

# LATROBE VALLEY PREFABRICATED ENERGY EFFICIENT BUILDINGS

Discussion paper (draft 1, 7 Aug 2015)

## BACKGROUND

Latrobe Valley has supplied cheap power to Victoria for many decades, and allowed the state to prosper, particularly in manufacturing. However the area by comparison has not received huge benefit. Major injections of employment and government investment eg ASIC have been small by comparison with the wealth created. Many of the recent multimillion dollar government grants have been directed to development and research of coal, in the face of the growing evidence of climate change and the development of a global climate budget whereby most of the known reserves of coal must be left in the ground.

Major transitions such as the demolition of Yallourn and privatisation of the SEC have resulted in community dislocation and distress. The higher education system (TAFE, university) has been damaged by recent budget cutbacks and struggling to reassert itself and retain young people in the area.

Morwell in particular has struggled to recover from privatisation. It is amongst the top 5 postcodes for social disadvantage in Australia. Property prices have fallen 9.9% in the last year according the Real Estate Institute of Victoria. The majority of Latrobe Valley 'ice' related drug crime is dealt with at the Morwell Police Station.

Latrobe Valley and Morwell in particular needs forward planning to deal with the looming crisis of decreasing power station productivity, moving towards closure of the mines and rehabilitation. It seems negligent if such planning is left until power stations are closing.

This is the reason why I am forwarding the following concept, for consideration as part of a transition program.

## CONCEPT

Prefabricated sustainable buildings, primarily housing, flatpack in shipping containers for Australia-wide quick distribution by rail, avoiding long hauls by truck.

It is envisioned that this will primarily be insulated panels (including cross laminated timber) incorporating channels for plumbing and electrical wiring. Panels can be used as walls, ceilings or floors and should be suitable for concrete slab or stump construction; flat or hipped roofs.

Design will include solar capacity for heating, cooling and hot water and storage water tanks as standard. Locally made cabinetry (kitchen, bathroom and built-in robes/cupboards) to be included.

## Why

- LV needs a new source of jobs and economic stability
- Message from Port Augusta is to start planning as soon as possible. On 30 July 2015 Alinta announced that the mothballed Playford B and fire damaged Northern Power Station would close as early as March 2016. With the cessation of mining at Leigh Creek, 400 workers and miners will be unemployed
- LV has technical skills, research capability, labour force
- LV needs to expand local training for retention of young people
- Housing is an ongoing, expanding need, both private and social.
- Owning your own home has become unaffordable for many young people. Mass produced houses should enable more affordable homes.
- Prefabricated housing is common overseas (eg 70% Sweden), but undeveloped in Australia (about 3%). In 2004 the UK Housing Corporation target of at least 25% of new social housing to be built using modern methods of construction which gave a significant boost to prefabricated housing.
- Opportunity to be the first large scale producer.
- Develop new innovation and design
- Prefabricated housing currently in Australia seems to be individual high end design and therefore not available to average purchaser
- Develop housing for Aust 100,000 homeless, improved social housing for better health
- Develop ecovillage on western edge of Morwell or alternatively a medium density development on Commercial Road Primary School after the new school is built. Consideration could also be given to creating a tertiary student village
- Assist long term climate change solutions in efficient housing
- Adaptable to commercial buildings, nursing homes, motels etc
- Create focus for govt assistance in transition: multimillion dollar setup
- Business case for Gippsland Logistic Precinct development
- Expand business of current building manufacture components
- Create new ventures and agriculture (insulation materials, forestry, fly ash use)

## How

- Develop industrial park around Gippsland Logistic Precinct at eastern edge of Morwell
- Develop Gippsland Logistic Precinct to receive, store, redistribute and ship components and finished product
- Investigate use of large unoccupied industrial sites
- Plan overseeing body eg LV building corp
- Plan the industrial park for efficiency of operation and energy supply from rooftop solar and pyrolysis, or a community energy hub
- Allow private enterprise input
- RMIT, Melb Uni for efficient design of building panels and range of houseplans.
- Refer to South Australia's experience of the Australian Living Laboratory, where the S.A. government has partnered with The South Australian Government has announced a partnership with the [Cooperative Research Centre for Low Carbon Living](#) (CRCLCL) and the [University of South Australia](#) (UniSA) to develop the Adelaide Living Laboratory (ALL) program.

