COMMUNITY POWER HUB LATROBE VALLEY

Planning a Transition

A Renewable-based Energy Future for the Latrobe Valley

PREFACE

Whilst I have spoken on many occasions about the many possible future options for the Latrobe Valley, I have come to believe that there is a need for a document that details how such a transition could occur.

The purpose of this document is therefore to present my vision of how this could come about.

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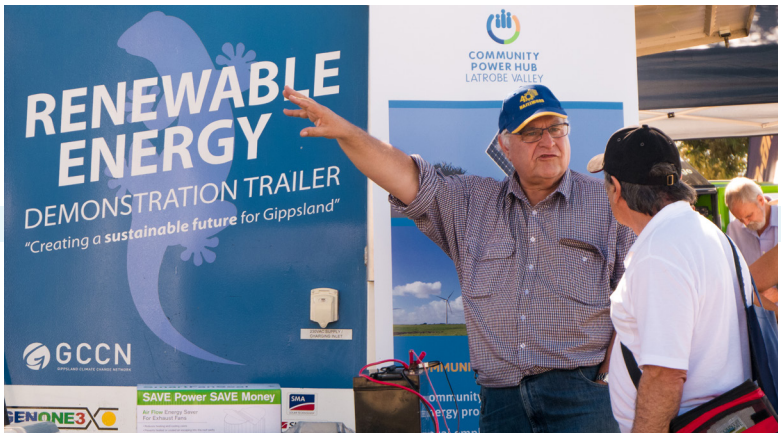
April 2020.

Author

Chris has lived his whole life in the Valley and has worked in all aspects of power generation and mining in the Latrobe Valley for 33 years. He holds a Master of Engineering Science and brings his extensive knowledge of the power industry, project management and business development to the renewable energy sector which he sees utilising the existing transmission facilities here to supply the national grid.



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BACKGROUND

For one hundred years the Latrobe Valley has been a major power source for the state of Victoria. It has drawn on the vast reserves of brown coal which have been burnt in power stations such as Yallourn A, B, C, D & E, Morwell Briquette and Power, Hazelwood, Yallourn W, Loy Yang A and Loy Yang B.

All but the last three have now closed and even these three are aged. A brown coal power station is normally designed for a thirty-year life span, but they are capable of being extended to up to fifty years with some serious refits.

Yallourn W commissioned its first unit in the early 1970s which means that this station is approaching what would normally be expected as its end-of-life period.

Loy Yang A commissioned its first unit in 1984 which means this station has up to about twenty years of life left.

Loy Yang B was commissioned later but it's links to the one mine could be a more limiting factor than the age of the station in this case.

Therefore, it is not unreasonable to assume that should no new stations be built, that the Latrobe Valley will exit brown coal power generation within the next twenty to thirty years simply based on the operating lifespan of the infrastructure. This does not exclude the protentional for a shift away from brown coal sooner for other reasons.

A brown coal station emits more carbon dioxide than a black coal or gas station. These days that is a black mark against its development

WHY NO NEW COAL-POWERED STATIONS?

When the electricity grid was controlled by the state it used brown coal to ensure no reliance on black coal supplies from NSW, which had proven problematic in the past.

However, given the nationalisation of the grid decisions are now made on a federal basis, this is a significant disadvantage for brown coal.

Firstly, a brown coal station is more expensive to build than a black coal one due to the large size of the boiler required.

Secondly, a brown coal station emits more carbon dioxide than a black coal or gas station. These days that is a black mark against its development.

Finally, political interference often means that engineering decisions are overwritten. At present, the major area with swinging voters is in Queensland. Thus, given that political will, cost and emissions favour black coal stations, it is unlikely that further brown coal stations will be developed.

WHAT OPPORTUNITIES DOES THIS OPEN?

The state electricity grid was built around the Latrobe Valley so there are substantial opportunities for large scale grid connections that are not available anywhere else.

As of today, there is capability to connect 3,500 megawatts to the grid from the Latrobe Valley. As other stations close this will expand further.

