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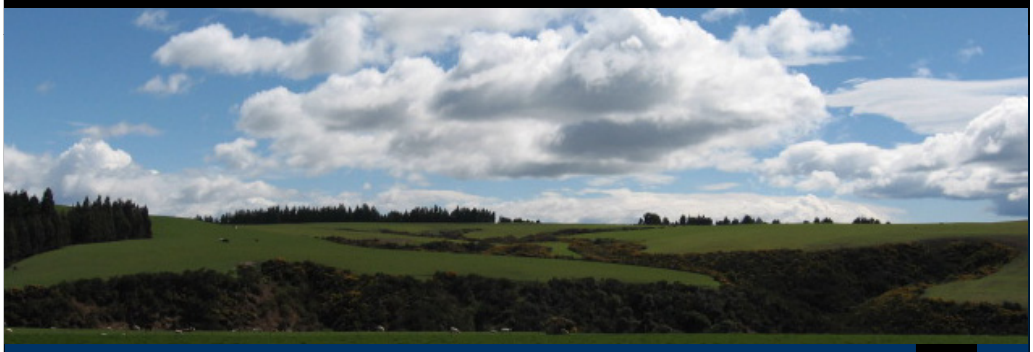
Wind Power



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Editorial—Wind power in New Zealand

By Inga Smith

Electricity demand in New Zealand is growing across the residential, industrial (including agricultural), and commercial sectors. In order to meet increasing demand, generators have been pushing forward with various options in recent years, including large-scale wind power projects. Since the previous issue of the Solar Action Bulletin went to print, the Government launched its "New Zealand Energy Strategy to 2050", with a stated objective of obtaining 90% of New Zealand's electricity generation from renewable sources by 2025. The Government expects new wind power projects to make a substantial contribution to meeting this goal.

This issue of the Solar Action Bulletin focuses on the current and future state of wind power in New Zealand. We have included a review of the current wind generation capacity and proposed projects, along with articles from New Zealand companies producing large-scale and small-scale wind turbines. Opposition to wind farms is often dismissed as "NIMBYism", however in this issue we publish an article that looks at three case studies from Otago and Southland and finds a wide range of views held by local people submitting for and against proposed wind farms. Policy and planning issues for the integration of wind turbines in the built environment are dealt with in another article.

Will the Government meet its target of 90% renewable electricity generation by 2025? As we pointed out in the media release that we made following the launch of the New Zealand Energy Strategy and the New Zealand Energy Efficiency and Conservation Strategy, the Executive of Solar Action is concerned that such a target will not be met unless the Government and its related agencies recognise the need for energy conservation by industrial, commercial, and residential consumers. Energy conservation is not seriously addressed in the final version of either policy, and finite resources cannot be used to meet continuously growing demand.

The focus of the next issue of the Solar Action Bulletin will be on food and energy, particularly the dependence of our current food production and distribution systems on oil.

Solar Action looks forward to getting your feedback on the issues contained in this issue of the Bulletin.

Inga Smith is
the Co-chair of Solar Action

Solar Action activities September to November 2007

At the end of August, Inga attended the Department of Building and Housing workshop in Dunedin on the Building Code Review 2007 consultation and had interesting discussions with the other attendees and the representatives from the Department of Building and Housing. The Solar Action Executive wrote a submission on the Building Code Review 2007 consultation, which is reproduced in this issue of the Solar Action Bulletin.

In mid-September, Maria, Tim, and Bob met with Solar Action members in Wellington to discuss energy related issues.

Maria and Inga attended the Sustainable Wanaka sustainable housing showcase on Labour Weekend, with Inga volunteering at one of the houses and Maria visiting most of the homes. Maria's report is included in this issue of the Solar Action Bulletin. The Executive is talking with Sustainable Wanaka about coordinating a nationwide event in 2008, so if you are interested in helping with the organisation of this event, please email Maria: editor@solaraction.org.nz.

Solar Action Bulletin 81 (focussed on Climate Change) was printed in late September and sent out to members, as well as to climate change and transport spokespeople of all the political parties represented in Parliament.

Tim presented the NZ Solar Action prize at the University of Auckland on 15 November 2007.

Inga, Nick, Luke, and Murray met with David Parker in Dunedin to discuss climate change, the NZES and NZEECS, and long term sustainability issues on 16 November 2007.

As Co-chair of Solar Action, Inga met up with Auckland members in late November when she was there for the NERI conference.

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Thanks to all those who helped with this issue: Many thanks to all authors and reviewers of articles.

Inga Smith and
Maria Callau (SAB Editor)

Photo credits front page top left to bottom: Otago Region Landscape (Maria Callau); Wind turbines in the Manawatu (Ewan Smith); Wind turbines in the Manawatu (Ewan Smith); Wind turbines in the Manawatu (Ewan Smith); Wind turbines in the Manawatu (Ewan Smith). Page 2 top left to bottom: White Hill Wind farm—Southland (Inga Smith); Wind turbines in the Manawatu (Ewan Smith); LA Wind turbines (Sarah Mager)

Current and future wind power projects in New Zealand

By Staff Reporter

The Solar Action Bulletin was curious to find out more about the future of wind power in New Zealand. How many wind generation projects are there "out there"? And who is planning/building them? The "New Zealand Energy Strategy to 2050" listed a number of projects, but there are more coming along all the time.

We decided to ask the "big five" generator-retailers a series of questions, and these and their responses are outlined below.

The other companies or entities mentioned in the "New Zealand Energy Strategy to 2050" (pages 63-64) as having wind generation projects consented, under appeal, awaiting consent, in process, notified, or in the planning stage are listed at the end of the "big five" responses. We have looked up the companies and entities on various websites to give you a brief description of them.

QUESTIONS FOR GENERATOR-RETAILERS:

(1) What is your company's current (October 2007) installed wind generation capacity (in MW)?

(2) What is your company's current installed total (i.e. thermal, hydro, etc as well as wind) generation capacity (in MW)?

(3) How much additional wind generation capacity does your company currently have proposed or planned?

(4) Which brand of turbine does your company install, and why are these the preferred turbines?

(5) Have you faced any issues with getting the wind generation capacity installed?

Mighty River Power Response – 29 Oct 2007

(1) Mighty River Power does not currently have installed wind generation capacity. However, we are seeking to add wind to our electricity generation portfolio, which already comprises hydro, geothermal, thermal and landfill generation capability.

(2) Mighty River Power's generation capacity (as reported for the financial year end 2007) totals 662.6 MW which is made up as follows: Hydro – 1040 MW; Geothermal – 66 MW (*); Cogeneration – 175 MW and Bioenergy – 10 MW.

(3) Mighty River Power has identified several potential wind generation sites in the North Island and upper-South Island, and is currently in various stages of investigative and monitoring activity. Depending on results of this activity, we would look to develop 400 to 500 MW of wind generation capacity over the next five years. In real terms that would be enough energy to power approximately 250,000- 300,000 homes.

(4) We are talking with several leading turbine suppliers that have suitable technology and an active interest in the New Zealand market sites. For the large and windy sites, prospective suppliers include Siemens, Vestas and Nordex; Suzlon and GE for medium wind sites, and the locally made Windflow turbine could be used for less accessible sites.

(5) We face challenges in common with other wind developers including turbine supply, price path uncertainty, consenting and proximity to the transmission grid. As more wind power is installed there are likely to be electricity market issues such as effects on dispatch and real time system operations.

(*) This represents Mighty River Power's equity share of projects totalling 150MW with a 90MW plant under construction at Kawerau.

Meridian's response - 14 November 2007

(1) What is your company's current (October 2007) installed wind generation capacity (in MW)?

149 MW

(2) What is your company's current installed total (I.e. thermal, hydro, etc as well as wind) generation capacity (in MW)?

2581.2 MW

(3) How much additional wind generation capacity does your company currently have proposed or planned?

142.6 MW under construction at West Wind, 630 MW consented for Project Hayes, 500-1000MW potential at other sites around the country under investigation

(4) Which brand of turbine does your company install, and why are these the preferred turbines?

NEG Micon NM72 at Te Apiti, Vestas V80 at White Hill and installing Siemens S82 at West Wind. Turbines are competitively tendered and factors such as suitability for the wind resource, life cycle costs and efficiency are considered as part of the process.

(5) Have you faced any issues with getting the wind generation capacity installed?

Obtaining resource consent is a challenge as with any infrastructure project. From a technical perspective, embedding wind in distribution networks (as at White Hill) can be a challenge and requires sophisticated system modelling and installation of appropriate ancillary equipment.

TrustPower Response – 24 Oct 2007

Happy to help but your questions are rather simplistic. Installed capacity, sometimes referred to as nameplate capacity, is largely irrelevant. Reference to installed capacity simply distorts comparisons between wind, solar, hydro, geothermal, gas and coal generation, because all have vastly different capacity factors. Even within each group, capacity factors vary greatly. For example, some hydro scheme have a capacity factor of less than 30%, while others are 90%. Internationally the average capacity factor for wind generation is around 32%, while here in New Zealand it is typically in excess of 40% and in the case of Tararua, which is rated as the best in the world, is 46%.

The only meaningful measure is the actual annual output, measured in GWh.

Our Tararua Wind Farm has an installed capacity of 160 MW with an annual output of 1120 GWh (the largest wind farm in New Zealand both in terms of number of turbines and output, and in terms of Stage 3, using the largest wind turbines in Australasia).

We have no thermal generation (gas/coal/co-gen) and no geothermal. We have approximately 420MW of hydro generation spread over 34 generating units, producing around 1,000 GWh per annum.

We are using two different makes of wind turbine (Vestas and Suzlon), and two different models in the case of one manufacturer (Vestas V47 and V90). The make and model used is selected according to a number of criteria, including whether the equipment is internationally certified in terms of output and reliability, availability, price, and suitability for a particular site - for example, some sites would be better with Class 2 turbines which some manufacturers don't make, while others are more suitable for Class 1 machines which are similarly only made by some manufacturers.

The issues we face with wind farm projects are generally around resource consenting, because of the incredible amount of misinformation that is in the public arena and is commonly used by wind farm opponents to justify their opposition (factors such as noise, vibration, fire risk, impact on property values etc).

We currently have two wind farms in the consenting stage - one (Mahinerangi, 200MW installed capacity) with a resource consent subject to three appeals (appeal period just closed) and another (Kaiwera Downs, 220 MW) for which the consent will be lodged next week. In addition we are in consenting phase for the Wairau Hydro scheme (72MW), Arnold Hydro scheme (42MW) and we are constructing the Deep Stream Hydro Scheme (5MW) which is due for commissioning late December. On top of that we have a further 60 projects in the pipeline, all small to medium, which are commercially sensitive at this stage.

Graeme Purches

Community Relations Manager

Contact Energy Response - 30 October 2007

(1) What is your company's current (October 2007) installed wind generation capacity (in MW)?

We do not have any current wind generation capacity.

(2) What is your company's current installed total (i.e. thermal, hydro, etc as well as wind) generation capacity (in MW)?

We generate electricity from thermal, geothermal and hydro sources.

Thermal: Otahuhu B - 404 megawatts / Taranaki CCGT - 377 megawatts / New Plymouth - 330 megawatts / Te Rapa - 45 megawatts

Geothermal: Wairakei - 181 megawatts (including binary plant 16 megawatts) / Poihipi Road 55 megawatts / Ohaaki 104 megawatts.

Hydro: Roxburgh 320 megawatts / Clyde 432 megawatts

(3) How much additional wind generation capacity does your company currently have proposed or planned?

We recently announced our proposed wind development, Hauauru ma raki—Waikato wind farm. This project has the potential to be up to 650 megawatts. Please see our website for more details.

(4) Which brand of turbine does your company install, and why are these the preferred turbines?

This is still to be determined.

(5) Have you faced any issues with getting the wind generation capacity installed?

We are still in the planning phase of development. We expect to apply for resource consent by the end of this year.

Genesis Energy Response – 29 Oct 2007

(1) What is your company's current (October 2007) installed wind generation capacity (in MW)?

8.65MW

(2) What is your company's current installed total (i.e. thermal, hydro, etc as well as wind) generation capacity (in MW)?

2049.65MW

(3) How much additional wind generation capacity does your company currently have proposed or planned?

300MW

(4) Which brand of turbine does your company install, and why are these the preferred turbines?

Enercon – best suited for NZ conditions.

(5) Have you faced any issues with getting the wind generation capacity installed?

Yes. It took two years to gain resource consents for the Awhitu Wind Farm, which remains on hold as economic factors deteriorated between lodging consents and finally gaining consents from the Environment Court. This site is consented for 18 turbines and we are continuing to work towards getting this project into construction. The issue with Awhitu was local opposition to the wind farm based on visual impact on the landscape, impact on equestrian activities and impact on Maori cultural values. All of which were declined by the Environment Court.

OTHER WIND GENERATION PROJECT DEVELOPERS MENTIONED IN THE "NEW ZEALAND ENERGY STRATEGY TO 2050"

New Zealand Windfarms (49 MW consented) - NZ publically listed company, 19.99% of shares (15,704,000 shares) owned by Vector Limited. 3.8 % (3,000,000 shares) are owned by Windflow Technology Limited.

