Member	Danny O'Brien	**Electorate**	Gippsland South
Period	01 April 2023 to 30 June 2023		

Regulation 6 - Expense allowance and electorate allowance	
Total amount paid to member for electorate allowance	$13,549.34
Total amount paid to member for expense allowance	$3,228.05

Regulation 7 - Motor vehicle allowance	
Total amount paid to member for motor vehicle allowance	$0.00
Member did not receive the motor vehicle allowance in the previous quarter and member has elected to receive the motor vehicle allowance for this quarter	No

Regulation 9 - Parliamentary accommodation sitting allowance	
Total amount paid to member for parliamentary accommodation sitting allowance	$7,139.44
Suburb in which the member's parliamentary accommodation is located	Melbourne

Regulation 10 - Travel allowance claims

Date from	Date until	Reason for travel	Total amount paid	Town or city in which accommodation was located	Value of the accommodation

Total number of nights for travel allowance claims **0**
Total amount paid to member for travel allowance **$0.00**

Regulation 11 - Commercial transport allowance claims

Date from	Date until	Reason for travel	Total amount paid	Mode of transport	Value of transport

Total number of nights for commercial transport allowance claims **0**
Total amount paid to member for commercial transport allowance **$0.00**

Regulation 12 - International travel allowance claims

Date from	Date until	Reason for travel	Total amount paid
24-Jun-23	06-Jul-23	Flight from Melbourne to Doha to Manchester and then return to Berlin to Doha to Melbourne for offshore wind energy research and mine rehabilitation	$5,553.15

Total number of nights for international travel allowance claims **12**
Total amount paid to member for international travel allowance **$5,553.15**

See attached travel report for further details

Managing the Energy Transition: opportunities and challenges for Gippsland

Danny O'Brien, Member for Gippsland South

Parliament of Victoria

July 2023

Overview

Gippsland has a rich history as an energy producer for Victoria and the nation but is well into a turbulent transition phase as fossil fuel usage declines or is pushed out by government policy.

The development of an offshore wind industry for Gippsland, virtually all of it off the coast of the electorate of Gippsland South, is a significant opportunity for the region help smooth that transition, albeit one that comes with threats as well.

Gippsland has had some advance warning of this industry, with the Star of the South project first coming to public prominence in 2017 and other projects coming forward in recent years.

A strong wind resource in Bass Strait and proximity to the high-capacity transmission network originating from the Latrobe Valley has attracted the attention of local and international developers.

As the State Member of Parliament for the region I have followed developments closely and, like most Gippslanders, have slowly developed an understanding of the industry, its requirements, its challenges and the implications for our region - both positive and negative.

However, as Gippsland will likely be home to Australia's first offshore wind farm, there is no local reference point for the industry.

As such, I decided that to inform myself and my community better it would be valuable to travel overseas and see first-hand areas where the offshore wind industry is well-established - to learn from their mistakes and appreciate better how we can harness the offshore wind industry to improve opportunities for Gippslanders.

A note here: this report and findings are recognition that the offshore wind (OSW) industry is coming and that other energy changes are upon us – whether we like it or not. This is not an endorsement of wind or any other technology as part of our energy mix – but as a local leader it is important to understand it.

This trip also threw up other opportunities for me to learn how we might successfully transition, capturing opportunities in new industries that complement our existing skills base and infrastructure. I was able to arrange briefings on and visits to facilities encompassing hydrogen, carbon capture and storage (CCS) and biomass energy production.

Finally, the rehabilitation of the Latrobe Valley's coal mines is a regional problem that has particular implications for the Latrobe River downstream and into Gippsland South. The trip finished with an enlightening tour of Germany's Lusatia region where rehabilitation of dozens of mines is already well underway.

Planning

The genesis of this trip occurred in 2016 when I traveled to the UK and Ireland with the then IBAC Committee of Parliament and we flew from London to Belfast. I noticed from the plane the significant number of offshore wind farms in the Irish Sea, so when Star of the South first made contact to outline their plans, I had some idea of what it may look like and where I could potentially go to see the industry first-hand.

I am grateful to Erin Coldham from Star of the South for suggesting locations and putting me in touch with various contacts. There followed a blizzard of emails to people in Australia and Europe, research online and the viewing of a number of useful YouTube videos. An unrelated briefing introduced me to Drax Power in Yorkshire, formerly Western Europe's largest coal-fired power station that has converted to biomass (wood pellets). In learning more about Drax, I came to understand the nearby Humber region has a burgeoning offshore wind industry and further enquiries made it clear I could see and learn a lot in a short time in a small geographic area.

As a global leader in offshore wind, Denmark was an obvious target and I give enormous thanks to Michelle Carden of the Danish Embassy in Canberra for organising my meetings and tours in Copenhagen and Esbjerg.

Finally, it was during a tour and briefing of Energy Australia's Yallourn mine that I was strongly encouraged to visit Germany to see how successfully that country had rehabilitated former brown coal (lignite) mines in Lusatia, formerly part of East Germany. Again, the German Embassy put me in touch with the German Chamber of Commerce who in turn introduced me to Peter Laux of LEAG, who was extremely generous in organising and conducting a two-and-a-half-day tour of the region for me.

I am also grateful to Jacqui Ingram of Flying Colours Travel in Sale for arranging flights and providing advice.

Outline

This report will be presented in chronological order of the trip and meetings, followed by conclusions and recommendations.

A note on content of this report:

It should be noted that the facts, figures and interpretations in this report have been made by a journalist-turned-politician who has listened very carefully and taken extensive notes. However, I am not an engineer, offshore wind developer or technical specialist and the content herein is my understanding and lay-man's interpretation of what I have been told. It is written to be understood easily by the people of Gippsland South and should not be relied upon for technical or investment purposes.

The Trip

Saturday, 24 June

Depart Melbourne to Manchester via Doha.

Sunday, 25 June

Arrive Manchester at 6.15 am, collect hire car and drive to the Humber region. Given the early arrival I took the opportunity to familiarise myself with the region, driving past the Drax power station and crossing the Humber Bridge to get my bearings on travel to Grimsby and Immingham, which I would visit the next day.

This included driving to Killingholme to get a glimpse of one of the main onshore substations which brings power ashore from the Hornsea 1 and 2 offshore wind farms (among others).

The Humber Bridge is a sight to behold in itself, stretching 2.2 kilometres across the wide Humber estuary. From atop the bridge, one can get a sense of the massive heavy industry of the Humber - Drax Power Station visible some 50 kilometres away to the west, and in every direction wind turbines (onshore), multiple port facilities on both sides of the river, oil refineries, chemical plants, power stations, factories, transmission lines, substations and just out of view a large steel plant at Scunthorpe.

Despite, or perhaps because of, the presence of heavy industry, the Humber has been an economically depressed region that has undergone significant change with the decline of local fishing and coal industries, industry change and pressure to decarbonise. In this context, the offshore wind industry has been something of a godsend, if not a panacea to the region's problems.

Gippsland locals will see obvious parallels, although the scale of the Humber's heavy industry is mind-boggling - far in excess of what we have in the Latrobe Valley and Central Gippsland with the coal, timber and oil and gas industries. Nonetheless, our two regions face or have faced similar pain and similar new opportunities in the energy sector.

Monday, 26 June

Siemens Gamesa Renewable Energy

My first appointment was a tour of the Siemens Gamesa Renewable Energy blade factory in Hull. Established in 2016, the factory has since turned out more than 2200 wind turbine blades of a scale that is hard to fathom. Starting at 75 metres, the factory is now producing blades that are 108 metres long, three metres longer than a standard soccer pitch. Blades are made of a composite of fibreglass, balsa wood and resin. I was advised that Siemens Gamesa developed technology in 2022 that will allow blades to be recycled in future, solving a shortcoming that has seen the wind industry face criticism that components past their useful life had to be consigned to landfill.

