

Unclassified

Interim Report on UK Mission to New Zealand on Renewable and Clean Energy February 2 - 6, 2009

Dr Steve Thompson, Science and Innovation, British High Commission, Wellington,
17 February 2009

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Introduction

The British High Commission in New Zealand brought a party of UK specialists in renewable and clean energy to New Zealand in early February 2009. The mission was sponsored by the UK Foreign and Commonwealth Office through its Strategic Programme fund¹. The mission dealt with commercially orientated research and development. To support this and other UK missions, the High Commission created the post of Science and Innovation Promoter in mid-2007, jointly sponsored by UKTI, NZTE, InvestNI, the Government Office of Science and FCO, to promote research links between British and New Zealand research and technology institutions.

While the UK team was in NZ, opportunities were created for UK and NZ counterparts to make individual contacts with organisations of interest.

As a result of the discussions, collaboration potential has emerged in several areas, ranging from near commercial to longer-term research. No agreements were concluded during the meetings.

Acknowledgements and Thanks

The financial support of the Foreign and Commonwealth Office Strategic Programme fund is gratefully acknowledged in enabling this mission to proceed. The High Commission is indebted to the New Zealand Ministry of Research, Science and Technology, Meridian Energy, the Institute of Geological and Nuclear Studies, Industrial Research Ltd, CRL Energy, Transpower and the Energy Efficiency and Conservation Authority for their interest and hospitality, and use of their facilities.

Votes of thanks go to Philip and Alison Wolfe of Wolfeware and the UK Renewable Energy Association, who advertised and organised the UK end of the mission. Cito Gazo of the New Zealand Energy Federation arranged the meetings at various venues around Wellington. John Huckerby of AWATEA, the Aotearoa Wave and Tidal Energy Association, arranged the day visit to Meridian Energy's wind farm at Makara. Carolyn Weston provided press coverage and arranged several press interviews for mission participants.

Mission Participants Representing the UK

UK Participants attending in February

1. Toby Barber, Garrad Hassan
2. Steve Bouzalakos, Nottingham
3. Phillip Cozens, Progressive Energy
4. Rick Hudepohl for John Elliott, Eureka Heat Recovery
5. Gilbert George, Ocean Power Technologies
6. Donald Hepburn, Glasgow Caledonian
7. Henry Jeffrey, Edinburgh

8. Martin Jones, Oxford
9. Stephanie Merry, Focus Offshore
10. Terry Pollard, Isis, Oxford
11. Sandy Robinson, Thermo-d.demon

and for the March biofuels segment (report to come when mission complete):

1. Paul Sallis, Newcastle University
2. Khalid Shukri, Scionix, London
3. Catherine Side, Inside Consulting

¹ PSF LCHG SC 000434 Task: 0.1 Expenditure type: Programme spend. Expenditure organisation: GEID.SDBG Economic Governance / GOF

Meeting Objectives

The Mission was designed to meet two of the objectives of the FCO Strategic Programme fund:

- to bring together research providers and users in key areas of strategic importance
- contribute significantly to UK climate change and energy security (CCE) objectives: 'Achieving climate security by promoting a rapid transition to a sustainable low carbon, global economy and access to clean, secure and affordable energy supplies for the UK'

and two of the objectives of the High Commission in New Zealand:

- Stimulate commercial S&I interaction between UK and NZ – identifying commercial benefits to UK.
- NZ to implement coherent policies leading to effective domestic climate change mitigation; NZ to play a positive role in influencing others in the region and in international fora.

UK and NZ R&D teams collaborated on wind and water energy supply technologies, carbon sequestration, and energy efficiency in commercial and private usage. The project took advantage of opposite NZ and UK seasons (but similar weather patterns) to accelerate research, and provide opportunities to sell UK technology into New Zealand.

The purpose in the UK specialists attending the conference was to bring researchers and firms in the sector together in a focussed setting where they could exchange specific scientific/trade information and proposals. The participants discussed potential collaborations, with a declared intent to work towards one or more agreements on scientific and commercial collaboration.

The tangible objective was to encourage institutions or companies to draw up agreements on:

- collaborative research, containing clauses covering IP discovery and use. While the research would initially be in the pre-competitive stage, agreements should provide useful templates for further business collaboration should useful IP be developed;
- inward or outward investments; and
- sales (or purchases) of IP or products.

Meeting Results

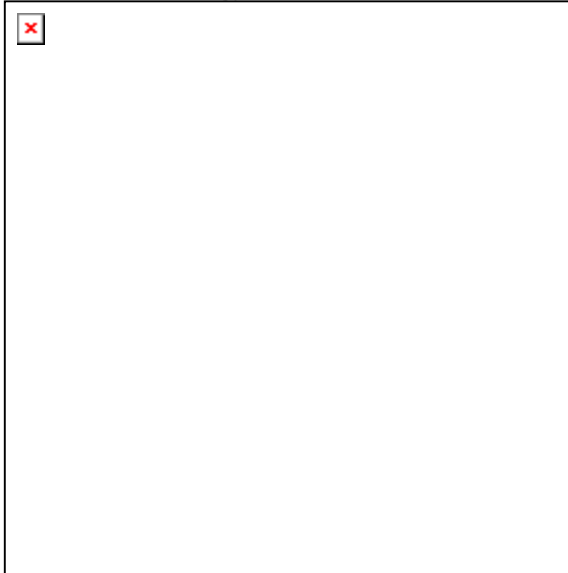
The original plan called for seven participants from the UK. In the event, the mission was highly subscribed, with a total of 14 participants representing the UK. This interim report catalogues early linkages made. The High Commission will follow up with participants at regular intervals.

1. Ocean Power Technologies reports that contacts were made with Meridian Energy, EECA, Mighty River Power, and Main Power. OPT expects that discussions will commence on a **possible demonstration unit** and that the UK developed PBISO technology will be utilised, Discussions will take at least 12 months, as the project will include applications for funding, consent etc.
2. The UK Renewable Energy Association reports contacts with Peter Cozens, Victoria University of Wellington - strategic support for marine current turbine technology in NZ; and with AWATEA NZ for the **transfer of technical information** on REA members' wave devices and consulting services. Discussions were held with Peter Cozens on an oceanography centre in Wellington, and marine renewables in the Pacific. Discussions with IRL covered hydrogen and electrolysis.
3. Nottingham University linked with Dr Joe Gamman at NERI (National Energy Research Institute), George Hooper at CAENZ (Centre for advanced engineering NZ), Robert Holt at IRL (Industrial Research Ltd) and Rob Funnell of GNS (Institute of Geological and Nuclear Studies) with regard to **possible research collaboration** or knowledge transfer
4. Glasgow Caledonian University (GCU) linked with Stephen Drew of Energy response Ltd with a possible conference presentation opportunity. GCU will follow up **research collaboration in distributed generation** with Joseph Mayhew, EECA (Energy Efficiency and conservation Authority), Robert Holt of IRL, and Tony Pearson of Proven Energy. **Academic collaboration** will be pursued with Dr Nirmal Nair and Prof Richard Flay, Auckland University, and Drs Susan Krumdieck and Bill Heffernan, Canterbury University. Contact will be arranged between Prof Mohammed Farid (Auckland) and Glasgow Caledonian staff working on indoor climate health. Contact will also be established with CRL's Tony Clemens on coal/biomass mix transport
5. Ocean Navitas UK represented by Greg Hussey, (Smart Energy Ltd), will be pursuing contact and **collaboration opportunities with AWATEA, EECA and Victoria University along with NZ heavy engineering companies**. Ocean Navitas will be working toward **deploying a Marine Wave generator in NZ coastal waters** within 24 months.
6. Isis Innovation (research and emerging technologies from the University of Oxford, and existing spinout companies) made contacts with EECA and AWATEA NZ in relation to new tidal power technologies being developed in Oxford, and **possible trials in NZ**. Discussions also took place with other UK participants on the mission, to see if Isis Innovation might be able to provide **further support in the UK via the Carbon Trust Incubator scheme**. In relation to ISE, a spinout company in Oxford that has recently raised first round funding, there was interest in the Smart Meter technology they are now commercialising and **possible partners in NZ**. Conversations also took place with local organisations involved in technology commercialisation to discuss opportunities for **bringing technology from NZ to the UK**.

