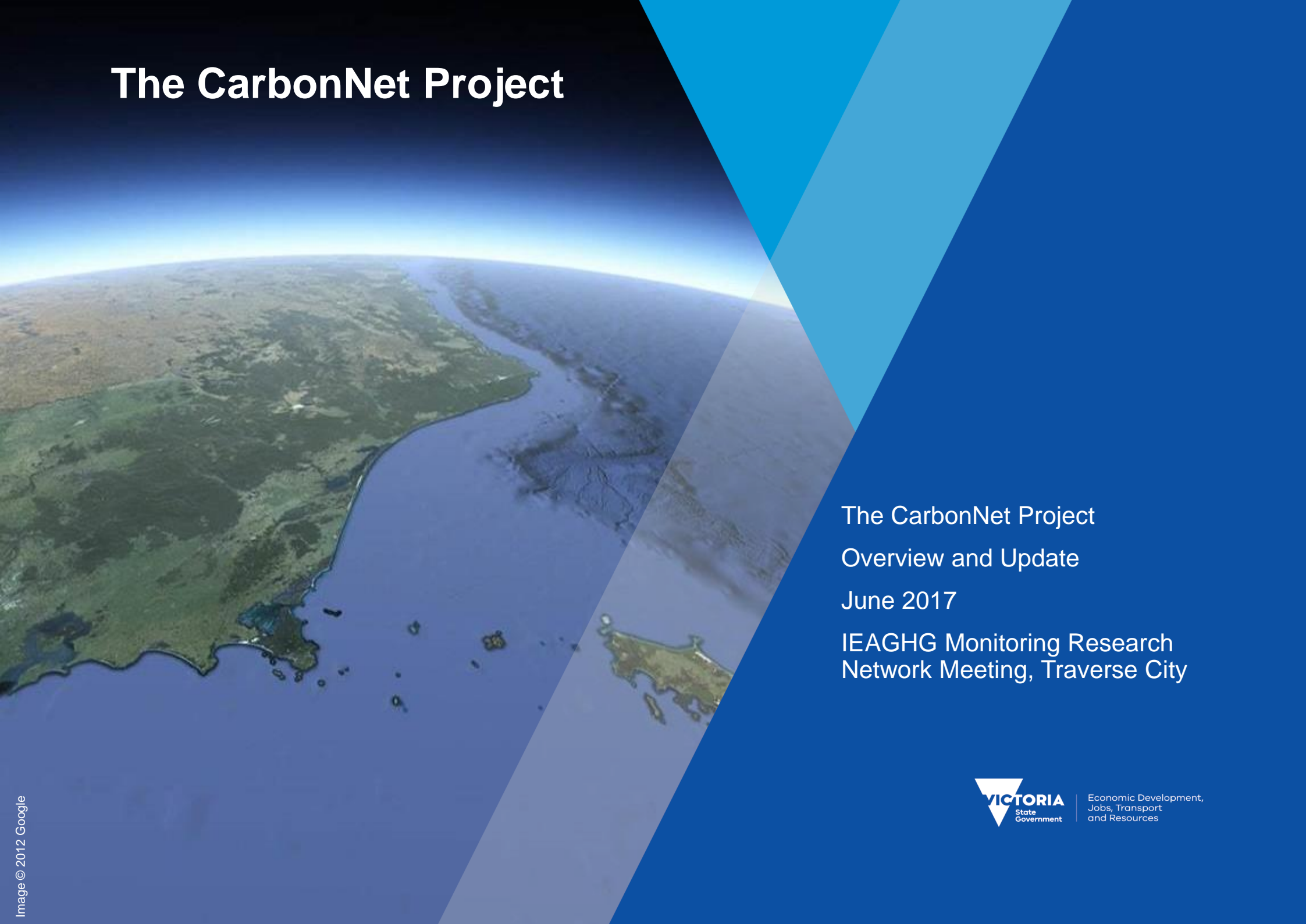


# The CarbonNet Project



The CarbonNet Project

Overview and Update

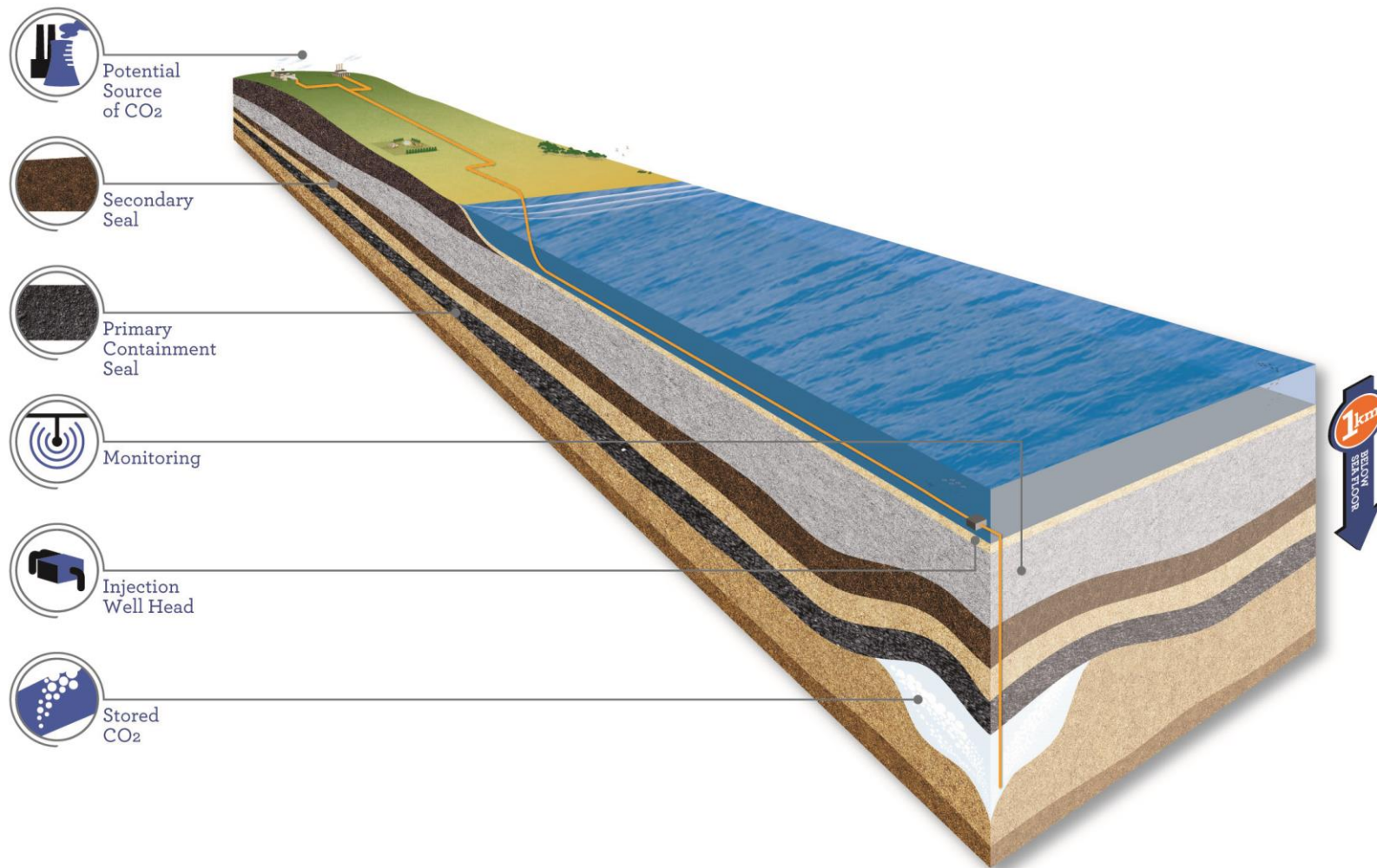
June 2017

IEAGHG Monitoring Research  
Network Meeting, Traverse City



Economic Development,  
Jobs, Transport  
and Resources

# CARBON CAPTURE AND OFFSHORE STORAGE



# MONITORING IN THE OFFSHORE/NEARSHORE THE CARBONNET EXPERIENCE

- **Commercial projects rely on proven technology**
  - Technology must be proven and cost-effective to be of value
- **3D seismic offshore**
  - The “Gold Standard” e.g. Sleipner.
- **Targeted Well Monitoring**
  - Full instrumentation of the injection/monitor well cluster (offshore) and an onshore sentinel – water well (eg CO2CRC Otway Stage 3)
- **AZMI**
  - Checking pressure across seals
- **Research programme (GipNet)**
  - Investigating whether other technologies might work in this complex nearshore zone

# CCS IN AUSTRALIA

## Australia is “bigger than Texas”



### GORGON LNG PROJECT (WA)

- Liquefied Natural Gas project currently being commissioned;
- 3.4 - 4 million tonnes per annum of CO<sub>2</sub> injected and stored in a deep saline formation;
- **The worlds largest dedicated geological storage.**