By comparison, the western parts of Victoria which have been the main point for the establishment of renewable technologies so far have congested the grid to a point where the limitations are now being put on new generators. This will only be fixed once a very expensive upgrade to the interconnector is completed.

This restriction also means that developers are now turning to the Latrobe Valley as an area which will allow development and connection without restriction.

A secondary benefit for such developments here is a large and highly skilled workforce with tremendous experience in generation, transmission, civil engineering, logistics and administration.

Developers are now turning to the Latrobe Valley as an area which will allow development and connection without restriction

THE OBVIOUS OPPORTUNITIES HERE

We have started to see large-scale investors such as Star of the South, which is Australia's first proposed offshore wind farm, however we have also seen the political resistance. Given that the first offshore wind farm was developed in Denmark in 1991, it is strange that thirty years later we are still arguing about our first one.

Offshore wind offers serious potential for the region in terms of construction, operation and maintenance. It is also quite a reasonable, given the wind strength in Bass Strait, to expect that more such wind farms will follow.

OSMI Australia has also proposed a wind farm at Delburn (200 megawatt). This is a novel approach with the turbines planned to be sited inside pine plantations. It also offers opportunities to develop a construction industry for the towers used by the wind farm and a maintenance workforce. Another wind farm is proposed for Alberton.

The manufacturing skills available in the area also attract small business such as Earthworker where hot water services are now being manufactured in Morwell.

Other groups that are developing are specialists in the integration of renewable energy sources into complex business systems such as farms. This group has also started importing small scale wind turbines and building the towers.

Solar is often discounted as a resource here. However, it is interesting to note that Germany has a vast solar farm resource and even the best solar radiation experienced in Germany will always be less than the worst place in Australia for solar. Even on our skin, we can feel the power of the sun's intensity here. Australia has the highest rates of melanoma in the world and it's often referred to as our 'national cancer'.

The grid connection is a strong attractor, and we are seeing this resulting in proposals such as the Hazelwood Solar Farm (70 megawatts), Toongabbie Solar Farm (70 megawatts), Gippsland Energy Park (500 megawatts), as well as in several others.

The effectiveness of solar can also be boosted using another resource that is abundant in the region which is water. Floating solar panels on a water body offers two advantages – first, the cooling from the water increases the output of the solar panel by about 15%, secondly, the floats reduce water loss due to evaporation by up to 30%.

Thus, a water-based solar farm in the region can compete with a land-based solar farm in the northern part of the state.

Such a system called FloatPac Solar has been designed with this in mind and is now being manufactured in Melbourne.

The water-based resources that we have also opened possibilities for pumped hydro systems. For example, the Thomson Dam has the potential to act as a feeder for the dam(s) built in the hills above the dam. One such site could be based just below the Mt Baw Baw ski resort.

As discovered in the review of Snowy Hydro 2.0 the grid connection is a major issue, however under this model, the hydro scheme would be able to connect to the grid at the Yallourn W site.

Australian Paper has also proposed a waste-to-energy plant which will utilise household waste streams from eastern Melbourne. This is an example of continuing the tradition of energy generation with a change of fuel source.

WHAT FURTHER OPPORTUNITIES EXIST?

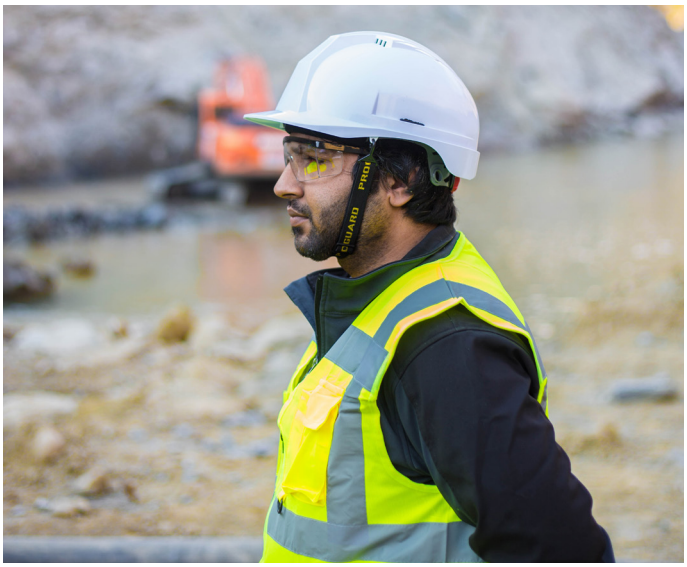
The large layer of coal in the region acts as a blanket for the underlying aquifers and this geothermal resource has not been exploited. To date, it has been tapped by the mines as a necessity to ensure stability and then cooled and disposed to local rivers and creeks.