7. Engineer S Robinson linked with Contact Energy. Further work will be needed, but a joint project seems imminent. Work with Watties was facilitated by being a member of the Mission, and an eventual **agreement appears highly probable**. UKTI facilitated contacts with some New Zealand hospitals. Prospects there are more difficult to forecast as the cost to a hospital is relatively small, and the Specification for Sterilisation is convoluted. It may be that co-operation at Government level would be needed to get the biggest possible savings. Mr Robinson foresees his technology might have application in spray drying in the dairy industry.

Press Coverage

British developers keen to work with NZ on clean energy



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A UK-to-New Zealand mission on renewable and clean energy due to be held in Wellington from February 2 to 6 aims to encourage collaboration between researchers and developers working in the sector. Steve Thompson, science and innovation promoter for the British High Commission, says that a common UK and New Zealand interest in renewable and clean energy provided the impetus for the mission. "There are many ideas at the advanced research or near-commercial stage, such as in wind, wave, carbon-capture and storage, and efficiency, where UK and NZ researchers and developers should be able to build mutually beneficial collaborations," he told Carbon News. The mission is sponsored by the UK Foreign and Commonwealth Office through its strategic programme fund, and deals with both commercially orientated research and development and trade and investment. Thompson says that meetings held during the mission will facilitate individual discussions with New Zealand organisations, with the intention of setting up agreements to undertake collaborative research, inward or outward investments and/or sales and purchases of intellectual property or products. Any agreements to undertake collaborative research will address the issue of the discovery and use of intellectual property, and will provide templates for business collaboration, even if the research is in the pre-competitive stage. British participants in the mission have issued invitations to a broad range of New Zealand companies, academics and representative bodies. Most have responded positively to the invitation, although Carbon News understands power companies such as Meridian Energy, Contact Energy, Genesis Energy and Mighty River Power are yet to confirm their attendance. Awatea (The Aotearoa Wave and Tidal Energy Association), which wasn't invited to the seminar, says it is setting up its own meeting with the UK visitors for February 2. [NB: AWATEA was indeed invited to the seminar]

Marine energy the 'perfect' plan

PAUL EASTON - *The Dominion Post* | Monday, 09 February 2009

New Zealand is perfectly placed to turn its "fantastic" marine energy resources into real power, a visiting expert says.

Henry Jeffrey, from Edinburgh University, has been in Wellington with a British renewable energy delegation. Wellington is the site of a proposed marine energy project by Neptune Power that could result in a test turbine being underwater in Cook Strait by year's end. Mr Jeffrey said that, in Britain, marine energy was moving from the drawing board to reality. "In the past 12 months there's been a step change. Now when people give presentations on marine energy, rather than showing artists' impressions, they're showing photographs of hardware in the water connected to the grid." Mr Jeffrey said that, although New Zealand was behind on marine energy generation, that should change soon. He sits on the Marine Energy Deployment Fund, which offers grants of up to \$2 million a year over four years for marine energy projects. Last year Auckland company Crest Energy was given a \$1.85 million grant to generate electricity from the tides in Kaipara Harbour. Mr Jeffrey said the panel had made recommendations for the second round of funding, with a final decision to be made by Energy Minister Gerry Brownlee. He could not say which of four applications to the fund were recommended for funding. Marine energy projects are slowly taking shape. Christchurch company Neptune Power has consent from Greater Wellington regional council to place a trial turbine 95 metres below the surface, 4.5 kilometres off Sinclair Head, on Wellington's Southwest coast. It hopes to have the turbine going by the end of the year, powering 400 Wellington houses through Vector's Wellington grid. Spokesman Chris Bathurst said it had applied to the Marine

Energy Deployment Fund. Cook Strait tides could generate 7000 megawatts of electricity almost equal to New Zealand's annual production. Mr Jeffrey said Cook Strait was an "interesting and potentially valuable resource".

Learn from us, says UK renewables expert

Tuesday 3 Feb 09 9:00am Story copyright © Carbon News 2009

New Zealand could take a leaf out of the British government's book and provide incentives if it seriously wants to encourage the development of renewable energy technology, says a visiting expert. British-based companies have seized the initiative on marine energy with world-firsts in Portugal and Northern Ireland. Henry Jeffrey is visiting New Zealand as part of a renewable energy mission organized by the British High Commission. He told Carbon News that UK-driven wave and tidal energy projects were going ahead thanks, in part, to measures taken by the UK government to incentivise the development of renewable energy technology. "We're no longer speaking about concepts and artists' impressions," he said. Jeffrey says that enhanced tariffs for marine energy in the UK mean that utility companies are investing in marine energy. "This kind of investment is allowing things to take off," he said. Under the UK system, a tariff is added on top of the wholesale electricity price so that energy generated from renewable sources achieves a premium price. This provides a real incentive for power companies to invest in the development of renewable energy. The UK government is due to publish its Renewable Energy Strategy soon, but it is expected that renewable energy will make up as much as 15 per cent of the UK's energy profile by 2020. Jeffrey says that during the past year, a wave company in Edinburgh launched the world's first grid-attached wave-energy farm in Portugal, with an array of three devices. Marine Current Turbines also launched the first full-scale grid-connected tidal energy turbine, known as SeaGen, with the capacity to produce 1.2MW of energy in Northern Ireland. This is despite the fact, Jeffrey says, that UK renewable technologies face the same - if not more - regulatory hurdles, as do their New Zealand counterparts. Jeffrey says that the British public has a broadly positive attitude towards renewable energy because UK projects manager has engaged with stakeholders at an early stage. "There's been early engagement with stakeholders, and they have taken environmental concerns into consideration from the outset," he said. Jeffrey is one of two international members of the panel that evaluates applications for the New Zealand Government's Marine Energy Development Fund - a fund that he says sends a very good signal to the international marine energy sector. "It shows that New Zealand is being proactive, and demonstrates the credibility that New Zealand is giving to the sector," he said. The panel is currently considering the merits of the four applications received for the second of four funding rounds that will potentially see \$8 million distributed to marine energy projects over four years. The decision on the current funding round is expected in May or June. Last year, Crest Energy received \$1.85 million for its Kaipara Harbour project in the first funding round.

Kiwis a bit short on good ideas, UK expert says

Story copyright © Carbon News 2009

Stephanie Merry ... not a lot going on in NZ. A British marine energy expert says New Zealand is lacking ideas and needs to do more to support the emergence of the marine energy industry.