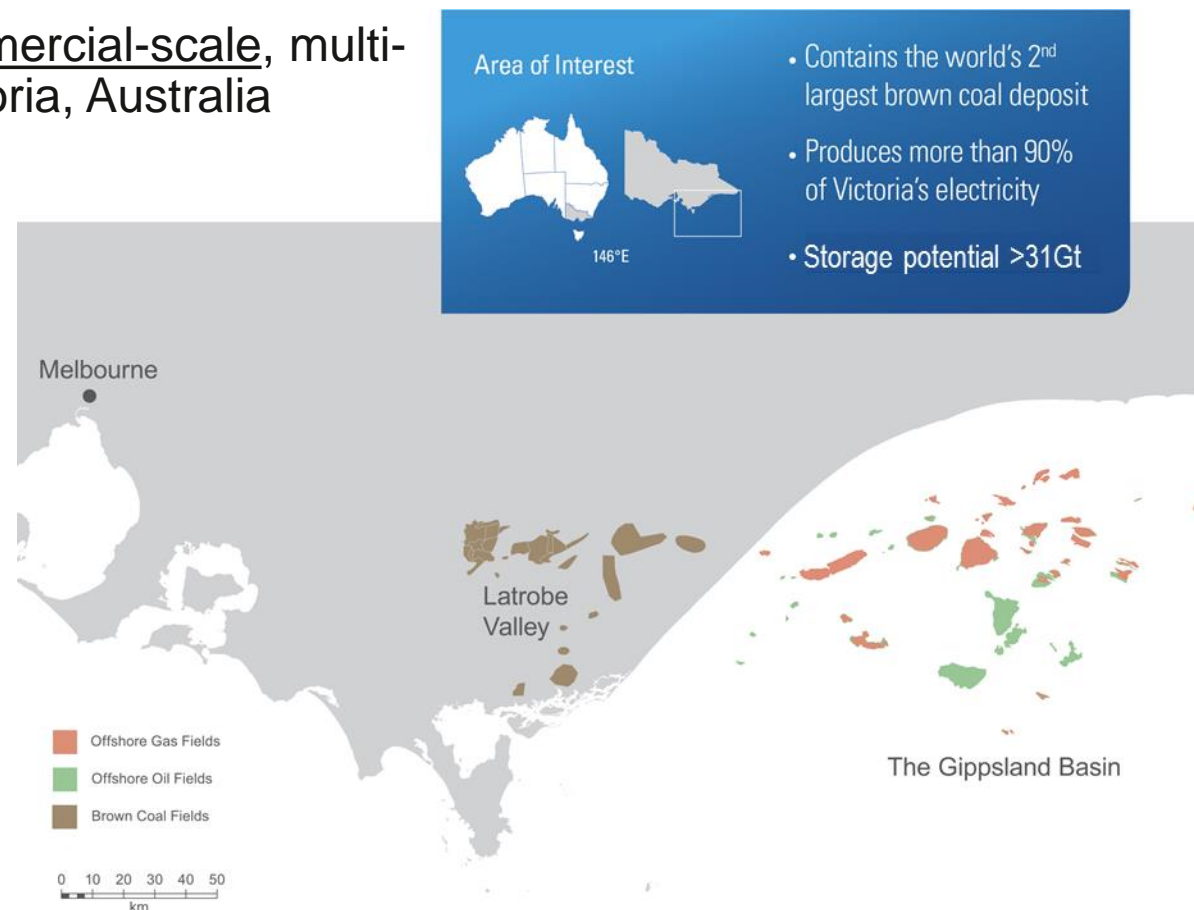
### CO2CRC OTWAY DEMONSTRATION PROJECT

- **The world’s largest carbon capture and storage demonstration project** with over 80,000 tonnes of CO<sub>2</sub> injected and stored in a variety of geological formations;
- The most comprehensive, internationally renowned, monitoring program that tests advanced technologies and techniques with the aim of reducing cost.



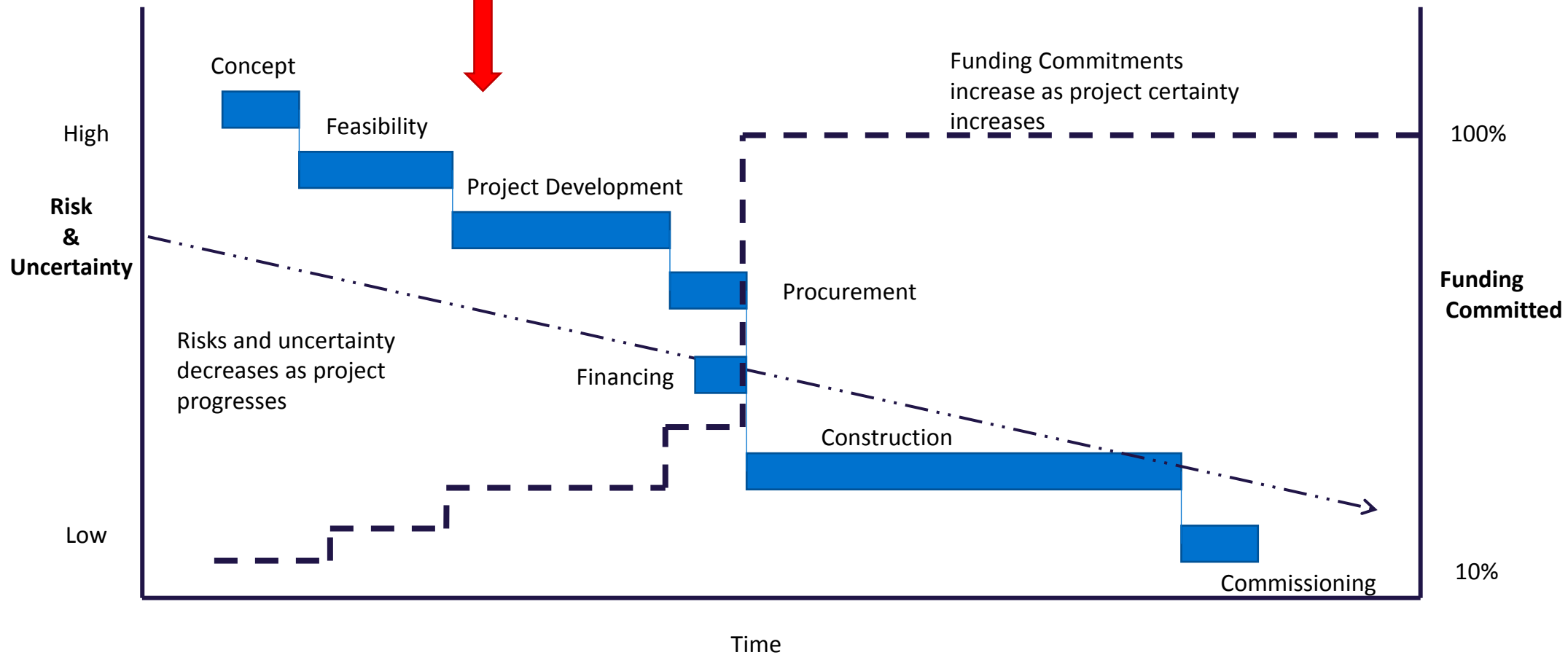
# THE CARBONNET PROJECT

- Investigating the feasibility for a commercial-scale, multi-user CCS network in Gippsland, Victoria, Australia
- Jointly funded by the Australian and Victorian Governments to 2020, also supported by GCCSI
- Governments have made significant research investment to support CarbonNet
- CO2CRC is CarbonNet's lead research organisation
- Working collaboratively with industry to secure customers and investors in a **CCS service**



