

# Best practice planning for Sustainable Industry

## Envisage this...

At a time when we **need action on climate change and jobs** more than ever, Frankston Council could **address both issues** by releasing degraded green wedge land between East Link and Frankston Dandenong Road to expand the Carrum Down industrial precinct to create a 21st century, six-star, **ecologically sustainable industrial park** with integrated **recycled water, energy and transport** usage for use by clean, **innovative, job-dense, high-tech companies**.

With good planning green corridors and canopy cover could be introduced to improve the **environmental value of the land** and the development of the land could also raise funds for protecting and **improving other green wedge land** in the area.

## The Carrum Downs ecologically sustainable industrial park

Like the successful eco-industrial parks in Kalundborg (Denmark), Daven (USA) and Burnside (Canada), Carrum Downs has a **nationally recognised industrial base** in nearby Dandenong, established **supply chains** and a knowledgeable **skills base** that local high-tech manufacturers are already leveraging.

Uniquely, Carrum Downs is positioned **30 minutes from Melbourne** at the **crossroads** of our regional road network. Next door to the Eastern Treatment Plant, the precinct also has access to its underutilised **Class A recycled water** and the potential for **closed-system solar energy** and **biomass farming**.

Done well, an expansion of Carrum Downs Industrial Estate would provide our high-value, high-return businesses the chance to locate in a modern 'green-technology' park founded on **circular economy principles** and designed for **sustainable innovation retrofitting** from its inception.

The unique conditions in Carrum Downs already share many similarities with best practice eco-industrial parks in Australia and abroad...

Best practice example	Criteria for success	Carrum Downs opportunity
<p><i>Burnside, Nova Scotia</i></p> <p>A 20-minute trip to the Halifax city centre over the MacKay bridge</p> <p>Good 'affordable' and 'premium' housing choices within 15 minutes for employees.</p> <p>Fairview Cove container port</p>	<p><i>Location is important</i></p> <p>The best eco-industrial parks are uniquely located at <b>road transport intersections</b>, with good access to export freight and growing nearby population centres where employees' live.</p> <p>Favouring <b>sites</b> away from, but <b>accessible to major cities</b></p>	<p><i>Eastlink, Penlink, Thompsons Rd</i></p> <p><b>30 minutes to Melbourne</b></p> <p>Sited at the <b>crossroads</b> of the SE region's arterial road network.</p> <p>Infrastructure discussions are underway about a Lyndhurst inland <b>rail-freight port</b>.</p>

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<p><i>Devan REZ, Massachusetts</i></p> <p>Proximate to world-recognised Massachusetts Institute of Technology (MIT) and also 4 of the five University of Massachusetts campuses.</p>	<p><i>Established industrial expertise and renewing technical skills</i></p> <p>High-tech eco-industrial parks aren't invented, they <b>evolve in areas of strong manufacturing expertise</b>. Superior technical skills are needed to operate collectively.</p>	<p><i>Skill and knowledge clustering</i></p> <p>31% of manufactures already locate in CDIE because it is <b>'desirable for their industry'</b>.</p> <p>Two Monash and two Chisholm TAFE campuses are nearby and could further tailor courses into high-tech manufacturing</p>
<p><i>Kalundborg, Denmark</i></p> <p>Asnæs power station is a scale producer of <b>waste heat</b> and steam</p>	<p><i>'Biproduct waste' diversion</i></p> <p>Symbiosis requires an existing public utility that can <b>"share waste on day one without too much retooling"</b> that can be initially diverted to anchor tenants</p>	<p><i>Eastern Treatment plant</i></p> <p>330ML of <b>Class A recycled water is discarded as waste</b> into Western Port Bay each day</p>
<p><i>Kalundborg, Denmark</i></p> <p>A <b>high level of trust</b> exists between symbiotic companies, this is an essential element to collaborative success.</p>	<p><i>Industrial symbiosis mindset</i></p> <p>Integrated supply networks replace traditional B2B transactions through <b>mutually cooperative industrial relationships</b>. However, if one fails...all fail.</p>	<p><i>Dandenong NEIC Cluster</i></p> <p>Many reliable <b>high-tech manufacturing supply chains</b> are already established here. 13% of organisations co-locate in CDIE and/or the NEIC for 'access to suppliers'</p>
<p><i>Yarrabilba, Queensland</i></p> <p>Control of <b>water, waste, energy and transport systems is localised</b></p>	<p><i>Localised advantage</i></p> <p>The future benefits of upfront sustainable planning and investments are retained locally for the benefits of the local community.</p>	<p><i>If well planned, an CDIE extension has the potential for decentralised solar- biomass farming and closed system energy storage.</i></p> <p><i>As well as sustainable waste, and water systems.</i></p>
<p><i>Kalundborg symbiosis</i> is a <b>business-community board</b> mandated to oversee this estate's progressive development</p> <p><i>Yarrabilba MIBA</i> was planned to attract job-dense businesses and enable <b>retrofitting of new sustainable innovations</b></p> <p><i>Devan REZ</i> <b>"designs-in" hassle free expansion options</b> for businesses when they are first set-up in the estate.</p>	<p><i>Planned, curated and future proofed estates</i></p> <p><b>'Active governance'</b> by the business community and local government (not just land developers) keeps these ecological business parks relevant, progressive and renewable.</p>	<p><i>A CDIE extension should involve our region's lead high-tech manufactures and community in its design and ongoing governance processes.</i></p> <p><i>Considering issues like covenant restrictions on tree coverage, site size, parking/transport and non-conforming tenancy.</i></p>