Dr Stephanie Merry, an adviser in marine renewables for the London-based Renewable Energy Association, suggests the establishment of a field-testing site where inventors can test prototypes at low cost. Merry was in New Zealand last week as part of a renewable energy mission organised by the British High Commission. She told Carbon News that there is a plethora of ideas in Britain, many of which are generated by retired engineers who don't want to stop thinking. "There is a more inventive culture in the UK," she said. "There don't seem to be many technology ideas happening in New Zealand. From what I've gathered, there's not a lot going on in wave energy in New Zealand." She concedes, however, that there is more money available to fund such work in the UK than in New Zealand. Merry came to New Zealand armed with information from British wave device developers looking for customers in this country. She is also a director of Focus Offshore, a consultancy company that specialises in marine energy, and which is involved in setting up a trial site for tidal energy projects in a relatively shallow tidal stream on the Isle of Wight to allow developers to test prototypes in a relatively benign setting. Merry says that developers are able to leave their prototype tidal generators in the water there for a short time - days rather than weeks - to test the viability of their designs. The site also allows them to practise installing and decommissioning their devices. Practising these processes at the trial site is important because it is not easy to install and decommission devices in a strong tidal stream, she says. Setting up a similar site in New Zealand would take some of the financial burden off individual developers and would allow prototypes that are not going to work in the field to be weeded out at an earlier stage. "A lot of the ideas that inventors have actually won't work for one reason or another," said Merry. "It's much easier to stop it early so that the money can be spent on other things."

In addition, Donald Hepburn was interviewed by **Television One News** on 5 February about the NZ power crisis in Auckland and the age of New Zealand's power grid. Stephanie Merry was also interviewed by **Pacific Ecologic magazine**, due to appear shortly. **NZPA** will also write an article based on the press release "Invention Success" below.

Press Releases

British Renewable Energy Mission Comes to New Zealand

Top UK experts on clean and renewable energy are coming to New Zealand for a series of 'think tank' meetings in early February. The scientists and technology development leaders will meet with energy experts and businesses in both Wellington and Auckland. The aim is to exchange information and set up collaborative research and business projects between the two countries. They will explore opportunities in carbon capture and storage, tidal and wave energy, biofuels, wind power and other 'green' energy initiatives here and in the UK. The British government will soon publish a Renewable Energy Strategy to underpin increasing the contribution renewable energy makes to the UK's energy mix to as much as 15% by 2020. The sector is planned to make a growing contribution to the United Kingdom's economy. One of the visiting experts, Henry Jeffrey, from the University of Edinburgh, is on the evaluation panel for the New Zealand Marine Energy Deployment Fund. The NZ government is making grants of up to 2 million dollars a year for the next four

years to encourage the development of marine energy. In the United Kingdom, the British government forecasts there will be over 100mW of working marine energy devices by 2009. The first full-scale trial of a tidal energy device is currently being conducted in Northern Ireland. The UK mission arrives in Wellington on Feb 1st and leaves on Feb 5th

UK Energy Mission Feb 02

UK green energy experts currently visiting New Zealand say there is great potential for this country to collaborate with many overseas renewable energy projects. The UK scientists and business leaders are meeting this week in Wellington with their New Zealand counterparts to set up collaborative research and business projects. Henry Jeffrey from Edinburgh University arrived here last week to help the New Zealand Marine Renewable Energy fund decide who should get the 2 million dollars worth of grants available to develop marine energy in this country. He says marine energy worldwide is a very young industry that is developing rapidly. Stephanie Merry works for the Isle of Wight which is aiming to become green energy self sufficient, and she says New Zealand has that potential too. The Isle of Wight is setting up an inshore tidal energy site to test marine devices. She says New Zealand businesses could provide equipment for the project. The UK Mission is meeting at GNS in Lower Hutt on Tue 3rd of Feb to discuss Carbon Capture and storage. On Wednesday it will discuss energy efficiency with New Zealand experts and on Thursday the mission will visit the new wind farm at Makara.

Electricity Problems

A visiting UK electricity infrastructure expert says power systems all over the world are in a similar state to New Zealand's. Dr Donald Hepburn of Glasgow University says most countries power grids were set up around the same time, in the 1950's and 60's. He says Britain's power infrastructure is 40 years old and it could take up to 110 years to update it. Dr Hepburn says blackouts like the one in Auckland yesterday also occur in London. Dr Hepburn is currently in New Zealand as part of a trade delegation of UK renewable energy experts hosted by the British High Commission.

Invention Success

A visiting British power expert has found three New Zealand companies he believes could make a prototype of a power saving device he has invented. Sandy Robinson is part of a trade delegation of renewable energy experts to New Zealand hosted by the British High Commission. He believes New Zealand's famous number 8 wire ingenuity will be able to put into reality his sterilisation invention designed to save 1 per cent of the power usually used in the process. He says his invention would be very useful especially for hospitals, canning processors like Watties and power companies. He is thrilled that his mission has been so successful and he will talk further with the three companies before deciding which one he will work with.

Meetings Schedule

Monday 2 February

Ministry of Research, Science and Technology (MoRST), level 10, 2 the Terrace, Wellington (walking distance from downtown hotels)

0830: Welcome and Introduction - Steve Thompson.

0845: NZ Energy Briefing, hosted by MoRST, with various government representatives giving short overviews.

1100: Walk to Meridian Energy Wellington Harbour (15 minutes).

Meridian, a State-Owned Enterprise, is New Zealand's largest electricity generator, supplying electricity to the largest customer, the Tiwai Point Aluminium Smelter and over 180,000 residential, business and rural customers throughout our country. Meridian's electricity is generated entirely from renewable resources and is New Zealand's only supplier of carboNZero certified electricity. Meridian operates nine hydro stations in the South Island, New Zealand's largest wind farm in the North Island, and a wind turbine in Wellington. Meridian's Executive Director is Tim Lusk. Alan Seay, Communications Director, introduced Meridian's operations.

1115: Wind and Marine Energy - Presentations by UK and NZ attendees

1230: Lunch

1315: Wind and Marine Energy - continued

1530: Coffee and Close (to allow for jet lag)

Tuesday 3 February

Start at Geological and Nuclear Sciences (GNS) in Avalon (30-minute drive North of Wellington), then back to CRL Energy and Industrial Research Ltd (IRL) in Gracefield, Lower Hutt.

0830: Drive 30 minutes to Avalon

0900: Carbon Capture and Storage - Presentations by GNS staff:

GNS Overview: Mike Isaac

NZ Carbon Capture & Storage: Rob Funnell

Risk Studies: Staff member

Geothermal: Mike Isaac

GNS is 1) the government's principal earth systems and isotope science researcher and advisor the national expert on off-shore and on-shore energy and mineral resources 2) the national expert on geological hazards and risk, and their economic, social, and environmental impacts 3) the national expert on isotope and nuclear science and technologies 4) the national innovation centre for ion beam and non-invasive scanning technologies the pioneer in researching 5) the geosphere-biosphere interface uniquely accessible in New Zealand 6) a preferred research partner with public and private organisations throughout the world 7) a southern-hemisphere geoscience and isotope-science employer of choice.

1000: Coffee

1020: Carbon Capture and Storage - Presentations by UK and NZ participants

1130: Drive to CRL Energy in Lower Hutt, for site visits and discussions. Host: Rod Whitney, CEO

CRL is an energy and environmental research and consulting company, with specialist knowledge in all aspects of the energy chain and a strong testing and analytical capability. CRL has specialist knowledge in new energy technologies such as hydrogen and biomass conversion, a strong history in all aspects of fossil fuel energy, particularly coal-related research. CRL offers research, consultancy and laboratory testing services to the energy and environmental industry sectors

1200: Lunch

1400: Walk to IRL for site tour and discussions

IRL is a technology company based on world-class science and engineering capability, with the New Zealand government as a shareholder. IRL engages with industry through research and development, pilot scale production, consultancy services, sales and licensing. IRL is also active in the commercialisation of technology-based innovation – progressing viable business opportunities through to the global market. It maintains expertise in Carbon dioxide capture and sequestration; Distributed energy systems; Geothermal and energy modelling; Hydrogen technologies; Fuel cells and electrolyzers; Solar research; and Wave energy technology

1530: Coffee and Close

1550: Return to Wellington (25 minutes drive)

Wednesday 4 February

Walk to Transpower, 96 the Terrace

0930: Electricity Distribution.