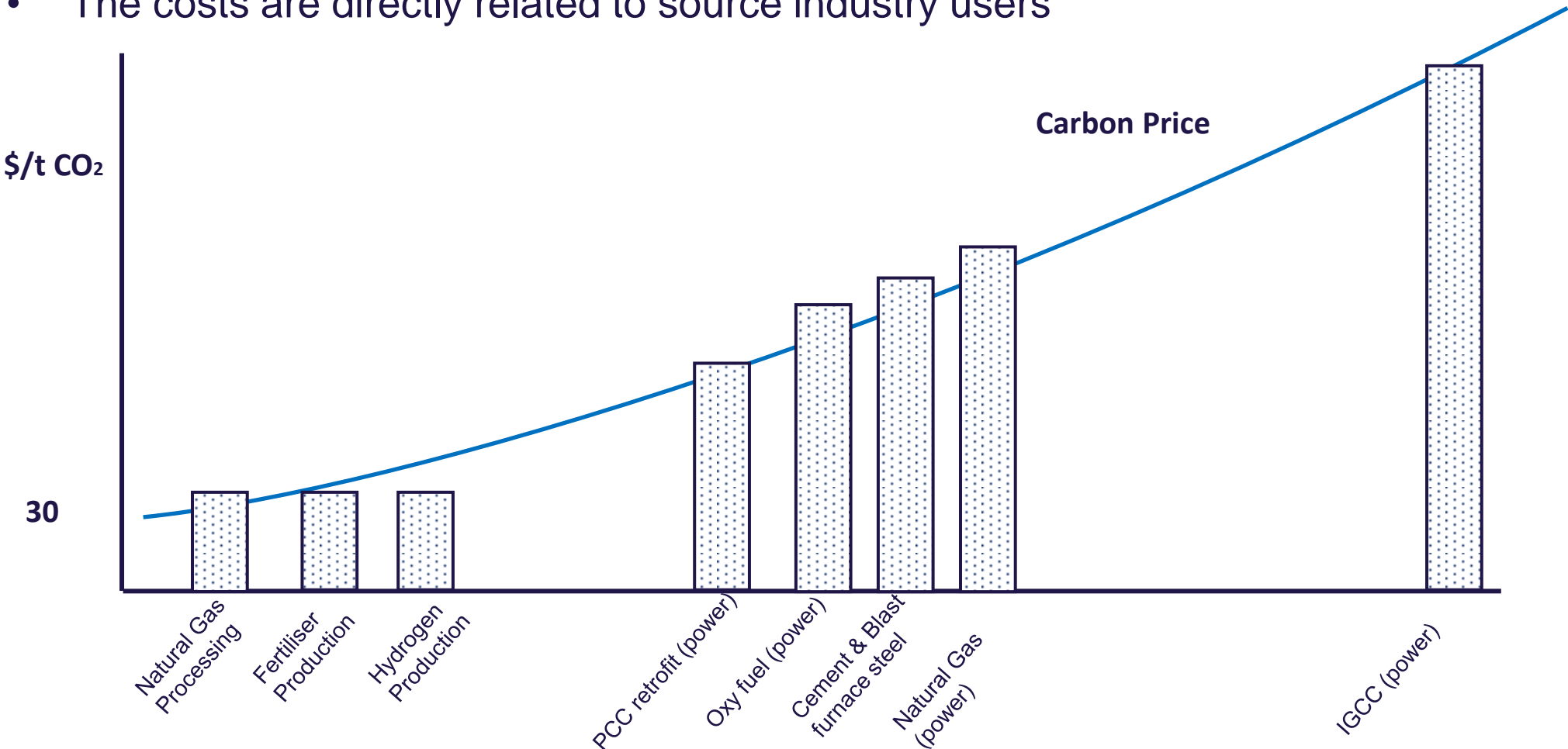
# A GATED APPROACH

We are here



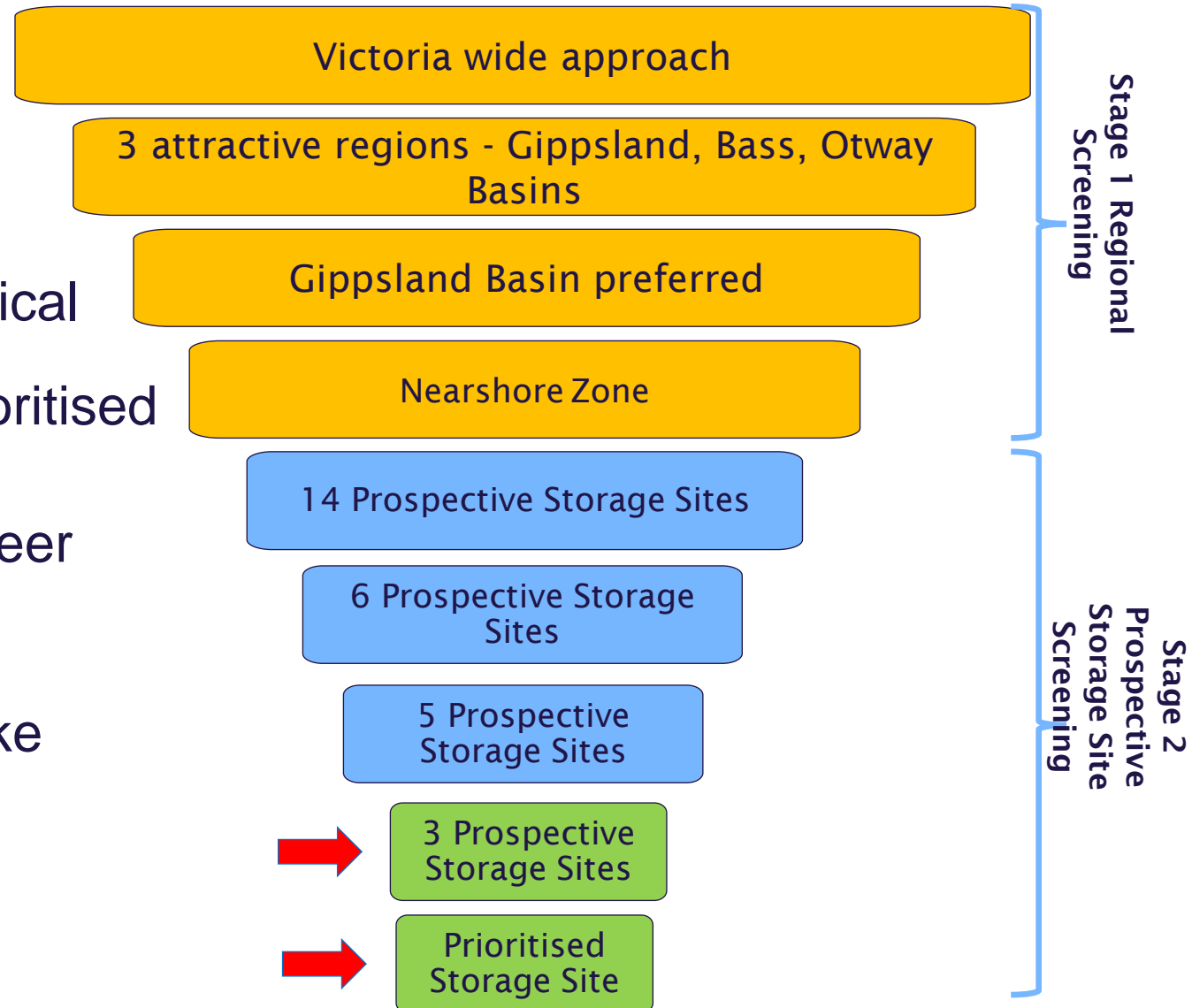
# COMMERCIAL VIABILITY

- CCS is not a homogenous product
- The costs are directly related to source industry users



# STORAGE CERTAINTY - A MAJOR FOCUS

- Two-stage process
  - regional
  - site specific
- Technical and non-technical assessment - criteria developed to identify prioritised storage sites
- Independent Scientific Peer Reviews
- Independent assurance certification by Det Norske Veritas:
- Statement of Feasibility
- Certificate of Verification