## CLIMATE CHANGE & SUSTAINABLE ENERGY EFFICIENT BUILDINGS

Global opinion has acknowledged the effect of increasing greenhouse gases in the atmosphere, and the need to rapidly reduce CO<sub>2</sub> emissions to avoid a greater than 2 degree rise in temperature.

United Nations Secretary-General Ban Ki-moon has urged representatives from more than 150 countries to act quickly on climate change. Juan Somavia, the head of the Geneva-based International Labour Organization (ILO), outlined his organization's plan for a new "[Green Jobs Initiative](#)." Somavia noted that "Investments in energy efficiency, clean energy technology, and in renewable energy have enormous potential to create productive and decent work."

Globally the building sector consumes more energy (34%) than the industry sector (28%) and transport sector (27%), occurring during the sourcing and construction phases, design, operation and demolition stages. It is also the biggest source of GHG pollution, and has huge potential for significant cuts at little or no cost. Precision factory produced buildings will be better sealed and allow easier building research, development and implementation. Production costs would be reduced due to factory assembly rather than on-site construction of each building.

UK studies show savings of 10-15% in building costs and 40% in transport costs compared to on-site construction. It is also possible to have good building-waste recycling systems within the factory. In Japan, 15% of residential buildings are modular green buildings produced in the most technologically advanced factories<sup>(1)</sup>

It is estimated that housing produces about 40% of Australia's current emissions. This can be reduced by better construction methods and materials, insulation, better sealed housing, energy efficient appliances, natural lighting, skylights, LED lighting and domestic energy production and storage. Retrofitting can have high upfront costs and in the case of poorly constructed social housing, it may more cost effective to demolish and rebuild.

Energy efficient buildings can be achieved with proper orientation, insulated walls, ceilings and floors, double glazed windows, natural lighting, skylights and solar tubes, shading, thermal mass and reflective roofs. In addition power use can be decreased using LED lighting, motion sensors, power monitoring and passive ventilation. Solar panels, evacuated tube or heat pump hot water systems could be standard design. HRV heating, reserve cycle cooling and heating, energy storage, water storage and recycling could be optional extras. Components eg double glazing would become standard as in Europe.

The development of an industrial hub offers the opportunity of community energy production via rooftop solar and possibly pyrolysis using organic waste from forestry, urban tree felling/trimming, sawmill and woodworking offcuts etc. This reduces the carbon footprint and ongoing expense of operation.

Houses will be intended to use electricity only ie gas not required.

## **HOUSING**

Much of Australia's housing has been described as a leaky envelope compared to European housing. Energy efficient housing built to NABERS 7-8 rating results in less of a household budget being spent on power (electricity and gas) and being more comfortable to live in. Properly constructed and sealed buildings can largely reduce or eliminate the reliance on coal-fired power. The basic design of the prefabricated housing should be flexible enough to be used in many types of buildings.

The advantage of prefabrication is that houses are constructed much more than quickly and precisely than on-site build, and clients will be able to occupy their house much sooner than on-site build.

Private house companies and builders could offer several plans with various grades of finishes to accommodate clients' aspirations and budgets.

Social housing could be a variety of smaller homes, units, 2-3 storey developments etc. Energy efficient housing should result in better health, more money for healthy food and improved ability to provide education expenses for children. The least healthy housing situation is no shelter at all.

## **COMMERCIAL BUILDINGS**

Energy efficient design could be used for aged care residential developments, schools, offices, prisons etc, any building where it is an advantage to provide a comfortable environment and reduce running costs at the same time. The basic construction panels will allow for flexibility of building plan and be quicker to erect and fit out. With inbuilt solar, feed-in tariff could be a revenue source.

**ECOVILLAGE** as demonstration of what the future may look like.

There are many derelict and poorly used buildings at western entrance to Morwell and presents a poor image of the town. This area is on bus routes, walking distance to CBD, train and bus stations and primary schools, and in an area of average housing. It could be redeveloped as an ecovillage incorporating sustainable housing (social rental and private purchase) with community meeting place (eg neighbourhood house) and facilities, playground, and community garden offering opportunity to grow vegetables and increase exercise and social interaction. As well as improving the variety of low cost housing the government could demonstrate how it is able to improve its social planning, including carbon reduction as per RET and VRET.

The same principles could be applied to land currently occupied by Commercial Rd Primary School, which is soon to be amalgamated into a newly built Morwell Primary School. There is also the opportunity for similar development of tertiary student housing in Traralgon.