Transpower is a State Owned Enterprise, tasked with owning and operating New Zealand's National Grid - the network of high voltage transmission lines and substations that connect areas of generation with towns and cities across the country. Transpower transports bulk electricity from where it is generated (by companies like Meridian Energy and Mighty River Power) to cities, towns and some major industrial users (like New Zealand Steel) connecting with smaller lines companies (like Vector) who package and deliver that power to homes and businesses managing New Zealand's power system so that electricity is delivered whenever and wherever it is needed, 24/7.

NB: Our UK participants have asked us whether we can invite: Power utilities (for cable monitoring and microgrid development proposals), wind turbine operators (for microgrid development and for condition assessment) eg- Meridian Energy, Contact Energy, Genesis Energy, Mighty River Power, Empower Consultants, ETS NZ Ltd; Vortec Energy Ltd; Transpower, Electricity Commission; major carbon emitters. Invitations are also going out to a wide array of NZ interested parties.

NBB: Begin with a group discussion on grid distribution, with participants giving brief presentations

1000: Coffee

1030: Electricity Distribution - continued

1200: Lunch NB: Donald Hepburn (UK) to give a luncheon talk on his work

1315: Walk to Energy Efficiency and Conservation Agency (EECA), 44 the Terrace.

1330: Energy Efficiency session hosted by CEO Mike Underhill, including video link with Auckland participants.

EECA promotes sustainable energy by changing the way New Zealanders think about, and use energy. EECA works to raise community awareness of energy efficiency and renewable energy issues and provides businesses and individuals with the tools to make changes. EECA develops programmes to meet the needs of specific markets, often working in partnership with other organisations. EECA is the main agency responsible for helping to deliver the Government's extensive energy efficiency agenda. Its function is to encourage, promote and support energy efficiency, energy conservation and the use of renewable energy sources. It has developed the New Zealand Energy Efficiency and Conservation Strategy in conjunction with the Ministry for the Environment. EECA has a Memorandum of Understanding with the Electricity Commission that specifies how the two organisations will work together to promote electricity efficiency.

1515: Close, transport (15 min) to High Commissioner's residence, Homewood, Karori

1600: Reception at the High Commissioner's residence.

Thursday 5 February

Choice of visits to 1) Makara wind farm and marine projects. 2) Technology Transfer agencies

1) Makara Wind Farm

Project West Wind, due for completion by late 2009, is in construction on the rugged hills of Makara Farm and Terawhiti Station. Meridian's plans for one of the world's biggest and most productive windfarms is generating debate over the installation of turbines in areas of natural beauty. The wind farm will comprise 62 wind turbines, each generating up to 2.3 MW of electricity. The combined output would supply enough power for Wellington's domestic use, according to Meridian Energy. The planned 210MW farm at Makara, west of Wellington - with 70 turbines, each more than 100m tall - will be one of the biggest windfarms in the world. The company has already built the Te Apiti farm in the Manawatu, the largest in Australasia, generating 90MW from 55 turbines. By comparison, the Huntly power station, New Zealand's biggest, can put out 1000MW of electricity. Generating at full strength, the \$360 million West Wind farm could meet the needs of 110,000 average homes - equivalent to every home in Wellington City, Lower Hutt and Porirua. The Environment Court approved Project West Wind in May 2007.

0930: Pick-up: Lobby of the IBIS Hotel, Featherston Street

1000: Arrive on site for orientation and safety briefing, followed by site tour.

1230: Depart site and drive to Lyall Bay

(Note: a side trip to Brooklyn turbine for a 'helicopter' view of Wellington)

1300: Lunch
 1415: Depart for central city
 1430: Return to IBIS Hotel

2) Technology Transfer Agencies

0900: NZBio - CEO Bronwyn Dilley.

NZBio is the industry organisation. Its role is to create the right environment for individuals and organisations to be successful. The four goals that allow NZBio to have the greatest impact on building a prosperous biotechnology sector are:

1. Generating valuable intellectual property

Industry development requires a strong pipeline of opportunities. It is important to have sufficient research scale to be successful, with high quality intellectual property and effective technology transfer.

2. Creating a favourable operating environment for commercialisation

The industry needs an environment that supports its development. It is imperative that Government policy and strategy, particularly in the areas of investment, taxation, regulation and technology transfer, are aligned with this goal.

3. Developing business connections

To take advantage of opportunities the industry needs to be well informed and networked. NZBio's role is to encourage the development of business connections between industry participants, and this is where the regional networks, special interest groups and our international connections play a valuable part.

4. Promoting industry development

NZBio's role is to increase the level of understanding of biotechnology in the wider community, to build a constituency of advocates who support its development.

1000: GROW Wellington - CEO Nigel Kirkpatrick.

GROW Wellington connects high growth businesses with the people, tools and knowledge they need to fulfil their potential. It invests in growing our economy, especially exports, to help create a strong and vibrant Wellington region. GROW Wellington is the regional economic development agency, funded through the Greater Wellington Regional Council and charged with the delivery of the economic aspects of the Wellington Regional Strategy

1100: Victoria University of Wellington Commercialisation - Pro Vice-Chancellor David Bibby, Bob Burgess and members of the Centre of Building Performance Research

1200: Massey University Commercialisation - Director Mark Cleaver, Research Management. Services

1300 Foundation for Research, Science and Technology - Anna de Raadt, Graham Scown and Ruth Berry

FRST invests in research, science and technology for the benefit of New Zealand. In recent years FRST has changed from being a funder to an investor and this has changed the way it works.

As a funder, FRST was able to support the best research proposals submitted. As an investor, however, it can help shape the direction of research proposals. This makes it more likely to invest in research that will produce tangible benefits for New Zealand. FRST monitors research programmes we select for investment to make sure they are delivering the intended results.

1400: New Zealand Trade and Enterprise - Director of Enterprise and Innovation Paul Frater

New Zealand Trade and Enterprise (NZTE) is the government's national economic development agency. It stimulates economic growth by helping to boost export earnings, strengthening regional economies, and delivering economic development assistance to industries and individual businesses. As a global organisation, it uses its knowledge and contacts in overseas markets to connect New Zealand businesses with trade and investment opportunities.

Monday, 9 February, 1000: Auckland University Uniservices - CEO Peter Lee

Auckland UniServices Ltd is the commercial research and knowledge transfer company for New Zealand's largest University, The University of Auckland. Its capabilities have been applied to projects in Energy, Education, Medicine, Wine, Food, and many others across all faculties.

1800: Mission dinner and post-mortem

Friday 6 February: Waitangi Day

Complete mission questionnaires and return them to Steve Thompson.

Opportunities also existed for personal contacts to be cemented before departure.