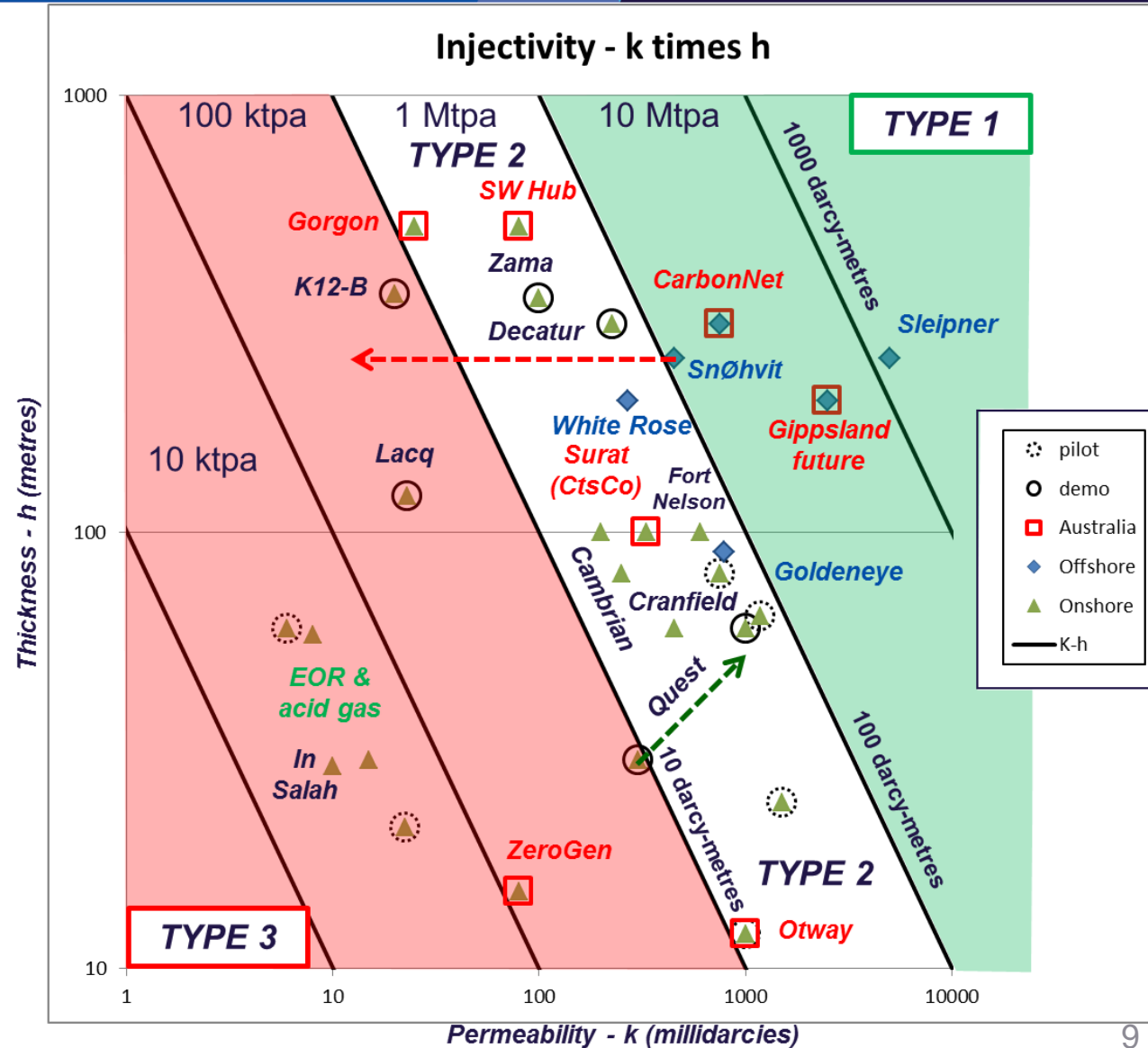


# RESERVOIR INJECTIVITY STORAGE 101

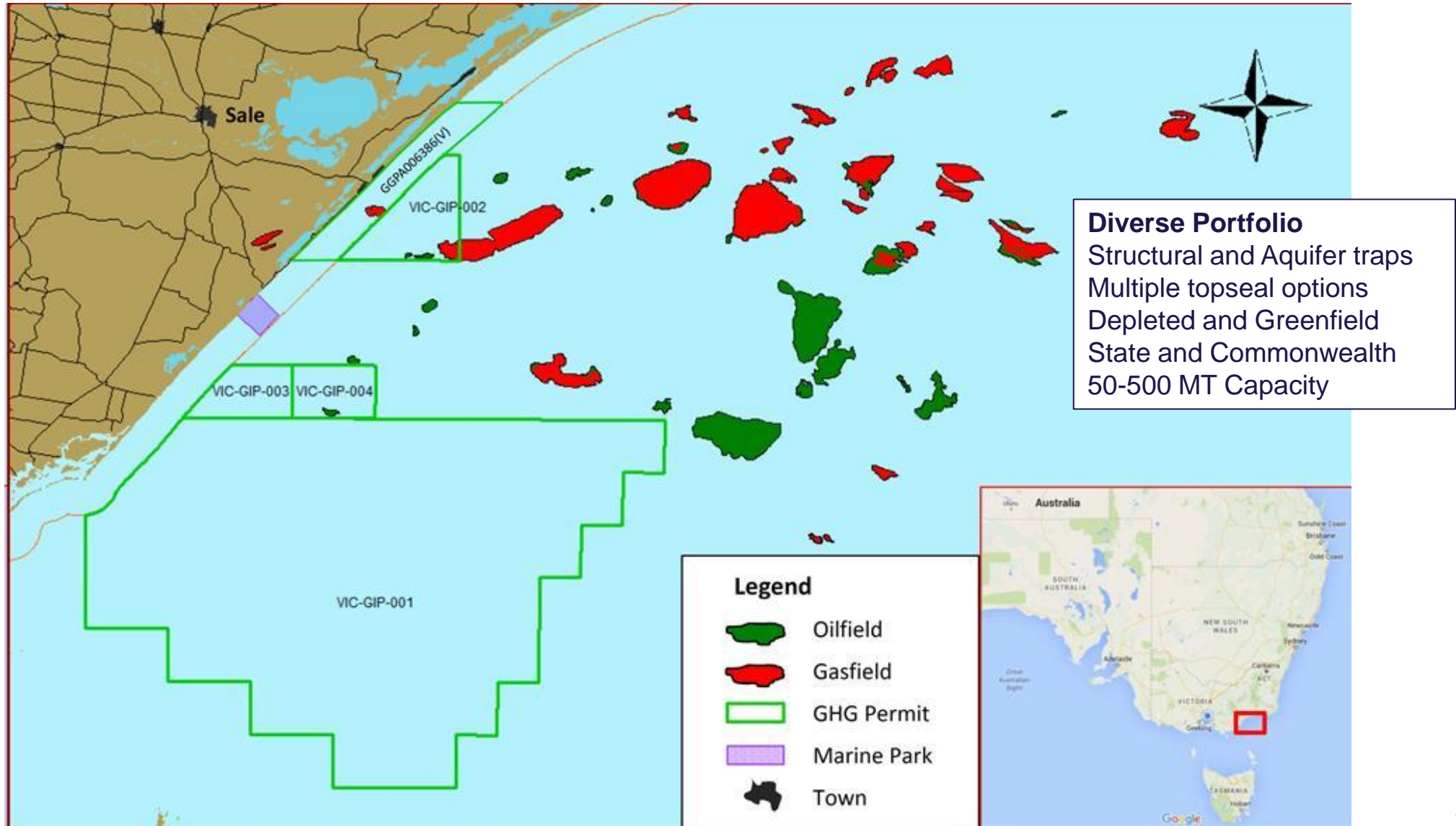
- There are three subsurface requirements for commercial success
- Injectivity
- Injectivity
- Injectivity

