Submission No: 34

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House of Representatives Standing Committee on Industry and Resources
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SUBMISSION TO THE INQUIRY INTO DEVELOPING AUSTRALIA'S NON-FOSSIL FUEL ENERGY INDUSTRY

Dear Committee Secretary,

INTRODUCTION

I am making this submission because I have serious concerns about the development of wind-power as a component of Australia's non-fossil fuel energy industry. My submission involves discussion of complex and poorly understood topics relating to wind farms.

I oppose the construction of wind-farms for large scale electricity generation.

AN EVERYDAY EXAMPLE OF ENERGY WASTAGE

Recently I visited a Sydney North Shore specialist for a consultation in a prestigious St Leonards building. As I waited for my turn, I observed the lighting in the waiting room. I counted 20 halogen down-lights, each of 50 watt rating and totaling 1000 watts. The lights were used to illuminate just one modestly sized reception/waiting room.

I was surprised at the amount of energy being poured into such a small space. I estimated that 10 low energy fluorescents of 18 watt rating and totaling 180 watts would have done the job adequately; and would have saved 800 watts in one room alone. It would have also saved the air conditioner using about 200 watts of electricity because it no longer would have to pump out 800 watts of heat. Thus as saving of 1000 watts could be achieved, just by changing the lights in one doctor's small waiting room, resulting in a saving of 12 kilowatt-hours of electricity per day.

I left the building via one of two small elevators. I noticed that there were seven 50 watt halogen down-lights illuminating the lift car when two 18 watt fluorescent lights would have been ample. The wastage is roughly 7.5 kilowatt-hours per day in just one lift car.

I formed an opinion that there were probably no energy sacrifices being made in that particular building and I made a tentative conclusion that same profligate energy wastage is probably occurring in buildings, not only, across the city of Sydney, but in cities across the country.

You may well wonder what an energy inefficient building has to do with a submission on wind turbines. The reason is that some people in the Southern Tablelands already are, or will be, affected by wind turbines. Those people have to make sacrifices for the greater good of city people. Many city people are profligate energy wasters and don't even know, nor care, that they are wasting energy. Energy conservation and the elimination of energy wastage must be a first priority before we even contemplate building wind farms. We should not produce electricity to waste. People need to be educated to avoid wastage and practice energy conservation, and if necessary regulated to limit energy wastage.

Wind turbines are for making money for the developer, any notion that wind farms produce electricity that is "clean, green, renewable and cheap" is a promotional untruth.

ARGUMENT FOR OF CONTROLS ON EFFICIENCY OF END USES OF COAL

Last year NSW Planning Minister Frank Sartor approved the Taralga Wind Farm. He said it would save 250,000 tonnes of CO2 being emitted a year.

Some residents in the Southern Tablelands are, or will be, grievously affected by the Taralga Wind Farm. The affected residents were told by the NSW Department of Planning and the Land and Environment Court that they have to make altruistic sacrifices for the greater good of the community. The sacrifices affected residents have to make is to cop the negative aspects of wind farms, such as incessant noise, devaluation of their property's worth, disruption of their lives, destruction of rural landscapes. The wind farm will also be a destroyer of birds and an agent of local and global climate change. The Taralga wind farm will also be an evaporator of soil moisture from prime agricultural land.

Recently, NSW Planning Minister Frank Sartor approved the Anvil Hill coal mine. Combustion of the coal from Anvil Hill will produce 12.3 million tonnes of CO2 per year. Minister Sartor said that he could not stop a particular development and allow others to proceed. Whatever happened to the principle of the greater good? The principle has been conveniently discarded for the Anvil Hill Coal Mine development approval. The affected residents of Taralga have been betrayed & sacrificed.

At very least, Minister Sartor could have made the Development Approval of the Anvil Hill Coal Mine, conditional upon the mine owner selling coal from the mine to buyers who agreed to burn that coal using the most efficient technology available.

The uranium oxide export industry has controls over the end uses of uranium to prevent proliferation of nuclear weapons. Similarly there is no reason why the coal mining industry should not be forced to impose conditions on coal sales which mandate efficient end use of that coal.