Background on UK Participants

Toby Barber, Garrad Hassan Pacific (Garrad Hassan and Partners Ltd, St Vincent's Works, Silverthorne Lane, Bristol BS2 0QD United Kingdom)

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Toby is an engineer with Garrad Hassan Pacific and works on wind farm design and analysis and on occasional marine energy projects. Toby's background is in mechanical engineering, originally in product design and development and then in renewable energy. Before joining Garrad Hassan he worked for an energy utility in the UK and specialised in wave and tidal projects, providing technical advice on participation in the Wave Hub project and managing a tidal energy project in south west Wales. Toby has undertaken assessments of a variety of marine energy devices and completed resource assessments and energy yield predictions for several projects. He is interested in the successful development of wave and tidal energy in New Zealand and Australia and is currently completing an MSc in renewable energy.

Sector of interest: Utility scale wind, wave, tidal and solar energy

Research Objectives: Collaborative R&D associated with device and project development.

Intended commercial outcome: Further development and validation of in house tools for use in consultancy services and implementation within commercial software packages.

Prospects in New Zealand: Device developers (Windflow and other similar but possibly earlier stage companies in this and other sectors). Academics, project developers, financiers, investors, government representatives.

Presentation at the workshop: Wind, Wave and Tidal Energy - R&D activities at Garrad Hassan

GH is an engineering consultancy with a strong track record in multi-partner, national and multi-national R&D projects (UK government, EU and NREL funded programmes in wind and marine energy). Given the early stage of marine energy our current focus in this sector is on R&D, we have assisted a number of tidal and wave energy device developers from concept through to prototype stage. We are completely independent of any technology and so are able to offer informed, impartial technical advice in all areas of the sector.

Dr Steve Bouzalakos, Research Associate Centre for Innovation in Carbon Capture and Storage (CICCS), Department of Chemical and Environmental Engineering, University of Nottingham, University Park, Nottingham, NG7 2RD

steve.bouzalakos@nottingham.ac.uk +44 (0) 115 951 4198

Dr Steve Bouzalakos is a Research Fellow at the Centre for Innovation in Carbon Capture and Storage (CICCS), University of Nottingham. He works with Professor Mercedes Maroto-Valer and his research is focused on geological storage and mineral carbonation processes for CO₂ sequestration. He is also responsible for supervising students at undergraduate and postgraduate levels. Steve holds a PhD and an MSc in Environmental Engineering from Imperial College London, and a BEng in Civil Engineering from University College London. He is a Graduate Member of the Institution of Civil Engineers and the Energy Institute, UK. Steve is involved in multi-disciplinary activities for the management, outreach and marketing of CICCS and liaison with industrial collaborators. He is interested to expand the international collaboration and network of CICCS and to develop innovative research projects on carbon capture and storage.

Sector of interest: Carbon sequestration

Research objectives: Familiarisation with carbon sequestration activities in New Zealand; Potential collaboration with institutions/companies; Outreach of CICCS

Intended commercial outcome: We would like to see short- and long-term collaborative industrial-based research projects develop with New Zealand institutions/companies in carbon capture and storage. We would like to focus on research that is complementary to CICCS and New Zealand collaborators. Our academic members of staff could offer their expert advice as consultants to solve specific industrial problems.

Prospects in New Zealand: National Energy Research Institute (NERI); CRL Energy; Industrial Research (IRL); University of Otago (Prof. Alan Mark; Dr Andrew Gorman); GNS Science (Dr Peter King; Rob Funnell); The University of Auckland (Dr Rosalind Archer; Dr Sadiq Zarrouk)

Presentation at the workshop: Overview of CICCS; areas of research (with examples of key findings to date) and potential collaboration mechanisms/opportunities.

Phillip Cozens, Head of Technology Development, Progressive Energy Ltd. Swan House, Bonds Mill, Stonehouse, Gloucestershire, UK GL10 3RF

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Sector of interest: carbon capture and storage, second generation bio-fuels, but also tidal, wind, and wave.

Research Objectives: We have made substantial progress in the development of a CCS project here in the UK based upon an integrated gasifier combined cycle gas turbine (IGCC) process; the Eston Grange Project at Teeside. The project comprises high pressure gasification of coal followed by synthesis gas shift to recover carbon dioxide before combustion, combustion of hydrogen in a combined cycle power plant, and pumping, transport and storage of carbon dioxide in a saline aquifer beneath the North Sea, where there is the potential also to use the carbon dioxide for enhanced oil recovery. With the knowledge acquired in the development of this project over a period of ten years our

objectives would be to promote the merits of this type of low carbon energy concept and explore the potential for investment in the UK as well as exploring the potential for technical co-operation related to the deployment of this concept in NZ, especially given the focus in NZ energy strategy for hydrogen use.

We also have an active interest in the development of second generation biofuels (i.e. those made from non-food crop biomass or waste biomass). Hence we would be interested to meet any technology developers who have made progress in this area.

Intended commercial outcome: A possible commercial outcome would be a technical collaboration agreement with a NZ power plant operator or utility interested to develop CCS projects. We believe we can shorten the learning curve for anyone contemplating the application of this technology in view of our ten years experience in this area. We are also involved in a major initiative for the development of a second-generation bio-fuels facility. We would be interested in exploring the potential for technical co-operation in his area.

Prospects in New Zealand: The main companies we would like to meet would include Genesis and Contact Energy plus perhaps Transpower and the Electricity Commission and major carbon emitters who need to abate their emissions. It would also be of interest to meet representatives of oil and gas operators contemplating end of life extension of oilfields and / or the potential for using these as carbon dioxide storage sites.

Presentation at the workshop: The Eston Grange IGCC and CCS project.

John Elliott, Director, Eureka Heat Recovery Systems Ltd, Unit 125, Woodlands Way, Denaby Main, Doncaster, DN12 4JE. john@eurekaheatrecovery.co.uk 01709 324252 - unable to attend.

Represented by: Rick Hudepohl, Managing Director, Climatedmaster, 11-15 Torrens Tce, Mt Cook, Wellington, P.O.Box 6056. T: 04 3877 148. M: 021 247 3569 (021 AIRFLOW)
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John Elliott is a British Citizen. MD of Eureka Heat Recovery Systems Ltd. Over 30 years experience in refrigeration and air conditioning industry with a bias to energy saving products especially heat recovery. Associated with Eureka Germany for 24 years. Has worked in the Caribbean, Saudi Arabia, Seychelles, and South East Asia. Operating own contracting company in Seychelles and joint venture with Malaysian company in SEA. On the heat recovery side, projects include large hotels, (up to 600 rooms), airport in flight catering kitchens, supermarkets, abattoirs and food processing factories. The mission will help verify the potential for Eureka products in New Zealand and assist distributors and installers to understand the scope for energy saving and carbon emission reduction this product brings. Contacts with companies made prior to the mission will be strengthened and mutually beneficial trade agreements would be agreed.

Sector of interest: Energy efficiency for domestic or commercial use.

Research Objectives: We would seek to identify the market potential for the high efficiency Heat recovery systems we produce.

Intended commercial outcome: We would look to source suitable qualified installation companies to work with us as dealers/distributors.

Prospects in New Zealand: Envirogroup Ltd; Energy Efficient Homes Ltd; Kiwi Airconditioning & Electrical Ltd.

We are currently developing a heat pump system that will be up to 30% more efficient than anything on the market. Because this system has to go through independent testing, to verify performance figures, we do not have an exact launch date. If we have the independent data by February a presentation would be a possibility.