This water could be accessed at the cost of a small pump and pipeline to build a spa complex which has substantial tourism options.

It is being used commercially for the first time at the new Gippsland Aquatic Centre and Performing Arts Centre which will be using this to heat the water at the pool and the arts buildings.

Most power stations have about a 30% efficiency which means that there is a large amount of (low temperature 40%) waste energy. This provides a potential option to create a substantial horticulture-based industry drawing heat from the existing power stations.

The mines in the region are huge and the substantial land masses available upon closure open another opportunity for bioenergy production and carbon farming.



Land which has been undisturbed by farming can contain up to 15% carbon. Land that has been used extensively for farming can drop its carbon yield to 1%. As such good farming practices offer a substantial way to reduce atmospheric carbon. The extensive lands surrounding the mines offer a potential site to sustainably grow crops that could be used to produce renewable fuels.

One such system that has been proposed is the pyrolysis of biomass to produce several products such as diesel, biochar, graphene and wood vinegar. These high-value products offer a solution to jet fuel replacement, soil improvement and potentially carbon engineering.

Another product that can be grown is a grass species known as miscanthus, which can be used as a biofuel and can act to improve soil carbon.

However, other sources of biomass can be used such as plantation timber or even timber which has been exposed to fire. This option can provide a methodology to recover resources from bushfire affected areas and utilise timber workers that have been displaced by restrictions to logging areas.

Further to this, a fund has been proposed that will amalgamate projects to allow access to large scale investors such as superannuation funds. It is hoped that this can be used to accelerate the projects proposed here.

There is also substantial electricity market expertise that can be developed and able to offer better packages and Power Purchase Agreements to local governments and businesses to again further provide savings and thus competitiveness.

Expertise in power protection systems and grid protection systems will also provide a pathway to long-term employment as new distributed generators come online.

Batteries are a growth area and skills in the integration of these into both home and grid will be an area of demand.

If regulations change then there will be a need for expertise in both microgrids and embedded networks and development of a workforce skilled in their implementation.

Substantial experience in the electricity markets also opens the possibility of developing a group to negotiate better deals with electricity providers.

Chapter 2: The Circular Economy

The Victorian government is committed to the development of the circular economy. This means that there is a need to develop recycling centres that can be used to recover and reprocess products such as metal, cans and plastics.

The Latrobe Valley has experience in the development of chemical processes such as the conversion of brown coal into gas and oil. This expertise provides a resource for new chemical-based industries to draw upon.

Other opportunities include recycling products such as solar panels, which are a growing source of waste. This is also currently being investigated.

RECYCLING & REUSING SOLAR PANELS

Solar panels are designed to last for 25 years however, it is becoming more common that businesses will replace them after ten years. This is increasing the rate at which waste panels enter the market.

Solving this issue is largely political. Firstly, the Small-scale Technology Certificates (STC's) are issued to the location where the panels were installed for the duration of time that remained at the time of installation. For example, if a panel was installed in 2010 it would have received STC's for a twenty-year period. If they are then scraped before this time is up, the greenhouse savings are never realised.

As such, I would propose that the STCs should be assigned to the panel and not the location. This would mean that one of these second-hand panels could still receive ten years of STCs and that the early scrapping of the installation would require repayment of the STCs that were not delivered. Fundamentally this would allow for a free installation. This change would need to be implemented by the Clean Energy Regulator (CER).

The second issue that occurs relates to the Clean Energy Council (CEC). The CEC is responsible for the testing and authorising of new solar panels to their approved list. For this, they receive an annual

payment. This list is used by a number of bodies to ensure that the panels to be installed are safe.