On the Minister's figures it would take 50 Taralga wind farms comprising 2,500 two megawatt wind turbines to make up for just one Anvil Hill Coal mine and we are told that there are more coal mines to come. If arranged in a line, down the Great Dividing Range,

those 2500 two megawatt wind turbines, would stretch from Sydney to Melbourne, there are obviously a lot more of them to come too.

There was scope to achieve significant reductions in CO2 emissions in electricity produced from the combustion of Anvil Hill coal. Integrated Gasifier & Combined Cycle (IGCC) technology emits 0.6 tonne of CO2 per megawatt hour of electricity compared to conventional coal fired thermal technology at 0.95 tonne of CO2 per megawatt hour.

A saving of up to 37% in CO2 emissions, per unit of electricity generated, could have been achieved, by inserting a CO2 emission limit clause in the Development Approval. If prospective buyers of coal from Anvil Hill mine were willing to comply then we would have won an ethical victory and achieved massive reductions in CO2 emissions per unit of electricity generated; far more than we could ever achieve by building wind farms. If prospective buyers of Anvil Hill coal don't want to use the most efficient technology then so be it. People of NSW probably don't really want to sell coal to these polluting customers anyway; especially since the people of NSW will have to pay a lot more for so called "green" electricity from wind farms.

If Minister Sartor had imposed conditions on the end uses of Anvil Hill Coal he could have achieved up to 58% more units of electricity being generated for the same amount of CO2 emissions.

EFFECTS OF WIND FARMS ON THE EFFICIENCY OF THE ELECTRICITY GENERATING SYSTEM

NSW Planning Minister Frank Sartor, at the time of announcing the approval of the, 50 turbine, Taralga Wind Farm, said that it would produce enough energy for 38,000 homes. I disagree, according to my calculations the Taralga wind farm will only produce enough energy for 23,000 homes. To power the other 15,000 homes the Taralga wind farm will have to steal the energy from the electricity generating system.

Sometimes the 100 megawatt Taralga wind farm will produce 100 megawatts of electricity; sometimes it will produce nothing at all. On average the gross output of the Taralga wind farm will be about 30 megawatts. The mix of other generating plant in the electricity generating system (mainly coal fired thermal plant in the case of NSW) has to compensate for the variable and unpredictable fluctuations in output from wind farms in addition to an already variable but predictable demand. That additional unpredictability and variability will reduce the efficiency of the existing plant held in reserve for wind farms. For the Taralga wind farm I estimate the effect of having 100 megawatts of existing coal fired power generating plant in reserve, and operating in a less efficient mode than it would normally operate is equivalent to 11 megawatts and CO2 emissions will increase from 0.95 to 1.1 tonne per megawatt-hour for that reserve plant. In scrupulous fairness, it is an energy charge against the output of the Taralga wind farm. So that leaves the 50 turbine Taralga wind farm producing a net 19 megawatts of electricity on average not the gross 30 megawatts.

When Planning Minister Frank Sartor announced on ABC news that he had approved the Taralga wind farm, he said it would save 250,000 tonnes (per annum) of CO2 being emitted; he was implying that Taralga wind farm will produce no CO2 emissions at all. However the effect of making the reserve electricity generating plant less efficient really means, in scrupulous fairness once again, that Taralga wind farm will be responsible for the production of 94,000 tonnes of CO2 per annum for its net output of 19 megawatts, not zero as the Minister would have us believe. Thus the Taralga wind farm will produce about 0.57 tonne of CO2 per megawatt-hour. This is better than coal fired thermal at 0.95 tonne of CO2 per megawatt-hour but it is worse than combined cycle gas turbine technology at 0.35 tonne of CO2 per megawatt-hour. In such a scenario wind-power is not carbon neutral and therefore it is not climate neutral. Just one very small size combined cycle gas turbine plant, of about 20 megawatts capacity, would supply electricity more reliably and for a lower cost than the combined output of the 50 turbines of the Taralga wind farm and emit 58,000 tonnes of CO2 to produce the same net output as the Taralga wind farm.