Gilbert George, Director, Ocean Power Technologies, OPT (Australasia) Pty Ltd, PO Box 7511 Cloisters Square, Perth, W.Australia 6850
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Gilbert George has a BSc in Agricultural Science with Honours from the University of Western Australia, as well as a Masters of Economics from Hitotsubashi University (Tokyo, Japan). Prior to starting his own consulting business in 1988, Mr George work with the Australian Wool Corporation in sponsored economic research, and subsequently worked for five years with the Australian Embassy in Tokyo as Director of the Australia Japan Foundation. Prior to becoming a Director of Ocean Power Technologies (Australasia), Mr George was a consultant to OPT, Inc, assisting in developing financial and technical relationships for OPT in Japan and Australia. Mr George has worked with OPT, Inc, OPT Ltd and OPT (Australasia) Pty Ltd since 1997. Mr George has also previously been a director of Tokyo Electric (Australia) Pty Ltd, and Tokyo Gas (Australia) Pty Ltd.

Sector of interest: wave energy

Research Objective: Identification of financial and industry partner to assist in developing a demonstration wave power station, with subsequent expansion potential.

Intended commercial outcome: Identification of potential partner / project

Presentation at the workshop: "OPT - Recent Developments"

Dr Donald M Hepburn, Lecturer, School of Engineering and Computing, Glasgow Caledonian University
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Donald M Hepburn has been involved in High Voltage condition monitoring research for around 18 years. Initially involved in materials breakdown studies his research interests have broadened to include detection and identification of partial discharge (PD) in power plant. He has been at Glasgow Caledonian University (GCU) since 1991, working with the UK's electrical transmission and distribution operators, i.e. National Grid, ScottishPower and EDF, and a number of plant manufacturers and operators, e.g. VATEch and First Engineering. Recent work at GCU has developed hardware and software to detect, isolate and interpret the measurable parameters of incipient faults in power plant. Asset management, through identifying pre-breakdown phenomena, allows equipment operators to plan repair or replacement of degrading assets and reduces the financial impact which occurs in unplanned outage. Keen to meet with electrical transmission and distribution operators and with generators, to show developments at GCU and to identify ways in which we could work together to find solutions to meet industry (and customer) needs.

Areas of interest: improving condition monitoring of underground MV and HV cables; condition monitoring of renewable energy systems and infrastructure and design and implementation of efficient microgrid equipment and control systems.

Research Objectives: identifying academic and industrial groups with which to prove existing, and develop improvements in, condition monitoring of underground MV and HV cables; develop academic and industrial collaboration for comparative studies in implementing and condition monitoring of renewable energy systems and in microgrid implementation in NZ and UK: this would enhance current studies with Chinese and Omani representatives.

Intended commercial outcome: demonstrate effectiveness of cable monitoring software to power utilities; seek collaborative research links on wind turbine condition monitoring; seek collaborative research in microgrid control development

Prospects in New Zealand: Power utilities (for cable monitoring and microgrid development proposals), wind turbine operators (for microgrid development and for condition assessment) eg. Meridian Energy, Contact Energy, Genesis Power, Mighty River Power, Empower Consultants, ETS NZ and Vortec Energy.

Presentation at the workshop: "Advantages and challenges of on-line cable monitoring for Partial Discharge activity"

As a member of the High Voltage and Insulation Diagnostics Group (HVIDG) at GCU, I have been involved in research into condition monitoring of power plant over a number of years. I am a member of a team which has specialist skills in design and construction of monitoring equipment (e.g. IEC60270, RF and chemical) and in software to analyse faults in installations. We have close connection with UK power utilities and universities working in this area. GCU has invested in equipment to enhance our ability to carry out applied research in this area and we would welcome the opportunity to present our skills and to develop links with academic and industrial sectors in New Zealand.

Greg Hussey, for Ocean Navitas UK Ltd (via Smart Energy Ltd. 287 Stafford St. PO Box 75. Timaru 7940. T+643 688 4492 M: +6421 976 722
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Sector of interest: Generation and grid distribution

Research Objectives: Our goal is to assess the level of interest in our product n NZ, raise our profile to attract the (EECA) grant funding, check out the manufacturing capabilities, possibly view deployment sites and meet energy sector officials

Intended commercial outcome. To identify and initiate key strategic networking and relationship opportunities and cement existing business relationships. To leave the mission with a defined workload accurately directed at the realization of commercial activity in New Zealand / Pacifica.

Prospects in New Zealand: NIWA, Meridian, Contact, Genesis

Henry Jeffrey, Institute for Energy Systems, University of Edinburgh, UK.
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Henry Jeffrey began his career in the energy business within the oil and gas industry. In 1998, he moved into the commercial marine renewables sector. One of the highlights of this was being part of the project team responsible for the installation of the world's first commercial grid-connected marine energy device. In 2003, Henry took his knowledge of the commercial marine energy sector and transferred into academia. Henry's present position is with Edinburgh University. His responsibilities include dissemination and internationalisation of the UK Supergen Marine program and conducting the UKERC road mapping and learning rates investigation of the marine renewables sector, which enables the identification of key technology, investment and policy requirements for the sector. Henry is interested in identifying collaboration opportunities for both Supergen Marine and UKERC with New Zealand organisations. **Supergen Marine** www.supergen-marine.org.uk is part of the EPSRC SUPERGEN Programme, the academic partners within the marine consortium are: the University of Edinburgh, Queens University, Heriot Watt University, Lancaster University and the University of Strathclyde. The industrial collaborators include more than 20 national and international marine energy and electricity supply companies. **UK Energy Research Centre** (www.ukerc.ac.uk) undertakes world-class research addressing whole-systems aspects of energy supply and use, while developing and maintaining the means to enable cohesive UK research in energy

Sector of interest: Tidal and Wave energy.

Research Objectives: Presently the University of Edinburgh is managing the multi million pound SuperGen marine program for wave and tidal energy and is seeking international collaboration and commercial opportunities. We would welcome the opportunity to market the underpinning research and collaboration offered by the University in a wide range of marine renewable areas from resource assessment to network integration.

- Explore the research capability in NZ that could collaborate with the SuperGen marine work.
- Establish where NZ research funding could be used to fund the international collaboration and research work.
- Establish MOUs and agreements with appropriate NZ organisations

Intended commercial outcome:

- Establishing where NZ companies, agencies and organisations can engage commercially with the work of SuperGen marine.
- Establish MOUs and agreements with appropriate NZ organisations

Prospects in New Zealand: New Zealand marine energy technology and project developers as well as marine research organisations.

Presentation at the workshop: SuperGen Marine research capabilities and the UKERC Marine Energy Roadmap.

I presently sit on the evaluation panel for the New Zealand Marine Energy Deployment Fund (MEDF) as their international expert from the UK. I am interested in attending the mission to develop collaboration opportunities with the growing marine energy sector in the NZ on behalf of SuperGen Marine and the University of Edinburgh.

Dr Martin Owen Jones, Inorganic Chemistry Laboratory, South Parks Road, University of Oxford, Oxford, OX1 3QR

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Dr Jones is a senior research fellow at the University of Oxford and Visiting and Project Scientist at the Rutherford Appleton Laboratory. His recent research centres on functional materials including; transparent conductors, electronic oxides, electronic solutions, metallic nanoparticles and solid state hydrogen stores. His main areas of expertise lie in functional materials synthesis, processing and characterization, and most recently those related to energy and in particular to hydrogen storage applications. He is currently actively involved in a number of EPSRC (SUPERGEN, UK-SHEC), DTI (Technology Programme), IPHE, IEA and CCLRC hydrogen storage projects.

Research Objectives: One of the most productive parts of our hydrogen storage programme is a multinational interaction branded (but not funded) by the International Partnership for the Hydrogen Economy (IPHE). This grouping includes Oxford, National University Singapore, Los Alamos and Pacific North National Labs in the US and IRL from New Zealand. This grouping has already produced significant breakthroughs in hydrogen storage materials (see attached paper for an example), and a large part of its success has revolved around short interactions and visits by the co-investigators to each others laboratories for presentations and discussion.