However, once a panel is obsolete or discontinued the manufacturer ceases the annual payment and the item is removed from the approved list. Thus, almost all second-hand panels will not be shown as being fit to install.

I propose that the CEC should maintain an obsolete list showing panels that have been tested as fit to use but are no longer current. This should also show any new restrictions introduced e.g. for those without a current fire rating - only available for use in solar farms, off-grid or on a non-habitable structure.

This would make the approval of used systems much simpler and cheaper. This could also be used to provide solar cheaper to a large range of social housing.

Recycling is being investigated by a number of groups but at this time, it generally consists of recovery of the aluminium frames.

HYDROGEN

Hydrogen is considered to be a potential fuel of the future. At present, it is being investigated locally using brown coal. By reacting coal with oxygen and steam under high pressures and temperatures, a synthesis gas is formed that is a mixture primarily made up of carbon monoxide and hydrogen.

This project is providing substantial information about the handling, storing and shipping of hydrogen. This project is also linked to the development of Carbon Capture and Storage which has been proposed as another potential industry for this region.

On a large-scale, hydrogen can be used for smelting and reduction of steel. This opens the concept of 'make it and burn it', which avoids the complications of compression and storage

Hydrogen has potential as a fuel for larger vehicles such as trucks, ships and trains. It can also be blended into the gas grid at a rate of about 10%. Higher rates are possible but require better piping and changes to burners.

On a large-scale, hydrogen can be used for smelting and reduction of steel. This opens the concept of 'make it and burn it', which avoids the complications of compression and storage. Australian Paper is a major user of gas and this may be an option worth further investigation.

THE ROLE OF GREEN POWER

As Australia does not have a carbon tax it is sometimes difficult to appreciate the value that this places on products in markets that do have one.

As a result, many resources refined or created using renewable energy can attract a premium price in a European market. As a result, as more green energy passes through the grid nodes of the Latrobe Valley local manufacture, refining and smelting aimed at the European market will become more attractive.

As more renewable energy passes through the grid at the Latrobe Valley it opens the potential for the production of green hydrogen using unwanted off-peak or cheap midday renewable power.

Hydrogen was previously made at several power stations and as such local experience is available if green hydrogen, is to be explored further. Green hydrogen being produced by the electrolysis of water (breaking H2O, into its component elements of hydrogen and oxygen). If the electricity used is itself produced by a renewable source (e.g. Solar PV or a wind turbine), the clean hydrogen produced is known as green hydrogen.

OFF-PEAK ENERGY

Renewable energy is often criticised about energy not being available when the sun 'don't shine and the wind don't blow'. However, there is a corollary to this and that relates to what do you do when power is being produced but it is unwanted?

This is where there is a need for energy storage. This can be pumped hydro, battery, gravity or potentially converting to another fuel such as hydrogen.

ELECTRIFICATION OF TRANSPORT

Over the next few years, electric vehicles will become more commonplace. They have a natural advantage in that there are substantially fewer moving parts and thus reduced maintenance costs.

This transition will require significant retraining or new staff familiar with electrical concepts rather than mechanical ones. Already it is becoming more commonplace that the salespeople for electric vehicles will also be offering home solar installs, batteries and charging points. This may also include being able to use the battery of the vehicle to power your home.

This is a major point that has the potential to significantly change the nature of firming needed in the grid. Most vehicle batteries will be at least 40kWh compared to a Tesla Powerwall which is 15 KWh. This means that an average car will have enough power to run an average household for two days.

This has serious implications in terms of demand for charging. Given that most will want to draw from their battery in the evening and early morning, it is reasonable to expect that there will a large demand for charging during daylight hours, as well as during off-peak overnight. This has the potential to address what is currently known as the duck curve where power prices are depressed due to oversupply due to solar generation in daylight hours.

The release of Tesla's new electric trucks will also have a significant impact as it will change the economics of haulage. This is an opportunity we should be prepared for with service agents and rapid charging points.

This may also include being able to use the battery of the vehicle to power your home

ENERGY EFFICIENCY

Energy efficiency is a major opportunity for development. This has great potential to reduce costs to homeowners or renters and to offer a more competitive advantage to business. One local small business has been created to provide such a service within Gippsland.