High-porosity offshore reservoirs are also easy to monitor with 3D seismic

High-porosity open aquifers avoid long-term pressure problems

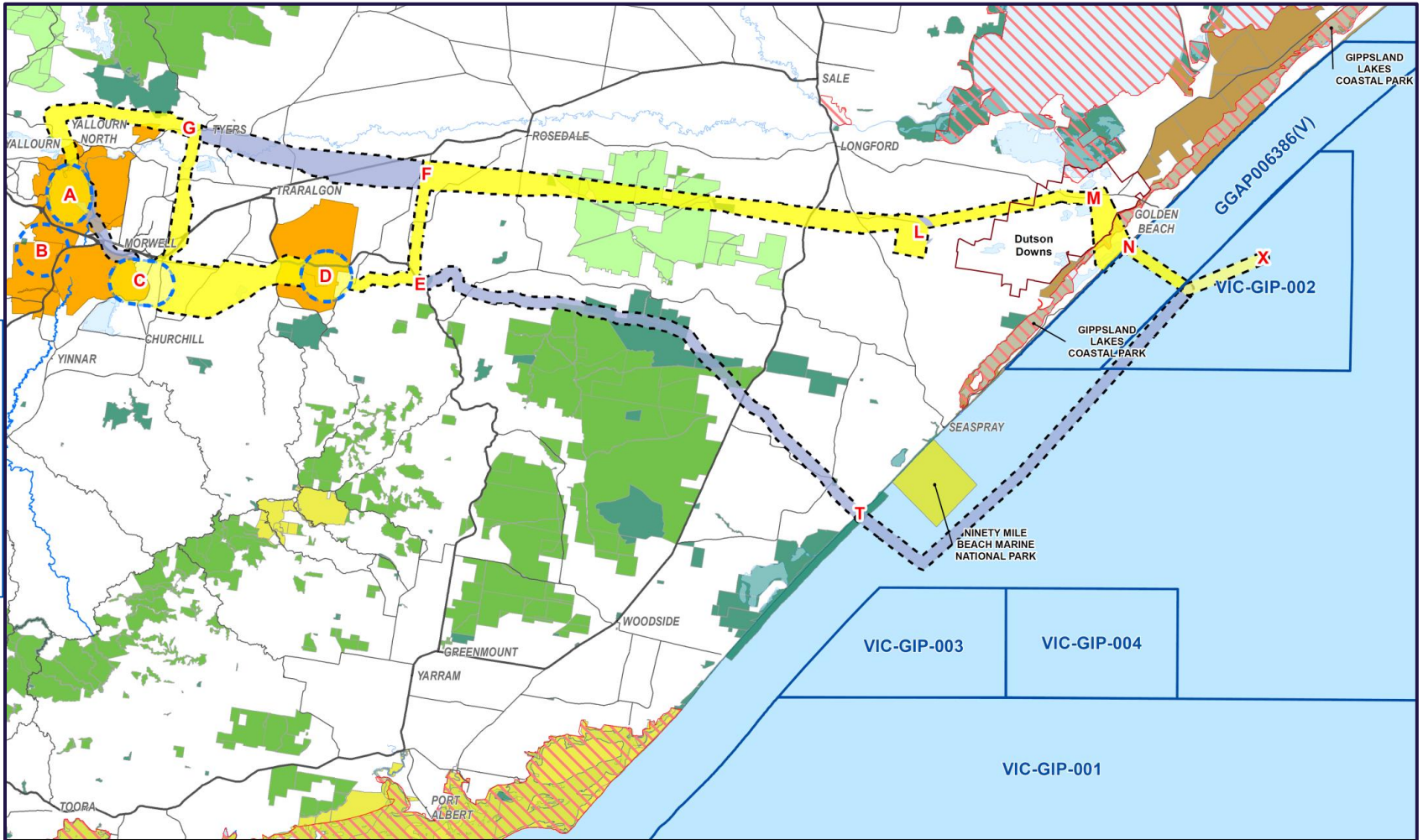


# CARBONNET PORTFOLIO



# PIPELINE FEASIBILITY STUDY

- The reference corridor is coloured yellow and the grey routes are alternative options
- The reference corridor avoids important cultural and topographic elements



PROJECT ID: 60275198  
 CREATED BY: DXE  
 LAST MODIFIED: 22 MAR 2017

DATUM: GDA 1994, PROJECTION: MGA\_ZONE 55  
 0 2,500 5,000 10,000  
 metres  
 (when printed at A3)

**Legend**

Potential Source Hubs	Ramsar Sites
Pipeline Corridor - Reference	Mining Licence Boundary (DPI)
Pipeline Corridor - Variation	National Park
GHG Assessment Permits	State Forest
	State Park
	Coastal Park
	Reserve

**CARBONNET FEASIBILITY STUDY  
 PRIORITISED CORRIDOR OPTIONS**

Department of Economic Development,  
 Jobs, Transport and Resources  
 CarbonNet Project