Ventus Energy (NZ) (20 MW consented) - Ventus Energy Ltd is a company incorporated in the Republic of Ireland, and Ventus Energy (NZ) Ltd is a New Zealand offshoot of the company (incorporated in early 2004).

Hawkes Bay Wind Farm Ltd (225 MW consented) - Hawke's Bay Wind Farm is a special purpose private company owned by three shareholding private companies, which are owned (ultimately, through a series of further private companies) by 21 individuals, according to the documents on the Companies Register. The developer is Wind Farm Developments Ltd. Wind Farm Developments Ltd (ultimately owned by 3 individuals) was formed to develop, design, project manage, commission and operate utility scale wind farm developments in New Zealand and Australia, according to the Hawkes Bay Wind Farm Ltd website.

Unison (48 MW consented (with Hydro Tasmania)), 102 MW notified) - Unison Networks Limited, trading as Unison, is the lines company for the Hawke's Bay, Taupo and Rotorua. Unison is wholly owned by the Hawke's Bay Power Consumers' Trust.

Hydro Tasmania (48 MW consented (with Unison))- Hydro Tasmania is a Government Business Enterprise, owned by the State of Tasmania.

Taharoa C (100 MW consented)- The Taharoa C Block is a Mäori incorporation (corporate office in Hamilton) registered under the Te Ture Whenua Act. The group's 1,432 proprietors own North Island West Coast ironsands, forests, farms and property in New Zealand and Australia.

Allco Wind Energy (110 MW under appeal, 135 MW planning)- Allco Wind Energy is part of the Infrastructure division of the Australian Stock Exchange listed company Allco Finance Group Limited.

Pioneer Generation (1.8 MW in process) - Central Lakes Trust owned company was which was previously known as Central Electric Ltd, until the Electricity Reforms of 1998 enforced the sale of parts of the business. The generation division was retained and renamed Pioneer Generation Ltd. The company's head office is in Alexandra. Central Lakes Trust grants funds for community charitable purposes in the local area.

WEL Energy (84 MW in process)- WEL Networks has one shareholder, the WEL Energy Trust, a community trust that represents the interests of the local community. The Trust is elected every three years. The long term capital beneficiaries of the Trust are the local councils, Hamilton City Council, Waikato District Council and Waipa District Council.

Mainpower (35-63 MW planning)- MainPower is a community owned lines company for the North Canterbury, Kaiapoi and Kaikoura regions. The MainPower Trust holds all of the ordinary shares in MainPower. It also has other cash investments, and MainPower has also invested in a number of subsidiary and associate companies such as Ellsoft Ltd. (50%), Energy Link Ltd (50%), VirCom Energy Management Services Ltd (80%), and MainPower Contracting Ltd (100%).

Solar Action media release on the Government's final New Zealand Energy Strategy and New Zealand Energy Efficiency and Conservation Strategy

By Staff Reporter

Solar Action released a media release on the Government's final New Zealand Energy Strategy and New Zealand Energy Efficiency and Conservation Strategy. This media release was posted on the scoop.co.nz website at the following address: http://www.scoop.co.nz/stories/BU0710/S00216.htm

The media release was subsequently picked up internationally by the US website "Solar Energy in the News":

http://solarenergyinthenews.com/2007/10/13.htm

The media release is displayed below.

Solar Action: Energy Conservation Critical (Thursday, 11 October 2007, 4:50 pm.—Press Release: Solar Action)

Solar Action media release for immediate use: Energy Conservation Critical if Government Wants to Meet Energy Policy Goals.

The Executive of Solar Action today welcomed the release of the New Zealand Energy Strategy (NZES) and New Zealand Energy Efficiency and Conservation Strategy (NZEECS) announced by the Government.

"Solar Action welcomes the Government's target of generating 90% of New Zealand's electricity from renewable sources by 2025," said Inga Smith, Co-chair of Solar Action.

"However, Solar Action is concerned that such a target will not be met unless the Government and its related agencies recognise the need for energy conservation by industrial, commercial, and residential consumers."

"Despite Solar Action and other groups raising this issue in submissions to the draft NZES and NZEECS documents, energy conservation is not seriously addressed in the final version of either document."

"Indeed, despite the NZEECS repeatedly using the phrase 'energy efficiency and conservation measures' throughout the document, the phrase 'energy conservation' is not included in the glossaries to the NZES and NZEECS. This is despite the phrase 'energy efficiency' being defined in those glossaries, as per the Energy Efficiency and Conservation Act 2000."

"For the record, the definition of 'energy conservation' given in the Energy Efficiency and Conservation Act 2000 is 'energy conservation means a reduction in energy use'. Solar Action looks forward to the Government addressing this critical aspect of energy policy implementation."

Solar Action was formed in 1979 and is a New Zealand renewable energy advocacy group.

ENDS

What do local people think of proposed wind farms? Case studies from Otago and Southland

By Jessica Graham

It has been noted internationally that although the public might hold positive attitudes towards wind energy, actual proposals for the construction of new wind farms are often met with strong resistance from the local population. However, this is not always the case, and some proposals are welcomed by the local community.

There has been only limited research on social attitudes towards wind farms in New Zealand so far. In 2007, I carried out research into the nature of local attitudes to proposed wind farms in New Zealand, using three Otago and Southland proposals as case studies. This research was carried out under the supervision of Dr Inga Smith, Dr Janet Stephenson, and Professor Gerry Carrington of the University of Otago. The focus of my research was to compare the attitudes revealed in submissions by local people to resource consent applications with those attitudes identified in the international literature, in particular the work of Devine-Wright (2005).

My research centred on analysing public submissions on resource consent applications for Project Hayes, Project Mahinerangi and Project Whitehill, which were three separate proposed wind farm projects in Otago and Southland. This is a different approach to that taken by many international researchers, who generally issue questionnaires to sample attitudes to wind farms. Submissions on resource consent applications are a matter of public record, but nevertheless we took great care to treat the submissions as anonymous when reporting the aggregated results. The preliminary results of this study were presented at the National Energy Research Institute (NERI) Energy Research Conference in Auckland (22-23 November 2007). The final results are currently being prepared as a paper for submission to an international journal.

The focus of this research was attitudes by "local" submitters, so only submissions from those with residential addresses within 15 km of the proposed wind farm were analysed in detail. These local submissions were analysed to identify individual issues raised by each submitter. Issues raised in each submission were separated into the category and aspect groupings proposed in Devine-Wright's (2005) framework. Where an issue did not fit within the categories and aspects identified by Devine-Wright's framework, a decision was made about whether a new category or aspect grouping was required.

Attitudes towards wind farms held by local submitters in the Otago and Southland case studies ranged from negative to positive. The emphasis of local attitudes and perceptions varied between different wind farm proposals. Project Whitehill, for example, had only 9.6% of local submitters in opposition, while Project Hayes had 30% of local submitters in opposition, and Project Mahinerangi had 87.5% of local submitters in opposition (with the other 12.5% neutral rather than supportive of the proposal). All wind farm proposals generated submissions in opposition, but the concerns differed between proposals. The main concerns for those submitting in opposition to the Project Whitehill and Project Mahinerangi proposals, for example, were "local impacts of construction" and "landscape context", while the main concerns for those submitting in opposition to the Project Hayes

proposal were "farm size and shape" and "landscape context".

The four negative aspects found to be of most concern to local submitters across the three proposals studied were (in order) "local impacts of construction", "landscape context", "perception of the developer" and the "local environment". "Landscape context" and "local impacts of construction" were cited in the top three negative aspects by local submitters for all three projects studied. "Perception of the developer" and "public participation and consultation" are two aspects that had a high impact on a person's perception towards a wind farm, however comments regarding these aspects are split between negative and positive comments, which may lead to an underestimation of the importance of these aspects when presented in this way.

"Attitude towards wind power in general", "local or community benefit or control" and "national good/security of supply" (in that order) were the three most commonly cited positive aspects for local submitters across the case studies. No local submissions were received in support of the Project Mahinerangi proposal. Of the 13 local submissions in support of the Project Hayes proposal, 12 of these were on pre-ticked (in support of the proposal), postage-paid, pro-formas that the developer (Meridian Energy) had sent out to residents.

The research showed that some additional categories and aspects were needed in addition to those proposed by Devine-Wright (2005) to describe the social attitudes to the wind farm proposal case studies from Otago and Southland. The additional aspects that were identified were "cumulative effects", "proximity to important features", "attitude towards wind power in general", "security of supply", "perception of developer", "economic effects (property values)", "social impact", "local impacts of construction" and "local environment". It is unlikely that only people in New Zealand have these concerns, and their absence from the framework proposed by Devine-Wright may be due to the methodology used in that paper.

References

Devine-Wright, P. 2005, 'Beyond NIMBYism: towards an integrated Framework for Understanding Public Perceptions of Wind Energy', Wind Energy, vol. 8, pp. 125-139.

Jessica Graham is a graduate of the Energy Management programme (BAppSc(Hons)) at the University of Otago.

The Integration of Wind Turbines in the Built Environment

By Lloyd McGinty

1. Introduction

Diversifying electricity generation is a current concern in New Zealand. Almost 65% of New Zealand's electricity is generated from renewable resources, mainly hydro dams. However, in recent years, low rain fall and summer droughts have highlighted the problems of placing too much reliance on one source of generation.

Wind generation is one way of diversifying supply. Furthermore, wind generation works favourably with objectives of the New Zealand Energy Strategy such as increasing the percentage of renewable generation. This article explores the feasibility of establishing wind turbines in the built environment under New Zealand's current policy plans. The wind turbines considered in this article are small turbines with the capacity to supply household or community needs, with the turbines either grid connected or stand-alone systems. The built environment is considered to be urban or community areas in towns and cities.

2. Current Situation in New Zealand

According to the Energy Data File 2007, New Zealand consumed 140.9 PJ of electrical energy for the year 2006. Of this, wind contributed 2.22 PJ or 1.6% of New Zealand's total generation. This represents an increase of more than 50% since 2005 (Ministry of Economic Development, June 2007).

The first commercial wind turbine in New Zealand (225kW) was installed in 1993. Since then, wind generation has increased to a total installed capacity of around 321 MW in 2007 with 46 MW under construction and 1700 MW at the resource consent stage (http://www.windenergy.org.nz/). The installed capacity is comprised almost entirely of MW scale machines that are part of large grid connect wind farms.

On the other hand, small scale turbines, that is machines with a rated power of less than 20 kW have been around a lot longer. However, there is not a lot of data available for the total installed capacity in New Zealand or where they are situated.

3. New Zealand Legislation and Obligations

The Resource Management Act 1991 (RMA) is legislation determining the way in which New Zealand's natural and physical resources are managed, used and developed. Energy is included as part of the definition of natural and physical resources. (RMA, Section 1.2.1) Because of this, energy needs to be managed in a sustainable way and all adverse and positive effects need to be taken into consideration when proposing new developments including electricity generation. Thus, the RMA can have a significant effect on the uptake of turbines in the built environment. Recent amendments to the RMA create a favourable legislative environment in which to increase wind generation in New Zealand. Section 7 in particular should make it easier to obtain resource consent for wind turbines.

Furthermore, in accordance with the RMA, local authorities (district and regional councils) must develop appropriate plans that uphold the RMA. These plans are known as District and Regional Plans respectively. Wind turbines in the built environment are most likely to be considered under the District Plan. District Plans may or may not contain provisions specifically relating to wind generation. However, given the introduction of Section 7 (j) into the RMA, it is likely that District Plans will be reviewed to include provisions which specifically cover different forms of renewable electricity generation.

The Kyoto Protocol was initiated in 1997 and is an international agreement dealing with climate change and global warming. New Zealand ratified the Kyoto Protocol in 2002. In doing so, the New Zealand Government agreed to reduce greenhouse gas (GHG) emissions to 1990 levels between the initial period 2008 to 2012. If this can not be achieved, carbon credits can be purchased from countries who have achieved targets. Wind turbines in the built environment should be considered favourably under the Kyoto Protocol because they help to meet New Zealand's Kyoto Protocol targets.

Electricity Act 1992 Section 62- Continuance of Supply

The current approach taken in this Act is unlikely to have any effect on the use of wind turbines however this may change significantly in the near future. Under Section 62, electricity distributors are not allowed to cease the supply of line services to any place without the consent of the Minister or the written approval of all those affected unless for reasons such as maintenance work, the failure of a consumer to pay their bill or natural acts of God . Part 6 of this section says: "This section shall expire with the close of the 31st day of March 2013, and on the 1st day of April 2013 this section shall be deemed to have been repealed." From 1 April 2013 electricity distributors have the right to cease supply of services to any area. This is likely to be in rural areas on distribution lines that are uneconomical to maintain, rather than cities. Because of this, wind generation is likely to increase in rural areas.

4. Does this facilitate the uptake of wind turbines in the built environment?

The RMA is a significant piece of New Zealand legislation that makes direct reference to energy, climate change and the development of renewable energy. The resource consent process can be expensive and time consuming. Large scale wind farm developments have not had this problem. For example West Wind lodged for consent in July 2005 and was approved in little more than a year illustrating that large scale wind turbines have obtained consent with relative ease. Furthermore, the development of the Southbridge 100kW single turbine in Canterbury was a non notified consent. That is, written permission from all affected parties was obtained.

