

20 minute Local Power dinner talk – **Biedo – Future Energy Forum** – Kingaroy 24/9/2008

Hi. As mentioned I won't be speaking on "A LIGHT HEARTED VIEW OF CLIMATE CHANGE".

I would however like to make this a \*hopeful\* talk about some solutions to climate change that we have been working on in "Local Power" and then more broadly.

For the first half I will talk about the "Local Power" community based bulk buy for Solar PV panels for residential and community building rooftops.

For the second half I will talk about why I believe that "Solar is a big part of our energy future". Not the whole story of course, because there is room for lots of different renewable technologies.

What is Solar Power? There are two main types:

- Solar PV (or photovoltaic) generates electricity directly from light from the Sun. Those of you living in the bush and are not on the grid, you might have solar PV together with batteries and generator as a backup. The biggest growth is connecting Solar PV to the grid, so there are no batteries required.
- Solar Thermal, which is commonly found on homes as solar hotwater, uses the heat from the Sun to heat water. In the case of large Solar power stations in the desert, they heat the water much hotter, making steam (like burning fossil fuels like coal), which drives turbines and generates electricity

### **The "Local Power" bulk buy**

For some background, I'm from West End, an inner city suburb of Brisbane, which is a very diverse and certainly from my experience a very interesting place. My two young daughters go to the local state primary school, where at last count I think there are 35 cultural groups represented. West End has a long history as home for, and a traditional meeting place of Aboriginal people, and along with Anglo-Celtic Europeans, were joined in the mid 20<sup>th</sup> century by Greek migrants and in the later parts of the 20<sup>th</sup> century Vietnamese refugees and migrants. West End is also very diverse in other ways, housing the wealthy, the poor and homeless, university lecturers and students, pensioners, and people from all parts of the political spectrum. The West End area has a strong sense of community, partly due to geography being surrounded by the river and not having much through traffic. It has a very rich tapestry of people and ideas, which I think helped us in our project greatly.

At the beginning of last year a few friends and I had some conversations about the climate change. At the time it was impossible to pick up a newspaper or turn on the TV without a story or two about the topic. What could we do in our homes and with our families to do our bit? The problem seemed to be so large and taken hundreds of years to create, the causes complex, and the solutions not obvious, nor easy.

For example we would all agree that water has been and still is a big problem for SEQ

- perhaps governments at all levels and all parties have dropped the ball on it
- perhaps we haven't appreciated its true value & it's been priced too low
- perhaps partly due to climate change that there is simply less water to go around
- a lot of work is being done on water to get us back on track. that work is expensive (water grids, pipelines, recycling, desalination, water tanks) and the price of water will have to go up to pay for it
- for those of you who live on the land, water as a scarce and precious resource has probably been obvious for a very long time. For some of us in the cities these obvious truths are not always obvious.

These friends and I, having already installed water tanks to improve the sustainability of our homes for water, decided we wanted to make our homes more sustainable for energy.

Our initiative was based on believing that energy, like water before it, will be the next big problem

- we need sustainable forms of energy for our own future and that of our children
- sustainable meaning no pollution (toxic gases & CO2)
- sustainable meaning not finite like oil and gas which will run out this century
- sustainable meaning getting smarter about not wasting the energy we use
- sustainable meaning that our the next couple of hundred generations will enjoy a livable planet
- efficiency measures (water use per capita has halved since the drought began and we are coping ok)

We started a small not for profit community group called "Local Power" to bulk purchase PV Solar panels for our homes. We made considerable savings in 3 main areas

- buying the components in bulk
- installing them in bulk with homes near each other and
- coordinating the work as a community project which had lower admin costs.

We aimed to get 50 homes. At the time we started (June 2007) there were only 342 grid connected homes in Queensland so 50 was going to be quite a contribution. We ended up with 150 signups, far exceeding our expectations. As of June 30 2008 there were 1005 grid connected homes in Queensland.

