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ANSWERS TO QUESTIONS ON NOTICE
Industry, Innovation, Science, Research and Tertiary Education Portfolio
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AGENCY/DEPARTMENT: COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION

TOPIC: Energy Transformed Flagship

REFERENCE: Written Question –Senator Bushby

QUESTION No.: AI-96

What does CSIRO consider have been the most tangible, practical achievements of the Energy Transformed Flagship over the course of its existence?

ANSWER

There have been numerous achievements and impacts from the work of the Energy Transformed Flagship. The following are a small number of selected highlights.

- **Carbon Capture and Storage (CCS):** CSIRO is working to demonstrate the viability, reduce the cost and improve the efficiency of post combustion carbon capture and storage. CSIRO's carbon capture technology is currently deployed at four pilot sites in Australia and China. CSIRO is also a key contributor to Australia's first underground CO_2 storage project, the CRC for Greenhouse Gas Technologies project in Victoria. The project demonstrated the successful containment of over 60,000 tonnes of CO_2 and has one of the world's most comprehensive monitoring and verification programs. A successful global deployment of these technologies is an essential component of a low emissions energy future and will enable Australia to continue to enjoy the benefits of its large coal endowments in a carbon constrained future, for both domestic and export use.
- **Solar Thermal Power:** CSIRO has partnered with global industry leaders, (for example Mitsubishi Heavy Industries (Japan), Abengoa Solar (Spain) and Thermax (India)), on developing a new solar thermal technologies, ideally suited to Australian needs. CSIRO's new solar thermal technology is currently being tested in two pilot fields (with 500 and 1,200 kW_{th} peak capacity respectively) at its international solar thermal research hub in Newcastle. CSIRO's new modular technology is initially aimed at regional and remote (eg mining) sites across Australia, where it could offer a cost competitive low emissions alternative to current generation technologies (eg. diesel generators).
- **SolarGas™**: CSIRO's Solar Gas technology will allow Australia to capitalise on two of its most abundant energy resources – natural gas and solar. A SolarGas plant produces synthesis gas, a low emissions fuel and chemical feedstock that can be stored, transported and exported in liquid or gas form for both domestic and potential future export applications. Around 25 per cent of the energy contained in SolarGas is clean energy captured from the sun.
- **The UltraBattery™** is a cost effective new battery technology, ideally suited to power hybrid vehicles and to smooth the output of intermittent power sources, such as wind or solar plants.

The UltraBattery is about 70 per cent cheaper to make than batteries with comparable performance and can be made using existing manufacturing facilities. The UltraBattery technology has been licensed to The Furukawa Battery (Japan) and East Penn Manufacturing (US) for various applications throughout the US, Japan, Thailand, Mexico, Canada and most recently, China. East Penn Manufacturing has also acquired the Sydney based CSIRO spin-out company Ecoult, which provides turn key solutions for the power industry based on the UltraBattery. Ecoult is operating a 1MW battery bank at a demonstration facility in Hampton, NSW and building several large scale projects in the US. ACIL Tasman, as part of a wider impact assessment of flagships, found that the commercialisation arrangements for the UltraBattery will support revenue streams back to Australia valued at tens of millions of dollars. A summary fact-sheet of the report is provided with the answer to AI-94.