Even better than that, replacing 1,000,000 incandescent light globes with energy efficient fluorescent light globes (each costing $4) in 200,000 homes would eliminate the need for the Taralga wind farm altogether and therefore save 94,000 tonnes of CO2 per annum being emitted.

Mandatory renewable energy targets (MRET's) is the deeply flawed policy responsible for creating the Taralga wind farm monster. The MRET policy is a boon for the wind farm developer. In addition to the guarantee of a purchaser for electricity produced the developer stands to get a hidden power subsidy equivalent to 11 megawatts from the existing state owned coal fired electricity generating system and come out of it looking "squeaklessly clean and slimy green" while coal fired thermal power stations come out of it worse off and literally "carry the can" for the Taralga wind farm.

We should adopt a policy which encourages energy conservation and favours the lowest cost means of CO2 avoidance. We should ditch MRET's altogether and definitely not increase the target at all.

THE FOOTPRINT OF A WIND TURBINE & THE EXTENT OF WIND FARMS

A letter to the editor Goulburn Post, dated Wed 9th February 2005, by wind farm advocate, Dr. Mark Diesendorf revealed the real agenda of wind farm proponents. Dr. Diesendorf stated that by 2040 *"Wind farms with a generating capacity 20,000 MW, (20 gigawatts) together with a little additional peak-load plant, could substitute for 6,600 MW (6.6 gigawatts) of coal power".*

Dr. Diesendorf seems to assume that there there will be no inefficiencies caused to the existing electricity generating system due to the connection of such a large amount of wind power. However it is inevitable that there will be inefficiencies when such a large amount of wind power is connected to the existing electricity generating system.

Wind farms with 6.6 gigawatts of average net electrical output will require something in the order of 10.4 gigawatts of average gross electrical output. Using a load factor of 30%, 10.4 gigawatts of average gross output will require an installed capacity of 35 gigawatts of wind power. 35 gigawatts of wind power will require 17,500 wind turbines of the 2 megawatt size proposed for Taralga.

Those 17,500 wind turbines, each almost as tall as the Sydney Harbour Bridge, and sporting between them 52,500 blades, 45 metres long, whizzing around at 300 km/h could well become storyline of the 21st century mechanical sequel of Rachael Carson's defining book the "Silent Spring". It was the "Silent Spring" which alerted us to the effects that pesticides and their residues were having on flora and fauna. In the twenty first century there will not be as much bird song because there will be fewer birds. Some of the birds will have been mechanically clubbed to death by the blades of wind turbines, or crippled by turbulence. The 52,500 blades of 17,500 wind turbines will provide a swept area of 11,000 hectares (27,000 acres) for any unsuspecting birds that stray into their path.

If 17,500 wind turbines were spaced 450 metres apart as recommended by the NSW Wind Energy Handbook 2002, they would form a single unbroken line stretching for nearly 8000 (7875) kilometres. That is an equivalent distance along the coast from Cairns to Perth via Melbourne.

Dr. Diesendorf is not specific, in his letter, about where wind turbines will be sited, but I will give you a hint. Most of the wind turbines will be sited in the regions of high mean wind velocity i.e on the tops of mountain ranges and ridges. In a high mean wind velocity area, encompassing Goulburn, Taralga and Crookwell, wind turbines will achieve their maximum density. It is conceivable that wind turbines will be arrayed along the ridges against the prevailing north-westerly winds in rows where the wind turbines are 450 metres apart across the wind and 800 metres apart downwind. It would not be an unreasonable expectation to have 2000 wind turbines in the area of high mean wind velocity encompassing Goulburn, Taralga and Crookwell. (1 turbine per 80 hectares). And when it is all said and done, by the year 2040, wind farms will account for no more than twenty percent of electricity generated. And where will most of the electricity generated go? To the city where it will, for the most part, be wasted!