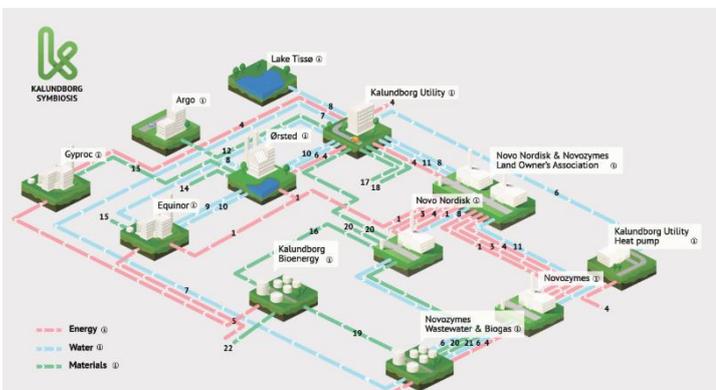
## Successful high-tech industries in a circular economy

Best practice examples of sustainable living create **circular economies** that provide **land for livelihoods and integrate local jobs into the suburb's design.**

**Kalundborg Eco-industrial Park** is an industrial symbiosis network in Kalundborg, Denmark, where companies in the region collaborate to use each other's by-products and otherwise share resources.



The exchanges of waste, heat, energy, water and materials have greatly increased environmental and economic efficiency, as well as creating other less tangible benefits for the business including sharing personnel, equipment and information.



The collaboration and its environmental implications arose unintentionally through private initiatives, as opposed to government planning, making it a model for private planning of eco-industrial parks.

However, researchers have studied **Kalundborg** and other successful high-tech eco-industrial parks like **Burnside** in Nova Scotia, Canada, and **Devens REZ**, Massachusetts USA, to understand how to replicate these principles and conditions in future sustainable industrial developments.

## Case study: Kalundborg, Denmark

At the centre of the exchange network is the 1959 *Asnæs power station*, a 1500MW coal-fired power plant that has material and energy links with the community and several other companies.

**Surplus heat** from the power station is used by *Statoil* to heat 3500 local homes in addition to a nearby *fish farm*, whose **sludge** is then sold as **fertiliser** to the local *agricultural businesses*.

**Steam** from the power plant is sold to *Novo Nordisk*, a world-renowned pharmaceutical, insulin and enzyme manufacturer, as well as the *Statoil* refinery. This reuse of heat reduces the amount of thermal pollution discharged to a nearby fjord.

*Novo Nordisk* gives away its own sludge, of which it produces 3000 cubic metres per day, which is refined for **biogas** for the *Asnæs* plant.

*Statoil* also removes **sulphur** from its natural gas and sells it to sulfuric acid manufacturer *Kemira*.

Additionally, a by-product from the power plant's sulphur dioxide scrubber contains **gypsum**, which is sold to *Gyproc*, a global plasterboard manufacturer. This is two-thirds of the manufacturer's gypsum needs, which reduces the amount of open-pit mining needed.