There is an opportunity to create a new industry in

There is an opportunity to create a new industry in relation to energy efficiency in homes

relation to energy efficiency in homes. In Victoria, no homes are subject to audits to verify that they have been constructed to the design approved and there is no system to provide this information about a home being sold.

This discourages investment in home retrofits. Some market forces are growing such as Bank Australia's low-interest loans for those with an energy-efficient home. But government regulation would create a new industry and a progressive increase in housing efficiency standards.

SHARED ENERGY

In this I am referring to microgrids, solar gardens, community batteries and other forms of solar sharing.

For a long time, there has been interest in the concept of sharing energy either generated or stored. However, this has been a point of difficulty for regulators from the introduction of rooftop solar.

In the Netherlands, someone was not happy with their feed-in tariffs and so started to sell power to a neighbour by an extension cable over the fence. This led to the aptly named "Over the Fence" bill which outlaws such direct sales.

A similar situation applies in Australia. In Gippsland, the 'poles and wires' are owned and maintained by Ausnet. One of the payments they receive is what is known as DUOS and TUOS. TUOS is the charge for moving electricity over the transmission systems – it stands for Transmission Use of Service. DUOS is the charge for moving electricity over the distribution systems – it stands for Distribution Use of Service. What this means is that generators are charged every time power crosses a title boundary. Thus, a homeowner could, in theory, sell to their neighbour but the price would be inflated by the application of DUOS and TUOS charges. As a rule, these can be about $0.14 per kilowatt.

This has major consequences in the idea of sharing power and batteries. For example, if these charges are levied when power is put in a communal battery and then again when it is drawn from that battery, a cost of $0.28 per kilowatt has been charged. This would be more than most current tariffs making the concept uneconomical.

Selling to your neighbour would incur the $0.14 cost plus a payment to yourself – usually a minimum of $0.07 making a total of $0.21 per kilowatt. However, this is stumped by one single fact – it is illegal.

Selling to a customer requires a retail licence these are difficult to obtain and very expensive - you need a minimum of $4 million to get such a licence.

There have been some changes with Powercor offering a reduced TUOS charge to a community which was moving power within a defined area. There is also one exception to this rule where a property has multiple buildings on a single title. In this case, what is known as an embedded network could be established. However, having an embedded network has the potential to restrict the choice of energy supplier and therefore not provide the best value outcome. This is currently being reviewed by the Victorian Government and as such groups are discouraged from implementing these until the review is finalised.

REGENERATIVE AGRICULTURE & DRAWDOWN

Every system comprises of more than just one part. Renewable energy reduces the emissions compared to fossil fuel-generated energy which slows the rate at which carbon dioxide increases in the atmosphere. However, to reach a point of drawdown of carbon as soon as possible the removal of carbon already in the atmosphere is also needed.

The easiest way to achieve this is to change farming practices to improve the carbon holding in the soil. Soil which has not been disturbed can hold up to 15% carbon. Soils that have been degraded by constant overuse can reduce to 1% carbon.

By recovering degenerated land using a combination of science and regenerative farming practices carbon capacity can be rapidly increased which also improves water holding and production capacity with less need for fertilisers.

To reach a point of drawdown of carbon as soon as possible the removal of carbon already in the atmosphere is also needed

If used to farm energy-based crops such as miscanthus and hemp, we can achieve both carbon reduction per kilowatt and carbon capture in the soil.