Built directly on reclaimed land and an under-utilised port area, the plant is producing blades for the local offshore wind developments in the North Sea as well as for export around the world. It currently employs 1000 staff, soon to expand to 1400 with a massive expansion is underway at present. The plant is already Hull's largest private employer and 97 per cent of workers live within 30 miles of the plant. The current expansion will see the factory have a total area under its many rooflines of approximately 7.7 hectares.

Danny O'Brien MP next to a 108m wind turbine blade under manufacture at Siemens Gamesa, Hull, UK

The location on the wharf is critical given the difficulty of moving such large turbine blades by road. In the past, other components such as nacelles and the wind towers themselves have been trans-shipped to Hull, stored on the wharf, combined with blades and loaded onto ships for transport to the construction sites directly.

The development of the facility followed a competitive process involving a range of British and European sites and was secured with financial support from the UK Government.

A similar facility to provide components for offshore wind may not be considered viable in Gippsland, or indeed Victoria. However, with the pipeline of proposed projects in Gippsland and in other zones around the country, there is a prospective decades-long order book for an Original Equipment Manufacturer (OEM) such as Siemens Gamesa, GE or Vestas. Governments should actively pursue the prospect of a major manufacturing facility in Gippsland and Victoria.

RWE Grimsby

German energy giant RWE runs an operations and maintenance (O&M) hub at Grimsby for its Humber Gateway Offshore Wind Farm which is comparatively close in shore, allowing crews to undertake works via Crew Transfer Vessels (CTVs) on a daily basis. Working 12-hour shifts, there are 37 employees servicing the 73 turbines of the wind farm.

Unfortunately, I was unable to visit the wind farm itself, but did get to see the CTVs which were in port. The base includes an operations hub for controlling the wind farm as well as crew areas and a small warehouse facility for supplies.

Danny O'Brien MP aboard a crew transfer vessel in port at RWE's Grimsby base. There are around 640 employees combined at the RWE and Orsted offshore wind O&M bases at Grimsby.

Orsted Grimsby

Danish offshore wind pioneer Orsted (it built the first farm in Denmark in 1991) also runs its O&M base from Grimsby, just a few minutes away from RWE. However, its base is considerably larger, with 600 employees working through or at the base, servicing six offshore wind farms, including Hornsea 2, currently the largest in the world (for now) at 165 turbines with a capacity of 1.38 GW.

It also remotely manages other offshore farms from this base. Orsted operates CTVs for its close inshore farms, with crews of less than 12 travelling to and from each day. However, the Hornsea and other farms are considerably further offshore. For these it operates Service Operations Vessels (SOVs) which only return to port on 14 and 28-day rotations, with crews of 40 to 60 onboard for two week shifts at a time (followed by two weeks off). For the ships at sea for 28-days, crew change-over is facilitated by helicopter, just as with our Bass Strait offshore platform operations.

This SOV model may well be adopted by operators of Gippsland farms given the lack of close port facilities to the 90 Mile Beach offshore wind zone.

Orsted has spent around £15 million on its Grimsby base with more to come and staff levels expected to be more than 800 by 2030 when additional farms come online. Like RWE, it was able to capitalise on vacant port space at Grimsby, in its case a former timber dock.

Grimsby port has considerable capacity (although not a deep-water port), has attracted a number of related wind and renewable energy firms and has plenty of available local workforce (74 per cent of staff live within an hour of Grimsby and half within the town and its satellites). Like Hull, it is/was an economically disadvantaged area after the virtual collapse of the local fishing industry in the 1980s and 1990s. After WW2, Grimsby was believed to be the largest fishing port in the world. While it retains a strong fish market and associated trade, it now has very few boats based out of the port. As such, the offshore wind industry has been a welcome good news story for the town.

Orsted advises that it chose Grimsby for the following reasons:

- Location close to offshore projects
- Deep water estuary and large ports
- Development land close to shore
- Good communications
- Clustering potential for associated industries
- Government and public support including incentives
- Support of local businesses

Such points may be relevant to furthering Gippsland's interests, particularly the prospect of Barry Beach becoming an O&M base.

Drax/ABP Immingham Port

Due to its close proximity to Grimsby, I undertook a visit to the Drax/ABP Immingham Port biomass terminal ahead of a visit to Drax Power Station later in the program (see below).

Drax has converted four of its six 660MW turbines from coal to biomass (mostly wood pellets) which it imports from all over the world, predominantly the US (Louisiana) and Canada (British Columbia). It is vertically integrated, owning pellet plants that are usually established in close proximity to forestry operations (mostly Southern Yellow Pine plantations in the US), including mills. It utilises forestry and mill residue timbers to create the pellets which are imported to four terminals at Immingham, Hull (both on the Humber) and Liverpool and Tyne (Newcastle).

The Immingham port terminal, operated by ABP (Associated British Ports, which operates 21 ports around the country and shifts about a quarter of the country's seaborne trade) is a massive facility with capacity for around 160,000 tonnes of pellets in eight enormous concrete silos and a number of associated storage sheds. Ships of around 60,000 tonnes capacity are constantly on the water en route to the UK (20-25 at any given time), with the station using 30,000 tonnes per day at full capacity.

Biomass wood pellets at Immingham port

The Immingham terminal was previously predominantly a coal import/export terminal and although this is still a commodity through the port, it is at greatly reduced scale today, with biomass taking over by volume. Unlike coal, it is imperative that wood pellets do not get wet, necessitating fully enclosed shipping and storage such as the silos and sheds, as well as closed rail wagons which transport the pellets from port to station.

The Immingham terminal is part of a large complex of port facilities, including vehicles and bulk terminals, and is surrounded by heavy industry including an oil refinery, power stations and nearby at Killingholme, the onshore substation for the Hornsea offshore wind farms.

Tuesday, 27 June

Hull City Council

Hull City Council (HCC) governs the immediate Hull region, a population area of around 270,000 people (there are 60 councillors!!) and I met with council officers Helen Stinson and Simon Mounce.

In 2009, Hull City Council in partnership with ABP and University of Hull established "Green Port Hull", an attempt to capitalise on Hull's port capacity given burgeoning offshore wind activity in the North Sea. Like Immingham and Grimsby, Hull's fortunes had faded in conjunction with activity at its port which was traditionally focussed on trade with Europe in commodities such as timber, coal and wool as well as a local fishing fleet. However, it remains a manufacturing hub with timber and paper, caravans and mobile homes among the major industries, along with chemicals and other industry at places like the Saltend Chemicals Park just outside the city boundary (see below).

Capacity at Alexandra Dock was used by Council and ABP, along with financial support from the UK Government, to attract the Siemens Gamesa Renewable Energy blade plant which began operations in 2016.

Hull's history as an industry hub and port, plus its high unemployment rate through the 1980s and 90s, meant there was little resistance to the establishment of the blade factory. HCC reported some nervousness among existing manufacturers about the impact on labour availability and wages, but this was largely not realised, with staff trained up in the new industry with collaboration between SGRE and Hull College. There has not been a massive increase in ancillary industries to support SGRE given most of the components of blades are imported, however there has been an uptick in industries supplying personal protective equipment (PPE) with Arco UK, one of the largest suppliers of industrial clothing, footwear and PPE headquartered in Hull.

The residents of Victoria Park, adjacent to Alexandra Dock, did raise some concerns about dust, noise and disruption, but through close consultation, the erection of a sound wall between the plant and homes and an ABP program of home mitigation (double glazing etc), this was managed. Concerns about loss of real estate value have been unfounded - indeed values have risen in this area due to its proximity to the plant and well-paid jobs available there.