The South Australian Govt has already in an experimental development at Lochiel Park. See Adelaide Living Laboratory program.

## **GOVERNMENT**

Community concern about global warming is increasing and action is happening, from renewable energy targets by govt to installation of solar panels by over 1.3 million households in Australia, including 20% in Victoria (2). Part of the solution to reduce GHG is tightening and implementing the National Construction Code.

This should also include making mandatory an energy rating on property listed for sale.

As Latrobe Valley is a coal based economy, it is very vulnerable to further economic disruption, as happened with the privatisation of SEC. Governments are aware that assistance will be required, and development of a prefabricated sustainable building industry provides a logical investment opportunity, in amongst other opportunities which hopefully will arise.

There are over 100,000 homeless people in Australia and a lengthy wait for those on social housing waiting lists. In July 2014, there were 225,000 people on social housing waiting lists throughout Australia. Additionally much of the current social housing is of poor inefficient standard. The government could use its assumed future investment in LV to order new social housing stock from the project, giving baseline security of turnover. As above (see Ecovillage) the government will have the opportunity to demonstrate a new approach to housing low socioeconomic groups and encourage development of community and better health.

This hopefully will result in lower healthcare costs, fewer essential service disconnections, more cash in the family budget and development of community connection.

Past governments have offered around \$10 million for development of the Gippsland Logistic Precinct. Has this not occurred because there has not been enough businesses requiring the service? There is sufficient land in the vicinity of the Gippsland Logistic Precinct for development. The plan could incorporate a storage and warehousing facility to accommodate the needs of the industrial hub. Part of this plan is to use rail to transport buildings across Australia, avoiding fuel emissions and road congestion of trucks.

This will also provide further justification for building a extra track/passing lines on the Dandenong rail line, which is Melbourne's most congested. Currently the Gippsland service is V/Line's most unreliable, as trains get stuck behind Metro trains. Train patronage is expected to increase as the housing corridor to Warragul expands.

## **LATROBE VALLEY**

LV desperately needs new industries and job creating opportunities to allow the economy to move away reliance on coal based jobs. Planning for this transition is urgent to avoid a more disasterous repeat of the privatisation experience.

The Hazelwood Mine Fire Inquiry is investigating recommendations for rehabilitation of the three large mines in the area. Mine rehabilitation cannot be viewed in isolation from whole Latrobe Valley area as alternative employment must be available as mines close prior to rehabilitation.

Diverse development is desirable but a start needs to be made on a practical project.

There is a variety of skills available locally eg engineering, electrical, technical, power generation, forestry, education, transport, building, administration, research.

Latrobe City Council's Wood Encouragement Policy (14POL-1) <sup>(3)</sup> aims to stimulate sustainable economic development within the Gippsland timber and wood products industry and encourage value adding products within the timber industry, to align opportunities for state and federal funding and promote the industry as a renewable resource, capturing the environmental benefits of forestry for the area. Cross ply panels and pyrolysis energy generation fit with this policy.

Australia Paper is struggling to be viable. If this business should fail, the economic effect will be severe, and a use will need to be found for the many plantations which currently supply the paper mill.

## **BUSINESS**

This could be an expansion opportunity for existing businesses who chose to be involved. Housing companies could offer a prefabricated energy efficient house, ready to occupy in a short time compared to several months on-site construction.

Component manufacturers such as window manufacturers and cabinet makers could have contracted work and may wish to be part of the industrial park.

There is efficiencies of labour in having construction planned and trades working in sequenced order, uninterrupted by weather, rather than tradesmen travelling to each building site and having components delivered to each building site.

A local team of mobile construction workers should be available to accompany and assemble the buildings at its destination to ensure proper integrity. Some road transport will be required.

The manufactured panels could also be used in renovation and extension of buildings.

New businesses will probably arise eg.