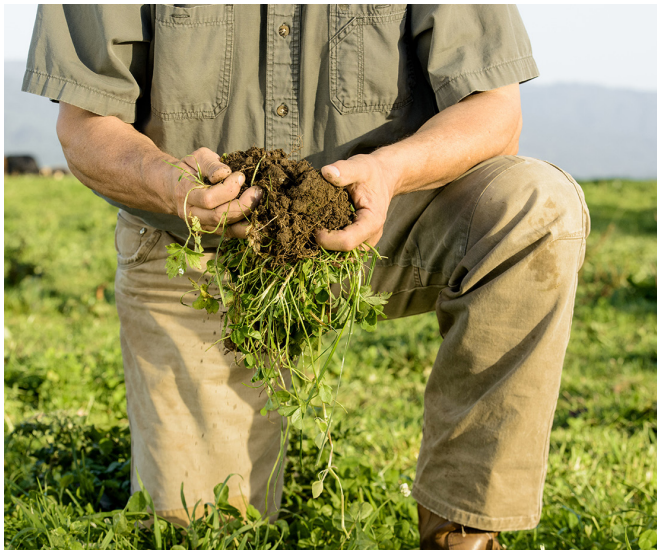
Waste products such as manures can also be used to produce methane which can be used as a source of heat or energy.

Moving forwards there is a need to encourage a different form of agriculture that also includes the incorporation of trees and browsing shrubs into what is normally a bare paddock. This introduces a variety to feedstock and increases soil carbon.

SEWERAGE

The Gippsland Water Factory and the Bairnsdale Water Treatment Plant currently use sewerage as a feedstock for the production of methane which is burnt to produce electricity. This type of innovation should be adopted and expanded throughout the region.

Similar types of systems are also appropriate at other areas that produce biological waste such as slaughterhouses and processing plants.



Chapter 3: Funding These Changes

These projects will cost millions of dollars and accessing such amounts remains problematic.

Superannuation funds are not interested in projects less than $100 million. Banks have reluctance in dealing with community energy as there is little precedence. No set class for this type of lending has been defined.

This can be solved by the aggregation of projects allowing access to more potential funders.
One example, Generate Capital in the USA, has raised billions of dollars for renewable energy investments. A similar model has been proposed in Victoria and has been presented to several government bodies for seed funding.

With interest rates at an all-time low and the volatility in the share market investment in renewable projects and infrastructure should be very appealing.

THE NEED FOR REAL-WORLD CASE STUDIES

Whilst paper-based studies offer knowledge they are less accepted in industry than a real-world example which shares data and cost savings.

For example, in Victoria many pools are heated using gas. These can often be replaced by heat pumps with a return on investment of about three years. Being electric the costs of operation can be further reduced by combination with solar panels.

However, there is no publicly available case study done by a council that is available to other potential clients.

It is also important to note that the case study needs to be in a relevant industry. For example, councils talk to councils thus for a pool project it ideally must be done by a council.

COMMUNITY ENERGY

As proven by the success of the Latrobe Valley Community Power Hub, there is a great opportunity to develop and encourage others to undertake community energy projects throughout Gippsland.

The role of the Power Hub was to work with community groups to design, develop, fund and implement community energy projects.

It is important to note that the role of the Hub was not to do the project but rather to guide the group to a successful end.

In Denmark, a system exists which provides an education service to train groups in the processes associated with community energy. This may be a model that could be adopted in the future.

Chapter 4: The Transition

COULD WE SHUT DOWN THE BROWN COAL STATIONS EARLIER?

The grid is a very complicated beast. It is required to deliver power on demand in constantly changing circumstances. It integrates many different power sources and juggles a payment system to all.

Standalone renewables can be affected by weather changes and so these new systems need to be backed by firming measures such as batteries and hydro. If these are not options, then renewables can be firmed by gas-peaking plants.

The point is a solution will need all of these as to be integrated moving forwards.

Rapidly removing large scale brown coal power generation without building this response has the potential to lead to the collapse of the grid and an unreliable power supply. As such the closure of these stations must be done progressively and ideally aligned with the commissioning of new sources of energy.

It should also be mentioned that the grid itself will evolve as distributed energy becomes more common. It is feasible to imagine that many remote towns will eventually become independent of the grid, and even many not so remote households.

New interconnectors between states will also likely be introduced allowing more connection and sharing of resources. All of this will make towns more robust and increase the opportunity to maximise the use of energy when available.

One such example would be to connect large solar farms in Western Australia to the eastern sea-board providing a way to meet the evening peak with solar energy.

WHAT DO WE DO WITH THEM ONCE THEY ARE CLOSED?