East Riding of Yorkshire Council

East Riding of Yorkshire Council is based in the tourist township of Beverley, just half an hour from Hull and it encompasses the large rural hinterland surrounding Hull and further afield, as well as the East Yorkshire Coast where transmission cables for many of the North Sea offshore wind farms come ashore.

I met with Matthew Sunman from the planning department of the Shire to see how transmission infrastructure has impacted this rural area. Mr Sunman indicated that despite multiple onshore cable runs and the need for new transmission infrastructure, there has been little public resistance in the area. A contrary view of the national picture was later put to me by National Grid (see below). Certainly I could find no evidence of organised local opposition.

In general, cables come ashore underground to a central substation such as Creyke Beck (near Beverly, around 30 km inland) or Killingholme (see above) where they then run as 400 kv overhead lines into the grid. An additional transmission line to accommodate the growth in offshore wind is currently in planning from Creyke Beck to High Marnham in Lincolnshire, however this will follow the route of an existing line.

Mr Sunman indicated that local landholders, usually farmers, do not generally object to underground cables running through their properties, provided acceptable terms can be made for landholder agreements covering compensation for loss of production during construction, crop loss and any ongoing payments. I was later advised by a third party that, anecdotally, some farmers receive as much as £90,000 per month in payments, which would assuage even the strongest of objectors!! I am not able to verify this figure.

Unlike Australia, the UK is of course very closely settled and developers face a complex process negotiating access agreements with multiple landholders to reach a central substation.

On returning to Hull I passed the large Creyke Beck substation and a new adjacent substation being constructed for the giant Dogger Bank offshore wind farm, part owned by Equinor (see below).

Equinor and Saltend Chemicals Park

Equinor is a Norwegian company, formerly the state-owned oil and gas company, and is the largest single supplier of traditional energy to the UK, including 25 per cent of its gas supply.

As part of the Zero Carbon Humber project, a collaboration between 14 organisations in the Humber (many of whom are featured in this report), Equinor plans to build a 600 MW hydrogen plant at Salt End Chemicals Park, just to the east of Hull. Zero Carbon Humber aims to be the world's first net zero industrial region by 2040.

Dual pipelines will be constructed through the Humber to supply hydrogen to industry and to take captured carbon dioxide and store it underground in the North Sea. The carbon capture and storage (CCS) project will be used jointly with Net Zero Teesside (Middlesbrough), a partnership with similar ambitions to Zero Carbon Humber.

The hydrogen plant, known as H2H Saltend, will supply hydrogen to the 1200 MW Triton power station at Saltend which will switch fuel from natural gas. The hydrogen plant will be "blue hydrogen", using natural gas as a feedstock and capturing the CO2 for storage in the Endurance field in the North Sea.

Equinor advised that UK policy acknowledges that hydrogen and CCS will be critical to meeting the UK's net zero targets by 2050 and that £20 billion over 20 years was allocated in last year's British Government budget to support CCS projects. Equinor itself has run CCS projects on a commercial scale since as early as 1996 (the Sleipner project storing around 1 million tonnes of CO^2 p.a.) and is a partner of the Northern Lights CCS project with Shell and Total, itself part of the Norwegian Government's Longship program for CCS.

The existing and proposed activities outlined here highlight the misinformation spread by Victorian Greens MPs about CCS, particularly the proposed CarbonNet project off Gippsland, that it is "untried technology that does not exist anywhere in the world". It is very clear it must be a part of overall greenhouse gas (GHG) mitigation - even the Intergovernmental Panel on Climate Change (IPCC) states it is a "mature technology" in the gas and enhanced oil recovery sectors and a "critical mitigation option" in the power, cement and chemicals sector (IPCC Climate Change 2023 Synthesis Report - Summary for Policy Makers, p 25).

The wider roadmap for Equinor's hydrogen projects includes the world's first at-scale 100 per cent hydrogen power plant at Keadby in North Lincolnshire and domestic hydrogen heating trials for homes in towns across Lincolnshire and Yorkshire.

Other key locales in the project include Easington, the site of a natural gas processing plant which will be the onshore export point for CCS into the Endurance field, and Aldbrough, a future hydrogen storage site further north on the coast.

The Equinor activities in hydrogen and CCS outlined above have parallels for Gippsland with both the Hydrogen Energy Supply Chain (HESC) project and the related CarbonNet CCS project, as well as Esso's proposed CCS activity. Equinor staff agreed with the proposition I put to them that our HECS project would help establish the skills, technical understanding and infrastructure for a future green hydrogen sector in Gippsland, stating that the H2H project had the same potential for the Humber and wider UK.

National Federation of Fishermen's Organisations

I am very grateful to Mike Roach, Deputy Chief Executive of the National Federation of Fishermen's Associations (NFFO) for travelling a considerable distance out of his way to meet me in Hull and share his industry's experience of the offshore wind sector.

Prior to our meeting, Mr Roach sent me a joint NFFO/Scottish Fishermen's Association report titled "Spatial Squeeze in Fisheries". This report outlines the challenges posed to UK fishing industries by the cumulative effects of competing uses of UK seas and highlights the potential risks for Gippsland and Australia, particularly for fishing fleets operating out of Lakes Entrance and to a lesser degree, Corner Inlet and San Remo.

In the past 23 years, the UK trawling fleet has gone from being restricted in just 0.39 per cent of the UK exclusive economic zone (EEZ) to 23 per cent. Under a possible future scenario, by 2050 the fleet could be restricted in 49 per cent of the EEZ via a combination of marine protected zones, offshore wind developments and cable exclusion areas.

While there are large, localised impacts in some locations, the current restrictions have not had a major impact on fishing overall, but future scenarios paint a different picture.

Mr Roach indicated there are no formal UK restrictions on trawling within offshore wind farms (unlike the EU), but safety considerations mean most fishermen will not trawl through an offshore wind farm (OSWF). Static fishing methods such as pots, lines and nets are less impacted by OSWFs.

Mr Roach observed that there is a policy assumption that the "fishing industry is infinitely relocatable" but that is simply not true as fish stocks do not necessarily move and relocating one group of fishermen can bring them into contact and conflict with others - depleting resources on a local scale.

In general, these are matters for the Federal Government to consider given fishermen and OSWFs operate in Commonwealth waters, but the needs of local fishing fleets must be considered early in development and approval processes.

While there is little data available as yet, Mr Roach did acknowledge that the "reef" affect caused by turbines in the water may well be a boon for recreational fishermen, provided they are able to fish within wind farms.

Withernsea

With my appointments for the day concluded, I drove the 30 km to Withernsea on the Yorkshire Coast to see my first offshore wind farm. Located around 8 km from the coast, the Westernmost Rough wind farm with 35 turbines is easily visible although not terribly intrusive. The Humber Gateway wind farm to the south was also visible but only just.

View of Westernmost Rough Wind Farm - 8 km from the shore at Withernsea, UK. Picture gives some idea of the visibility of turbines from the shore.

Wednesday, 28 June

Drax Power Station

As mentioned above, Drax Power Station was previously a 3900 MW coal-fired power station - the largest of any fuel-type in Western Europe - and has now converted four of its turbines to biomass energy, mainly wood pellets. The remaining two units were to be decommissioned but the Ukraine War led the UK Government to request these units be maintained as a back-up - they were ultimately not required and the decommissioning process will now proceed.

Originally built in the late 1960s through to the early 1980s, this behemoth station was developed to utilise local Yorkshire coal but that didn't last long, requiring imported coal and associated port and rail infrastructure to keep producing. Drax made the conversion under policy direction from the government and has become a world leader in renewable electricity production of this type (biomass is considered renewable by the UN/IPCC).

