From:
To:
Cc:
Subject: correspondence with wind farm operators
Date: Sunday, 18 November 2012 5:52:12 PM
Attachments: Fwd Waterloo.msg
Fwd FW Snowtown wind farm data.msg
Fwd Waterloo.msg
Fwd Waterloo.msg
Fwd Waterloo.msg
Fwd Waterloo.msg

Dear Senator Xenophon

As requested during the public hearing on the proposed wind farm legislation, attached are copies of
correspondence that was sent to two wind farm companies requesting operational information for our
research project. The person who sent the correspondence for our project was a Masters student, Nic
Henrys who receives a scholarship supplement from my Australian Research Council project. I asked
him to send the letters as I thought he would have more chance than me of getting the information.
Ever since I appeared in 2010 as an expert witness for the residents of Hallett in their application to
the Environment Resources and Development Court in SA, I have heard from my colleagues that I am
not a very popular person in the wind industry, even though I am not opposed to wind farms in
principle. I just object to the secrecy and dishonesty that is associated with them when it comes to
their noise generation and I believe that residents living near proposed wind farms have a right to have
their case heard.

Regards

Colin Hansen

—
Emeritus Professor Colin H Hansen
School of Mechanical Engineering
University of Adelaide
South Australia 5005
AUSTRALIA

---------- Forwarded message ----------
From: **Purkiss, Clint**
Date: Fri, Apr 27, 2012 at 11:37 AM
Subject: Waterloo
To:
Cc: "Head, Michael"

Hi Nick,

Nice to speak to you briefly.

If you could detail the information and data requirements you have and give us an understanding i.e an executive summary of your intended thesis then we can understand the availability of the data you may require and look to assist you in your research.

Kind Regards

Clint Purkiss - Project Development Manager | Business Development | TRUenergy

Level 33, 385 Bourke Street | Melbourne Victoria 3000

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---------- Forwarded message ----------
From: **Nicholas Henrys**
Date: Fri, Apr 27, 2012 at 4:28 PM
Subject: Re: Waterloo
To: "Purkiss, Clint"

Cc: Con Doolan

Hi Clint,

Thank you for your call this morning. I very much appreciate your offer to assist me in my research where possible.

I have attached an excerpt from my research proposal which gives some background to my project and briefly outlines what I intend to achieve. I expect that my research, if successful, will have benefits for wind turbine designers and manufacturers, wind farm developers such as TRUenergy, as well as local communities near existing and proposed wind farms.

I note that my research is still in the very early planning stages and many of the details are yet to be finalised. However, it would be good to have your input early on as to the availability of data so I can work around this. It is likely that the following data will be useful:

- Hub height wind speed and direction
- rotational speed
- turbine yaw angle
- blade pitch angle
- temperature at hub height

Please let me know whether you are able to provide this information, as well as the time interval that the data is logged at. I appreciate that some of the above may be commercially sensitive and I stress that I will be using it in calculations for the purposes of research only. I am happy to discuss a non-disclosure agreement should you consider this to be necessary.

Please don't hesitate to contact myself or my principal supervisor, Dr Con Doolan (who I have cc'd to this email) if you have any questions or want to discuss anything in more detail.

 Kind regards,
Nic Henrys

Prediction and measurement of far-field wind turbine noise

Human use of wind energy predates the application of petroleum and coal, with people using windmills to pump water in Egypt about 3000 years ago. The first use of wind turbines to generate electricity was in Scotland in 1887.

Recent concerns regarding depletion of conventional fossil fuels including coal, oil and gas; and fears about serious adverse environmental effects of these energy sources has led to a resurgence in interest in wind energy as a renewable and clean energy resource. The average annual growth in global installed wind power generation capacity was approximately 30% between 1995 and 2011; and it is estimated that the total capacity will reach 292 GW by the end of 2012.

However, wind energy is not free of adverse effects on the environment and human health. In particular, noise emissions from wind farm developments may result in annoyance, decreased wellbeing, sleep disturbance and adverse health effects for residents in the vicinity. Wind turbine noise has been found to be more annoying than transportation or other industrial noise sources at similar levels, possibly due to amplitude modulation, described as "swishing" or "thumping".