Our 1kW system after all rebates worked out at around \$1400 for top quality panels (Sharp) and related equipment fully installed for a 1kW system and around \$15000 for a 3kW system.

I believe we had a lot of interest and success due to:

- solar on your own roof captures peoples imaginations
- people want to be part of the solution to climate change and do their bit
- being community based and not commercial, led to people trusting us and helping us in many and varied ways, letterbox dropping, government agencies giving us advice, word of mouth etc. e.g. people were very cooperative, we could do 12 inspections per day in half hour timeslots, people put up with email interaction for the most part etc.
- media coverage – ABC TV News, Local Paper front page, Channel 10 News, etc.

From start to finish it was a bit over a year from the idea, to getting a website together, getting enough interested buyers together, negotiating with suppliers and installers, inspecting every home, doing all the rebate and grid connection paperwork, managing the logistics to install 20 tonnes of Solar PV panels. The total installed capacity is around 200kW and was approximately a \$2M community project. (Tarong powerstation is 1400MW (4 x 350MW) and Tarong North is 445MW.)

We are currently surveying our email list about whether the rebate means test changes make it viable to do another buying group. We are also quite interested in electric cars which will be commercially available by large car companies in 2010.

For more of the nitty gritty about the Local Power community bulk buy, how we did it, what we learnt, please come along to one of the workshops tomorrow.

## **Solar is a big part of our energy future**

Moving onto the second half talking about why solar will be a big part of our energy future, I will cover several myths about renewables and solar in particular.

### **Myth – "All renewables have problems and can't replace what we have now"**

Yes. All renewables have problems or should I say all energy sources have pros and cons. The wind doesn't blow all the time. Hydro depends on having enough rainfall and water flow. The sun doesn't shine at night. Geothermal (the best hot rocks) are a long way from the grid.

Fossil fuels also have pros and cons too, the main cons being they are finite fuel sources, and they generate pollution and greenhouse gases.

The energy mix in the world is already quite diversified, i.e. it we use lots of different forms of energy in

different places for different things e.g. oil, gas, coal, hydro, wind etc. depending on where you are in the world. In Australia 80% of our electricity is from coal and worldwide that figure is 40%.

It's simplistic thinking to want the one same solution for every part of the world like coal is now the main power generation source. Why not generate wind power in windy places, solar power in sunny places, geothermal power in the places where it's ideal and build the grids to where the power sources are? This is what we did for our current crop of coal power stations, hydro plants etc..

### **Myth – "Solar PV is too expensive."**

Solar PV at the moment is a very expensive form of energy. The cost of electricity probably increases across the spectrum from the cheapest being fossil fuels such as Coal and Natural Gas with cheapest renewable currently being in order Wind – the cheapest, then Geothermal, Solar Thermal and finally Solar PV.

Fortunately for Solar PV there are a number of subsidies for households today which help to bring the cost down. These include PVRP/SHCP, RECs and FiT. (more details in the workshop)

The FiT is the subsidy which I would like to briefly touch upon now. It's where a renewable generator like solar gets paid a premium over the retail price for the renewable energy they generate. Countries like Germany (which doesn't have much sun) and Spain (which does) have implemented this form of subsidy which has made their solar industries boom, and Germany installs 50% of all the solar panels manufactured in the world. Queensland has implemented a less than optimum version of a FiT on July 1 2008. In my opinion this won't be as successful as in Germany because the payment are not known accurately in advance, so the financial return won't be known well enough to borrow against. The ACT has however implemented a very good FiT and hopefully the current Senate inquiry will shed light onto why the German model should be adopted here as input to the COAG process.

There are some people in government (mainly economists at both state and federal level) who are critical of solar due to the required subsidies.

The purpose of any industry development subsidy is to get the industry to grow to the point when the costs drop and where it no longer needs the subsidy.

Our fossil fuel industries and our electricity grid have been subsidised for decades. Until quite recently our electricity generation, transmission, distribution and retail have been wholly owned by governments. There is therefore a clear precedent to subsidise renewable energy for a short time until they can compete with fossil fuels on a level playing field.