THE GLOBAL CONSEQUENCES WIND FARMS

An article in the Canadian publication, The Globe and Mail (9th Nov 2004), by Stephen Strauss, sounded an ominous warning on how wind farms might affect global climate. Canadian and US Scientists used computer simulations to show that using wind farms for large scale electric power generation could *".....create a significant temperature change over the earth's land masses. While the precise trade-off between the climate changes from wind farms versus that from carbon-based power systems is still a matter of contention, the fact that wind power isn't climate neutral leaps out of the simulations. "We shouldn't be surprised that extracting wind energy on a global scale is going to have a noticeable effect. ... There is really no such thing as a free lunch," said David Keith, a*

professor of energy and the environment at the University of Calgary and lead author of the report, which appeared in the Proceedings of the National Academy of Sciences. Specifically, if wind generation were expanded to the point where it produced one-10th of today's energy, the models say cooling in the Arctic and a warming across the southern parts of North America should happen. The exact mechanism for this is unclear, but the scientists believe it may have to do with the disruption of the flow of heat from the equator to the poles.

Depending on how much energy is ultimately generated by wind power, the study's simulations say these changes could range from one-third of a degree to 2 degrees Celsius. One unexpected finding to the study is that the hotter temperate zone / cooler Arctic effect exists in the simulations if the wind farms are concentrated in a few spots or scattered across the world".

I assume that the simulation, conducted by Dr Keith and others translates to the southern hemisphere by the models saying "a cooling in the Antarctic and a warming across the southern parts of Australia should happen"?

What will be the consequences if wind power generation were increased by twice as much, as the 10% used in the global simulation, to 20% forecast by Dr. Diesendorf in his letter to the editor Goulburn Post Wed. 9th February 2005?

Some people may regard wind as a nuisance, like the lady who says "it mucks up my hair" but is not until you are confronted with the imminent arrival of wind turbines that you start learning about the wind and wind turbines, and the adverse consequences wind turbines may have on climate change and the environment.

The kinetic energy of the wind has an important job to do in transporting heat energy from the hot equatorial regions to the cold polar regions of the planet by the process of atmospheric circulation. The wind is a part of a heat energy transportation system. The global simulation conducted by Dr. David Keith and others shows, that wind farms on a large scale, may interfere with atmospheric circulation and the climate. That is to say that wind turbines will interfere with the global transport of heat energy.

The effect of wind farms spread across South Eastern Australia, is to intercept, with turbines, the prevailing wind on its journey from the equatorial regions to polar regions. The process slows the wind, by stealing much of its kinetic energy, and loads the wind with low-grade heat energy, being a consequence of the inefficiency of the process, and then sends the wind on its way, somewhat crippled and degraded.

According to Dr. Keith a global population of wind turbines producing 2 terawatts of electricity will place 4 terawatts of drag on the wind. By proportion it follows that a 2 megawatt wind turbine will place 4 megawatts of drag on the wind. That is to say a 2 megawatt wind turbine will turn 4 megawatts of the winds kinetic energy into 2 megawatts of electricity and 2 megawatts into low-grade heat.

By reducing the velocity of the wind, we reduce the ability of the wind to go as far as it did before. In other words we cripple the wind. However that is not all that we do to the wind. The 2 megawatts of electricity a turbine generates is led somewhere else by cables and is used. Most of it ends up as low grade heat and adds to the 2 megawatts of heat that was lost due to the inefficiency of the process. Thus a 2 megawatt turbine will strip 4 megawatts of kinetic power from the wind and load up what is left of the wind with 4 megawatts of low grade heat. An entirely possible and logical consequence of degrading the wind and loading it up with heat is that Antarctica gets colder and the temperate zone, Southern Australia gets hotter. The question that must be answered is this. Will we get more energy out of wind farms than we will have to put in to compensate for their effects?

THE LOCAL CONSEQUENCES OF WIND FARMS

Wind farms do have effects on the local climate. There are quite a few internet articles but they all point to the same study conducted by S Baidya Roy and others at Princeton University in the U.S. I have reproduced below an article from Science News, Oct. 16, 2004, p. 246. Change in the Weather? Wind farms might affect local climates by Sid Perkins.

Large groups of power-generating windmills could have a small but detectable influence on a region's climate, new analyses suggest.