- **OptiCOOL (BuildingIQ)** is an automated control system that improves the heating and cooling performance of commercial buildings. Designed to be retrofitted to almost any existing building, the system is flexible and self-learning. Based on weather data and energy market prices it controls the building to achieve cost savings, occupant comfort, energy efficiency and peak demand reduction. Depending on the initial building performance, peak and average energy consumption savings of up to 30 per cent have been demonstrated. CSIRO has licensed OptiCOOL to the Australian company BuildingIQ for commercialisation. Building IQ has won multiple awards for the technology (eg EcoGen 2011 Award for Most Outstanding Clean Energy Technology Innovation) and deployed the technology in commercial buildings in capital cities across Australia and the US.
- **Solar air-conditioning:** On Australia's hottest days, air conditioners account for a significant contribution of the nation's power generation. Heating and cooling of buildings typically also accounts for around half of a building's energy needs and is a major driver of costly electricity network expansions. Solar thermal air-conditioning is very different to conventional roof top photovoltaic (PV) systems and uses the heat from the sun to power a thermally-driven cooling process. It is a low emissions and cost competitive (if total system costs are taken into account) alternative to conventional air-conditioning systems. Large-scale deployment of solar thermal air-conditioning systems could facilitate long-term containment of electricity price rises in Australia. CSIRO has a pilot installation at Hunter TAFE, Newcastle and is in the process of commercialising the technology with a major Australian manufacturer in 2012.
- **Australian Zero Emission House (AusZEH)** is Australia's first commercially available, zero-emissions residential building. Together with industry partners Henley Property Group, Sustainability Victoria and Delfin Lend Lease, CSIRO created a building with technology designed to fit the Australian lifestyle, climate and budget of a typical middle income family. CSIRO scientists estimate that if all new houses built in Australia between 2011 and 2020 were zero emission houses, 62 million tons of greenhouse gas emissions could be saved. The AusZEH is providing an example to the Australian community and industry on how affordable zero emission housing can be achieved in Australia.
- **Energymark** is helping households understand what they can do at home, work and in the community to save energy and reduce greenhouse gas emissions. It is a highly successful community based program that has been rolled out in New South Wales, Brisbane, Adelaide and Newcastle. Based on the power of the 'kitchen-table' chat, the program provides information on climate change and energy to empower people with the knowledge to enable behaviour change. On average, volunteers reduced their energy consumption between 10 and 30 per cent.
- **CSIRO EnergySavers** was created following on from the success of Energymark. Aimed at the low income and financially constrained segment of the population, the program helps these households reduce their power bills. This program has been designed by the CSIRO to achieve

both energy efficiency and affordability for Australian households experiencing financial hardship. The pilot program will shortly commence in Brisbane and Melbourne. The research is vital to inform future policy and programs by identifying what information and tools are most effective to support financially constrained households to help them meet the rising costs of energy.

- **The CSIRO Home Energy Saving Handbook** is a commercially available, affordable, 228 page how-to guide for all Australian households ($29.95, Pan Macmillan). Easy to read, yet comprehensive, the Handbook provides all the advice a household needs to reduce their carbon footprint, reduce their energy consumption and save money on power bills. Chapters include information on climate change, calculating your carbon footprint, saving energy around the home, new technologies, transport, housing design and more. Tens of thousands of copies have been sold to date.
- **Intelligent Grid (iGrid):** The Intelligent Grid Research was a partnership between CSIRO and five Universities. The iGrid work identified opportunities and pathways for Australia to limit the future cost increases of electricity by up to $130 billion in today's dollars by systematically capturing opportunities from distributed energy generation, energy efficiency and demand side response.
- **Future Fuels Forum (Fuel for Thought)** brought together the key stakeholders of Australia's transport fuel sector to map out scenarios for the future of fuel in Australia. The process and transport sector modelling capability that was developed now underpins all major analysis of the transport sector by key government departments, for example Treasury's analysis of the impact of the Clean Energy Future package on the road transport sector and the Department of Resources, Energy and Tourism Energy White Paper analysis of alternative transport fuel scenarios.
- **Flightpath to Sustainable Aviation** outlines the roadmap for a sustainable aviation fuels industry in Australia and New Zealand. All major partners (Qantas, Virgin and Boeing) involved with Flightpath to Sustainable Aviation have announced sustainable fuels research and development projects and partnerships. The Flagship is currently working on a project with Boeing to evaluate the potential for growing new feedstocks in northern Australia and turning them into sustainable aviation biofuels.
- **Flexible Integrated Energy Devices** (FIED) is a wearable battery and charging technology developed for Australian soldiers and supported by the Department of Defence. FIED could dramatically reduce the significant weight of batteries that a modern soldier has to carry in the field. Soldiers who have to carry less, can be more agile, more effective and have increased chances for survival.