Noise emissions have implications both in terms of the effects of existing wind farms, and as a significant barrier to the development of future wind energy projects near communities. It is therefore imperative that an accurate noise prediction method is used in the design of new wind turbines, as well as in the siting, layout and operation of future wind farms.

Current practice for the prediction of noise from proposed new wind farm developments in Australia and internationally is to obtain the sound power level of a wind turbine from measurements in close proximity. The predicted noise level at residential locations is then determined by using this sound power level at each proposed turbine location as an input to a sound propagation model. However, this approach may lead to inaccurate results in conditions which differ from those during the original measurements (for example if there is significant inflow turbulence due to topography or the wake of another turbine); and in conditions which differ from those assumed in the propagation model.

A number of numerical and semi-empirical methods have been developed with the aim of predicting wind turbine noise emissions in a variety of conditions using wind turbine geometry, operating parameters (such as blade pitch angle and rotational speed), and meteorological conditions as inputs. These models have the potential to aid in more accurate prediction of noise from new find farm developments; as well as informing the design of quieter blades to reduce overall wind turbine noise emissions. However, to date, validation of these models using experimental results has focussed on measurements in the laboratory or field measurements of one wind turbine in relatively close proximity.

However, in reality new wind turbines are seldom located closer than 800 metres to the nearest residence and complaints regarding noise are typically received from residences exposed to noise from multiple wind turbines. It is possible that previously developed models do not adequately account for noise received from more than one turbine, because two or more turbines operating in phase may create localised areas of sound level or amplitude modulation reinforcement. Elevated turbulence intensity in the wake of a turbine may extend for at least several hundred metres downwind which may result in a turbine downwind of another turbine generating a higher sound level compared to the sound level generated by the same turbine in isolation. Furthermore, some characteristics of the sound, such as amplitude modulation, may be evident at large distances but not in close proximity to the wind turbine due to the varying attenuation of different frequencies with distance.

The research proposed in this report aims to apply a semi-empirical prediction method and propagation model to calculate and characterise wind turbine noise from multiple wind turbines at distances of between 800 and 1200 metres. It is proposed to validate the prediction method using acoustic array measurements at the prediction locations, which will enable the identification of individual noise sources and also the elimination of background noise.

Nicholas Henrys

27 April 2012

From:
To:
Subject: Fwd: Waterloo
Date: Saturday, 17 November 2012 7:52:36 AM

---------- Forwarded message ----------
From: **Nicholas Henrys**
Date: Mon, May 14, 2012 at 4:55 PM
Subject: Re: Waterloo
To: "Purkiss, Clint"

Hi Clint,

Just wondering whether you had a chance to read my proposal below and assess whether you will be able to provide me with data?

Kind regards,
Nic Henrys

At this point I called Mike Head (project manager for Waterloo) to discuss my research. He brought up the incident which you probably recall had just occurred at the time, where a UoA student in one of the other faculties had been doing a survey on community response to the windfarm at Waterloo. The student's results had been leaked to the media before they had been properly reviewed, and there was an article in the Australian which was quite negative towards Waterloo wind farm and TruEnergy, based partly on his unreviewed results.

I agreed with Mike that it was an unfortunate situation, but stressed that I had no involvement in that project and that they could be sure that my results would not be leaked in the same manner. I also noted that since my project didn't directly involve residents it was less likely to generate controversy and supporting my project by providing could be an opportunity for TruEnergy
to demonstrate that they are genuinely committed reducing noise emissions.

Mike did not give me an indication on whether they would support my research over the phone, but said he would discuss with his colleagues in due course.

---------- Forwarded message ----------
From: **Head, Michael**
Date: Tue, May 15, 2012 at 1:56 PM
Subject: RE: Waterloo
To: Nicholas Henrys

Hello Nic,

Would you please call me?

Mike

Michael Head - Project Development Manager - Business Development | TRUenergy

Waterloo Wind Farm, South Australia. PO Box 702 Clare, SA 5453

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---------- Forwarded message ----------
From: **Head, Michael**
Date: Wed, Jun 20, 2012 at 11:00 AM
Subject: Waterloo
To: Nicholas Henrys

Good Morning Nic,

After much internal deliberation we have decided to decline your request for information.