However, this may not be the case for wind turbines in the built environment as noise issues, visual affects and permitted property activities could prevent consent being obtained under District Plans. Thus, it can not be assumed that resource consent, for wind turbines in the built environment, are obtained easily. District and Regional plans are influenced by the RMA, yet there has been no emphasis on the use and development of renewable energy within these plans. It would be likely that most District Plans do not contain specific reference to wind turbines in the built environment due

to the time when they were written. This is because wind farms were not being proposed at the time the 'first generation' plans were written.

Moreover, it is likely that many councils, such as those in Wellington, will introduce plan changes that specifically address wind development to give effect to recent amendments to the Section 7 of the RMA. It is likely District and Regional Plan changes will favour the introduction of wind turbines in the built environment as long as the potential adverse affects are properly mitigated.

Section 62 of the Electricity Act 1992- Continuance of Supply- does not get revoked until 1 April 2013. If this happens there are likely to be significant impacts on people in under utilised network areas. These areas are likely to be in rural zones where the cost of maintaining and operating the network is likely to be expensive because of the small number of connections to the network. However, in terms of micro scale generation, the revocation of Section 62 could act as a driver for this type of generation as it may become more economic to self-generate electricity rather than pay to maintain the network system.

5. Policies in New Zealand and Internationally

The situation in New Zealand

Currently, there are no specific policies in New Zealand regarding wind turbines in the built environment or small scale generation (micro-generation). However, this may change in the future and has been suggested in the Environmental Performance Assessment released by the Parliamentary Commissioner for the Environment in May 2006. Needless to say, national policies exist that favour their implementation.

New Zealand policies are heading in the direction of increased renewable distributed energy. These current policies form a good base to build upon. However, while the foundation is there, very little action is being taken to move forward. This is quite different to what is happening is Europe and the United Kingdom.

Comparing New Zealand with other countries

Germany and Denmark have used subsidies and market mechanisms, such as feed-in tariffs, to increase renewable energy uptake. This has worked successfully and one such reason for its success could be that initiatives are attractive to people who may not otherwise have considered a wind turbine as an investment. More importantly, this creates ownership and acceptance- further key contributors of success.

The UK and Scotland have used a subsidy only system. While this system has been successful, it has not been able to achieve similar results to the European examples. This is despite the fact that the UK has one of the better wind potentials in Europe (Niels I. Meyer, 2005). The UK system has also failed, at least in terms of large scale developments, to achieve public acceptance. However, the Scottish initiative requiring new developments to generate 10% of its electricity on site may be more effective.

There are several obvious differences between the New Zealand system and the others. The New Zealand system could be compared to the UK system in the sense that it has some good ideas but does not show how it intends to achieve them. The European system, on the other hand, is more active and proposes actions that are aimed at ensuring its goals are achieved.

6. Can New Zealand Adapt Policies From Other Countries?

Adapting policies from another country is not that simple. Different countries have different circumstances. For example the New Zealand electricity market is very complex and adapting policies that require drastic changes to the New Zealand electricity market may be difficult or impossible. Making recommendations on policies that may work within New Zealand's current system and situation are beyond the scope of this article.

On the surface, policies used in Germany and Denmark should be considered for adaptation as they have been proven to work. Furthermore, their policies have been successful in many different areas such as social acceptance of wind turbine, employment opportunities, economic benefits from owning a wind turbine and increased proportion of renewable energy generation. The key point for New Zealand to learn from Germany and Denmark is the necessity to set out how policy objectives will be achieved. Feed-in-tariff policies from Germany and Denmark should be considered for adaptation into the New Zealand system. Such policy took 10-20 years from implementation to see the results and requires the total commitment of the government.

There will always be barriers to adopting another country's policies or system. Adopting a system that needs integration into an already complex market, such as the electricity market, requires the co-operation of all affected parties and needs to be overseen by suitably experienced people. Getting all parties to agree and finding a suitably qualified person to oversee the changeover may be difficult. Public acceptance of wind turbines in the built environment is also likely to be a significant issue.

7. Recommendations for Achieving the Integration of Wind Turbines in the Built Environment

Every home in New Zealand receives annual rates bills. However, many district councils, under the direction of Central Government, offer rates rebates. The introduction of a micro generation rebate could be offered as another, or alternative, incentive for the uptake of small scale wind generation.

In order for turbines in the built environment to succeed, they must be accepted by the public. Benefits can be created through subsidies and feed-in-tariffs and acceptance can come from a feeling of ownership. This can be achieved by moving away from large scale generation projects to community or group owned wind projects. However, these are unlikely to occur unless there are worthwhile returns on investment. At present, New Zealand policy, while addressing the main goals, does not have an action plan for achieving policy objectives such as increasing renewable energy proportions using technologies such as wind turbines in the built environment. Thus, it is recommended that clearer policies that incorporate action plans be developed in the future.

8. Conclusion

If the New Zealand Government wants to achieve its stated goals, then it needs to implement tried and proven policies. Regardless of the fact that New Zealand may have one of the best wind resources in the world, if the policies are not properly developed and applied, they are unlikely to succeed.

This article has compared the New Zealand approach with that of other countries, and suggested that we could learn from their experience and make changes to our own system.

In particular, the Denmark model stands out, because it has been effective at solving the problem of public acceptance of

wind turbines. They achieved this by offering economic incentives such as investment opportunities through private and community wind turbine ownership. Many of the turbines used in Denmark range between 100 and 400kW in size. These turbines are probably too large for densely populated areas. However, they are appropriate for small town communities. Regardless of the size of the turbine, the principles behind the system are the same. That is, introduce an incentive for public investment and this will lead on to the increased proportion of renewable energy generation. In addition, once the turbines are seen as a source of income and investment, public acceptance of turbines in communities and the built environment is more likely.

Unfortunately, New Zealand's current policies do not offer much incentive to encourage the uptake of micro scale generation such as wind turbines in the built environment. Nevertheless, recommendations on how to improve on this have been offered for consideration. Overall, the future of wind turbines in the built environment is positive. New Zealand legislation and policy favours their implementation. However, there are improvements and refinements that could be done to current policy that would promote and improve the share of micro scale renewable generation.

9. References

Ministry of Economic Development (June 2007). New Zealand Energy Data File.

Niels I. Meyer (2005). Influence of Government Policy on the Promotion of Wind Power [Electronic Version] from http://www.plan.aau.dk/~ana/Education/Influence%20of%20government%20policy%20on%20the%20promotion%20of%20wind%20power.pdf.

Lloyd McGinty is a graduate of the Energy Studies programme (BSc) at the University of Otago.

The Answer to Our Energy Needs? It's Blowing in the Wind Opinion Piece

By Sheralee MacDonald

Wherever you are in New Zealand, you're sure to see the signs of a windy day.

Trees waving gently, clouds sailing by, leaves playing on the grass, sailboats dancing on the harbour, washing flapping in the breeze.

And now, in the windiest parts of the country, you're also likely to see one or several wind turbines – making clean, renewable electricity out of thin air!

New Zealand's electricity demand has been growing by 1 - 2% per year and we've been struggling to keep up with it. Another large hydro dam or coal fired power station isn't the way most people want to go – let alone nuclear!

Geoff Henderson, a kiwi engineer with a passion for the environment and the future of wind energy, worked on wind farms in the US and England before returning to New Zealand in 1990. At that time our electricity price was one of the lowest in the world because of cheap natural gas so wind energy simply wasn't economic here yet.

Not long after his return, a section of particularly windy land came available on the Tararua ranges, and Geoff had the foresight to get a consortium together to buy it with the vision of turning it into a wind farm one day.

To make wind energy more viable, Geoff set about designing a NZ made wind turbine which would handle the tough NZ gusts, and that would be lighter and cheaper than turbines made overseas. After many years of consulting and advocacy, Geoff formed Windflow Technology and went public with the company to raise sufficient capital to get the dream off the ground. He and his team of engineers have since a prototype near Christchurch, installed five Windflow 500 turbines on a wind farm (Te Rere Hau) on that land near Palmerston North, and have another 44 on order. The Te Rere Hau wind farm is consented for up to 97 Windflow 500 turbines.

Photo Credits: Sarah Mager (Los Angeles USA)

The 500 kW wind turbine stands ten storeys tall and has two blades, the diameter of which are the same size as the wingspan of a 737 aeroplane. One turbine provides enough electricity to power around 200 households per year. Over 90% of the components are made right here in NZ, a fact which Geoff and his company are very proud of.

There are currently four wind farms and three single medium-size turbine installations in NZ which total 322 MW and provide approximately 3% of NZ's electricity needs. Another twelve wind farms have either received resource consent or are in the process of obtaining consent which could add another 1780 MW of wind power to New Zealand's electricity system.

Even though the wind doesn't blow all the time, New Zealand is lucky to have a high percentage of hydro generation as well which can be held back as reserves when the wind is blowing. This means that at least 20-30% of our electricity generation could come from wind.

What was once a fringe industry has become very much a mainstream generation option. Electricity generators Genesis, TrustPower, and Meridian Energy have existing wind farms and all have plans for more.

The New Zealand Energy Strategy has a target of 90 percent renewable energy generation by 2025. No one will be looking forward to that moment more than Geoff Henderson – a man who knew that the answer has been 'blowing in the wind' for a long time.

Sheralee MacDonald is an employee of Windflow Technology.

Wind news snippets April 2007 to November 2007

By Staff Reporter

11 April 2007 - The Press reports that Central Otago District Council-contracted planner David Whitney recommended in a report that Project Hayes (Meridian Energy's 176-turbine project) be declined resource consent because the negative impacts locally outweighed the national benefits. Adverse effects on the "iconic landscape" from turbines up to 160m high, as well as on heritage and tourism prospects, were likely to be significant according to the report. (http://www.stuff.co.nz/4021786a6009.html, viewed 11/04/07)

12 April 2007 - New Zealanders need to realise there are environmental impacts with any form of electricity generation, says the Wind Energy Association after an independent adviser recommended Project Hayes, a big Central Otago wind farm be rejected. (http://www.stuff.co.nz/4022957a13.html, viewed 12/04/07)

27 April 2007 - Vector announced that it had conditionally agreed to take a stake of up to 19.99 percent in NZ Windfarms Ltd., worth around $18 million, according to NZPA reports. (http://www.stuff.co.nz/4040458a13.html, viewed 27/04/07)

8 June 2007 - White Hill, the South Island's first large wind farm, began operating near Mossburn in Southland, according to the stuff.co.nz website. Prime Minister Helen Clark flicked the switch to start operation of the 29 turbines. Generation of up to 58 MW is expected. (Report dated 09/06/07, http://www.stuff.co.nz/4088612a13.html, viewed 10/06/07)

27 June 2007 - Allco Wind Energy NZ (AWE), a New Zealand subsidiary of Australian finance company Allco, announced that it was considering appealing against the reduced-scale approval it was granted to build the Motorimu wind farm in the Tararua Ranges, according to the stuff.co.nz website. The resource consent was granted on 26 June 2007 for 75 of the 127 turbines AWE had sought. (http://www.stuff.co.nz/4110089a13.html, viewed 27/06/07)

15 August 2007 - Meridian Energy confirmed it would proceed with the Project West Wind wind farm at Makara, with 62 of the 66 turbines granted resource consent to be erected, according to stuff.co.nz. The turbine towers were reported to be 111 metres high, and the projected generation was 140-150 MW, taking two years to construct. (http://www.stuff.co.nz/4165746a13.html, viewed 15/08/07)

2 October 2007 - According to NZPA reports, the Commerce Commission granted an exemption to Vector relating to its investment in generator NZ Windfarms Ltd. The commission said the limited exemption was granted in relation to arms length rules in the Electricity Industry Reform Act which became an issue in board appointments to NZ Windfarms Ltd. Under the Act a company may own both generation and retail businesses, but generally needs permission to own both lines and generation, or lines and retail assets. The reason given for approving the exemption was that Vector would not be connecting the generation assets to its own network or selling the electricity to its own lines consumers. (http://www.stuff.co.nz/4221675a13.html, viewed 02/10/07)

20 October 2007 - The Press reports that Windflow Technology is developing three different versions of its wind turbine, in a bid to target international markets, for example India and China, and the USA. Other areas of interest were reported to be remote islands like Stewart and Chatham that relied on diesel to supply electricity; Windflow wanted to design controls where the diesel generator stopped completely when the wind power kicked in. (http://www.stuff.co.nz/4243980a13.html, viewed 20/10/07)

31 October 2007 - NZPA reports that commissioners appointed by Central Otago District Council have decided in a majority decision to grant consent to Meridian Energy for the 176-turbine Project Hayes wind farm on the Lammermoor Range. The Dominion Post reports (1 November 2007) that the Upland Landscape Protection Society is likely to lodge an appeal. Panel chairman John Matthews dissented from the majority panel view. (http://www.stuff.co.nz/4257184a7693.html, viewed 12/11/07, http://www.stuff.co.nz/4256868a13.html, viewed 31/10/07)

31 October 2007 - Meridian Energy issues a press release stating that the Project Hayes resource consent highlights grid problems with the HVDC link. (http://www.scoop.co.nz/stories/AK0710/S00302.htm, viewed 31/10/07)

