed in 2006 to provide an alternative source of electricity with a fixed forward cost to industrial business. RPG's vision is to be the leading developer of wind electricity auto-generation projects in Ireland. It believes that companies should generate and consume electricity locally.

### The Entrepreneur

RPG's directors and management have a mix of energy, industry and construction backgrounds. Managing Director Dave McNamara is an industry expert on grid connection of renewable energy, a Vice-Chairman of the Irish Wind Energy Association and a member of the Institute of Engineers.

### The Technology Focus

RPG's product offering includes the integration of renewable energy into industrial environments and planning capabilities. RPG's wind turbines are connected directly into the site electrical system, removing the need for a new grid connection and avoiding use of system charges for the electricity consumed. On-site demand management techniques are used to maximise the demand for electricity produced during times of good wind resource and minimise demand when the wind resource is low. This means using current, leading-edge technology in the industrial process and control areas and integrating it with the latest technology in wind turbine design and control capabilities.



## Hybrid Energy

“The SEAI Incubator programme provided a valuable bridge between the South East Enterprise Platform Programme in WIT and full commercialisation of the project. Support from SEAI enabled us to leverage valuable skills within the College and greatly enhance our technical capabilities, as well as providing financial support during product development and validation.”

**Nick McGrath, MD, Hybrid Energy**



For more information visit:  
[www.hybrid.ie](http://www.hybrid.ie)

### The Company

Hybrid Energy is a Waterford Institute of Technology (WIT) campus company that provides renewable energy-based hybrid power generation technologies to industry by generating stable and reliable electrical supplies from renewable resources. It assists clients pursuing a green strategy, increasing efficiency through innovative and cost effective solutions, while leveraging expertise from a number of research groups within WIT.

### The Entrepreneur

Hybrid Energy's CEO Nick McGrath was a participant in the 2007-2008 South Eastern Enterprise Platform Programme at WIT and has been awarded CORD funding by Enterprise Ireland. Nick was previously Director at GE Energy Ireland.

### The Technology Focus

Telecommunications operators regularly utilise diesel generators to power their base stations due to poor grid access. Hybrid Energy was established to assist companies to pursue a green strategy – by offering energy solutions on a sale, lease or rental basis, accommodating long-term, short-term and backup requirements.

It assists telecommunications operators to secure easy access to cost-effective clean sources of power. In Ireland, Hybrid Energy markets directly to telecommunications operators and the contractors who are providing outsourced services to them. In the UK and overseas markets, the company is channelling its products through local partners.

Hybrid Energy's product offering enables the entire base station to be powered from renewable resources. Typically diesel consumption is reduced by more than 75%.

## Sustainable Energy Incubator Programme

Company Profiles



## Eco Electrics



For more information visit:  
[www.ecoelectrics.com](http://www.ecoelectrics.com)

### The Company

Eco Electrics is an electrical engineering company providing sustainable energy solutions utilising solar, wind, hydro or a combination of these at micro-generator scale.

### The Entrepreneur

Damien Doherty, the founder of Eco Electrics, previously held positions in Alphyra and Siemens. Damien believes the potential for customers to not only generate, but to sell, electricity will have a positive impact on Ireland's carbon footprint and will contribute substantially to sustainable energy in Ireland and towards a more secure energy future.

### The Technology Focus

Eco Electrics offers a range of designs for the micro-generation of electricity systems and voltage management units to form sustainable energy solutions for all electricity users. The micro-generators use wind, solar, hydro energies or a combination of each technology to provide a hybrid micro-generator that fully complies with planning and development regulations. As well as designing, developing, supplying and implementing micro-generators, Eco Electrics also supports its customers with full maintenance and services.



## Energy Matters

“SEAI incubator support was critical as it enabled me to bridge financial gaps incurred by the business. The supplementary business support was key for the business in accessing the appropriate professional and Third-level expertise to independently appraise the proposed venture and provide direction in developing, refining and executing the idea.”

**Ronan Rogers, MD, Energy Matters**



For more information visit:  
[www.emat.ie](http://www.emat.ie)

### The Company

Energy Matters is a building energy management consultancy that provides a broad range of design and specification consultancy. Energy Matters was established prior to the transposition of Building Energy Rating (BER) into legislation in Ireland. It provides BER certification services to the residential and non-domestic sectors.

### The Entrepreneur

Ronan Rogers founded the company in September 2006. Ronan holds a Masters Degree in Engineering Science from NUIG and is a Chartered Engineer and a member of Engineers Ireland.