Please see the attached letter for confirmation of this decision.

Feel free to call to discuss.

Kind Regards,

Michael.

Michael Head - Project Development Manager - Business Development | TRUenergy

Waterloo Wind Farm, South Australia. PO Box 702 Clare, SA 5453

Brighter energy solutions for today and tomorrow

Nicholas Henrys
University Of Adelaide

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enq@truenergy.com.au
www.truenergy.com.au

Dear Nicholas,

Thank you for your recent request for TRUenergy to support your research project, 'Prediction and measurement of far-field wind turbine noise'.

TRUenergy collaborates with major research groups, industry associations and government to investigate more efficient forms of energy generation.

We also contribute funding via joint partnerships to the development of new low and zero emissions energy generation facilities that have the potential to diversity our energy generation portfolio, reduce our emissions intensity and satisfy rising customer demand for energy.

Reading your proposal I understand that you are trying to apply a semi-empirical prediction method and propagation model to calculate and characterise wind turbine noise from multiple wind turbines at distances of between 800 and 1200 metres. I believe this will be valuable research, however the nature of your investigations are outside the scope of research and investigations TRUenergy is currently pursuing, as above.

I am sorry we cannot assist you further at this time.

For more information on our research programs, please visit www.truenergy.com.au

I wish you and The University of Adelaide every success with your work.

Yours sincerely

Michael Head
Project Development Manager
TRUenergy Renewable Developments.

---------- Forwarded message ----------
From: **Jim Pearson**
Date: Mon, Jun 25, 2012 at 1:12 PM
Subject: FW: Snowtown wind farm data
To:

Hi Nicholas,

Thanks for your email. Your thesis sounds very interesting. Unfortunately TrustPower is not in a position to release our wind data for the Snowtown site due to confidentiality obligations.

Best regards,

Jim Pearson

Project Manager

TrustPower Limited **|** Private Bag 12023 **|** Truman Lane **|** Tauranga

CONFIDENTIALITY

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From: **On Behalf Of** Nicholas Henrys
Sent: Monday, 25 June 2012 2:52 p.m.
To: Snowtown
Subject: Snowtown wind farm data

To whom it may concern,

I am a Masters student in the school of Mechanical Engineering at the University of Adelaide. The topic of my thesis is wind turbine noise, and in particular I will be investigating in detail how multiple wind turbines in a wind farm interact to produce noise. As part of my project I intend to take noise measurements in the vicinity of wind farms in South Australia, potentially including Snowtown Wind Farm. This site is of particular interest since Stage II will probably be constructed and operational within the duration of my project, allowing me to compare pre-construction background noise levels with operational noise levels.

I expect that my research will have implications in terms of improved prediction methods for proposed wind farm developments; optimised wind turbine blade design to reduce noise emissions; and development of management procedures (for example, active desynchronisation of turbines) to reduce overall wind farm noise emissions. Current noise prediction models are in terms of worst case noise emissions only. At some sites the meteorological conditions which lead to worst case noise emissions are rare but are represented in the noise prediction models, resulting in sub-optimal wind farm layout in terms of power output. The dynamic noise prediction model which I intend to develop may allow for more optimal wind farm layouts, with turbines that react to meteorological conditions in real time to minimise noise emissions at key locations.

My research, if successful, will therefore be of benefit to wind turbine designers, wind farm developers, and local communities near existing and proposed wind farms.

I expect that detailed operational data obtained from wind farm operators in conjunction with my noise measurements will be integral in ensuring the success of the project. For example, wind speed at turbine hub height; rotational speed of each turbine; and yaw angle will be necessary to determine the relationships between each turbine and the noise level at the measurement location. I appreciate that some of this data may be commercially sensitive and I stress that I will be using it in calculations for the purposes of research only.

If you are amenable to the provision of this data I can provide further details as necessary. I am happy to answer any questions you may have regarding my project, as is my principal supervisor, Dr Con Doolan.

Kind regards,

Nicholas Henrys.