12 November 2007 - Keith Turner, CEO of Meridian Energy, announced that he will step down from his position on 31 March 2008, according to NZPA reports. (http://www.stuff.co.nz/4270732a13.html, viewed 12/11/07)

11 November 2007 - The Sunday Star Times reports that Green Party co-leader and Government Spokesperson on Energy Efficiency and Conservation Jeanette Fitzsimons has given up on wind power for her property after the turbine on her Coromandel farm fell off in a gale. Wires supporting a 10m pole holding up the turbine propeller have snapped several times in the past five years. Ms Fitzsimons has lived off-the-grid for 13 years, and is now looking at setting up a microhydro scheme on a stream at her property. She has twelve solar panels that provide energy over summer. She says that at $1500 for repairs each time the turbine broke down, combined with the cost of overhauling it, the project had become too expensive to run. Wire-free set-ups were not available at the time that her system was set up, but are now. (http://www.stuff.co.nz/4269635a11.html, viewed 12/11/07)

16 October 2007 - Contact Energy revealed plans to build New Zealand's biggest wind farm, Hauauru ma raki, along Waikato's remote west coast between Te Akau and Port Waikato, a $2 billion project in which 218 turbines, each 150 metres high, would be built on a series of ridges slightly inland, along a 40km stretch of coast. Projected generation capacity was 650MW. (http://www.stuff.co.nz/4241166a11.html, viewed 12/11/07)

20 November 2007 - Power company TrustPower is reported by the Dominion Post to be selling 228,000 carbon credits from its Tararua wind farm to European nuclear and gas company Electrabel. Each carbon credit is for the equivalent of one tonne of carbon dioxide emissions. The deal was reported to potentially be worth many millions of dollars over the five-year contract. The Tararua II wind farm project is an eligible project under the Kyoto protocol, but TrustPower will not get more carbon credits to sell from future power projects. Electrabel will use the emissions reduction units to cover its commitments under the European emissions trading scheme. (http://www.stuff.co.nz/4280929a13.html, viewed 20/11/07)

Powerhouse Wind and small wind turbines—Company Update

By Bill Currie

Graph provided by Powerhouse Wind

Why have small wind turbines been slow to reach their potential for providing small scale local energy for houses, farms and small communities? Why in particular is it that small wind is much less developed than photovoltaic technologies, especially when the technical challenges with small wind are apparently more at the engineering end of development rather than issues of basic science?

There have been some excellent analyses of the barriers that exist to greater uptake, and the American Wind Energy Association's Roadmap for the small wind turbine industry (available at http://www.awea.org/smallwind/documents/31958.pdf) is a good example of such work. Their findings are that the barriers fall into three categories: Technical, market, and policy. Their belief is that if these groups of barriers can be addressed, small wind has the potential to supply 3% of US electricity needs by 2020, which is equivalent to an installed capacity of 50,000 MW!

Of course this is a very big vision when there is currently only about 45 MW of installed small wind in America, and action is needed quickly on the issues that are currently limiting the realisation of this potential in the US and similarly in countries like New Zealand and Australia.

A small Dunedin company is working hard on the aspects of the challenge most accessible to a small start-up, that is the technical barriers and connecting to a market of early visionary customers.

Powerhouse Wind is developing a concept for a small wind turbine that has been designed from the ground up to power individual houses and potentially clusters of houses from the wind in their environment.

Houses are not usually built in the sort of places that wind farms choose, they are in lower, more turbulent winds resulting from trees, buildings and shelter. A wind turbine to be installed close to a house needs to harvest energy effectively from such wind, be quiet in all wind conditions, be fully automated and self managing, have a long reliable life in such conditions, and ideally be able to be scaled to suit the varying needs of its customers. Of course it also has to be economically manufacturable so it provides a payback to its buyer.

The Powerhouse Wind concept is based on a novel downwind, single blade design which incorporates a new way of managing power above design wind speed. The machines are designed to control blade teeter down wind, and fly their single blade on a decreasing cone as the wind strength increases. This has two main advantages. First, the blade sees the same condition all the way around the rotation which is good for noise and provides a steady stress for the material which is good for reliability. Second, the blade is not fixed rigidly to the shaft, allowing it to move with gusts and effectively giving it a suspension system to reduce stress.

The minimal design has also been developed from the beginning to combine components to do several jobs, use materials as efficiently as possible, and generate power from the wind from the leanest possible concept.

Advanced electronics are used to manage the power generated, control and supervise the machine, and give feedback to the user on performance.

Design and development is well underway, and early machines for testing and lead customers will be available in mid 2008. There is more information and contact details at www.powerhousewind.co.nz.

Bill Currie is a founder of Powerhouse Wind

Release of the Government's New Zealand Energy Strategy and New Zealand Energy Efficiency and Conservation Strategy

By Staff Reporter

On the 11th October 2007 the New Zealand Energy Strategy and the New Zealand Energy Efficiency and Conservation Strategy were launched by the Government. The previously announced target to generate 90% of New Zealand's electricity from renewable energy sources by 2025 was incorporated into the strategies. The links below include the original press releases and speeches.

Overall media statement: http://www.beehive.govt.nz/HomepageFeature.aspx?id=50
Helen Clark's speech notes: http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=30956
Helen Clark's fact sheet: http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=30950
David Parker's speech: http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=30951
Jeanette Fitzsimons's speech notes: http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=30953
Jeanette Fitzsimons's fact sheet: http://www.beehive.govt.nz/ViewDocument.aspx?DocumentID=30952

The Solar Action Executive Submission on the Building Code Review 2007 Consultation

By Solar Action Exec

TO: buildingcodereview@dbh.govt.nz

Submission on the Building Code Review 2007 consultation

BY: Solar Action PO Box 6457 Dunedin

WHO WE ARE RESPONDING ON BEHALF OF:

Solar Action is a New Zealand renewable energy advocacy group, formed in 1979. Membership is nationwide and includes over 100 members, including architects, engineers, scientists and enthusiasts.

HOW WE SOLICITED THEIR VIEWS:

Solar Action produces a quarterly magazine, the Solar Action Bulletin, for our members and the last four issues have included articles on the building and housing matters, amongst other topics. Solar Action also coordinated the New Zealand "Sustainable House Day" event on behalf of the Australia and New Zealand Solar Energy Society in 2006, and over 300 members of the public viewed the sustainable houses in Wanaka and New Zealand. We interacted with the attendees at these events, and therefore feel that we are uniquely in touch with their concerns about sustainable housing in New Zealand.

Due to the very short time-frame for submissions on the latest round of the Building Code Review, the Solar Action Executive has not been able to directly call for member input on the topic. However, members based in Auckland, Wellington, Christchurch, Dunedin, and Wanaka with particular interests and expertise in housing have informally discussed sustainable housing with key members of the Solar Action Executive in face-to-face meetings in the last year, and therefore the Solar Action Executive makes these submissions having taken into account this feedback.

This submission represents the views of the current (2007) Solar Action Executive, taking into account the concerns of members with expertise and interests in housing.

SUBMISSION

1. INTRODUCTION

The Building Code Review represents in important opportunity to reduce the energy and resource use of New Zealand houses and other buildings, and to thereby improve the health of New Zealanders and the contribution of New Zealand to climate change.

New Zealand current building stock comprises many inadequately insulated and poorly constructed buildings. Requirements for insulation and such measures as double glazing are far below those of countries such as the UK and Sweden. Buildings are often constructed with very short term considerations in mind, and long-term intergenerational planning does not occur. Not only is this a waste of resources, but with growing concerns internationally over climate change and peak oil, it is grossly irresponsible.

2. COMMENTS ON THE DISCUSSION DOCUMENT IN GENERAL, PARTICULARLY WITH RESPECT TO SUSTAINABLE HOUSING

Previous studies have shown that houses in New Zealand do not achieve comfort and little energy is provided for space heating. In general houses are very poorly insulated with more than 70% of building stock built before energy efficiency regulations. Looking into the future, 70% of the 2030 building stock already exists, therefore there is also some urgency in improving the condition of existing houses. We believe that the Building Code should advise and support the improvement of all existing houses in NZ.

To achieve thermal comfort in New Zealand houses without increasing energy use and carbon emissions requires a number of approaches, including high levels of insulation and glazing, passive solar design, regulation of overall emissions, (not the intensity of emissions), and the encouragement of low or carbon neutral heating fuels such as wood.

Historically our housing stock has been made up of small houses that are partially heated and with living areas arranged on the north side. There is a trend away from this for more modern houses.

To address energy efficiency, the Building Code to date has specified minimum specific thermal resistance levels for some building components (R values), or minimum area and climate weighted predicted annual heating energy requirements (Building Performance Index, or BPI)

However the strongest determinant of actual heating energy use in houses is the total floor area, the size of the heated area of the house (very few houses are heated), and the number of heating hours per day. The environmental impact of a house is proportional to resource use, not efficiency. The NZ ETS recognises this by focusing on overall carbon emissions, not the intensity (efficiency) of emissions.

According to Statistics NZ, trends are that every year new houses are being built larger than the year before. Average m2 of building consents across NZ show that it has been growing year after year since 1976. The typical 1960's state house is 100m2, while the average new consented size in 2005 was 193 m2. Over the same period occupancy rates have decreased.

A large house built to current regulations will likely have higher net annual heating energy requirements than a smaller, old, poorly insulated house, simply because of its larger size.

The Building Code requirements will not result in less carbon emissions or energy use unless they focus directly on energy use, not energy efficiency.

The BPI and minimum R-value specifications should be replaced with a measure based on net annual heating energy requirements that are not weighted by floor area or perhaps even degree days. This will recognise innovative solar design that reduces heating energy requirements as well as additional layers of insulation to reduce heat loss. This will also reward houses that are designed to a practical size.

The tools are in place to allow this method. Net annual heat-

ing energy requirements can be estimated from construction details using BRANZ's ALF3 or the soon to be introduced HERS Accurate. These models take into account not only the heat loss reductions of insulation, but the benefits of solar gains, and living spaces oriented to the north.

Increasing insulation requirements for building elements alone will not solve the problem: will not reduce energy requirements and will fail to deliver warm houses.

Heating NZ houses

Houses will never achieve warmth by adding insulation only. Methods to utilise renewable resources should be encouraged and promoted by the Building Code. Capturing energy from the Sun by promoting good passive design can reduce energy requirement for all new houses built in NZ, which could lead to warm houses without the need to purchase high levels of energy (minimizing operational cost and environmental impact). In addition, when purchased energy is needed (when the Sun is not shining or its heat has not been stored), an adequate efficient heating system should be encouraged. Thus even with high levels of insulation, unless there is a source of energy to warm up the inside of houses (solar, internal or purchased energy), houses will not achieve warmth.

In addition life cycle analysis could be performed to help to visualise the long term impact of constructing new buildings and assess if it is worth it. New buildings should respond to best practices, which should not be seen as an extra option but as a starting point. Education plays a key role.

3. COMMENTS ON PARTICULAR SECTIONS OF THE DISCUSSION DOCUMENT

Part 4 (Type 1 changes clarifying performance requirements) Indoor Climate - Internal moisture control

The BCR states that the proposal is that "Buildings shall have a means of removing moisture generated by: breathing, cooking, laundering, utensil washing, bathing and showering, products of combustion, and commercial or industrial processes." This is a very sound suggestion and should be pursued. The energy use required for the removal of moisture should be minimised. Passive techniques should form part of the acceptable solutions. Heat recovery could also be considered.

Part 5 (Type 2 changes to performance requirements) Indoor Climate - Thermal control

The BCR states that the review is "...considering setting performance requirements for thermal conditions that acknowledge the interactions between temperature (air, radiant), humidity and air velocity (draught), as well as how much clothing is worn and activity level."

The important points are that indoor temperature and humidity should be able to be achieved in an energy efficient manner, by utilisation of passive solar heating, for example. With the world likely to become carbon constrained and subject to increasingly unstable climate, the ability to heat/cool/ventilate a building should be able to be achieved as passively as possible, and sensitivity predicted outputs of to climate model variability should be taken into account.

"We are considering adding a performance requirement that habitable spaces of buildings where people work and live should be able to maintain a thermal environment that is likely to satisfy 85 percent of the population, that is, 85 percent predicted satisfaction. The figure of 85 percent is derived from 15 percent PPD, a basic level that reflects the current building practice in industrialised countries. A Verification Method would provide the full set of design values." - acclimatisation needs to be taken into account, before non-NZ values are applied.

A comfort requirement for habitable spaces will almost certainly increase the use of purchased heat, unless the benefits of solar gains are sufficiently acknowledged. Much less heating energy is needed when zoned heating is supported in houses, when living areas can be maintained at a higher temperature than, say, bedrooms. Zoned heating that meets internationally accepted minimum temperature requirements (for example, those specified by the World Health Organisation) should be considered.

Part 6 (Type 3 changes to performance requirements) Resource Efficiency

Carbon-dioxide emissions:

The statement in the consultation document indicates that this work is at a very early stage: "...considering the possibility of assessing the resources used by buildings through the carbon dioxide (CO2) emissions associated with their construction, operation, maintenance and demolition. If CO2 emissions are a suitable measure of the whole-of-life impact of using resources, then a maximum design annual CO2 emission could be included in the Code. This would be a new measure for building codes internationally. Further work is required on the detail of how this might be calculated, and how it might work in practice."