Prospects in New Zealand: Discussions with Drs Tim Kemmitt and Mark Bowden at IRL.

Stephanie Merry, Director and senior technical consultant of Focus Offshore Ltd, 4 Cliffe Avenue, Hamble, Southampton SO31 4LJ; Head of Marine Energy at the Renewable Energy Association, 17 Waterloo Place, London SW1Y 4AR

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Dr Stephanie Merry is Sector Advisor in marine renewables for the Renewable Energy Association (REA) in London. She is also Director of Focus Offshore Ltd, a technical consultancy specialising in marine renewable energy. Prior to setting up this company, she worked as principle engineer in the Submarine Hydrodynamics Group at QinetiQ (formerly the Defence and Evaluation Research Agency), Haslar. From 1990 to 1996 she was employed as a lecturer in Marine Technology at the University of Southampton, where her role was to integrate students and staff from the Engineering Faculty into the world-renowned Southampton Oceanography Centre (now the National Oceanographic Centre). Steph's interests for the trade mission to New Zealand are twofold.

1. On behalf of 100+ members of the Ocean Energy Group at the REA, which primarily covers wave energy and tidal current device developers along with project developers, and providers of services to the sector, her remit will be to disseminate information about the products and services these companies can provide and to gather information on commercial opportunities for them in New Zealand.
2. On behalf of Focus Offshore Ltd, her aim is to seek collaborative partners for the development of a shallow water test site for the optimisation of marine renewable energy devices. Areas of interest include multi-functional moorings / foundations and options for power take-off / power utilisation,

Sector of interest: wave, tidal stream and tidal head

Research Objective: To investigate the wave and tidal energy resource, the legislative environment and the existing infrastructure for commercial development of marine renewable energy in New Zealand

Intended commercial outcome: On behalf of Focus Offshore Ltd: to seek collaborative partners for the development of a shallow water test site for the optimisation of marine renewable energy devices. Areas of interest include multi-functional moorings / foundations and options for power take-off / power utilisation. On behalf of the REA: to gather information on commercial opportunities in New Zealand for marine energy device developers who are members of the

REA;

Prospects in New Zealand EcolInnovation; ETS NZ Ltd; Inertialess Drive Technologies; Power Options NZ; Powerflow Ltd; Turbines; Any companies wishing to expand their portfolio into marine renewable energy

Presentation at the workshop: "Marine renewable energy in the UK - successful projects and the legislative environment"

As Head of Marine Energy for the REA, the information I collect will be disseminated to the 100+ members of the REA's Ocean Energy Group. As Director of Focus Offshore, I am seeking collaborative partners and best practise that may find applications in a project to develop a shallow water test site on the Isle Of Wight. See <http://www.solentocceanenergy.com/>

Terry Pollard, Business Development Manager (Isis Enterprise division), Isis Innovation Ltd (the technology transfer company for the University of Oxford) Ewert House, Ewert Place, Summertown Oxford OX2 7SG
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Terry has a background in physics and technical business consulting, and an MBA from Imperial College London. He joined Isis Innovation (the technology commercialisation company for the University of Oxford) in 2003. Here he worked as a Project Manager commercialising intellectual property from the Physics, Chemistry, Materials and Engineering departments. He was involved in the formation of several spinout companies, including Oxford Catalysts Plc, a company that is developing specialty catalysts for the generation of cleaner fuels. Oxford Catalysts floated on AIM in 2006, and Terry left Isis in early 2007 to gain experience working for this SME. Terry returned to Isis in April 2008 to join the Isis Enterprise group. Isis Enterprise takes the experience and networks built up by Isis Innovation over the last 20 years, to provide advice and hands-on assistance in technology commercialisation. Clients include universities and research organisations, SMEs via a scheme funded by the Carbon Trust, and multinational companies looking to find new technologies and/or enter European markets. Aims for this mission include facilitating links between research groups in industry and academia in the UK and New Zealand, and determining if the advice and hands-on support available from Isis Enterprise might be of benefit to research organisations and companies in New Zealand.

Sector of interest: Isis Innovation has experience of commercialising technology from the University of Oxford in many different areas. Currently these include new designs of tidal turbine (could be a good opportunity for collaboration in NZ as these now need to undergo field trials), more efficient designs of wind turbine, and the next generation of smart meter (for improving energy efficiency in both domestic and commercial situations by identifying the energy used by specific devices). Oxford Catalysts is an example of a spinout company from the University, that is developing technology for the next generation of biofuels (produced from waste and non-food crops), that is working with commercial and research partners globally. Oxford Catalysts is listed on AIM and has to date raised almost £20 million in funding. Isis has access to academic and industry experts across Europe, investors, and links to companies in a position to bring these types of technologies to market. Other sectors where Isis is active that might be of interest include fuel cells, and through the University access to large collaborative groups looking at emerging technologies for energy efficient vehicles etc.

Isis Enterprise (as a relatively new consulting division of Isis Innovation) is sharing the experience built up in Oxford over the last 10+ years, and helping research organisations across Europe and indeed globally to bring new technology to markets. Isis Enterprise runs a Carbon Trust Incubator, so has experience of working with SMEs. Through the Carbon Trust Incubator Isis provides advice on the commercialisation of new clean-tech technologies to SMEs and other companies and research establishments from all across the UK. With funding, Isis would be in a position to provide the same advice and assistance (including access to industrial and investor networks across Europe etc) to SMEs and research establishments in New Zealand.

Research Objectives: Isis would be keen to help SMEs and research organisations that are active across the whole range of clean energy technologies. Objectives might be to build a strong IP portfolio, and also to help build collaborations across the UK and Europe, with the goal of bringing their technologies forward to commercial application. Isis has executed well in excess of 350 technology licensing agreements, so is well placed to assist with negotiations around IP.

Intended commercial outcome: One commercial outcome would be to help NZ SMEs and research organisations access investors and commercial partners in the UK/EU, with a view to accelerating the path of technology commercialisation. Another objective might be to link companies in NZ to leading technology providers and research establishments in the UK and Europe with a view to transferring technology to New Zealand for commercial application. Isis has for example completed technology reviews and technology scouting activities for Japanese companies looking at emerging technology areas, and something similar might be of interest in specific areas. Isis Enterprise would be keen to build partnerships with individual companies, and also probably via trade organisations and government bodies to technology based SMEs and research organisations across New Zealand.

Prospects in New Zealand: leading research organisations in New Zealand (both universities and companies) in this sector, and also to technology based SMEs active in the clean-tech area. One thought is that it may be easier to communicate with these smaller companies via trade bodies and government organisations?

Presentation at the workshop: "Commercialising clean-tech research from the labs at the University of Oxford"?

Sandy Robinson sandy@thermo-d.demon.co.uk

Sandy Robinson read engineering at Cambridge. After an apprenticeship on innovative high-speed steam turbines with a manufacturer, he spent some 35 years designing and building UK nuclear power stations in a variety of technical and

management roles. He joined the project team at Windscale that decommissioned WAGR – the prototype for the some 9,000 MWe AGR series of reactors – where he was responsible for managing compliance with licensing requirements. In support of building Sizewell B, he had set up the lead UK laboratory for testing electrical equipment in mixtures of air and steam. The temperature specification had been a challenge to achieve. One supporting test validated a little known theory of condensation of gases. This provided the clue to unlocking understanding of the physics, and the various solutions to save fuel and reduce emissions to the environment of carbon dioxide and other gases. The eventual target is thermal power stations; the early work will be at a smaller scale and financially less risky. Retorts / autoclaves are similar to the laboratory setup, and there is potential to reduce consumption of steam and cycle time, whilst also reducing the spatial variation of temperature within the vessel which gives both product and production advantage.