When will PV be cheap enough? Well fortunately for Solar PV, it doesn't have to become as cheap as coal. For residential and commercial buildings it only has to become as cheap as the retail price of electricity. I would like to predict that within 5 years or so the cost of electricity from PV will reach "grid parity" and over its life of 30 year, panels will cost the same c/kWh as retail electricity from the grid. When that happens, it will make financial sense for many people to put it in knowing they are locking in their electricity price for 30 years.

How can I make a prediction for so soon? Like the computer industry, & like in many other industries, the more of something you build, the more experience you get and the better and cheaper you can build something. It's often called "economies of scale" or the experience curve. Solar PV has been progressing for about 30 years now on this curve, and predictably the long term trend is that every time the cumulative number of panels produced doubles, the cost drops by 20%.

Assuming electricity increases by 5% per year and PV costs come down by 5% per year we will get there in 5 years or so. Electricity prices have gone up 1 July 2007 11.37% 1 July 2008 5.38% = 17.36% so I am being conservative. Does this mean that we should all wait 5 years before installing PV? Absolutely not! The subsidies which currently exist are enough to make it viable to install Solar PV now and will eventually go away.

The Australian contribution to Solar PV technology has been substantial. Professors Martin Green and Stuart Wenham their research teams from UNSW have held the world records for Silicon PV efficiency

for many years. Their most famous student Dr. Zhengrong Shi has started China's most successful PV manufacturing company worth around US\$6.7B on the NYSE.

### **Myth – “Renewables can't provide baseload power”**

It's true that the sun doesn't shine at night. Unless we use batteries, then yes Solar PV can't provide power at night.

Coal fired generation can provide power 24x7 and it's designed to do that very efficiently. However it's hard to turn the most efficient coal fired generators on and off quickly and also hard to even turn them down without compromising efficiency.

But most people don't operate 24x7. Most of us get up in the morning, use energy and go to bed in the evening and sleep. There is a natural variation in our power needs across the 24 hour day. Solar matches that natural demand very well, although not perfectly.

I will ignore wind and geothermal (getting heat from rocks several km under the earth) both of which can obviously operate at night.

However this is where the other type of Solar energy, Solar Thermal can shine (pardon the pun). There are several types of solar thermal power stations, including parabolic troughs, towers and dishes. All of them use mirrors of various shapes and configuration to concentrate the sunshine onto water or oil which is then used to generate steam, drive a turbine and generator. At this point no-one knows which of these will work out to be the best, and more importantly work out to be the cheapest.

It's been shown over the last 20-30 years that solar thermal works very well when the sun is shining. What about night time? The heat from solar thermal can be stored in tanks either as steam or in liquid salts, and then drawn off and used at night time to drive the turbines. The beauty of adding storage is that the electricity produced can actually be cheaper than systems without storage. By needing a smaller turbine and using it for more hours it works out more efficient and cheaper.

Again the Australian contribution to Solar Thermal technology is substantial. Dr David Mills has designed a system using cheap flat mirrors which heat water to produce steam. Last year he moved to the US where he attracted more than \$40M of VC money and built a robotic factory to build the mirrors very cheaply. His company Ausra believes they will be producers of the cheapest solar thermal electricity and will compete with coal, particularly when it has a carbon price, within a decade. I guarantee you will hear more about David Mills.

### **Conclusion**

I have hopefully given you a taste of our community solar project and also why I believe that solar power will play a much larger role in the future than it does today.

To leave on a hopeful note on what can each one of us do when it comes to energy, I suggest

- Buy GreenPower – accredited – 5-6.1c/kWh premium for 100% renewable power. this will encourage the building of renewable power stations
- Solar Hotwater – 34% of the electricity in a typical home
- Energy Audit – \$50 state government program in January 2009 with an energy meter
- Energy Efficiency measures are something we can all do today
- Consider PV Solar Panels, taking advantage of the current subsidies, to help drive the price down for the future.