Although this is at an early stage, this work appears to be innovative and exciting, and should be explored further. It may be that a more suitable measure of whole-of-life impact could be found, but carbon emissions would be a logical first step.

Environmental impact of buildings The way we build and operate our buildings through their lifetime have an important impact to our environment so it is important to make the right decisions in the building process to minimise this impact. In order to quantify this impact, CO2 emissions must be considered, these include: - Operational CO2 emissions (from burning fuels for space heating) for new houses should be minimised as much a possible. Quality solar passive design and could lead to reduction in energy needs for appropriately sized houses. Extra energy required for space heating should be supplied by the most efficient heating systems available. (Non-efficient systems should not be allowed to be the primary heating source for a building, e.g. open fireplaces burning coal should not be the primary heating source) - Embodied CO2 emissions (from materials embodied energy) should be considered together with the long term operational CO2 emissions. Initial embodied CO2 emissions should be compared with the long term operational CO2 emissions in order to assess its worthiness.

We support life cycle analysis of buildings, this will integrate these variables and provide with long term analysis that could help decisions to be made when building a house.

We believe the performance of buildings should be measured by considering operational CO2 and operational energy requirements. Intensity or efficiency measures should be replaced by a measure of emissions or operational energy requirements.

Embodied energy:

Operating energy is an important consideration in addressing the energy efficiency of buildings, and the Department of

Building and Housing is to be congratulated for attempting in previous consultations to improve the current requirements for such matters as design energy for space heating in houses, insulation requirements for residential and commercial buildings, energy efficiency requirements for domestic water heating systems and the efficiency of lighting in commercial buildings.

The BCR quite rightly points out that "...the energy used to produce the materials that make buildings more energy efficient, for example insulation, could in some circumstances outweigh the energy savings made in running the building". This embodied energy is important, and the objectives for conservation and efficient use of materials and addressing environmental impacts throughout the life of materials are crucial and should be attempted.

4. CONCLUSION

Solar Action looks forward to seeing the final decision on the Building Code Review, and thanks you for the opportunity to make a submission.

Draft Government Policies Open for Submissions

September to November 2007

By Staff Reporter

Relevant draft Government policies are listed in the Solar Action Bulletin and also on the website. This enables members to consider putting in their own personal submissions if Solar Action is not intending to submit on a particular policy document.

Note that sometimes the deadlines are so tight (often only a month exists between the announcement of a draft policy and the closing date for submissions) that we will not be able to notify members in time via the Solar Action Bulletin.

If you are aware of policies that are relevant to Solar Action and are open for consultation, please email the details through to us in the format below to

editor@solaraction.org.nz.

If you wish to contribute to a Solar Action submission on a particular policy, please contact policy@solaraction.org.nz

The following draft policies remain open at the time we went to press:

The Ministry of Transport has opened three related Maritime Policy consultations:

http://www.transport.govt.nz/maritime-consultations-1/

These policies are profiled below. The most relevant to energy matters is "Sea Change", although the other two policies are also related to energy matters.

Policy name: Sea Change

Release date: 5 November 2007

Website: http://www.transport.govt.nz/seachange/

Other means of contacting agency: To request a printed copy of the discussion document send an email to seachange@transport.govt.nz and provide a full postal address, or phone (04) 439 9095.

Closing date for submissions: 19 December 2007

Agencies involved: Ministry of Transport; aims to raise the percentage of domestic freight carried by coastal shipping from the current 15% to 30% by the year 2040.

Policy name: 4 Conventions - Four International Maritime Environmental Conventions/Protocols

Release date: 5 November 2007

Website: http://www.transport.govt.nz/4-conventions-1/

Other means of contacting agency: To request a printed copy of the document, send an email to

4conventions@transport.govt.nz and provide a full postal address, or phone (04) 439 9095.

Closing date for submissions: 19 December 2007.

Agencies involved: Ministry of Transport; public consultation to help in deciding whether New Zealand should become party to one or more of four international maritime environmental conventions/protocols, namely International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 (Bunkers Convention), Protocol of 1996 to amend the International Convention on the Limitation of Liability for Maritime Claims 1976 (LLMC Protocol), The Protocol Relating to Intervention on the High Seas in Cases of Pollution by Substances other than Oil 1973, as amended (Intervention Protocol), The Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances 2000 (OPRC-HNS Protocol). These collectively deal with liability and response issues to marine incidents involving pollution from oil and other substances (eg plutonium).

Policy name: Port and Harbour - Port and Harbour and Navigation Safety Management discussion document

Release date: 5 November 2007

Website: http://www.transport.govt.nz/portandharbour/

Other means of contacting agency: To request a printed copy of the discussion document, send an email to portandharbour@transport.govt.nz and provide a full postal address, or phone (04) 439 9095.

Closing date for submissions: 19 December 2007.

Agencies involved: Ministry of Transport - The Port and Harbour and Navigation Safety Management discussion document looks at options for dealing with port and harbour safety in future (at present port and harbour safety is managed largely through a voluntary code that has no legal force).

SeaNet has other Marine related submission details and resources, at http://seanet.org.nz/

SeaNet is run by ECO, the New Zealand network of groups that share a concern for the environment.

Climate change, people, and the Sun

an interview with Dr Craig Rodger

By Staff Reporter

On Wednesday 10th October 2007 at the Hutton Theatre of the Otago Museum, Dunedin, the Otago Institute (the Otago Branch of the Royal Society of New Zealand) hosted a talk by Dr Craig Rodger, a senior lecturer from the Department of Physics, University of Otago. Dr Rodger is an internationally respected space physicist, whose research areas relate to the linkages between the Sun and the Earth. The title of his talk was "The influence of the changing Sun upon climate change". Solar Action presents here a summary of the key questions and points that Dr Rodger addressed on the relationship between climate change, people and the sun.

(Question from the media): Is there any hope that climate change is caused by solar processes and not by people?

Dr Craig Rodger: No. Climate change is caused by people. This is the worldwide scientific consensus.

(Question raised in the media): But wasn't there was a Danish study that said a large percentage of global warming was due to sun spot cycles?

Dr Craig Rodger : That research was originally based on a data set that was too small, and the study turned out to have faulty analysis techniques. Several of the authors no longer make those claims. This matter was settled about five years ago, but some media and some commentators don't seem to have realised this.

(Question from the audience): Weren't levels of CO2 higher and temperatures warmer than today at some point in the past?

Dr Craig Rodger: Yes, in the very distant climate records (more than 400 000 years ago), CO2 levels were higher and temperatures were warmer than they are today, BUT there weren't six billion people trying to live off a finely honed agricultural system back then. Agriculture is extremely dependent on climate, and climate variability is bad for agricultural production. This is particularly a risk when you have six billion people to feed. "Every city is three meals away from a riot" is a saying from the French Revolution that is very apt here.

(Question from the audience): From Milankovitch cycles, doesn't it look like we are about to go into an ice age, and therefore everything will be OK?

Dr Craig Rodger: We are due to go into an ice age in 20 000 years. That is too far away to save us from increases in global temperatures due to increased atmospheric CO2 levels.

(Question from the audience): Is there a technical solution that will get us out of the climate change problem?

Dr Craig Rodger: I have not heard a single plausible technical solution to climate change, other than reducing the amount of carbon that we are emitting into the atmosphere, and possibly capturing some of the carbon already in the atmosphere.

Why are we called Solar Action?

By Staff Reporter

All of us on the executive were puzzled by the name "Solar Action" when we first came into the organisation. We occasionally have members and supporters ask us "Why are you called Solar Action, when you look at much broader issues in renewable energy and sustainability?"

As many members will know, the word "solar" in the energy world is used to refer to all renewable energy, because wind, hydro, etc., are all ultimately powered by the sun. Solar Action is currently linked into the International Solar Energy Society (ISES) via ANZSES (the Australia New Zealand Solar Energy Society), which are both renewable energy/sustainability groups.

At the moment, Solar Action is an unincorporated New Zealand society under New Zealand law, and has been since 1979. The Solar Action Executive are in the process of finalising a constitution to become an incorporated society. At that point, Solar Action will probably become "Solar Action - the New Zealand Renewable Energy Society Inc." (known as Solar Action for short).

There is another closely related organisation called the "Sustainable Energy Forum", so we try to work out the limits of what we do and what they do, but there is a lot of overlap.

We have been alternating the focus of issues of Solar Action Bulletin using the sequence renewable energy topic, energy-related sustainability topic, renewable energy topic, hence the subjects of issues 82 to 84 were wind energy, food, and photovoltaics/solar electricity respectively.

We welcome members' input as we move forward to becoming an incorporated society.

Photo Credits: Sarah Mager (Los Angeles USA)

Industry Associations
NZ Wind Energy Association and SEANZ

NZ Wind Energy Association

http://www.windenergy.org.nz/

The New Zealand Wind Energy Association (NZWEA) is an industry association, which has 70 members who range from individuals through to the largest power generation companies in New Zealand. Members have a wide diversity of interests spanning generation, site development, service industries (such as law, finance and consulting), construction, engineering, academic and others.

The purpose of the NZWEA is to represent the interests of the wind energy industry to the general public, Government and other stakeholders in the NZ energy sector.

The NZWEA website is: http://www.windenergy.org.nz/

Sustainable Electricity Association New Zealand Incorporated (SEANZ)

http://www.seanz.org.nz/

(Photovoltaics – size unlimited; Wind – to 100kW; Hydro – to 1MW.)

The Sustainable Electricity Association New Zealand (SEANZ) is the industry association for photovoltaics, as well as smaller-scale wind and hydro-electricity generation. At the 2006 NZPVA (New Zealand Photovoltaic Association) AGM the establishment of SEANZ was approved with a unanimous vote. SEANZ has been officially registered as an Incorporated Society. The rationale for establishing this organisation was that many of the trading Sustaining members of NZPVA are involved with installing systems such as micro-hydro and small wind turbines, as well as photovoltaics.

A new web-site is being developed, complete with a member discussion forum. SEANZ will gradually take over from NZPVA, but memberships will officially be SEANZ from 2007. The stated mission of SEANZ is to "promote and support the generation and use of electricity from sustainable sources including the sun, water, wind, and biological materials as a reliable, sustainable and clean energy source". SEANZ will act as a non-government industry organisation. It will engage in (amongst other things) policy lobbying, information distribution, promotion of research and development, and accreditation.

The SEANZ website is: http://www.seanz.org.nz

Installed windpower capacity (MW)[1][2] by Country				
Rank	Nation	2005	2006	Latest
1	Germany	18,415	20,622	21,283
2	Spain	10,028	11,615	12,801
3	United States	9,149	11,603	13,885
4	India	4,430	6,270	7,231
5	Denmark (& Færoe Islands)	3,136	3,140	
6	China	1,260	2,604	2,956
7	Italy	1,718	2,123	
8	United Kingdom	1,332	1,963	2,293
9	Portugal	1,022	1,716	1,874
10	Canada	683	1,459	1,670
11	France	757	1,567	2,100
12	Netherlands	1,219	1,560	
13	Japan	1,061	1,394	
14	Austria	819	965	
15	Australia	708	817	
16	Greece	573	746	804
17	Ireland	496	745	866
18	Sweden	510	572	
19	Norway	267	314	
20	Brazil	29	237	
21	Egypt	145	230	580
22	Belgium	167	193	
23	Taiwan	104	188	
24	South Korea	98	173	
25	New Zealand	169	171	322
26	Poland	83	153	216
27	Morocco	64	124	
28	Mexico	3	88	
29	Finland	82	86	107
30	Ukraine	77	86	
31	Costa Rica	71	74	
32	Hungary	18	61	
33	Lithuania	6	55	
34	Turkey	20	51	
35	Czech Republic	28	50	
36	Iran	23	48	
	Rest of Europe	129	163	
	Rest of Americas	109	109	
	Rest of Asia	38	38	
	Rest of Africa & Middle East	31	31	
	Rest of Oceania	12	12	
	World total (MW)	**59,091**	**74,223**	**79,341**

[1] Global Wind Energy Council (GWEC) statistics.

[2] European Wind Energy Association (EWEA) statistics.

BOOKS:

"Wind Power - Renewable Energy for Home, Farm, and Business", by Paul Gipe

"Wind Power is the completely revised and expanded edition of Paul Gipe's definitive 1993 book, "Wind Power for Home and Business". In addition to expanded sections on gauging wind resources and siting wind turbines, this edition includes new examples and case studies of successful wind systems, international sources for new and used equipment, and hundreds of color photographs and illustrations."

ISBN: 9781931498142

Old ISBN: 1-931498-14-8

Publisher: Chelsea Green Publishing

Paul Gipe's web site: http://www.wind-works.org/

"Wind Energy Basics - A Guide to Small and Micro Wind Systems", by Paul Gipe

"Wind Energy Basics is the most up-to-date source available of information about small wind systems. The book includes the unique "standard small wind turbine rating" developed by the author, which is designed to help readers wade through conflicting performance claims by manufacturers in the U.S. and overseas. Also included is detailed information on planning, siting, and installing a wind system, and on integrating wind power with solar for more cost-effective and reliable off-the-grid applications."