Biofuels Section of the Mission, March 9-12 in Auckland

Paul Sallis, Senior Lecturer in Environmental Engineering, Civil Engineering and Biosciences, Newcastle University, Ridley Building, Claremont Road, Newcastle upon Tyne, NE1 7RU, UK

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Paul's interests focus on the control of pollutants in the environment, primarily in relation to municipal and industrial wastewater treatment, and the treatment of drinking water. My research also involves the development of novel treatment technologies in these areas relevant to both developed and developing countries.

Sector of interest: Algal biofuels, particularly biogas generation from seaweeds.

Research Objectives: To design an anaerobic digestion facility for the production of biogas (methane) for heating and electricity generation from seaweeds and marine wastes from aquaculture. The system would be particularly effective in providing power in more outlying New Zealand communities. I am leading a similar programme with the Shetland Islands but see an excellent opportunity for rolling out the technology into New Zealand.

Intended commercial outcome: I would be interested to explore the funding landscape, in particular industrial funding for the construction of a pilot plant processing New Zealand seaweeds and aquaculture wastes.

Prospects in New Zealand: Particularly interested in meeting with Natural Systems Ltd (Christchurch.) Also any aquaculture company that would have a potential waste stream that could be utilised.

Presentation at the workshop: Energy From Waste: Realising Aquacultures Potential

Biogas generation has great potential for New Zealand, particularly for power generation in more isolated communities that would have access to the marine raw materials, either aquaculture waste or seaweed harvesting. I am developing a similar system for the Shetland Islands and have the full backing of the Shetland Council, Shetland Seafood Development Programme and the 3 largest salmon producers in the islands.

Dr Khalid Shukri, Director Scionix Ltd, 298 Regents Park Rd, Finchley, London, N3 2UA, UK

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Scionix is a spin out of the University of Leicester. Scionix is involved in a large (~ £2M) TSB funded project in biodiesel. Our interest is using our patented technology for the purification of the biodiesel using our unique ionic liquids. Scionix is looking for companies interested in the manufacture of biodiesel and with the long-term aim to set up joint ventures and work with these companies to incorporate our technology.

Sector of interest: Biofuels

Research Objectives: using our patented technology for the purification of the biodiesel

Intended commercial outcome: we are looking for companies working with biodiesel so that we can jointly develop and commercialise

Prospects in New Zealand: Any company that deals with biodiesel (eg. Ecodiesel Limited)

Presentation at the workshop: Washing glycerol out of the biodiesel

Catherine Side, Director, Inside Consulting, 5 Short St, Pangbourne RG8 7NE, UK

CatherineSide@aol.com

Founder and business development manager of the Virtual Consulting Group, now trading as Acumentia Ltd, representing the interests of 40 bioscience consultants across all the Biosciences. With a strong background in the Biological Sciences from Cambridge University, Catherine has made a successful career in the sales and marketing of ingredients and intermediates for food, pharmaceuticals and biotechnology, with extensive experience abroad, including senior positions in an ingredients company in the USA and Canada and product launches in many countries world-wide. Since 1991, Inside Consulting has provided cost-effective and professional Business Development and Interim Management for companies and public sector bodies. Inside Consulting publishes an occasional Newsletter, the InSiDE Track.

Sector of interest: Biofuels, Algae, Animal health – vaccines and biocides (have worked extensively with Veterinary Laboratories Agency here), Exploitation of biotechnology, Partnering

Research Objectives: Biofuels and algae. I worked on fuel alcohol in the USA and developed and sold enzyme systems to all sizes of commercial "gasohol" operations, and have maintained an active interest in the area. The UK has recently started the Algal Fuels Initiative, which I subscribe to. I have located a start up company in Auckland with novel algal technology. Another group of interest is the UK's Bioscience for Business Knowledge Transfer Network.

Intended commercial outcome: My interests are in personally working with the NZ companies to advance their business prospects and to introduce to other consultants in our group who may provide further services, or act as a broker for partnerships.

Prospects in New Zealand: Fonterra, Tatua, Westland Milk, Vital foods, AgResearch, Plant and Food Research and IRL, Quantec, A2 Corporation, Ancare Scientific, Ecodiesel Ltd, Keratec Ltd, Pacific Edge Biotechnology Ltd, Seperex Nutritionals Ltd, Southern Cross Biotechnologies(NZ) Ltd, Summit Quinphos, ZyGEM

Presentation at the workshop: The Algal Biofuels Initiative in the UK; Bioscience for Business KTN update; Opportunities to use consultants for commercialisation of technologies.

Host for the Mission: Dr Steve Thompson, British High Commission, Wellington

Press Officer for the February Mission: Carolyn Weston, New Zealand

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Evaluation and Follow-up

A major goal for the project is to see at least four collaborative R&D agreements signed and operational by end of September 2009. The six questions below were rated by UK participants on a scale of: 1=not at all, 2=some, 3 = significant amount, 4= greatly.

1. **Has your ability to access international expertise, resources and/or facilities has been increased as a result of participation in this event?** 3,3,2,2,3,3,1,4 Average = **2.6**
2. **Do you intend to initiate or expand an international collaboration leading to one or more joint projects wholly or partly as a result of this event?** 3,4,2,3,3,2,3 Average = **2.9**
3. **To what extent did this event meet your objectives for attending it?**
4,3,3,3,3,4,2,4 Average = **3.3**
Comments: "Able to assess regulatory requirements and project opportunities". "Objective was partly just to learn, and also to raise awareness of GH's services, so I feel it accomplished these goals". "Learnt a great deal about how business is done over here – the possibility of the handshake. I thought the "Can do" attitude of the Kiwis would provide the breakthrough, and this has been greatly helped by the FCO and UKTI, in particular setting up contact at a much higher level than I could possibly achieve myself."
4. **To what extent did the event lead to significant new business opportunities?**
3,1,2,2,2,4 Average = **2.3**
Comments: Most responded "Too early to tell". Two responses were "Will talk with at least two potential partners" Another was: "You set this up by your immediate response of introducing me to NZ Geothermal Association, who copied in both Contact Energy and Mighty River. No agreement signed, but 95% expected".
5. **How would you rate the information received before the event?**
3,2,2,3,3,3,3,3 Average = **2.8**
Comments: "Just sufficient" "Good". "I was very lucky. However I suppose I could have been better briefed on the large number of Research Institutes, objectives, funding, collaboration etc. Perhaps I could have done more research back in the UK".
6. **How would you rate the practical arrangements for the event?**
4,4,3,4,4,3,3,4 Average = **3.6**
Comments: "Very Good". "Well organised." "Excellent".

Additional Comments: "Able to achieve Objectives quickly". "Would have preferred more focus on wave and tidal energy. The CCS and energy efficiency days were interesting but outside the remit of my company and the REA". "Very valuable experience. Perhaps would have been more useful to include more participants and more focussed rather than collectively for renewables etc.". "Excellent opportunity to meet with research organisations, late contact with industry association personnel may also be useful and productive.". "Well organised". "useful contacts and learned a lot about the NZ energy sector generally, but at this stage there aren't any significant leads for immediate business opportunities." "I Will Return!"

end