This is becoming more of an issue as people and governments grapple with the issue of mine and station rehabilitation. This is often complex as the age of a power station means that products now considered toxic were commonplace. These can include asbestos, hexavalent chrome-based refractory, chemicals and many others. This can also be further complicated by the presence of ash dumps and collection pits.

In the mines, the issues often relate to stability and potential fire risk. This is ideally addressed by the filling of the mine void with earth, but given the volume required and the cost, companies often prefer to use water. This is not without risk and other environmental issues including large-scale water use, rehydration of aquifers and the potential for stagnation due to low throughflow.

However, the vast volume of water surface that will be available when a mine is filled offers ideal sites for megawatt-scale floating solar. Secondly, the height from the mine floor to the surface has potential for gravitational based energy storage systems. These can be vertical or using the inclines of the roads for a regenerative braking system. Again, the size of the mines makes this have potential at a large scale.

The circular, terraced structures also offer the potential for concentrated thermal solar directed back to towers which can store heat in mediums such as molten salt which can be used to operate steam-based turbines.

The large concrete slabs used by power stations and conveyors could also house energy vaults (vertical block stacking systems used as battery systems). The landmasses can be used to produce energy-based crops that can be converted into power or fuels.

This availability of land is also a potential site for large scale industry needed access to the services and grid connection that were used by the power stations. These could be used to develop heavy industries producing products using the green power from the newer power producers.

It is also likely that some aquifers will still be pumped and as such, this means that the options for spa and plant propagation will remain.

HOW DOES THE WORKFORCE TRANSITION?

Over my time in the Latrobe Valley I have experienced three types of transition. These I classify as 'Horrid', 'Fair' and 'Just'.

A 'Horrid Transition' is basically when a large business is forced to close or experience substantial retrenchments in a short period of time. This is often done without any assistance to the workers.

This happened in the mid-1990s when prior to privatisation, 6,000 of the 10,000 strong workforce of the State Electricity Commission of Victoria (SECV) was offered voluntary departure packages. Analysts often assume a 3:1 flow on ratio meaning that the community would suffer the effects of an equivalent 24,000 job losses. This was in a community of 70,000.

The result was catastrophically high unemployment which was further compounded by the economic conditions at the time.

House prices plummeted and moving was not an option for many. Taking on a new long-term mortgage was not attractive to many older workers. No assistance was offered, and the community suffered intense pain for more than ten years. This is the type of transition that must be avoided at all costs.

A 'Just Transition' is often touted as the ideal but it is also the most difficult to achieve

The result was catastrophically high unemployment which was further compounded by the economic conditions at the time (18% interest rate on home loans, the collapse of Pyramid Building Society etc). House prices plummeted and moving was not an option as it was impossible to get a reasonable price for your assets here. Taking on a new long-term mortgage was not attractive to many older workers.

No assistance was offered, and the community suffered intense pain for more than ten years. This is the type of transition that must be avoided at all costs.

A 'Fair Transition' is a mid-ground option and is how I would class the efforts made after the closure of Hazelwood. In this scenario, support is provided, and workers assisted to find new jobs in the region.

Industries are encouraged to further develop the region and employ workers. Under such a scenario within two years most Hazelwood workers were absorbed back into the workforce. However, there is a problem with this model. In this scenario, the job that the worker moves to will not necessarily be of the same status or even pay scale under which they were employed. This has impacts on the wider community as it reduces the disposable income affecting local businesses for the long-term.

A 'Just Transition' is often touted as the ideal but it is also the most difficult to achieve. I interpret this as meaning that the worker moves to an equivalent position maintaining their wages and conditions. For this to occur there need to be business of equivalent size and turnover with a plan for major expansion or a substantial shortfall in staff. Such a situation rarely happens naturally and usually is instigated by significant investment leading up to the need for transition.

As such whilst preferable this will only be achieved with substantial planning and implementation over a long-term.

WORKING WITH THE COMMUNITY

Australians are renowned for two traits; one is a fighting spirit and the other is mateship.

It is very important to recognise this dealing with this community. When confronted, as happened with the carbon tax under Julia Gillard, the whole community will rise against and unite against it. You must remember you are upsetting a hundred years of history and continuous employment.