Also, **fly ash** and **clinker** (slag) from the power plant is used for road building and cement production.

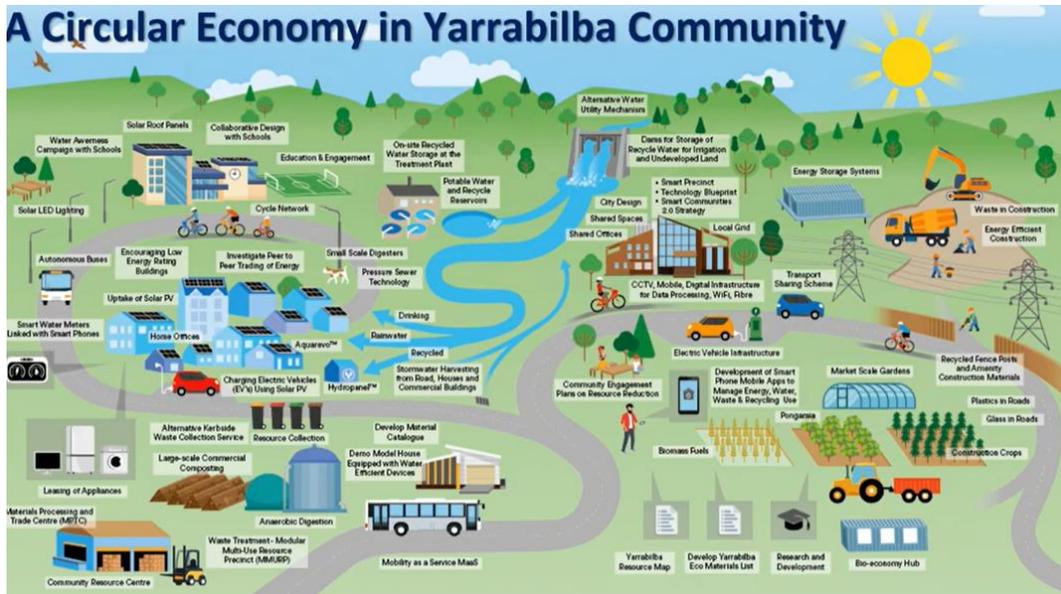
**Water** reuse schemes have also been adopted in Kalundborg. *Statoil* pipes 700,000 cubic metres of cooling water a year to the *Asnæs* power plant, which purifies it for use as boiler feed-water and for cleaning.

The 90°C residual heat from the refinery is not used for district heating due to taxes. Instead, heat pumps are used with the 24°C **waste water** as a **heat reservoir** for local industry.

## Case Study: Yarrabilba, Queensland

Yarrabilba in Queensland, 50km south of Brisbane, is where the principles of sustainability and a circular economy are part of the masterplan for a new community.

Started in 2012, **Yarrabilba** has set out to become **Australia's first circular economy community** with 17,000 homes, 45,000 residents and 13,000 jobs, on a 20 square kilometres site.



In Yarrabilba, planners are thinking differently about utilities.

- Control of Yarrabilba's **water, waste, energy and transport systems is localised**.
- The precinct is designed so that **retrofitting of new sustainable innovations** can be done as the community grows.
- 73% of traditional landfill waste will be recycled (with separated collection systems) into the local circular economy so "waste outputs become high-quality business inputs and bioenergy".
- Decentralised energy storage and production means the community and businesses will be "powered by renewables"; surplus solar energy (which is subsidised on new houses) can be peer-to-peer traded with local manufacturers; and the whole community is targeting a 67% energy saving traditionally "lost" during generation and transmission.
- Onsite recycled water treatment and reuse; stormwater harvesting; and retention of natural waterways (which double as recreation reserves) and catchment dams are part of Yarrabilba's design.
- Innovative transport alternatives like autonomous public buses (on preprogrammed routes) and e-vehicle charging stations will be trialled.

"Sustainable employment first" is a unique feature of the Yarrabilba community. Not only is dedicated land being put aside for livelihoods but also high-tech manufacturing businesses are being encouraged to move to the estate and are being rewarded with lower operating and input costs.