"This book confronts the common but controversial practice of "power rating" that may mislead consumers about the potential of some small wind turbines. Known for his frank style, Gipe quickly cuts through technological jargon and the hype surrounding power ratings."

" ' Nothing tells you more about a wind turbine's potential than rotor diameter—nothing. The wind turbine with the bigger rotor will almost invariably generate more electricity than a turbine with a smaller rotor, regardless of their generator ratings, ' " he says.

"Gipe also comes down hard on roof-top mounting. 'Don't bother,' he warns. 'It's not worth the trouble.' He also minces few words on mounting wind turbines in trees. 'Sometimes wind energy isn't the right choice,' Gipe says. 'If you live in a forest of tall trees and you can't afford a tower tall enough to clear the trees, then wind energy isn't for you.'

ISBN: 9781890132071

Old ISBN: 1-890132-07-1

Publisher: Chelsea Green Publishing

(1999)

"Power Play - the fight for control of the world's electricity", by Sharon Beder

"Sharon Beder argues persuasively that the track record of electricity privatisation and deregulation around the world indicates that it is a confidence trick. Her book shows how simplistic ideology and economic theory have been used to mask the pursuit of self-interest; how control of electricity has been wrested from public hands to create profit opportunities for investors and multinational corporations; and how an essential public service has been turned into a speculative commodity in the name of 'reform'."

"Power Play explores the battles between private and public ownership in the United States, the United Kingdom, and Australia since the early twentieth century, and the agenda-setting and public relations strategies involved. It investigates the way that developing countries such as Brazil and India have been forced to allow foreign investors to exercise a stranglehold over their electricity systems. And it uncovers the campaigns waged by think tanks, corporate interests, and multinational companies such as Enron to swindle the public in dozens of countries out of rightful control over an essential public service."

Scribe Publications (Australia) ISBN (10): 0908011 970, ISBN (13): 9780908011971 (2003)

"The Shock Doctrine: The Rise of Disaster Capitalism", by Naomi Klein

"Naomi Klein traces the rise of disaster capitalism from its birth in the 1970s' dictatorships of South America, through its growth during the collapse of communism, to its present-day incarnation in New Orleans, Iraq and South-East Asia. "

Camberwell, Vic. Allen Lane, ISBN: 9781846140280 (2007).

WEBSITES:

The Danish Wind Industry Association (DWIA), an organisation representing companies connected with wind energy has a website that has extensive sections on how wind power works.

http://www.windpower.org/en/core.htm

Paul Gipe is an author who has worked extensively in wind power for many decades. His web site is:

http://www.wind-works.org/

Campbell Live (TV3) "video on demand" items related to carbon trading and carbon credits (websites valid as at 26 September 2007):

"Beginner's guide to carbon credits"

26 Sep 2007

http://www.tv3.co.nz/VideoBrowseAll/WeatherEnvironmentVideo/tabid/316/articleID/35606/Default.aspx?articleID=35606#video?articleID=35606

"Govt announces new plan to target climate change"

20 Sep 2007

http://www.tv3.co.nz/VideoBrowseAll/PoliticsVideo/tabid/370/articleID/35121/Default.aspx?articleID=35121#video?articleID=35121

"Carbon credit scheme labelled as sham"

22 Sep 2007

http://www.tv3.co.nz/VideoBrowseAll/WeatherEnvironmentVideo/tabid/316/articleID/35313/Default.aspx?articleID=35313#video?articleID=35313

Quit revolution - an XCO2 innovation

Quit revolution Ltd is a spin off from London based engineering and design studio XCO2. Concerned with low carbon solutions for both new and refurbished buildings, XCO2 works in conjunction with architects and developers to design energy efficient ecofriendly buildings.

www.quietrevolution.co.uk and www.xco2.co.uk

Global Wind Energy Council (GWEC)

http://www.gwec.net

EVENTS & CONFERNCES:

Sustainability EXPO 2008 to be held at the

Rolleston Community Centre (near Christchurch) on Saturday/Sunday 26/27 January 2008.

See www.sustainabilityexpo.co.nz <http://www.sustainabilityexpo.co.nz/>

New Zealand Wind Energy Conference 2008 (NZWEC2008)

Tuesday 8th and Wednesday 9th April 2008 at Te Papa (the Museum of New Zealand) on Cable Street, Wellington.

Registration fees (exclusive of GST) are:

Member of NZWEA: $800

Affiliate of NZWEA: $900

Non-member: $1000

http://www.windenergy.org.nz/events/conferences/NZWEC08/conference08.html

Campbell Live (TV3) "video on demand" items related to carbon trading and carbon credits (websites valid as at 26 September 2007):

"Beginner's guide to carbon credits" 26 Sep 2007

http://www.tv3.co.nz/VideoBrowseAll/WeatherEnvironmentVideo/tabid/316/articleID/35606/Default.aspx?articleID=35606#video?articleID=35606

Climate change news snippets February 2007 to November 2007

By Staff Reporter

26 February 2007 - Air New Zealand chief executive Rob Fyfe says rising environmental awareness overseas poses a real threat to New Zealand's tourist industry and economy, according to the Dominion Post. European tourists in particular are under mounting pressure from environmentalists to consider the impact of holidays that require long-distance flights, even though this contributed just 1.6 per cent of all carbon emissions according to Mr Fyfe. The Dominion Post noted that there was no evidence that European or American tourists were heeding calls to avoid air travel. Tourist numbers were growing at about 6 per cent a year, compared with 4 per cent globally (http://www.stuff.co.nz/3973856a13.html, viewed 26/02/07)

2 March 2007 - Climate change poses as much danger to the world as war, UN Secretary-General Ban Ki-moon said today as he pledged to make global warming the focus of talks with world leaders in June, according to a report in the website stuff.co.nz from Reuters news agency. "In coming decades, changes in our environment and the resulting upheavals from droughts to inundated coastal areas to loss of arable land are likely to become a major driver of war and conflict," said Ban. "I am encouraged to know that in the industrialised countries from which leadership is most needed, awareness is growing," he said adding that the cost of inaction or delayed action exceeded the short-term investment needed. "The world needs a more coherent system of international environmental governance. Unfortunately my generation has been somewhat careless in looking after our one and only planet but I am hopeful that is finally changing." (http://www.stuff.co.nz/3979394a12.html, viewed 02/03/07)

7 March 2007 - NZPA report in stuff.co.nz that Mighty River Power has abandoned plans to recommission the controversial, coal-fired Marsden B power station near Whangarei, saying renewable power options are now more economic. The decision was hailed by environmentalists who had vigorously opposed the plan, arguing such a plant would greatly increase New Zealand's carbon and greenhouse gas emissions. MRP plans to spend over $2 billion on wind and geothermal projects. Contact Energy last month announced similar plans for the next five years. The Marsden B project looked doubtful after Climate Change Minister David Parker this month wrote to all generators telling them the Government's new energy strategy, due this year, would impose greenhouse gas charges on all new power stations (http://www.stuff.co.nz/3985008a13.html, viewed 07/03/07)

14 March 2007 - Britain has become the first country to propose legislation setting binding limits on greenhouse gases as it stepped up its campaign for a new global warming pact to succeed the Kyoto Protocol, according to Reuters reports on stuff.co.nz. In its draft Climate Change Bill the government said carbon dioxide emissions had to be cut by 60 per cent by 2050. The draft bill also sets a legally binding interim target for carbon cuts of 26 to 32 per cent by 2020. Britain and Germany are leading the charge to extend Kyoto and expand its scope to bring in boom economies such as China and India, as well as the United States, which rejected it 2001 (http://www.stuff.co.nz/3991963a12.html, viewed 14/03/07)

28 March 2007 - Contact Energy is promoting the introduction of a price for carbon that would make electricity produced by state-owned Genesis Energy's Huntly power station more expensive than that from gas-powered stations, according to an NZPA report on stuff.co.nz. In a presentation to investors in Taupo yesterday, Contact said a $20 to $30 a tonne carbon price would push the short-run marginal cost of power from combined-cycle gas turbine stations using gas below the price of Huntly power. Contact said its challenge was for the electricity sector to reduce carbon emissions by 40 per cent within seven years. The 40 per cent carbon reduction challenge could be met by major investment in renewable energy and a new gas-fired plant to displace Huntly from its base load role, the company said. While carbon pricing was expected, it was not likely to make Huntly less economic than gas-fired plants for base load generation. (http://www.stuff.co.nz/4008828a13.html, viewed 29/03/07)

1 April 2007 - Windfall profits are on the way for power companies already flush with cash, experts say, as consumers bear the brunt of higher power prices from plans to penalise carbon emissions, according to stuff.co.nz. The perverse outcome is a result of the electricity market delivering consumers the most expensive power available to meet demand, not the cheapest. Add tradeable permits into the mix and some generators will get a chance to double dip - earning extra profits on higher prices and on-selling carbon permits. What impact that would have on domestic power bills is hard to calculate, although earlier government documents calculated a $15-a-tonne carbon charge would add $14 (or 15%) to a wholesale industrial electricity price of $65-a-megawatt hour. (http://www.stuff.co.nz/4012780a13.html, viewed 01/04/07)

3 April 2007 - Federated Farmers has told the Government it is rushing too fast to meet its climate change obligations under the Kyoto protocol and wants to discuss how farmers can help, according to the Dominion Post. Government thinking behind the proposals seems underdeveloped, the federation says. The federation accuses the Government of fostering an "unhelpful public belief that the agriculture sector is largely to blame for New Zealand's greenhouse gas emissions". It pinpoints "obvious disjoints" in the proposals, saying sustainable land management appears to be sacrificed so the Government can obey the protocol's rules. This raises questions of whether the Government ought to drive policy from what the protocol does and does not allow or instead drive policy from what outcomes it wants to achieve. The federation also says no clear link exists between the proposals and wider sustainability initiatives on water and energy or between wider government priorities on economic transformation and carbon neutrality (http://www.stuff.co.nz/4014169a13.html, viewed 03/04/07)

3 April 2007 - Transpower has suggested the Government could upgrade its consenting and regulatory processes to allow faster investment in renewable energy generation and transmission. However, while Transpower saw itself as an enabler of the Government's energy strategies, it was currently unable to favour connection of renewable gen-

eration to the grid over that of thermal generation. It disagreed with an estimate that up to 4585 megawatts of wind generation capacity could be installed with high or medium confidence by 2015. The national grid would have to become more flexible to accept connections from increasing numbers of renewable generators, expected to be largely wind and often in remote areas (http://www.stuff.co.nz/4014026a13.html, viewed 03/04/07)

6 April 2007 - Climate experts have sparred over the wording of a UN report spelling out the grim impact of global warming, struggling late into the night to find consensus ahead of Friday's deadline. Delegates from more than 100 countries have been in Brussels since Monday to discuss the report, which describes how climate change is already affecting the planet, but were still debating roughly 12 hours before its scheduled release. The report predicts rising temperatures will lead to more hunger in Africa, the melting of Himalayan glaciers, more heatwaves in the United States and damage to Australia's Great Barrier Reef. The report says rising temperatures will have costs for society even though some countries, such as Canada and Russia in the north, might benefit for a while from higher farm yields. A draft copy says "roughly 20-30 per cent of species are likely to be at risk of irreversible extinction" (http://www.stuff.co.nz/4017937a12.html, viewed 06/04/07)

6 April 2007 - A new report into the environment shows New Zealand's reputation for being clean and green is being tarnished, according to the Green Party, stuff.co.nz reports. The OECD Environmental Performance Review of New Zealand says the country made progress in some areas over the past decade since its last report but said water pollution was increasing and there were other problems. Key criticisms were that: water pollution had increased largely because of agriculture; Climate protection policy was weak and the dropping of carbon tax plans meant New Zealand would struggle to meet Kyoto targets; Waste management needed to be improved with higher charges to deter tip use plus better tracking and treatment of hazardous waste; and better national reporting was needed. At a press conference on the report, OECD official Lorents Lorentsen said New Zealand had a good environmental reputation. "It's always at risk but I think the image is so strongly rooted that you need several bad examples to really reduce your clean and green image but it is vulnerable." New Zealand was praised for its low level of environmentally harmful subsidies, improved drinking water quality, improved balance of environmental and social concerns through the Resource Management Act and expanded protected areas. (http://www.stuff.co.nz/4017926a11.html, viewed 06/04/07)

29 March 2007 - A Texas-sized piece of the Antarctic ice sheet is thinning, possibly due to global warming, and could cause the world's oceans to rise significantly, polar ice experts said. They said "surprisingly rapid changes" were occurring in Antarctica's Amundsen Sea Embayment. The scientists blamed the melting ice on changing winds around Antarctica that they said were causing warmer waters to flow beneath ice shelves. The wind change, they said, appeared to be the result of several factors, including global warming, ozone depletion in the atmosphere and natural variability. (http://tvnz.co.nz/view/page/425822/1042160, viewed 06/04/07)