Mateship is a different strategy. Here we approach with a common problem. For example, we all know the power stations are getting older and no one is building more, so we should work together to build renewable energy systems so that you and your kids have a different place to work.

This is a much better received message here and this brings me to the next point – actions speak louder than words.

The introduction of new technologies needs to be done in a way that does not threaten, instead, it should be used as means educate and encourage adoption of the technology. Indeed, in an ideal world I would welcome the idea of working with our major power companies to deliver a range of projects that can be used to build experience and train their workforce to assist when transition occurs.

Small projects may be seen to be of negligible value, but it is far from the case. As seen from our work within the Latrobe Valley Community Power Hub, Rotary Centenary House is supported by fifty Rotary Clubs - thus a small project gains a wide audience. The Licola Wilderness Village was only thought to be of interest to its members but instead, it hit the national news and is awakening interest in off-grid options from other similar groups. A solar pathway in Yinnar is now inspiring other towns to do the same in parks without reticulated power.

Another element to this is awareness vs action. Awareness can be good if it is aimed at decision makers such as politicians and high-level public servants. However, when it disrupts the general public, the backlash can often be negative.

Action, on the other hand, can inspire the general public to join in and participate in making their environment better. In the campaigns I have run this is my preferred strategy as it creates a positive energy around the process.

TIMEFRAMES – SEQUENCING THE CHANGE

This table is indicative as to when some of these plans could be implemented.

It is important to note that many of these things can be achieved immediately and is not subject to government changes in policy or closures of existing plants. The main hold up is the negotiation with the current generators to develop an interest in the opportunities presented in a way that does not jeopardise security or increase risk.

Opportunity	Product	Timeline
Co-location with existing power stations to use waste heat	Significant opportunity for flower, fruit and vegetable growth in an enclosed environment	Available for immediate implementation and opportunity will remain for the life of the power station
Co-location with existing mine geothermal pumping	Potential for development of spa or tourist resorts using existing bore water supply	Available for immediate implementation and opportunity will remain for the life of the mine
Recycling solar panels	Panels for reuse and resource recovery	Under investigation
Energy Efficiency	House retrofits	Now available – larger skill base needs to be developed
Carbon Capture & Storage	Carbon offset	Under investigation
Coal to Hydrogen	Hydrogen supply to Japan	Pilot plant being built
Funding for RE	Grant application	2020
EV charging	Rapid charging and maintenance	Start 2020
Community Energy	Training	2020/2021 subject to finance
Training	Maritime, Wind turbine maintenance, solar farm installation and maintenance, grid protections systems, domestic solar and battery installs	Starting 2021
Hazelwood Solar Farm	Solar/Battery	Start 2021
Toongabbie Solar Farm	Solar/battery	2021
Maffra Solar Farm	Solar Energy	Start 2021
Vegetables	Co-location with brown coal	Estimated 2021
Tourism	Spa resorts	Estimated 2021
Thomson Pumped Hydro	Feasibility study	Estimated 2021
Wind	Delburn wind farm	Estimated 2022
Bioenergy	Diesel/Biochar/Revised farming	Estimated 2022
Gippsland Energy Park	Solar/Battery	Estimated 2023
Offshore wind	Star of the South	Start 2025
Yallourn W	Closure	2025 - 2030
Recovery of metals using green energy	Magnesium, aluminium, tin	2025 onwards
Green hydrogen	With connection of more renewable projects there will be review potential	2027
Marinus	Second link to Tasmania	2030
Loy Yang A & B	Closure	2040 - 2050

Chapter 5: Conclusion

The Latrobe Valley has been a fading force in the power industry for many years however, the adoption of renewables has the potential to open a new chapter.

Brown coal could be with us for another twenty years and it will always be a part of our heritage, but it is not our future.

Right now, we have the opportunity to make these changes on our terms. We need to embrace it and to start planning for it so that current coal-based workers can be transitioned, and our children trained to provide the services needed for these future industries.

This is the time for change. This is the time to accept and acknowledge the past but also to embrace the future. The only thing holding us back is ourselves.