### The Technology Focus

Energy Matters designs specifications for energy efficiency, air permeability testing, radiometric thermography, in-situ heat flux, moisture measurement and building fabric endoscopic inspections. The company developed a technical Guide for consultancy firms involved in BER and is helping to develop the skills and capabilities of energy professionals in the industry. The initiative will further improve the quality of the service provided to the public, lead to greater energy efficiency, the reduction of the environmental impact of energy production and use and, ultimately, the reduction of greenhouse gas emissions. Energy Matters is also developing a software management system that will include all the necessary procedures and templates to achieve the ISO standard.

## Sustainable Energy Incubator Programme

Company Profiles



## Clear Fuel

"The SEAI incubator funding helped open doors with potential investors and partners; the ability to simply say that we're a client company of SEAI, an implicit approval, was of direct help in forming at least one partnership.

**Conor Toolan, CEO, Clear Fuel**



For more information contact:  
[conor.toolan@clearfuel.ie](mailto:conor.toolan@clearfuel.ie)

### The Company

Clear Fuel aims to become a leading player in the international bioenergy market through the development, research and sale of second-generation vegetable oil feedstocks and energy crops.

### The Entrepreneur

Founded by Tom O'Sullivan and Conor Toolan, Clear Fuel is a Trinity Technology and Enterprise Campus-based company. Conor Toolan, a chemical engineer and MBA graduate, started the business having worked for Shell Oil in the Netherlands and a number of state agencies in Ireland.

### The Technology Focus

Clear Fuel is positioning itself to provide crude oil to industrial oil-fired installations and domestic biodiesel producers at a competitive cost. The management team has chosen oil [Jatropha] as its main fuel crop as it is inedible, grows well on marginal land and has an extremely positive energy balance due to its 50-year lifespan. Clear Fuel believes that there is significant market potential for widespread adoption of vegetable oil by industry, particularly in the power generation and transport sectors in the Irish and EU markets.

Clear Fuel plans to provide a long-term, competitively priced supply of biofuel into Ireland and the EU through the development of biofarms. It plans to establish a small R&D facility in Dublin which will develop expertise in tissue culture, a means by which particularly productive or disease-resistant strains of the oil can be quickly replicated for planting.



## AP EnvEcon

“For AP EnvEcon the decision to take office space was a significant statement of intent to shift from a concept to a business. The SEAL incubator support was one of the catalysts for that decision. It mitigated some of the financial risk associated with taking those first steps into commercial operation.”

**Andrew Kelly, MD, AP EnvEcon**



For more information visit:  
[www.apenvecon.com](http://www.apenvecon.com)

### The Company

AP EnvEcon (Environmental Economics) provides environmental consultancy expertise to both the public and private sectors in Ireland. AP EnvEcon's main product offering is the provision of advisory services in environmental economics, policy and modelling areas.

### The Entrepreneur

AP EnvEcon was established by Dr Andrew Kelly and Professor Peter Clinch and is part of the UCD Nova programme. Andrew Kelly holds a MSc (2000) and PhD (2003) in the fields of environmental policy and integrated modelling of climate and air pollution. Peter Clinch is a Professor of Economics, a former Government adviser and a management consultant.

### The Technology Focus

AP EnvEcon provides technical advisory services in environmental economic analysis, energy and environmental modelling and evaluation. AP EnvEcon provides specific services in the areas of cost-benefit analysis and environmental evaluation, environmental impact assessment, data sourcing and management, and GIS analysis. Attention is placed on the areas of sustainable energy use, transportation, air quality, and climate change.

AP EnvEcon is currently developing national-level analytical capacity for the evaluation and further development of policy related to specific sectors, as well as broader integrated analysis of national energy use and associated air quality and greenhouse gas emissions.

## Sustainable Energy Incubator Programme

Company Profiles



## AirEn Services



For more information contact:  
[pmuldoon@airen.ie](mailto:pmuldoon@airen.ie)

### The Company

AirEn is a Dundalk Institute of Technology (DkIT) based company that is engaged in the development of alternative uses for on-site wind generated electricity. The company is also engaged in the development of utility-scale wind turbines on industrial sites.

### The Entrepreneur

AirEn, founded by Paul Muldoon in 2006, specialises in providing micro-wind solutions. Working with the Centre for Renewable Energy at DkIT, Paul has secured contracts with CRH for the installation of a Vestas V-52 850kW wind turbine at one of its sites.