Windmills once were quaint several-story-high mechanisms that pumped water or ground grain. They've since evolved into sky-scraping behemoths that can each generate electrical power for more than 100 homes.

Some modern turbines are 72 meters tall and have rotor blades that are about 25 m long, says S. Baidya Roy of Duke University in Durham, N.C. Future windmills may reach higher than 100 m, and their rotor blades may measure 50 m long, he notes.

All such turbines disrupt natural airflow to extract energy from wind. To investigate potential effects of a wind farm that includes thousands of windmills, Roy and his colleagues used a detailed climate model based on wind speeds, temperatures, and ground-level evaporation in north-central Oklahoma during a 2-week period in July 1995. In their scenario, the researchers considered a 100-by-100 array of windmills spaced 1 kilometre apart.

The simulation suggests that during the day, while sun-induced convection handily mixes the lower layers of the atmosphere, such a wind farm wouldn't have important climatic effects.

In predawn hours, however, when the atmosphere typically is less turbulent, a large windmill array could influence the local climate. For example, at 3 a.m., the average wind speed at ground level was 3.5 meters per second (m/s) in the absence of windmills. Adding the wind farm would increase the average wind speed to 5 m/s. Also, the 10,000 windmills would increase the temperature across the area by about 2°C for several hours.

Averaged over an entire day, the wind speed at ground level would go up about 0.6 m/s and the temperature would jump 0.7°C.

Turbulence caused by the rotating blades would shunt some of the high-speed winds typically found 100 m off the ground down to Earth's surface, says Roy. Those surface winds would boost evaporation of soil moisture by as much as 0.3 millimetre per day.

The researchers describe their simulation in the Oct. 16 Journal of Geophysical Research (Atmospheres).

The findings may stimulate scientists to validate the analysis with real-world tests, says Neil Kelley, a meteorologist at the National Renewable Energy Laboratory in Golden, Colo. In general, says Kelley, the simulation agrees with atmospheric data he gathered at a wind farm in California.

From Science News, Vol. 166, No. 16, Oct. 16, 2004, p. 246.

Evaporation of soil moisture at the rate of 0.3 millimetre per day might seem a trivial amount, however if it were maintained at that rate over a year it would amount to 110 millimetres. In an 800 millimetre average annual rainfall zone it would be a substantial amount.

The above article points to wind turbines, on a large scale, having a small but detectable influence upon local climate. The simulation, of a large wind farm in the US, conducted by S.B. Roy suggests that, at certain times of the day, the wind turbine shunts wind down to ground level and creates turbulence. Dr Roy states in a later clarification that most of the evaporation is due to by the increased turbulence created at ground level rather than the slight heating effect due to the inefficiency of wind turbines.

As stated above, a 2 megawatt wind turbine will place 4 megawatts of drag on the wind. That is to say a 2 megawatt wind turbine will turn 4 megawatts of the winds kinetic energy into 2 megawatts of electricity and 2 megawatts of low-grade heat.

Using that data I performed a calculation to estimate temperature rise and moisture deficiency a 2 megawatt turbine would create in the swept air-stream.

The 2 megawatt losses would end up as heat energy in the wake downwind from the turbine. It was estimated that the losses would heat the air-stream by 0.0244 degree Celsius. The temperature rise is very small but it is not insignificant because there is an enormous mass of air, in the order of 115 tonnes per second, passing through the area swept by the rotor. Despite the small amount of heating the resulting moisture deficiency created was calculated to be 2.24 litres of water per second.

While 2.24 litres of water per second moisture deficiency might seem a trivial amount, a 2 megawatt turbine producing 30% of its rated output will produce a moisture deficiency of 21 megalitres per annum. A 50 turbine wind farm of 2 megawatt turbines will produce a

moisture deficiency of 1,050 megalitres per year. By comparison Goulburn City's annual level 5 water target is 1,200 megalitres, based on a population of 22186 persons using 150 litres per day.