5 April 2007 - Winter Arctic sea ice this year was the second smallest area on record in a sign of greenhouse warming, US climate scientists said. This March's ice level represented a slight recovery from the record low during the same month last year when the ice extent was 14.5 million sq km. But low sea ice levels this winter are part of a trend toward less ice. "This long-term trend, which seems to be accelerating, is really an indication of a warming, and the only way you get the warming is with greenhouse gases," said NSIDC research scientist Walt Meier. March 2007 Arctic sea ice extent was about 7% smaller than the average from 1979, the first full year satellites recorded it, to 2000. (http://tvnz.co.nz/view/page/425822/1049568, viewed 06/04/07)

5 April 2007 - Climate change threatens to destroy the Great Barrier Reef and other natural wonders of the world if nations fail to act to reduce greenhouse gas emissions, says environmental group WWF. "From turtles to tigers, from the desert of Chihuahua to the great Amazon, all these wonders of nature are at risk from warming temperatures," says Lara Hansen, head scientist of WWF's global climate change programme. "While adaptation to changing climate can save some, only drastic action by governments to reduce emissions can hope to stop their complete destruction." (http://tvnz.co.nz/view/page/425822/1050314, viewed 06/04/07)

6 April 2007 - The world's scientists of the UN Intergovernmental Panel on Climate Change (IPCC) issued a grim forecast for life on earth in publishing their latest assessment of the impact of climate change, according to the Guardian Unlimited website. A warming world will place hundreds of millions of people at greater risk of food and water shortages and threaten the survival of thousands of species of plants and animals, the scientists said. Floods, heat waves, storms and droughts are all expected to increase, with people in poor countries suffering the worst effects. Rajendra Pachauri, chair of the expert panel that published the report, said: "It's the poorest of the poor in the world, and this includes poor people even in prosperous societies, who are going to be the worst hit." He said four areas of the world were particularly vulnerable: "The Arctic, where temperatures are rising fast and ice is melting; sub-Saharan Africa, where dry areas are forecast to get dryer; small islands, because of their inherent lack of capacity to adapt, and Asian mega-deltas, where billions of people will be at increased risk of flooding." (http://environment.guardian.co.uk/climatechange/story/0,,2051770,00.html, viewed 29/04/07)

3 April 2007 - The Guardian website reports that the EU in Brussels lambasted the US and Australia for their inaction in cutting carbon dioxide emissions and stressed Europe's leading role in the battle against global warming. Preliminary data on the EU carbon cutting scheme showed that 93% of heavy industrial plants covered by the scheme emitted less carbon than their quota of free permits. The resulting 1%-1.5% rise in emissions was not as great as in 2005. The trading mechanism is designed to create scarcity, forcing up the price of carbon and prompting industries such as steel and power generation to invest in cleaner, greener technologies, such as renewable, carbon-free energy and, eventually, carbon capture and storage. So far, it is manifestly not working as planned. Officials readily admit that the first phase of the scheme has been a botched experiment because of the generous over-allocation of permits. But they now insist that the second phase will be much more successful because of tighter controls on quotas. Many EU governments have significantly reduced the number of carbon permits they will grant to polluters. Poland has cut its permit total by 26% and Latvia and Lithuania by half. Brussels believes that the second phase of the trading scheme is crucial because it coincides with the

key stage of the Kyoto protocol from 2008 to 2012. Brussels is pressing the US, other developed countries and emerging economies to agree on a global emissions trading scheme to be introduced after 2012, at UN talks starting in Bali in December. The EU has endorsed a unilateral 20% cut in greenhouse gases by 2020 and wants the developed world to sign up to a 30% cut, with countries such as China and India joining in.
(http://environment.guardian.co.uk/climatechange/story/0,,2048918,00.html, viewed 29/04/07)

3 April 2007 - The US supreme court is reported by the Guardian website to have issued a landmark ruling in favour of environmentalists and against George Bush's stance on global warming. The court judged that the federal Environmental Protection Agency had the power through a clean air law to restrict exhaust emissions, and told the agency to re-examine the issue. The court found that the scientific evidence shows that global warming is not some future threat, but is already having serious impacts in the United States. The US is responsible for 35% of the world total carbon dioxide emissions
(http://environment.guardian.co.uk/climatechange/story/0,,2048761,00.html, viewed 29/04/07)

7 April 2007 - The website au.news.yahoo.com reports that the UN report painting the most frightening picture yet of the consequences of climate change has been described by Austrlaian federal Environment Minister Malcolm Turnbull as important but nothing new. The UN's Intergovernmental Panel on Climate Change (IPCC) report, released in Brussels, warns that almost a third of the world's flora and fauna face extinction, while billions of people face water shortages. The report, put together by 2500 of the world's leading scientists, predicts worsening drought conditions over the next 20 to 50 years for Australia with as many as 711,000 homes in peril from rising sea levels.
(http://au.news.yahoo.com/061008/2/10u7x.html, viewed 08/04/07)

10 April 2007 - New Zealand is vulnerable to global climate change with areas of the country expected to have major water problems by 2030, according to stuff.co.nz reports on the regional content of the United Nations Intergovernmental Panel on Climate Change (IPCC) report. Countering that, some parts of the country will benefit from climate change with a longer growing season. Water security, natural ecosystems, and coastal communities are the three sectors most vulnerable to climate change in New Zealand. The report says that as a result of reduced precipitation and increased evaporation, water security problems are projected to intensify by 2030 in Northland and some eastern regions. Production from agriculture and forestry is projected to decline by 2030 over parts of eastern New Zealand due to increased drought and fire. However, initial benefits to agriculture and forestry are projected in western and southern areas and close to major rivers due to a longer growing season, less frost, and increased rainfall. A southward shift in agricultural pests and diseases is likely with New Zealand becoming more susceptible to the establishment of new horticultural pests.
(http://www.stuff.co.nz/4021478a10.html, viewed 10/04/07)

10 April 2007 - Forestry professionals are calling for a carbon tax as the simplest way to reduce greenhouse gas emissions just 15 months after the Government dumped a proposed tax because of widespread opposition. In a submission to the Government on climate change, the NZ Institute of Forestry, representing 780 professionals, is calling for a broadly based polluter-pays carbon charge to tackle growth in greenhouse gas emissions. The business community was one of the proposed carbon tax's most vocal opponents in 2005 but business organisations are shifting to acceptance of some sort of carbon pricing mechanism, though they have different views on its form and when it should be introduced.
(http://www.stuff.co.nz/4020716a13.html, viewed 10/04/07)

10 April 2007 - Carbon-neutral home loans are reported by AAP to be on offer in Australia. Many companies are choosing to go carbon neutral by offsetting their emissions by buying carbon credits.
(http://www.stuff.co.nz/4021591a13.html, viewed 10/04/07)

11 April 2007 - South Pacific people fleeing from climate change are likely to turn to New Zealand if their islands slip beneath the waves or drinking water is contaminated, according to reports in the Press. The IPCC report says the South Pacific's reputation as a tropical paradise is under threat from climate change and that small islands are already experiencing the effects of it. In February, an Environment Canterbury report said "aggressive" immigration from South Pacific and Asian people fleeing rising sea levels was a risk to community cohesion and would put pressure on society and the economy. British environmental scientist Norman Myers has predicted that up to 150 million people may become refugees by 2050 because of rising sea levels.
(http://www.stuff.co.nz/4021832a10.html, viewed 11/04/07)

11 April 2007 - Reuters reports that the trendiest weddings in Britain are now at least metaphorically green as couples seek to reduce the impact of their nuptials on the environment. That means everything from recycled wedding dresses and guests arriving by bicycle, to home-grown flowers and locally produced food for the wedding buffet. Guests are getting into the spirit with their gifts. After charity gift-lists raised millions of pounds over Christmas, environmental groups WWF and Friends of the Earth have launched similar services for weddings. Guests can donate to charities on behalf of newly weds, making up to 20,000 pounds ($NZ55,555) a month for green and ethical causes, according to www.weddinglistgiving.com.
(http://www.stuff.co.nz/4021626a19716.html, viewed 11/04/07)

21 April 2007 - The Guardian website reports that Norway plans to be the first country in the world to become "carbon neutral" and cut its net greenhouse gas emissions to zero by 2050. The prime minister, Jens Stoltenberg, has proposed the move, expected to encourage other rich countries to act further and faster on climate change. "By 2050 greenhouse gas emissions will have to be reduced drastically. Rich countries should become carbon neutral. This does not mean no emissions from the countries in question. But it does mean that each tonne of greenhouse gases emitted is to be offset by an equivalent reduction elsewhere. This adds up to zero emissions," he said. Like other wealthy countries, Norway intends to reach its target mainly by offsetting its 54m tonnes of carbon emissions a year using quotas bought on international markets. The country, which is the world's fifth largest oil exporter, has built up savings from oil and gas exports of nearly $300bn. Norwegian emissions per capita are about 11 tonnes, almost three times the world average.

(http://environment.guardian.co.uk/climatechange/story/0,,2062357,00.html, viewed 22/04/07)

27 May 2007 - An Auckland private investigation firm is reported to be paying agents to infiltrate and spy on environmental, peace and anti-vivisection groups for its clients, including state-

owned enterprise Solid Energy, according to reports on the stuff.co.nz website. The tactics by Thompson & Clark Investigations are believed to be a first for New Zealand and have shocked the groups and civil rights supporters, who have demanded answers from the government about taxpayer-funded spying. Ryan, a 25-year-old Canterbury University student, confessed on Thursday when confronted by the Star-Times, admitting Thompson & Clark paid him on behalf of Solid Energy to infiltrate Christchurch environment group Save Happy Valley. The group opposes plans for a new government-run open-cast coal mine on the West Coast because of climate change and threats to a critically endangered endemic snail. Thompson & Clark's "corporate intelligence" operations are run by co-director Gavin Clark, a former police officer, using techniques from police undercover operations (http://www.stuff.co.nz/4074686a19715.html, viewed 27/05/07)

25 June 2007 - Global warming is such a threat to security that military planners must build it into their calculations, the head of the British armed forces, Jock Stirrup (chief of the defence staff) was reported by Reuters as warning. He stated that climate change could cause weakened states to disintegrate and produce major humanitarian disasters or exploitation by armed groups that had to become a feature of military planning. But he said first analyses showed planners would not have to switch their geographical focus, because the areas most vulnerable to climate change are those where security risks are already high. Stirrup said the unpredictability of the immediate effects of global warming on rainfall patterns and storms meant flashpoints could be advanced by years without warning. Asked on the margins of the meeting if that meant military planners should opt for premptive action where they saw a security crisis emerging, he said: "Only in the sense of building governance. Recognising the problem is the first step." (http://uk.news.yahoo.com/rtrs/20070625/tts-uk-climate-security-cff01a2.html, viewed 26/06/07)

29 June 2007 - Fonterra has been attacked by environmental lobby group the Sustainability Council for wanting to delay taking responsibility for greenhouse gas emissions from dairy farms. Council executive director Simon Terry was quoted as saying "If the dairy sector were to take responsibility for its emissions growth only from 2005 (one date that has been floated), this would equate to a taxpayer subsidy on its excess emissions of 68 per cent to 85 per cent." Fonterra replied by saying that it was working to raise farmer awareness about ways of reducing greenhouse gas emissions, such as following a nutrient budget, using nitrification inhibiters and making energy savings on-farm. (http://www.stuff.co.nz/4111393a13.html, viewed 29/06/07)

9 July 2007 - State coal miner Solid Energy's board says it has full confidence in the company's chief executive, Don Elder, after examining the company's payment to a spy to gather information undercover about a protest group. The company was rebuked by the Government in late May for paying for an informant to spy on anti-mining activists Save Happy Valley Coalition fighting the miner's proposed mine north-east of Westport. The board said the company had already confirmed to the shareholding minister, the Minister of State-owned Enterprises, that the company's security arrangements now specifically excluded "paid for" informants. (http://www.stuff.co.nz/4120843a13.html, viewed 09/07/07)

12 July 2007 - Increasingly ferocious winter weather wrought by climate change will push up insurance premiums, the industry has warned, as communities count the cost of the latest storms. Prime Minister Helen Clark said settlements in low-lying regions may have to consider shifting. Surveying damage yesterday in Kaeo, which was flooded for the second time in four months, she said that at some point some locations were no longer viable. Insurance Council chief executive Chris Ryan said winter was becoming highly destructive and climate change could cause insurance premiums to rise. "There's going to be much more responsibility placed on home owners to try to reduce the risk to them of climate change, whether it be flood or erosion, or rising sea levels. A big change is afoot." (http://www.stuff.co.nz/4124720a10.html, viewed 12/07/07)

13 July 2007 - The Press reports that ExxonMobil spent several million dollars and battled in court to keep secret some seismic data of an area in the Great South Basin, but it is OMV which has secured a licence to explore in that area. The ExxonMobil consortium has secured a licence over a 16,400 square kilometres and OMV has won three licences over a total area of 48,000 square kilometres. ExxonMobil's consortium includes New Zealand's Todd Energy with a 10 per cent stake. OMV's work programme includes the drilling of five wells in the three licences within five years but after analysis of seismic and other material it has the option to drop out and not drill and must make the decision by three years from the start of the licence. (http://www.stuff.co.nz/4125777a13.html, viewed 13/07/07)