Drax has experimented with different types of biomass including sugar cane bagasse and others, but has settled on wood pellets as the most efficient and effective. It advises that there was little alteration required to its boilers and generators to switch to biomass. In essence, a thermal power plant burns something to heat water to create steam to turn a turbine - the change from using coal in the boiler to wood pellets required little physical alteration, albeit with some adjustments to boiler management.

The next step in its development is the implementation of a Bioenergy Carbon Capture and Storage (BECCS) system. It is already carbon neutral given its renewable feedstock, but by capturing and storing the carbon produced, it will become carbon negative. Drax is aiming to have two units fully operating BECCS by 2030.

Drax Power Station co-exists with surrounding agriculture and the village of Drax literally right next door

Its success as a leader of this innovation has led to enquiries from other coal-fired power stations around the world seeking advice on how to follow suit.

There is no doubt Victorian coal-fired power stations could similarly make the switch if forced out of coal, noting that logistics would require significant investment to get biomass pellets to a station, given they are currently simply supplied by conveyor belt from the coal mines they are sited on. Such a conversion could prolong the life of stations such as Loy Yang A and B which are the most modern of our fleet and ensure Victoria has a renewable, but dispatchable, electricity source to better manage the intermittency of wind and solar.

National Grid

While in country I had a phone hook up with Peter Abson of National Grid, the company which owns and manages the UK transmission system. We discussed what they refer to as the "trilemma": security of electricity supply, cost of delivery and action on climate.

National Grid is dealing with significant challenges and recognises it is behind on a national transmission build - it estimates it has 7.5 years to build transmission networks that should take 10. It expects a 50 per cent increase in electricity demand by 2035. As a regional example, it currently has 11 GW of capacity from the North to the Midlands but by 2035 it will need to be able to deliver 30 GW.

National Grid and the UK Government are trying to work to a principle of "Holistic Network Design" (HND) which is an attempt to future proof the network while also minimising the number and impacts of transmission lines across the country. Historically each OSWF would have its own cable from offshore to onshore but under HND, National Grid is trying to coordinate development, limit the number of cables and minimise disruption to local communities. This might be considered similar to the brief given to Victoria's VicGrid agency.

Mr Abson made clear that, just as in Gippsland and the rest of Victoria, transmission lines (particularly overhead) are not popular with those directly affected. Interestingly, he noted that many farmers are resistant to underground lines due the wide easement required, longer and greater disruption during construction and the limitations placed on some farming activities, such as cropping, by underground cables.

From a planning perspective, the UK has legally defined "Areas of Outstanding Beauty" through which overhead cables (and various other activities) are prohibited. In these areas, cables must be diverted around or placed underground, if feasible.

Mr Abson noted that the concept of "least cost" construction of transmission networks was open to interpretation - there is the immediate financial cost, the costs borne by the entire network and its customers, and costs of future proofing or otherwise. He noted that the pace of roll-out can also have a big bearing on cost.

Nonetheless, National Grid confirmed what we have been told in Australia - overhead transmission lines are dramatically cheaper (8 to 10 times) than underground so overhead is the starting assumption for most projects. National Grid has previously completed a report detailing the cost comparison and is currently updating the figures, which may be a useful resource for Victoria.

Overhead transmission lines (400kv) are prominent throughout the UK

We discussed the use of HVDC underground cables which some commentators have suggested are considerably cheaper. Mr Abson acknowledged it is more economic over longer distances (a HVDC cable runs subsea from Scotland to London) but that the need for converter stations at each end to supply AC current is also expensive.

On Wednesday evening I flew from Manchester to Copenhagen.

Thursday, 29 June

Danish Energy Agency

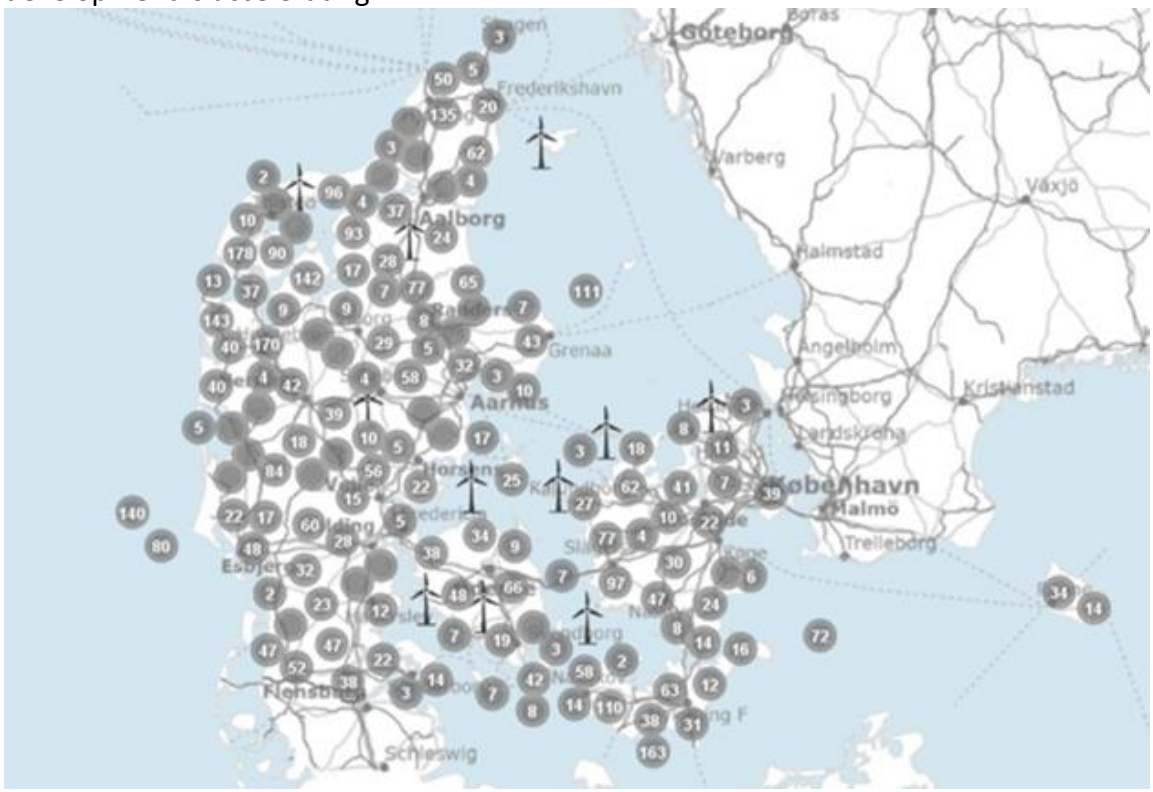
My Danish trip began with a meeting with staff from the Danish Energy Agency who outlined Danish energy policy and the state of their wind industry. Policy is driven by the Climate Act 2020 which set a target of a 70 per cent reduction in greenhouse gases (GHG) by 2030 and net zero by 2050 - recently brought forward by the government to 2045. The country aims to now reduce GHG by 110 per cent by 2050 via the use of CCS.

Denmark was the home of the first offshore wind farm, Vindeby, constructed in 1991 with turbines of just 0.45 MW and a rotor diameter of 35 metres. New projects are being bid with 20MW turbines and rotor diameter of 250 metres. Denmark's move to renewable energy began in response to the oil shock of the 1970s and concern over its reliance on imported energy and has subsequently continued in the pursuit of climate goals. It currently exports surplus wind energy to Norway where it is used for pumped hydro and exported back to Denmark when needed.

Despite being an early adopter of offshore wind (OSW), Denmark currently has only 2.3 GW installed and has a target of 9 GW by 2030. With a national population of 5 million, it is a similar population size and with similar ambitions in OSW to Victoria (but around 1/5th the area), however it already has significant manufacturing activity in wind and the largest OSW construction port in the world, Esbjerg (see below).