### The Technology Focus

AirEn offers independent testing facilities for manufacturers of micro-wind turbines to test their machines in a challenging wind regime. Examples of such innovative applications of their on-site wind generated electricity are CCTV camera systems for remote sites with no electrical supply, GPS monitoring equipment, telecommunication towers, ocean buoys, geo-thermal systems, and plug-in hybrid vehicles with micro wind turbines. AirEn is also working with installers of heating appliances so that households have a one-stop-shop for both their heating and renewable energy needs.

The core competency of the business is feasibility studies; this involves a site visit and an initial assessment of the potential of a site. In the preliminary stage, AirEn works on identifying all potential issues with grid connection and planning.

## Conclusion

The sustainable energy industry is diverse and is rapidly growing. This diversity is reflected in the numerous companies that have emerged in the past five years that are applying new technologies and fresh ideas. In Ireland, we are at a scale which allows us to innovate quickly. Emerging technologies and new energy solutions are exactly where Ireland's strengths lie. These advances can significantly contribute to our economic well-being.

Innovation can be stimulated through encouraging, enabling and empowering start-up enterprises. Government has a significant role to play in supporting the innovative concepts, ideas and technology developments that are required to enable companies bring unique product offerings to market. A constant stream of emerging clean technology companies, such as those featured in these pages, are needed to contribute to our 'ideas economy'.

Academic interest in sustainable energy issues has flourished over the past five years. Creating the appropriate facilitative academic environments remains critical for success. High-calibre researchers are required to stimulate ideas and invention. Exploring energy concepts, whether in frontier or applied research, requires significant investment in our talented researchers in their early-stage career formation. Building research capacity, in areas from the grid integration of renewable energy to the technologies required to power our future energy systems, is a vital prerequisite for competitiveness and commercial success. The exploration of our sustainable energy resources presents new research opportunities in areas including smartgrid and bioenergy technologies.

This publication has highlighted a sample of the innovators that are contributing to our ideas economy. These are some of the individuals and enterprises that can assist Ireland as it navigates its way to a sustainable energy future.

## Further Materials

SEAI has engaged with representatives from 12 enterprises and financiers in an attempt to ascertain their perspective on Ireland's ability to grow a clean-tech sector and grasp its competitive advantage. Their testimonies have been presented in the publication "Inside the Smart Economy".

The responses are grouped into four key thematic areas:

1. Introduction to the enterprises and financiers
2. Ireland's advantages in terms of clean technology
3. State supports
4. Future prospects

A copy of the publication can be downloaded from SEAI's website (see link below).



For more information visit:  
[www.seai.ie/smarteconomy](http://www.seai.ie/smarteconomy)

The screenshot displays the SEAI website's 'Inside the Smart Economy' page. The page features a navigation menu at the top with links for Home, Your Building, Your Business, Renewables, Schools, Grants, Publications, News & Events, and Dunda&O2020. A search bar is located in the top right corner. The main content area is titled 'Inside the Smart Economy' and includes a sub-header: 'Playing a leading role in transforming Ireland into a society based on sustainable energy structures, technologies and practices'. The page text describes SEAI's role in transforming Ireland into a society based on sustainable energy structures, technologies and practices. It mentions that SEAI has engaged with various market players to ascertain their perspectives on Ireland's ability to grow a clean tech sector and grasp its competitive advantage. The page lists four key thematic areas: 1. Introduction to the enterprises and financiers, 2. Ireland's advantages in terms of clean technology, 3. State supports, and 4. Future prospects. A call to action at the bottom of the page encourages users to download the 'Inside the Smart Economy' report. The footer of the page includes contact information for Matthew Kennedy and a link to the 'Energy Show 2011'.

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## About SEAI

### Our Mission

To play a leading role in transforming Ireland into a society based on sustainable energy structures, technologies and practices.

### Key Strategic Objectives

Energy efficiency first: implementing strong energy efficiency actions that radically reduce energy intensity and usage.

Low carbon energy sources: accelerating the development and adoption of technologies to exploit renewable energy sources.

Innovation and integration: supporting evidence-based responses that engage all actors, supporting innovation and enterprise for our low carbon future.

### SEAI Programmes

The Sustainable Energy Authority of Ireland manages programmes aimed at:

- supporting Government decision-making through advocacy, analysis and evidence
  - driving demand reduction and providing advice to all users of energy
  - driving the decarbonisation of energy supply
  - raising standards in sustainable energy products and services
  - building markets based on quality, confidence and proven performance
  - fostering innovation and entrepreneurship
  - improving the coherence of Irish energy research and development
- 



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