23 July 2007 - Reuters reports that an environment committee of British parliamentarians (the House of Commons Environment Audit Committee) has said that carbon offsetting has a role to fight in climate change, but urgently needs a code of practice. Voluntary offsetting is distinct from buying carbon offsets under mandatory schemes, such as the Kyoto Protocol, and involves individuals and companies paying companies to cut emissions on their behalf. Concern is that carbon offsetting is either used as a PR-exercise, so a company can say it is carbon neutral -- which means offsetting all your emissions -- and does not actually change behaviour. (http://uk.news.yahoo.com/rtrs/20070722/tts-uk-markets-carbon-voluntary-a8bf950.html, viewed 23/07/07)

5 July 2007 - From this month [July 2007], the public will be able to download millions of pieces of climate, water resource, and other environmental information for free. The National Institute of Water & Atmospheric Research (NIWA) is making access to its nationally significant databases free over the web. The initiative covers archived data on climate, lake level, river flow, sea level, water quality, and freshwater fish from NIWA, the MetService, and several other contributing agencies. (http://www.niwascience.co.nz/pubs/mr/archive/2007-07-05-1/, viewed 31 July 2007)

3 August 2007 - APEC finance ministers said the world needs to "go beyond" the Kyoto Protocol to adequately address climate change and warned a rise in protectionist sentiment could threaten growth and living standards, according to AFP article on the yahoo news website. (http://uk.news.yahoo.com/afp/20070803/tsc-apec-australia-meeting-0d7d00d.html, viewed 07/08/07)

22 August 2007 - Climate change is the biggest security challenge since the Cold War but people have not woken up to the risks nor to easy solutions such as saving energy at home, a Reuters report in stuff.co.nz quotes experts as saying. "We're not yet collectively grasping the scale of what we need to do," British

climate change ambassador John Ashton. Global warming "should be looked at as a totally different type of challenge instead of asking `what does it cost?'," said Joergen Randers, a leading Norwegian economist. (http://www.stuff.co.nz/4173235a7693.html, viewed 22/08/07)

5 September 2007 - Meridian has put carbon credits up for auction on Trade Me, to gauge the level of interest in small parcels of credits, while another NZ company, M-Co, is establishing a carbon trading registry. The carbon trading registry service, known as Regi, is being developed by electricity market operator M-Co, and would track and record the ownership of verified carbon units. (http://www.stuff.co.nz/4190041a13.html, downloaded 5 September 2007)

20 September 2007 - Government announces plans for an emissions trading scheme covering all sectors by 2013. Individuals will be exempt from the scheme but will have costs passed on as the energy, transport and industrial sectors pay the price for the amount of carbon they emit. The scheme will be phased in from 2008, starting with forestry and ending with agriculture in 2013. The Dominion Post reports that households will see their power bills rise by an average $7 a month and petrol will cost 4 cents a litre more under new plans to fight greenhouse gases. The Government also has two targets were being proposed in the transport sector: to cut per capita transport emissions in half by 2040 and for New Zealand to be one of the first countries to widely deploy electric vehicles. National deputy leader Bill English was reported as saying that the climate change policy was broadly consistent with National's policy and would help provide certainty for business.(http://www.stuff.co.nz/4208720a10.html. downloaded 20/09/07, http://www.stuff.co.nz/4209135a6160.html, downloaded 21/09/07, http://www.stuff.co.nz/4209082a6160.html, downloaded 21/09/07, http://www.stuff.co.nz/4209080a6160.html, downloaded 21/09/07)

26 September 2007 - The Press reports that Marlborough's New Zealand Wine Company says it is experiencing strong interest in its carbon neutral wines, with supermarkets like British giant Tesco lining up for product.(http://www.stuff.co.nz/4214582a13.html, downloaded 27/09/07)

28 September 2007 - Most crops grown in the United States and Europe to make "green" transport fuels actually speed up global warming because of industrial farming methods, says a report by Nobel prize winning chemist Paul J. Crutzen, according to Reuters reports. The findings could spell particular concern for alternative fuels derived from rapeseed, used in Europe, which the study concluded could produce up to 70 per cent more planet-warming greenhouse gases than conventional diesel. The new study shows that some biofuels actually release more greenhouse gases than they save, because of the fertiliser used in modern farming practices. The study singled out grasses and woody coppice species – like willows and poplars – as crops with potentially more favourable impacts on the climate. (http://www.stuff.co.nz/4218201a12.html, downloaded 28/09/07)

8 October 2007 - Deloitte growth solutions partner Alasdair MacLeod and Deloitte associate director Paul Shallard identified that some businesses were still on the defensive when it came to climate change issues. Research showed a third of people would change suppliers if given a "greener" option. In New Zealand, about 32 per cent of consumers fitted that description, a group that was growing by up to 7 per cent a year. A recent British survey indicated 24 per cent were "conflicted consumers", Business Council for Sustainable Development chief executive Peter Neilson said. "They are buying products from organisations they don't like, based on their environmental and social records." Some companies were already using sustainability in branding and making good gains, but Mr MacLeod said more dramatic shifts may be necessary, such as shifting production closer to markets. (http://www.stuff.co.nz/4229226a13.html, viewed 09/10/07)

11 October 2007 - The BBC reports that a High Court judge who ruled on whether climate change film, An Inconvenient Truth, could be shown in schools said it contains "nine scientific errors". Mr Justice Burton said the government could still send the film to schools - if accompanied by guidance giving the other side of the argument. He was ruling on an attempt by a Kent school governor to ban the film from secondary schools. The judge said nine statements in the film were not supported by mainstream scientific consensus. In his final verdict, the judge said the film could be shown as long as updated guidelines were followed. These say teachers should point out controversial or disputed sections. Without the guidance, updated after the case was launched, the government would have been breaking the law, the judge said. The government has sent the film to all secondary schools in England, and the administrations in Wales and Scotland have done the same. (http://news.bbc.co.uk/1/hi/education/7037671.stm, viewed 14/10/07) (Editor's note - The Solar Action Bulletin will investigate these so-called "errors" in a future issue, as we understand that some scientists disagree with the judge's ruling)

13 October 2007 - Former US Vice President Al Gore shared the Nobel prize with the UN IPCC climate panel for their work helping galvanize international action against global warming. Gore said in a statement earlier that he would donate all of his share of the Nobel prize winnings to the Alliance for Climate Protection - a nonprofit group Gore founded last year to raise public awareness of climate change (http://www.stuff.co.nz/4235954a12.html, viewed 14/10/07)

14 October 2007 - Climate Change Minister David Parker has congratulated New Zealand scientists working on the Intergovernmental Panel on Climate Change (IPCC) which won the Nobel Peace Prize with American climate change campaigner Al Gore. He noted that Dr David Wratt of the National Institute of Water and Atmospheric Research, was a member of the IPCC bureau managing the process of producing the organisation's high profile six-yearly reports (http://www.nzherald.co.nz/section/1/story.cfm?c_id=1&objectid=10469796, viewed 14/10/07)

18 November 2007 - Scientists and government officials from the 130-state Intergovernmental Panel on Climate Change (IPCC) have boiled down the findings of three reports of more than 3,000 pages issued this year on the risks of warming. The summary says human activity is causing rising temperatures and that deep cuts in greenhouse gas emissions, mainly from burning fossil fuels, are needed quickly to avert more heat waves, melting glaciers and rising sea levels (http://www.stuff.co.nz/4278145a12.html, viewed 18/11/07)

How to join Solar Action

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CLASS 2	Solar Action ANZSES ISES	NZ$ 99	NZ$ 60	Solar Action Bulletin, Solar Progress & ISES Publications

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Photo Credits: Sarah Mager (Los Angeles USA)

Sustainable House Day—Wanaka

By Maria Callau

This event was organized by Sustainable Wanaka during a weekend in November.

Location: Wanaka

Climate Summary:

Average Temp: 10.7ºC (1)

Max. Temp: 23.8 ºC in February (1) Min. Temp: -1.8ºC in July (1)

Wind speed: 6 Km/h (1)

Sunshine: 2025 hours (1)

Solar Radiation (mean): 14.4 MJ/M2 (2)

Rainfall: 360 mm (1)

Heating Degree Days to 18 ºC : 2650 (1)

(1) Data for Alexandra (NIWA)

(2) Data for Queenstown (NIWA)

Seven houses in and around Wanaka and three in Alexandria were opened to the public as part of Sustainable House Day 2007 organised by Sustainable Wanaka. The event gave the community the opportunity to see what designers are doing in this area to respond to sustainability issues. As expected in cold climates, most houses had a efficient heating system which provided the warmth needed to maintain the house at comfortable levels. In addition, heat losses were reduced in all of them by insulating the building fabric, in most cases to higher levels than Building Code specifications.

Some houses utilised high thermal mass to reduce swings in temperatures by absorbing, storing and slowly releasing energy. Central heating was a chosen alternative to provide under floor heating for some of the houses in which energy sources ranged from solar panels to wood burners, and in addition gas and electricity provided a backup for some of the systems. A variety of houses were presented, each one with different features. A brief description of some of the houses is presented below.

Photo Credits: Maria Callau and Juan Puricelli

The plans for this house were provided by the Ministry of Commerce Energy Division during the 1980's. The house is designed for maximum sun and the largest power bill in 12 years was of $132 in the middle of winter.

All external walls were constructed with timber frame structure while a concrete wall in the middle of the house provides internal thermal mass. The house is orientated facing north for maximum sun access through windows located at ground level as well as some located on the top which provide sun access to the internal corridor and concrete wall.

Water heating is supported by a flat panel while space heating is provided through a wood burner with wetback. Windows are single glazed with curtains.

This house was built with concrete block walls and double glazed windows. It is insulated with R5 insulation batts and hot blocks with polystyrene. The house is north facing with full height glazing and lineal design in two separate buildings (house and study).

Water is heated through evacuated tubes and space heating is provided through underfloor LPG hot water heating, wood fire and passive solar. Grey water and sewage recycled through treatment system to irrigate garden. (This house has approximated 260 m^2 of floor area + study / workshop area)

Photo not available

This accommodation lodge was constructed with 250 mm concrete thermopanel walls which have internal expanded polystyrene insulation.

Windows are double glazed with wooden shutters in bedrooms. All external walls and floor have thermal mass exposed to the interior. Bedrooms have their windows facing north. The building has radiant ceiling in bedrooms and underfloor gas powered hot water.

(This building has approximate 800 m^2 of floor area).

Described as an "energy efficient upgraded apartment", this apartment was upgraded to higher levels of insulation and provided with solar hot water system (evacuated tubes with gas as a back up). It will be monitored by Sustainable Wanaka for the purpose of measuring energy consumption (heating and hot water) and comparing data to a standard apartment of similar size and location. Walls are concrete tilt slabs with polystyrene, Windows are double glazed. The upgrade was made to achieve a thermal break between floors and external walls. Space heating is provided by energy efficient electric underfloor heating, gas fire and heat pump. (This house has approximately 220 m^2 of floor area)

This house is really two houses, with senior family members living in a self-contained suite that shares the efficient, comfortable heating with the main dwelling.

Designed by the owner based around a German central heating system.

The house is facing north, built with timber frame walls and is fully insulated. Windows are PVC framed double glazed provided with blinds. Floors are made of exposed concrete to provide thermal mass.

Hot water and space heating are provided by a solar-wetback combo which has an electrical and gas back up. The system is designed for underfloor heating and hot water.

There are vents in stone around the wood burner. The system provides heating for the two houses. Each area can be controlled independently.

"Simple and compact living with efficient use of space, thus efficient use of resources in building and in daily life". This house is a refurbishment of a 70's holiday home. It has been upgraded with insulation in all external walls. Windows are single glazed provided with thermal curtains.

The house is northern orientation with 95% glazing and clerestory windows. Hot water is provided by means of an hot water electric cylinder. The house is heated with a wood burner in the living room with heat transfer to the bedrooms through ceiling ducts. There are bricks surrounding the fireplace which provide some thermal mass.

This house was described as a "Bio and eco friendly lodge" with game rooms, art, antiques, privacy and ambience.

It has sun room conservatory and a swimming pool inside. The house is made of timber frame with timber lined. Double glazed windows and wool batts for insulation. It was built from untreated timber.

Water is heated through flat plate solar panels collector (including the swimming pool). There is a 5 tonne Tulikiri and oven for central heating and cooking.

According to the information provided, the swimming pool in living room heats and humidifies the air.

Maria Callau is a graduated architect undertaking Energy Studies at the University of Otago and editor of Solar Action Bulletin.

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Have your say...

We hope you are enjoying this issue of Solar Action Bulletin!!

We are already planning the next Solar Action Bulletins, so start writing those articles now! The focus of next issues will be **Energy and Food** and **Photovoltaics**. We also welcome articles on other topics as well as suggestions for the focus of future bulletins.

All contributions can be emailed to: **editor@solaraction.org.nz**

Or sent by post to : **The Editor / Solar Action Bulletin**

PO Box 6457 / Dunedin 9030 / New Zealand

Any comments on the statements, articles and design of the bulletin will be appreciated. We are also open to suggestion for future work. What would you like Solar Action to be doing in the future? You can also suggest books and interesting web sites!

Thank you for supporting Solar Action!

Solar Action Bulletin team

Next issues...

Energy and Food

Photo Credits: Food—Bolivia 2007 (Maria Callau)

Photo Credits: PV panels—Vermont 2007 (Greg Leonard)

Photovoltaics