Although the OSW industry developed with government support and subsidies, the industry has now matured to such an extent that the bid process for the Thor OSW area in 2021 resulted in developers paying the government, rather than receiving a subsidy. There are now no subsidies for future offshore wind development.

Denmark has a large onshore wind component with some 4200 onshore turbines, however this has generated significant community opposition - it was stated that the "NIMBY principle is alive and well in Denmark". This concern is one of the reasons offshore development is accelerating.



Onshore wind in Denmark - numbers represent the number of turbines in each wind farm

In any event, the OSW sector has also generated concern. Early projects were quite close inshore - within a few kilometres in some instances - and concerns were raised by communities over visual pollution, environmental impacts and landfall transmission infrastructure. Projects now tend to be further offshore, both to address these concerns and to harness better wind resources.

Government authorities have also responded, with landfall, grid connection points and transmission easements determined prior to offshore acreage bid processes to give communities certainty.

Denmark has ambitious plans in both hydrogen and CCS. It aims to be producing between 4 and 6 GW of hydrogen by 2040 and has CCS projects already underway to meet its plan to be carbon negative by 2050. Denmark has good access to carbon storage sites in the North Sea, believed to have capacity for 400-700 times the needs of Denmark itself. A new CCS project storing carbon from Belgium, Greensand, ran its first trial in March this year with a full-scale project expected to go ahead in 2024.

The nation is promoting a multi-energy policy known as Power-to-X (PtX) as it develops its offshore wind industry. This would see excess wind electricity used to produce or complement other energy projects such as hydrogen with a view to aiding the transition for hard-to-decarbonise sectors such as shipping, land and air transport. As part of these projects, the nation had plans for two "energy islands", one a man-made island in the North Sea and the other utilising an existing island, Bornholm, close to Sweden. The day before I arrived, the government announced it was shelving the North Sea project for now due to excessive cost but is planning to proceed with Bornholm. It will export energy to other European nations as well as develop alternative fuels such as hydrogen.

Danish Agriculture and Food Council and Food Nation

Although not directly related to the energy component of this trip, a briefing with the Danish Agriculture and Food Council (a peak body similar to the NFF but incorporating major processors as well) and Food Nation, an industry and trade promotional body, provided me with an overview of the strength of, and challenges facing, the Danish agriculture sector.

Like Australia, Denmark has achieved some large gains in agriculture in recent decades, producing more with less and with less carbon emissions. For example, pesticide use was 53 per cent lower in 2020 than 2010, milk yield has increased 51 per cent and piglets per sow 55 per cent since 1995. Since the early 1990s, agricultural production has increased while emissions have decreased.

A number of presenters are involved in a study for Food and Fibre Gippsland which will explore opportunities for developing a circular economy for food production and processing, aiming to ensure full utilisation of waste products, heat, water and energy from various stages of farming and processing.

Middelgrunden Offshore Windfarm

My first opportunity to see an OSWF up close came in the afternoon with a boat tour to the Middelgrunden farm just off the coast of Copenhagen. Escorted by one of the founders of the farm, Hans Christian Soerensen and piggy-backing off a visit by a visiting group of South Korean officials, we sailed in an old fishing boat around this small 20 turbine farm. It was established in 2000 with turbines of just 2 MW capacity each and running to 102 metres high at the tip.

The 25-year lease on the farm expires in two years and is currently being renegotiated with the government. Due to its location close to Copenhagen and the airport, it cannot be replaced with bigger turbines, so the operators are planning to optimise the turbines with a view to continue to operate it for a further 25 years.

Middelgrunden offshore wind farm, Copenhagen, Denmark

Although it is a "baby" compared to what is being proposed off Gippsland, it was the easiest place to feasibly see a wind farm in action in a short time.

In addition, one of the hosts of the South Korean group was an executive of Copenhagen Infrastructure Partners, a key investor in the proposed Star of the South offshore wind farm in Gippsland, so there was a useful sharing of insights with him.

Evening: travel by train from Copenhagen to Esbjerg (3 hours)

Friday, 30 June

Esbjerg Port

The Port of Esbjerg, on Denmark's western coast, is the largest OSW construction port in the world. The port is owned by the local Esbjerg municipality with operations leased to various port operators, principally Blue Water Shipping (see below). It has so far been the primary port for the construction of 59 OSWFs and is expecting this to increase dramatically up to 2030. It is currently undertaking a land reclamation process to further expand the port which already runs a distance of around 6.5 km from one end to the other.

Its location on the North Sea has proven an advantage given 120 wind farms have so far been constructed there and steaming time is an important factor considering it is estimated that construction ships cost up to €400,000 per day!!

Wind turbine towers ready for offshore assembly at the Port of Esbjerg

Esbjerg has a variety of port uses, ranging from a small fishing fleet (it was once one of the biggest fishing ports in Europe with some 600 vessels) to bulk commodities, vehicles and servicing the oil and gas sector. There are around 200 companies engaged at the port, employing 10,000 people with around half of these involved in the OSW industry. A further 6000 people are employed in wind manufacturing facilities within one hour's drive of the city.

The port has massive lay down areas for the increasingly large components involved in the OSW industry and has an access depth of 10.5 metres, rising in future to 12.5 metres after further dredging is undertaken. Denmark has developed manufacturing facilities for wind turbines that are largely located away from ports and mostly inland. This is beginning to result in higher cost for the transport of components and logistical difficulties in road

transport given the increasing size of components - 108 metre turbine blades (and heading for 120/130 metres) and nacelles that weigh 1500 tonnes.

It was here that I learned that the three major western Original Equipment Manufacturers (OEMs): Siemens Gamesa, Vestas and General Electric, actually undertake the installation of wind turbines themselves, not the developers of each wind farm. These OEMs will usually enter into an agreement to use a particular port (not necessarily a binding contract) well ahead of construction getting underway. This is pertinent to the State Government's decision to develop Hastings as the main Victorian construction port, and evidence provided at the Public Accounts and Estimates hearings in June that no binding agreements had as yet been made with any companies to utilise Hastings.

Port Manager, Denis Pedersen freely shared his knowledge on wind and construction ports and has also worked in Victoria so understands Victorian port capacity. He noted the capacity and limitations of our ports and channels, expressing concern at the steaming time required from Hastings to the Gippsland offshore zone. He also noted that the increasing size of OSW turbines is a challenge for all ports and shipping and that future construction or parts thereof may utilise some form of on-water barge operations, rendering deep water ports less critical. It should be emphasised here that this is an informal opinion.

An offshore wind construction vessel at the Port of Esbjerg

Victoria does not currently have a port of the scale of Esbjerg close to the offshore wind zone and it will require significant time and investment to develop one with both the necessary lay-down area and channel/wharf depth. Given the steaming time from Hastings to some proposed Gippsland OSWF locations is longer than from Bell Bay in Tasmania, the Victorian Government will have to make a strong commercial case to OEMs and developers for Hastings and should strongly consider further development of Barry Beach and its channels as an alternative.

Blue Water Shipping

Blue Water Shipping is a large OSW logistics firm, working closely with OEMs and developers to manage the logistics of construction and operations and maintenance. The company was founded in Esbjerg but now has an international footprint, 2400 employees, annual turnover of €1 billion and moves 10,000 wind turbine components per annum. It has offices in Australia where it has been closely involved in the logistics of onshore wind farm construction.

Blue Water Shipping has recently completed a new OSW port at Cuxhaven in northern Germany and is currently developing a wind port in Nova Scotia, Canada. BWS's Brian

Sorensen advised that virtually any port can be used for operations and maintenance, but construction usually requires a specialised or purpose-built port facility.