- EarthWorker hot water services would relocate if their product was an optional extra.
- Plantation timber for construction and cabinetry. Carbon credits should be applicable.
- Cross ply/cross laminated panels. See National Construction Code which allows timber up to 3 storeys eg Docklands library. Changes to this code are proposed.
- Fly ash to be used in concrete, to reduce GHG footprint and embodied energy. Latrobe Magnesium Limited signed an ash supply contract with GDF Suez in July 2015, to produce 40,000 tonnes of magnesium per annum to be used in cement, directly employing up to 150 people. <sup>(5)</sup>
- Pyrolysis units to make use of wood waste.
- Production of biochar fertiliser as pyrolysis byproduct (ask Brendan Clarke of Drop and Leave tree services)

## POWER STATIONS

- Power stations will change their business model and seek other opportunities eg rooftop solar installations and battery storage, and community energy projects such as the SunPower/Sunverge projects in Queensland which have received \$400,000 funding from Australian Renewable Energy Agency (ARENA)
- They will wish to be seen as addressing carbon issues eg by offsets
- They will feel an obligation to assist workers to find alternative employment
- AGL sees themselves as a corporate citizen here for a long time, in addition to being a coal fired power generator, as stated by Andrew Vesey, on Gippsland FM 104.7 on Sat 1 August, morning program.
- Byproduct of coal burning - fly ash can be used offsite of the power station sites, avoiding a storage and disposal problem, and producing income.

## BODIES WHICH COULD BE INTERESTED

Advance Morwell

Building companies eg DiFabrizio

Committee for Gippsland

Community support groups

St Vincents

Salvation Army

Qunatum

Berry Street

Dept Health Housing Services (federal), DHS (state)

Environmental groups

Environment Victoria

Latrobe Valley Sustainability Group

Education and research bodies

BZE (Beyond Zero Emissions)

Federation Training

Federation University

RMIT through ReActivate and Prof Rosalea Monacella

University of Melbourne\*

Gippsland Water

HIA

Housing companies eg Metricon

HVP

Keil Industries

Latrobe City Council

Latrobe Magnesium Limited

Local mills and wood users eg Fishers pallets

Political parties

Regional Development Victoria

Traralgon Cement Works

Unions

CFMEU

ETU

GTLC

Vic Rail

Voices of the Valley advocacy group

## EDUCATION

Research in building design, components and equipment (esp. robotic) to be conducted  
RMIT urban design involvement through the ReActivate project

TAFE and Fed. Uni could be involved

Trainee and apprentice positions would enable young people to be retained in the local area.

Entry level jobs for school leavers

## RESEARCH

University of Melbourne has recently launched its Australian Research Council Training Centre for Advanced Manufacture in Prefabricated Housing. It has received \$4 million in funding for 14 PhD and 6 postdoctoral positions, working under the guidance of Prof. Priyan Mendis and Dr Tuan Ngo. See [unimelb.edu.au](http://unimelb.edu.au)

University of Melbourne Energy Research Institute and Beyond Zero Emissions (BZE) have produced The Zero Carbon Energy Buildings Plan which demonstrates that there are no technical barriers to zero carbon emissions buildings in Australia <sup>(4)</sup>.

7.

"This report does not aim to make individual buildings energy self-sufficient (i.e. zero net energy consumption) as each building is planned to be connect to a 100% renewable energy grid as outlined in the ZCA Stationary Energy Plan. However, it identifies the maximum feasible contribution from distributed onsite electricity generation using solar photovoltaic technology and some small wind turbines.

The Buildings Plan comprises of the following components:

1. The most comprehensive compilation and assessment of all categories of Australia's existing building stock across all climate zones.
2. Review of multiple case studies of successful building retrofits and characterise energy savings, cost and efficacy of each method applied.
3. Review and judgement of commercially available technologies and methods for achieving energy efficiencies and for onsite heat and electricity generation.
4. Proposed viable blueprint for energy efficient retrofits on each building sub-category in each climate zone.
5. Quantification of required resources to implement plan and capacity to roll out process, including timeline.
6. Estimated investment costs and expected savings from implementing the Buildings Plan"



## CONCLUSIONS

There is an urgent need to commence planning for diversification of the economy of the Latrobe Valley as change may be forced upon us sooner than expected. The experience of late 1990's privatisation of the electricity industry was socially and economically disruptive and there has not been full recovery. Just recently Morwell was named as being amongst the fifth most disadvantaged postcodes in Australia, unchanged from a survey 13 years earlier. Cheap electricity from Latrobe Valley has greatly benefitted Victoria and it now time for governments to support the valley in the transition to a prosperous future.

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- (1) Prefab revolution? Factory houses are the secret to a green building. Karen Manley <http://reneweconomy.com.au/2015>
- (2) Clean Energy Council of Australia
- (3) Latrobe City Council's Wood Encouragement Policy (14POL-1)
- (4) The Zero Carbon Australia (ZCA) Buildings Plan <https://bze.org.au/download-zero-carbon-australia-building-plan>
- (5) Latrobe Valley Express, 6 August 2015