For a 17,500 wind-farm of 2 MW turbines spread across South-Eastern Australia the moisture deficiency due to the heating and drying effect of the air-stream in the is estimated to be 370,000 megalitres (370 gigalitres). To put this into perspective, 370 gigalitres of water is roughly equivalent to the average annual flow in the Murrumbidgee River at Hay, or the Darling River at Wilcannia. It is greater than the combined flow into dams supplying the city of Sydney.

It is of great concern that most of that moisture deficiency in the air will be translated into soil moisture loss in the turbulent area downstream of the turbine. The turbulence caused by the wind turbine at certain times of the day will bring the wind into more intimate contact with the soil and the plants growing in the soil. Evaporation will be increased.

The NSW Wind Energy Handbook 2002 recommends that to avoid turbulence from one turbine interfering with another turbine, that turbines be spaced no closer than 5 rotor diameters apart across the wind and 8 rotor diameters apart downwind. The implication being that within that zone there will be turbulence. For a 2 megawatt turbine with a rotor diameter of 90 metres that turbulent triangular footprint is 450 metres across the wind and 720 metres downwind; an area of 16.2 hectares. Evaporation of 110 mm from the footprint area of 16.2 hectares corresponds to 18 megalitres a year for each turbine. This amount is less than the 21 megalites a year I calculated above by another method.

PEJAR – THE CANARY IN THE CAGE

Coal miners of the 19th century, were in the habit of taking canaries down into the mines. It was not because the miners had pet birds, it was because the canaries could detect poisonous methane gas at a lower threshold than the miners themselves. If the birds sniffed it and then snuffed it then it was time for the miners to go topside because if they kept on sniffing it they would almost certainly snuff it too.

Pejar Dam, Goulburn City's main water reservoir was in wetter times a beautiful man-made lake. It was a place for boating, sailing, fishing and water sports, but Pejar has been bone dry and frighteningly empty over the last year. The late poet Dame Mary Gilmore who lived nearby wrote with passion about Pejar Creek;

PEJAR CREEK
Softly as a thrush sings
in the morning hushes,
softly sing the waters,
round the reedy rushes.
Softly at the sand-bar,
softly at the sally-
that's where the Pejar runs.

Runs like a slip of silver
through the valley.

I wonder what Dame Mary would write if she were alive today?

Above the Pejar catchment loom the 8 x 600 kW wind turbines of Crookwell I wind farm. Have these 8 wind turbines had anything to do with Pejar Dam being so comprehensively empty?

Crookwell II wind farm, 20 times the output of Crookwell I, and comprising 46 x 2 megawatt wind turbines has already been approved to be built nearby at the top of the Wollondilly catchment above Pejar Dam. What effect will this have on Goulburn City's major water storage?

I calculate that the Crookwell II wind farm will produce downstream of it a moisture deficiency of 966 megalitres per year. What effect will that have on soil moisture and consequent reduction in runoff into Pejar Dam? Wind-farms in the Wollondilly Catchment above Pejar Dam may make Goulburn City's water supply predicament a whole lot worse that it already is.

Who pays for this if it turns out to be an act of folly? The wind farm developer ? The Federal Government? The State Government who approve the wind farms? The electricity consumer? The unwitting ratepayers of Goulburn Mulwaree Shire?

The proponents of wind farms use adjectives "clean", "green", "renewable" and "cheap" 'ad nauseam' to describe the wind as a source of energy with no regard for the possible adverse consequences. The proponents make exaggerated claims that each wind turbine will provide electricity for 800 homes however I expect that it will be more like to 460 homes by the time wind farms are accomodated into the electricity generating system. But on the flip side the proponents don't tell you that each wind turbine might evaporate water from the soil equivalent to the water requirement for 450 homes. Soil moisture has to be replenished before run-off into dams occurs. Therefore the water supply for 450 homes may never reach the catchment. **For every one home supplied with electricity from a wind farm the water supply for one home will probably be evaporated.** The adjectives "dry", "brown", "degradable" and "expensive" might be more appropriate for wind-farms.