He also highlighted the critical part that steaming time plays in the cost of OSWF construction, while paradoxically acknowledging that Esbjerg is 2-3 days steaming away from some of the projects it is involved with.

Saturday, 1 July

Train journey Esbjerg to Berlin (8 hours)

Sunday, 2 July

Berlin

Monday, 3 July - Wednesday, 5 July

Germany – Mine Rehabilitation

I am very grateful to Peter Laux of LEAG, Czech-owned lignite miner and electricity producer in the Lusatia region for arranging the next few days, including picking me up from Berlin at 7.30 am.

After a two-hour drive to Cottbus in the centre of the German brown coal (lignite) mining region, I received a number of briefings from Peter and his colleagues on lignite mining in the region and what they call "sanitation" or "recultivation" of mining land - what we would describe as rehabilitation.

In addition to briefings in the LEAG office, the tour included visits to:

- one of four remaining working mines (Janschwalde)
- a former mine in the early stages of rehabilitation (Cottbus Nord or Cottbus See - "lake")
- the 1600 MW Schwarze-Pumpe power station
- a partially rehabilitated section of the Wezlow mine which has been turned into a forest, a nature reserve, agricultural land and a vineyard
- the tourist attraction of "F60" a giant retired overburden conveyor bridge;
- an almost fully rehabilitated lake at Großrachen; and
- the manager of the Brandenburg Mining Authority

I shall give an overview of the issues in this region and their relevance to the Latrobe Valley and Gippsland, rather than continuing the chronological description.

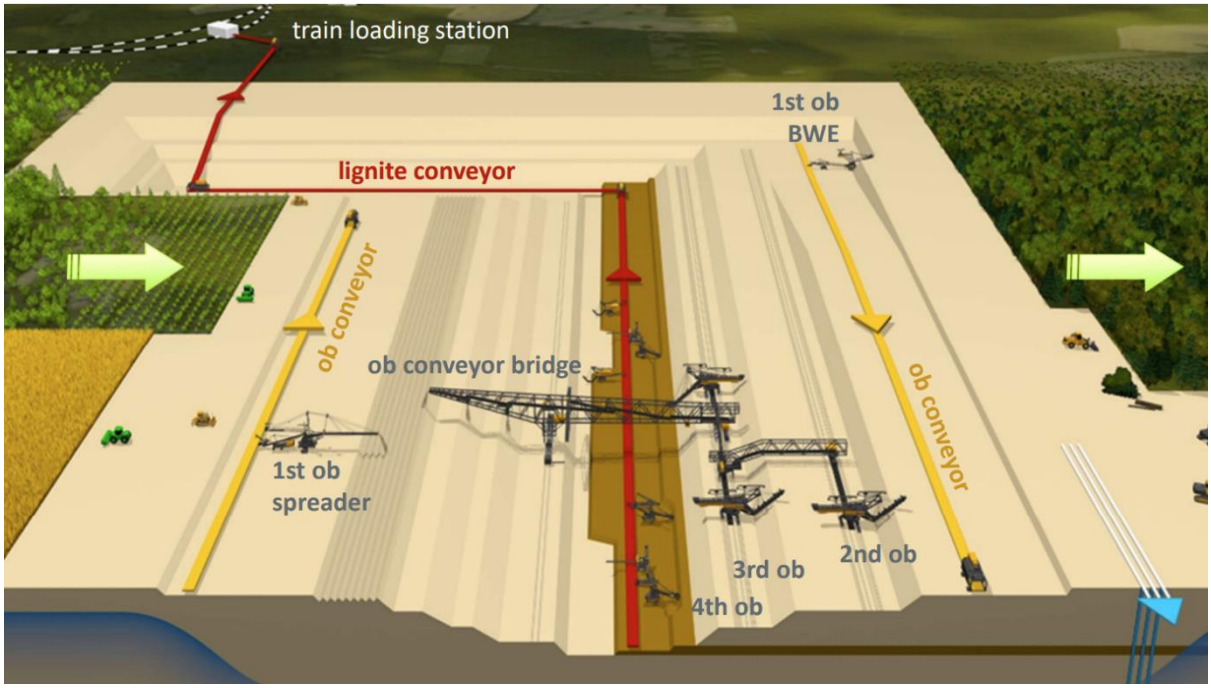
Historical background

The Lausitz or Lusatia region was part of the former East Germany, or German Democratic Republic (GDR), and currently encompasses parts of the states of Brandenburg and

Saxony. At the time of reunification in 1990 there were numerous lignite mines in operation and for largely economic reasons, many of them were shut down within a few years.

Most of these former mines are now managed by the Federal Government-owned LMBV (Lausitzer und Mitteldeutsche Bergbau-Verwaltungsgesellschaft) and rehabilitation is an ongoing concern. There are some mines/lakes from older times that are now managed directly by State Government departments. LEAG is the remaining private miner and power station owner, which operates four mines, has begun rehabilitation of a fifth and operates three large power stations.

Mining in this region is considerably different to Victoria's brown coal mines. Although mining is undertaken by an "open-cast" method, Lusatian mines have dramatically more overburden and thinner coal seams than in Victoria - ratios of overburden to coal are in the range of 8:1, as opposed to the Latrobe Valley which is virtually the reverse at up to 1:5. Once groundwater is lowered (dewatering) they are mined on a narrow strip by dredgers and with the use of giant overburden conveyor bridges which remove the overburden in front of the active mining strip and place it behind it. Conveyor bridges are some 600 metres long and mine an open bench usually around 3 km long.



A graphic demonstrating the lignite mining method in Lusatia. The dark brown strip in the middle is coal, the rest is overburden. Graphic source: LEAG

There are other unique challenges in this part of the world – dredgers have previously unearthed unexploded bombs from World War 2 and wolves are known to inhabit mine dumps!

As a result of the geology and mining methods, the German mines are not as deep as ours due to overburden mostly being placed back in the mine. However, this does not mean there are not challenges with both mine stability and water supply. The region was formed geologically during the last ice age and glacial movement left behind poor quality soils that are predominantly sand, and sand with spherical grains rather than having sharp edges,

meaning it doesn't bind well and moves and slips more easily when wet – virtually the sand can become liquified. This brings deep challenges for the ongoing stability of rehabilitated mines.

Rehabilitation methods

As proposed in the Latrobe Valley, mines are partially or fully flooded to create pit lakes to provide stability to the land form, however due to the volume of overburden, many areas are able to be rehabilitated for ongoing land use including forestry and agriculture. Given the mining methods, rehabilitation is planned as part of mine development, commences soon after mining begins and is an ongoing process as mining continues and for well after it has ended. Formal mine plans are prepared by the operator (LEAG or LMBV) and follow a rigorous government approvals process, including for any subsequent amendments. For example, the Cottbus Nord mine plan was submitted in 2004, approved in 2012 and has had 14 amendments since then.

Soil removed during mining is graded and placed according to the mine plan and relevant to whether the area is proposed for forestry, agriculture or a pit lake. In the case of land planned for agriculture, cover crops are planted and ploughed in for four to seven years to build up organic matter and effectively create new soil. Land usually needs some form of treatment, including vibration compaction to minimise the risk of future subsidence and slippage.

The still-active Welzow Mine with mining continuing in the background, forestry, cropping and a vineyard in the foreground on rehabilitated former mine land.

We visited the Welzow mine which is still in production and expected to continue till 2030, but which is being progressively rehabilitated. On the "recultivated" land that was previously mined, there are forests (which will ultimately be used for forestry), agriculture (mainly cropping), a nature park and a vineyard that was leased out to operators after an open tender process. This is a good example of how the land can be re-used after rehabilitation.

