



Briefing: Renewable Energy Storage - Batteries

Overview

Purpose To address the rising economic and ecological potential of storing renewable energy in batteries - thereby increasing resiliency and lessening energy dependency and exposure to inflating energy prices.

Audience

- Elected Members, Council Executive and Ratepayers
- All regional/rural Councils

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References South Australian Electricity Report – AEMO - 2012
CSIRO Smart Grid Report - March 2010
National Electricity Market – Aust. Energy Regulator - 2011
Hawaiian Sunblock – Institute for Local Self Reliance – Jul 2012

Council Community Plan 2022 Objective 1- A strong economy & supportive business environment via these strategies:

- 1.1 Support an increase in appropriate business investment and employment opportunities.
- 1.2 Promote VH’s competitive advantages to encourage new business and industries
- 1.3 Plan for an improved range of and access to services
- 1.4 Encourage improved reputation and business climate
- 1.5 Support business linkages through partnerships and collaboration
- 1.13 Advocate expanded options to access higher education and skills development.



Background

Description	With 230,000 houses and businesses under solar panels and wind farms lessening SA's use of coal fired power generation, it is clear that renewable energy technology will continue to be installed in regional and rural Australia. Towns and cities that do not adopt this approach face crippling energy costs. Currently wind and sun provide the most accessible means to generate power. Wind intermittently and sun during the day. Batteries provide the ability to have energy on call for the full 24 hour period, day in day out.
Problem	The City of Victor Harbor and other regional/rural towns are not only prone to cut offs and brown outs but also ever escalating energy costs. This places our business and agricultural production at a further cost disadvantage in the marketplace. Access to reliable, affordable energy is a major driver of business cost. Averting or lessening energy costs becomes a business attractant.
History	Both cost savings and carbon savings have been clearly identified via CVH's solar program. The 2012 "load shedding" hit Pt Elliot hard with the local hotel alone reporting losses of \$50k. The outage lasted 4 hours. Even with solar panels when the grid fails everything is shut down for safety. Batteries and switch over ability negate this problem.
Urgency	With PVP take-up of 40% in VH and the inevitable end of feed in tariffs – the ability to store energy for night time use is advantageous and necessary – in the face of ever increasing costs. New houses can not fit electric HWSs. VH's peak use is at midnight when all the hot water units come on under J tariff. SA Power Networks can not guarantee a megawatt into our industrial areas.
Potential impact	To enable the City of Victor Harbor to not only be self sufficient in energy production, but also offer resiliency from blackouts or "load shedding." In so doing the city can offer existing and potential business, cheaper (clean) energy with the added benefit of continuity. Domestic housing will also benefit. In time the city will have its own renewable energy company. The attraction is to have both solar, which can use cheap solar energy during the day and energy storage – which can store excess energy and draw from the grid at low overnight rates. It effectively doubles the economic attraction.



Key Issues

Overview

- Energy cost increases - *time of use pricing*
 - Battery type
 - Lifetime & warranty
 - Safety
 - Battery development
 - Victor Harbor's economic opportunity
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Energy Costs

The proposed introduction of time-of-use pricing, along with smart meters, means that consumers could be paying as little as 7c/kWh occasionally, but up to 52c/kWh in peak periods. This is already occurring in Victoria. VH's peak energy occurs at midnight! Energy storage can avoid this unwelcome cost impost.

Regional towns are mostly at power grid limits and the first to suffer cut off from motor accident, fire or flood or a remote decision without notice to shut their section of the grid down.

Battery type

Batteries have a history of several hundred years. Lead acid batteries (auto) are the most familiar. Lithium ion batteries, now mostly the type used in gadgets. The batteries suggested for trial here are Nickel Iron batteries, sometimes called NiFe Batteries. Some benefits are:

- Longest battery life of any battery known today
- Clean, simple "green" technology.
- Time-tested (invented - Thomas Edison - early 1900's)
- High efficiency - stays about 75-80% throughout its lifetime.
- Easily rejuvenated by a simple electrolyte change (unless abused)
- No need for frequent equalization charges.
- Electrolyte is a preservative for the metal plates.
- 100% nickel plated plates and posts and intercell connectors
- Up to three posts per cell in larger cell sizes!
- Individual cells - any voltage combination -12, 24, 36, 48, etc.
- Up to 80% Depth of Discharge (DOD) without harm or loss of battery capacity.
- Can add to your battery bank at **ANY TIME**
- Can replace a defective cell at **ANY TIME**, unlike lead acid cells
- *Average* life is 20 years, but original NiFE cells made by Thomas Edison have been found to still be functional after 80 years!

Australian company Redflow is developing nickel bromine batteries for emergency services support.

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Key Issues, Continued

Lifetime & warranty

NiFe batteries are currently guaranteed for 20 years. They can be upgraded and added to in a parallel fashion. They have a solid safety record and can be resuscitated and reused rather than thrown away.

Safety

NiFe batteries:

- **NEVER** sulphate
 - Do not freeze
 - Cause no harm if battery is overcharged
 - Do not contain sulphuric acid - no "rotten egg smell"
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Development and economic opportunity

Hanwha Solar One has announced a strategic partnership to develop a complete solar power and energy storage system for the residential market. **Kyocera** has said it will incorporate lithium-ion batteries into energy storage for home solar power systems. **Panasonic Corporation** has also announced its own lithium-ion battery system for residential applications. Manufacturers are now eyeing the massive market potential.

Initially these battery systems will be expensive - but as evidenced with solar panels, prices can drop dramatically and quickly with rapid take-up.

The uptake of battery technologies such as LiFePO₄ (lithium iron phosphate) is quickening as prices drop with many now being trialed by path-finding "off-gridders" in Australia. LiFePO₄ batteries are lighter, smaller and offer a longer lifespan over traditional deep cycle batteries.

Victor Harbor's Opportunity

The city continues its economic gain (lower & negative domestic power bills) with over 40% of its houses under panel and plans before Council to assist business to install panels. With strengthening University research links and the opportunity for Federal funding support, a storage trial of a business district and/or an aged care precinct and possibly one or two domestic sites, presents real economic opportunity. It does so by avoiding midnight peak power bills and providing the ability to sell energy back into the grid at those times. Such projects also strengthen our area's tertiary education opportunities and offer local employment.



Summary and Next Steps

Summary: Key issues

- Power prices will continue to escalate increasing business & agricultural costs - further disadvantaging rural and regional business and lessening our employment opportunities.
 - Solar panels and domestic wind turbines are proven, lower cost, available technologies which boost local employment.
 - Batteries (sometimes called the killer app) will further strengthen and broaden the economic activity already proven under the city's solar program.
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Decisions

In conjunction with Council's 2013 solar panel program:

- Advise Elected Members and council staff
 - Advise ratepayers
 - Engage Adelaide University research and development
 - Decide on battery type/s
 - Produce data supporting the decision
 - Approach trial sites linked to R&D program
 - Engage software/electronics groups
 - Regularly update website
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Next steps

- Brief Council and Exec
 - Hold public meetings to explain the thinking and outline the economic and ecological proposition
 - Initiate R&D program with University
 - Apply for federal funding
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