Sydney residents should not be complacent and regard the problems of wind farms as local problems confined to the Southern Tablelands and Goulburn. Most of the water that flows into Warragamba catchment comes from the Wollondilly River and the Wollondilly River rises near Crookwell in the Great Dividing Range just above Pejar Dam. The Taralga wind farm has also been approved to be built in the Tarlo River catchment. The Tarlo River also rises in the Great Dividing Range not far from the Wollondilly. The Tarlo River flows into the Wollondilly west of Berrima; water from the Tarlo River also ends up in Warragamba Dam.

SUMMARY

The proponents of wind farms, including the NSW Planning Minister, would have you and I believe that wind turbines generate electricity without producing the greenhouse gas CO2. Using NSW Planning Minister Sartor's reasoning, each wind turbine would save 5000 tonnes of CO2 being emitted each year. However by the time wind farms pay the costs of their accommodation into the electricity generating and distribution system it is estimated that each 2MW wind turbine will be responsible for the production of 1900 tonnes of the greenhouse gas CO2. So the saving is 3100 tonnes of CO2 per annum not 5000 tonnes per annum.

The 17,500 two megawatt wind turbines comprising Dr. Diesendorf's 6.6 gigawatt (net output) wind farm would have to be distributed over several south-eastern Australian States. The proponents of wind farms expect a wonderful electrical cornucopia of high voltage transmission lines to magically spring up and transport electricity from wind farms in South Australia and Victoria to supply NSW and vice versa. Such transmission lines would have to transmit large quantities of electricity very long distances. As a consequence such transmission lines would have to operate at the highest voltages and have large conductors and huge towers. They would cut massive swathes through South Eastern Australia. These transmission lines will be necessary if wind power is to reduce the inefficiencies it causes to the rest of the electricity generating system. Even so wind farms would still require substantial reserve generating plant. As a consequence, wind farm developers should bear the cost now. People who are seduced by the apparent something for nothing which developers recklessly exploit, should be aware.

I have done a few calculations on the viability of the Taralga Wind Farm and I am not all that impressed with the results. The estimated cost of the 50 turbine Taralga Wind Farm is $186 million so the estimated cost per turbine is $3.72 million. The annual cost of $3.72 million loan at an interest rate of 7% per annum for 20 years is $351,000. I estimate a turbine will produce a net 3,310 megawatt-hours of electricity per annum. So the cost of the loan is 10.6 cents per kilowatt-hour. If I add the cost of the 21 megalitres per annum of water evaporated at $2.90 per kilolitre, (the cost of desalination) which works out to be 1.9 cents per kilowatt-hour. The total cost of Taralga wind farm electricity is 12.5 cents per kilowatt-hour. I compare this with my Country Energy Rural Step 2 rate of 13.0 cents per kilowatt hour. It is quite obvious to me that wind power does not come cheaply. I conclude that by the time that distribution costs are added in I will have to pay a lot more for my electricity than I currently pay.

Global warming and climate change may make many places hotter and wetter, but South Eastern Australia is forecast to become hotter and drier as a consequence of global warming and climate change. To that gloomy forecast we might need to add the global heating effects of wind farms and if you live near them you might need to add the local heating and drying effects as well.

The locality of Bannaby near where the Taralga wind-farm is to be sited will have 122mm less rain by 2040 according to Bureau of Meteorology forecast mean rainfall trends . The local effect of wind farms, if there were 1 turbine every 80 Ha, could account for at least another 26mm, and possibly as much as 110mm. Therefore the locality of Bannaby could be between 150 and 230 mm drier by the year 2040.

The locality of Bannaby will, according to Bureau of Meteorology forecast mean temperature trends, be 0.5 degrees C hotter by the year 2040. The global effects or wind farms could add between 0.33 and 2 degrees C and the local effects of wind turbines could add a further 0.7 degrees C. Therefore the locality of Bannaby could be between 1.5 and 3.2 degrees C hotter by 2040.

Why should we sacrifice the locality of Bannaby to warming and drying in order to save the rest of the planet from warming? Where is the equity in that?

A wind farm of 6.6 gigawatts net capacity in south-eastern Australia is not a small undertaking; it is equivalent to six 1.1 gigawatt conventional coal fired thermal power stations or six 1.1 gigawatt nuclear power stations .