Water

Just as in Australia, there is a water deficit in Lusatia and competing uses for available surface water, especially with Berlin downstream on the main river through the region, the Spree.

Without getting into the detail of the water allocation process, I was advised in a number of meetings that water is allocated on a weekly basis depending on how much is available in the river. Unfortunately for those involved in mine rehabilitation, mine lakes are last in the allocation pecking order, which can make planning and management of lake filling difficult.

Just as in the Latrobe Valley, there is also debate about the re-allocation of water currently used in power stations being redirected for use in pit lakes.

Dewatering of mines provides significant flows to the Spree and Neiße rivers, however the groundwater in the region comes with its own problems – it is high in iron, sulphur and can be acidic. The iron content sends some parts of the Spree River a brown/red colour and requires treatment before it continues down to the nearby natural feature of Spreewald, a series of channels and wetlands that is a popular tourist destination, and further downstream to Berlin. About 70 per cent of groundwater goes back into the river, with 30 per cent treated for use in power stations.

Miners have also constructed "underground sealing walls" made up of clay that protect mines from the ingress of groundwater but allow groundwater outside the mine area to return to or stay at natural levels. These sealing walls are up to 120 metres deep and in one case, 11 kilometres long.

Groundwater can be used for filling lakes – indeed there is technically no alternative to it returning. Once dewatering of mines stops, the groundwater slowly returns anyway, partially filling mine voids naturally. While this has some benefits, the return of groundwater must be managed carefully and in the case of mines that have been filled in the past but not properly landscaped and compacted, has led to liquefaction, slipping of banks and closure of some lakes.

Most notably there was a major shoreline slip at the Knappensee Lake in 2021 after the lake surrounds had been closed in 2005 amid concerns about stability. At Lauchhammer there are serious concerns about land stability and one village has had to be relocated with more potentially in future. In some cases, this has affected villagers whose ancestors had to move to make way for the expansion of mines.

This instability has been brought on in many instances by the return of groundwater many decades after mining and dewatering ceased. As the water has returned, the sands have become unstable. In one case, a local farmer called officials and asked why his tractor was now stuck three metres down in the earth. His cattle had to be airlifted out from land that had become unstable in a very quick time.

Cost and scale

Lignite mining in Lusatia historically occurred on a grand scale, in particular during the time of the former East Germany.

It has been estimated that LMBV has spent €10 billion on mine rehabilitation already, with considerably more to come.

LEAG needs to ultimately rehabilitate five mines which will take many decades, the last not expected to be completed until at least 2070. The lake area of the five mines will be approximately 8,300 hectares and the total volume of the final lakes 1,816 GL. However, due to the dry starting point and sandy soils, it's expected to require more than 4,000 GL to actually fill the lakes. German lakes are filled with a combination of surface and groundwater – for example, the new Cottbus See is being filled with approximately 88 per cent of its water from the Spree River and 12 per cent via groundwater ingress.

By comparison, the Latrobe Valley mines are expected to be about 2,800 GL when full. To give some idea of the volume, Sydney Harbour is around 500 GL.

LMBV's water requirements are unknown but expected to be considerably more. It has approximately 20,000 ha of mine land to rehabilitate in Brandenburg and Saxony (Lusatia).

Alternatives to flooding

As mentioned above, the German mines are considerably different to the Latrobe Valley's given the huge amounts of overburden that are produced and used to backfill mines. This lessens the amount of water required overall.

Some movement of soil from elsewhere has been used. Tesla recently built a new "Gigafactory" in Berlin and a reported 100,000 tonnes of soil from the site was transported to a mine to be used in rehabilitation. This is insignificant in the context of the millions of cubic metres moved by mining each year.

Rehabilitation outcomes

The lakes in the Lusatia region in Germany are in various stages of rehabilitation. While some were considered fully "rehabilitated" in past-times, new information and geological movement has meant many still require additional land-forming and compaction work.

Of the mines rehabilitated since the reunification of Germany, few are complete but some are getting close. Next to the tourist attraction of the former "F60" overburden bridge, Bergheider See is virtually full and has water quality suitable now for swimming. It currently welcomes campers but plans are in train for the construction of a hostel and camping park, while the shore is already being used for concerts and festivals.

We visited Großraschen See which is one of the best examples of (LMBV) rehabilitation. The lake is virtually at its final full level, the banks have been rehabilitated, there is a vineyard planted on one part, a marina constructed, civic facilities on the bank and new apartments constructed near the shoreline. It is awaiting a canal to be connected to other lakes which will make boating and tourism more attractive. A former mine managers residence has been turned into a grand hotel.

A new marina at Großraschen See - a former mine turned into a pit lake. Behind it are new residential apartments and nearby is a vineyard, community facilities and tourist infrastructure including hotels and restaurants.

LEAG is planning similar facilities at Cottbus See where a marina has been pre-constructed on the dry shore waiting for the arrival of the water level, an island has been left within the lake area and new housing developments are also proposed. LEAG is also proposing a 21 MW floating solar farm on Cottbus See.

These developments offer an exciting glimpse of the opportunities offered by proposed new Latrobe Valley lakes in decades to come.

Conclusions

The energy transition is well-advanced in the areas of Europe I visited. Virtually everywhere I travelled on land there were onshore wind and solar farms although in the UK and Denmark they were usually of smaller scale (often a single wind turbine powering a small factory or farm) – a few turbines here and there, whereas in Germany they were larger wind farms with multiple turbines.

All three countries have ambitious plans to expand renewable energy production, especially offshore and there is strong activity in hydrogen and CCS (Germany is an exception on the latter). All of these offer opportunities for Gippsland as well if managed appropriately.

While in many respects they are further advanced than Australia in the transition, especially with offshore wind, it is both comforting and a little frustrating (because you hope to be able to find easy answers!) that each country seems to be facing similar challenges to us here in Australia. These include:

- meeting climate change targets while keeping electricity affordable and reliable;
- managing the regional economic impacts of transition;
- choosing between energy technologies that may be proven but with differing commercial and technical drivers;
- managing social licence, especially with respect to onshore activities such as transmission lines;
- fitting into and capturing opportunities in global supply chains for OSW;
- with respect to mine rehabilitation, massive technical, physical and financial challenges but with the prospect of positive environmental and economic outcomes if managed well.

Gippsland has been undergoing "structural adjustment" in the energy industry for many decades now although that term in itself is anathema to many locals. Too often they see economic decisions and job losses imposed on them from afar, either by city-based governments or corporate bosses in far-off board rooms and are expected to be soothed by "industry transition" programs, the promise of new replacement industries or commitments to attractive redundancy packages.

Gippsland, and in particular the Latrobe Valley, are also "transition" weary and sceptical of promises about new industries to replace jobs in traditional industries as many past promises or proposals have amounted to little or nothing.

Nonetheless, local leaders including myself, need to be realistic about the change facing the region and do our best to capitalise on opportunities and minimise the negative threats. It should also be recognised by the public that support for one new form of industry does not mean opposition to existing industries in our region.

I return from this trip with some optimism that Gippsland can benefit from forthcoming change in the energy sector – or at least break even as existing industries wind down. This will require collaboration with the private sector, support from Government for certain

projects and clear and deliberate policies from governments to ensure Gippsland captures the benefits of the transition.

The following recommendations, while by no means exhaustive, will help us do that.

Recommendations

1. **Barry Beach Marine Terminal must be supported to become an operations and maintenance (O&M) base for the Gippsland offshore wind industry.**

   Barry Beach is operated by the private sector. Government should assist with provision of supporting infrastructure including telecommunications, roads, workforce training and housing availability in the area. As the only suitable port in the Gippsland area for OSW, if Barry Beach does not play a major role, there will be little benefit for Gippsland from the OSW sector.

2. **The State Government should review its decision to not consider Barry Beach for OSW construction activity.**

   Development of Barry Beach can occur without significant taxpayer investment, is closer to the OSW zone and can ensure Gippsland captures benefits. While it does require significant dredging, there are dredging and other development and environmental requirements at Hastings that mean that, at the very least, both ports should be considered. The Victorian Government must also justify the decision to focus on Hastings alone, reveal the full cost to taxpayers of new port development and outline a timeline for preparing ports for OSW projects that will align with developer construction schedules.

3. **State and Federal Governments should actively pursue OSW manufacturing opportunities.**

   It would be too easy to say “we can’t get them here”. The jobs and economic benefits of OSW will be limited if turbines are all imported and installed by overseas ships with international crews. The big three original equipment manufacturers (OEM) in wind: Siemens Gamesa, Vestas and GE, should have a long-term pipeline of projects in Australia and the Asia-Pacific to make Gippsland, Victoria and Australia an attractive proposition for manufacturing facilities.

4. **Fishing and other marine users must be genuinely considered, consulted and compensated (where relevant).**

   The commercial fishing industry must be consulted early in the development of OSW wind and OSWFs sited to minimise disruption to fishing grounds and other marine users such as oil and gas. Compensation must be paid if other commercial activities are impacted and the Federal Government should enforce this if necessary.

5. **The Federal Government should provide clear legislative or regulatory guidance on fishing access (commercial and recreational) within wind farms.**

6. **The State Government should investigate whether seabed HVDC cable connection to the electricity grid for Gippsland OSW is feasible.**

   VicGrid has been given the role of coordinating transmission lines to minimise a "spaghetti effect" of cables. It should investigate whether it is feasible to establish an offshore connection point and seabed HVDC cable through Bass Strait into Melbourne, rather than across Gippsland farmland.

7. **Federal, state and local governments should assist the coordination of community engagement on OSW in Gippsland.**

   There is a lot of activity in energy both onshore and offshore in Gippsland, particularly in the Wellington and South Gippsland shires. Once feasibility licences have been awarded for Gippsland OSWFs, governments should work with local councils and developers to help coordinate community engagement, to avoid consultation fatigue from multiple developers holding repeat consultation sessions on virtually the same issues.

8. **Developers should work with Esso in the longer term to consider whether the Longford heliport could be used for crew transport to service operations vessels (SOVs) for OSWFs.**

   While this is a commercial decision for the companies involved, such a move would be a genuine and symbolic move to aid the transition from current energy production to future energy production.

9. **The State Government must back the Hydrogen Energy Supply Chain (HESC) project to stimulate the hydrogen industry in Gippsland.**

   The HESC project will ultimately proceed only on commercial terms, but the State Government must ensure it does not frustrate the project for political reasons. While all planning and environmental approvals would of course need to run their course, the Government must ignore green hysteria over coal and back this project. HESC has strong potential to give Gippsland the skills, technical knowledge, infrastructure and industry base for a future green hydrogen industry. It is feasible in decades to come that OSW, when not needed in the grid, could power green hydrogen production for industrial, domestic and power generation purposes. The attendant carbon capture and storage (CCS) project would also offer additional opportunities for new Gippsland industries.

10. **The State Government should back any proposal to convert existing brown coal power stations, which would otherwise close, to biomass.**

    The Drax experience shows conversion to renewable biomass is eminently feasible for Latrobe Valley power stations. Logistics changes such as port works and rail lines will be necessary. A biomass conversion of an existing coal fired power station would maintain and expand Gippsland jobs and, crucially, provide base load power to the grid to help manage the intermittency of wind and solar.

11. **The State Government must set objectives for Latrobe Valley mine rehabilitation beyond just achieving a "safe, stable and sustainable" landform to include long-term benefits from pit lakes such as agricultural, horticultural, industrial, tourism and residential developments.**

Attachment A: Trip schedule

Date	Time	Activity	Location
Saturday, 24 June	3.00pm	Travel Melbourne to Manchester (via Doha), UK	
Sunday, 25 June	6.30am	Arrive Manchester, hire car to Hull	
Monday, 26 June	8:30am	Visit Siemens Gamesa Renewable Energy blade plant	Hull, UK
	11:00am	Visit RWE O&M base	Grimsby, UK
	1:30pm	Visit Orsted East Coast Hub (O&M base)	Grimsby, UK
	3:30pm	Visit Drax Immingham Port	Immingham, UK
Tuesday, 27 June	9:30am	Meeting with Hull City Council	Hull, UK
	11.00am	Meeting with East Riding - Yorkshire Council	Beverly, UK
	1:00pm	Meet with Equinor – Saltend Chemicals Park, tour Triton power station	Hull, UK
	4:00pm	Meeting with Mike Roach - NFFO	Hull, UK
	6.30pm	Visit Withernsea to view OSWF	Withernsea, UK
Wednesday, 28 June	9:00am	Visit Drax Power Station	Drax, UK
	12:45pm	Phone call with Pete Abson (National Grid)	By phone
	7.00pm	Fly Manchester to Copenhagen	
Thursday, 29 June	9:00am	Danish Energy Agency (Energistyrelsen)	Copenhagen, Denmark
	10:30am	Agriculture & Food (Landbrug & Fødevarer) + Food Nation	Copenhagen, Denmark
	2:15pm	Copenhagen Offshore wind farm tour	Copenhagen, Denmark
	6.30pm	Train Copenhagen to Esbjerg	
Friday, 30 June	10:00am	Visit Esbjerg Harbour	Esbjerg, Denmark
	12:30pm	Blue Water Shipping	Esbjerg, Denmark
Saturday, 1 July	12.00 pm	Train Esbjerg to Berlin (8 hours)	
Sunday, 2 July		Berlin	Berlin, Germany
Monday, 3 July	7.30am	Peter Laux, LEAG – travel to Cottbus	
	10.30am	Briefings with LEAG and Cottbus Chamber of Commerce	Cottbus, Germany
	2.30pm	Tour Janschwalde Mine and Cottbus See	Cottbus, Germany
Tuesday, 4 July	9.00am	Tour Schwarze-Pump power station	Spremberg, Germany
	11.30am	Visit Welzow Mine Rehabilitation area	Welzow, Germany
	3.00pm	Visit “F60” overburden bridge tourist attraction	Lichterfeld, Germany
	5.30 pm	Visit Großrachener See	Großraschen, Germany
Wednesday, 5 July	8.00am	Meeting with Land Brandenburg (Mining Authority)	Cottbus, Germany
	11.00am	Travel to Berlin Airport	
	4.40pm	Depart Berlin to Melbourne (via Doha)	
Thursday, 6 July	11.30pm	Arrive Melbourne	

Attachment B: Costs schedule

Date	Activity	Cost ($AUD)
Saturday, 24 June	Flight: Melbourne to Manchester (via Doha), UK (return)	5033.15
	Travel insurance	242
Sunday, 25 June	Hire car – four days	744.86
Sunday, 25 June	Accommodation – Travelodge, Hull (3 nights)	399
Wednesday, 28 June	Flight: Manchester to Copenhagen	278
	Accommodation: Wakeup Copenhagen (1 night)	187.79
Thursday, 29 June	Train: Copenhagen to Esbjerg (3 hours)	124.88
	Accommodation: Esbjerg (2 nights)	285
Saturday, 1 July	Train: Esbjerg to Berlin (8 hours)	121.45
Saturday, 1 July	Accommodation: Motel One Hauptbahnhof, Berlin (2 nights)	340.32
Monday, 3 July	Accommodation: Lindner Congress Hotel, Cottbus (2 nights)	253.52