The environmental consequences such a wind farm could be severe, even catastrophic, and yet our governments have been prepared to let these developments proceed on an unplanned, divisive, destructive, ad hoc, chaotic basis against the majority wishes of the communities where they are being sited, contrary to Local Council guidelines, and in total ignorance of the possible adverse consequences both globally and locally.

By contrast Prime Minister John Howard has a taskforce to investigate the viability of nuclear power in Australia. The Prime Minister should have asked the task force to investigate the viability of wind power in Australia.

It would appear that almost everyman and his dog are seduced by the notion of getting so called "green" energy from the wind, to counter climate change. I suspect that most city people are overwhelmingly in favour of building, across the country side, wind-farms for large scale electric power generation.

It seems to be a foregone conclusion that these monster machines can produce electricity from the wind, for very little cost. However it is not a simple decision about wind farms at all, in reality it is an extremely complex decision about how well wind farms will integrate into our existing electricity power generating and distribution system and how adversely they will affect the efficiency and performance of the electricity generating and distribution system. It is a decision for experts not amateurs. It is also a decision we do not have the luxury to get wrong.

There are also issues, foreshadowed by overseas research, of local/global warming and drying effects produced by wind farms on a large scale. We do know from climatic modelling by Australian scientists that South-Eastern Australia will tend to get warmer and drier. However we have done little or no research into the effects of large-scale wind

farm developments on global and local climate acting in combination with the changes our scientists are already predicting.

I have been aware of the problem of climate change since 1989. However the first calculation into the impacts of increasing the concentration of CO2 in the atmosphere was performed by Arrhenius in 1896. Arrhenius calculated that doubling the CO2 content of the atmosphere could cause mean global temperatures to rise by 5 degrees Celsius. Scientists in 1989 considered calculations performed a hundred years earlier by Arrhenius to be very close to the mark.

It would seem that we are embarking upon yet another climatic experiment without really knowing what the consequences will be? Large scale wind farms for electric power generation will be a similar experiment to those experiments we have been conducting by burning fossil fuels. At the beginning of the industrial revolution man could plead ignorance about the consequences that shovelling coal into a furnace might someday have on the planet. However in 2007 we cannot plead ignorance that our actions might have adverse consequences; we have to be reasonably sure that they will not. Before we take another great imprudent leap into the unknown I believe that we must conduct a very thorough study of the possible adverse consequences of wind farms for large-scale power generation on both local and global climate, from the perspective of South East Australia.

James Lovelock, sometimes described as the father of the "Greens", was the scientist who discovered the link between synthetic refrigerant gases, "the freons" and holes in the ozone layer. James Lovelock tells us that the time for poncing about with our planet's future has expired. He says that our only option is to build nuclear power stations. I agree with him.

RECOMMENDATIONS

I make the following specific recommendations applicable to wind turbines for large scale power generation:-

The National Code Guidelines should specify where wind farms may be built and where they may not be built. The guidelines should also set the maximum density of turbines in wind farms. The guidelines should place a cap on how much energy may be extracted from the wind.

Wind farms should not be permitted to be built in water catchments of public water supplies until it can be demonstrated that their effect on rainfall run-off into reservoirs is negligible.

Wind farms should not be permitted to be built in water catchments of reservoirs for irrigation and river regulation until it can be demonstrated that their effect on rainfall run-off into reservoirs is negligible.

A moratorium should be placed on further construction of wind turbines for large scale electricity generation in until further research determines that adverse consequences of wind turbines on global and local climate do not outweigh the benefits.

The Australian Government immediately commissions research into the possible adverse consequences of wind farms.

Wind turbines must pay for any inefficiency they may cause to the existing electricity generating system. Wind farms must pay for the additional electrical plant required to integrate them into the electricity generating and distribution system.

A National Energy Conservation initiative be commenced to increase public awareness of the need for energy conservation, improved efficiency of energy users and the elimination of energy wastage.

Yours sincerely,

Dennis Workman.