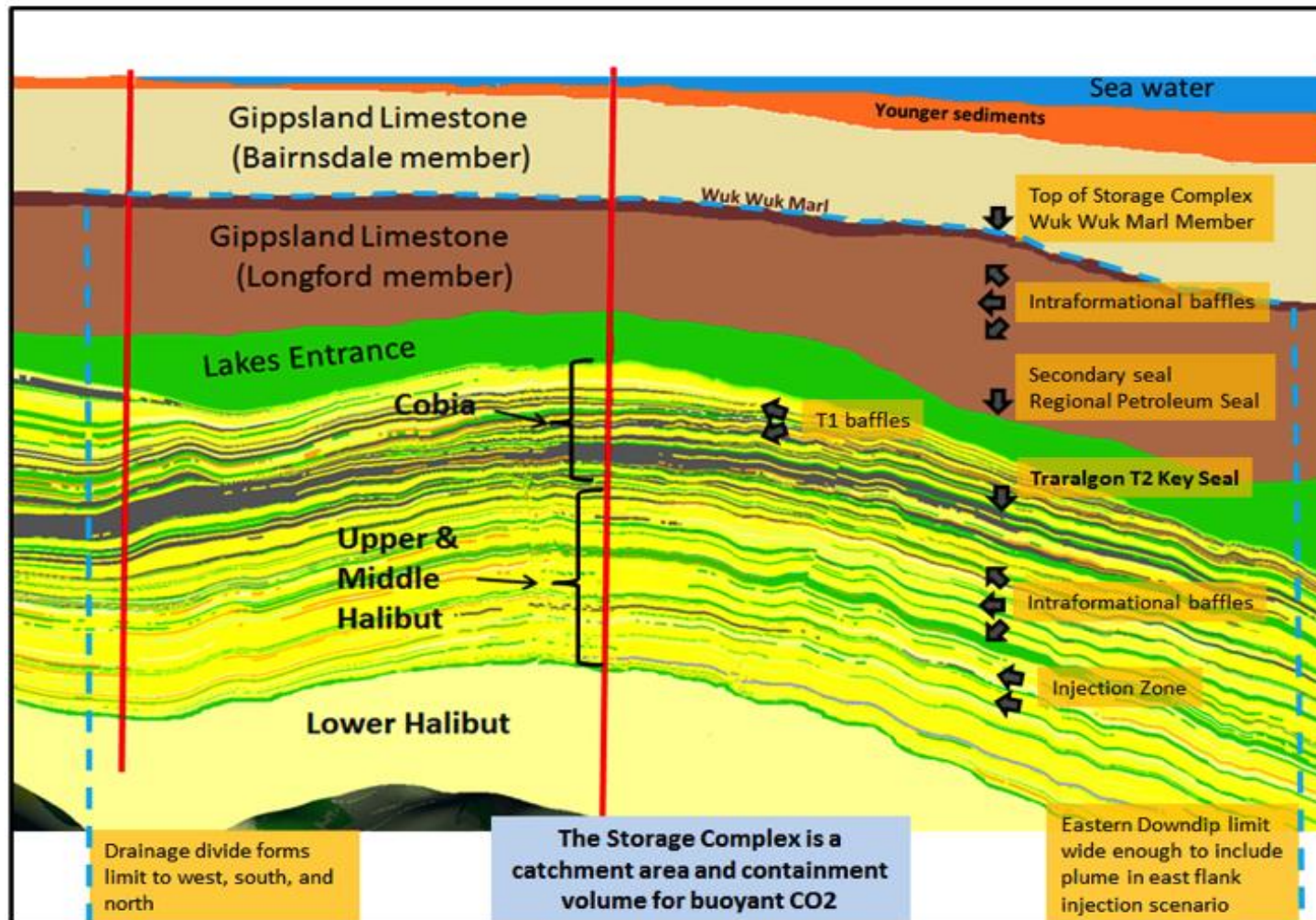
Figure  
**10**

1 Spring Street Melbourne

Data sources:  
 Base Data: (c) 2012 (DPI/DE)  
 (additional data)

# PRIORITISED STORAGE SITE

Two existing wells + 2D and 3D seismic data define the structure



## Site Screening

Existing Wells and seismic  
 Multiple topseal options  
 Greenfield  
 State and Commonwealth  
 Capacity (SPE definition)  
 1C: 125 MT  
 2C: 250 MT  
 3C: 500 MT  
 Advance to 1P/2P/3P with  
**Declaration of Storage & Injection Licence**

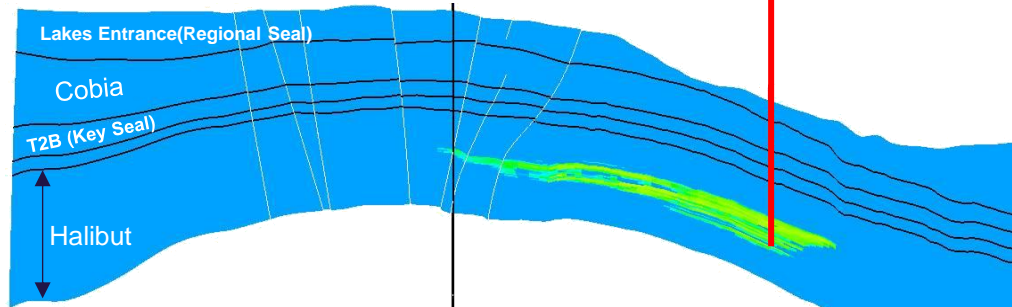
# MODELLING OF INJECTION SCENARIOS

WSW

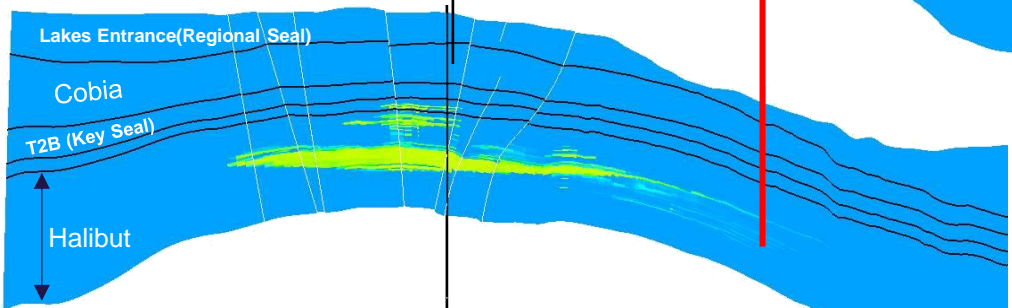
Crest

ENE

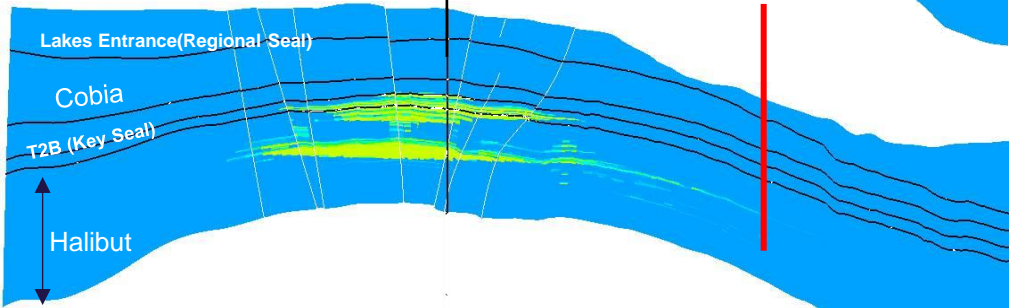
25 Years



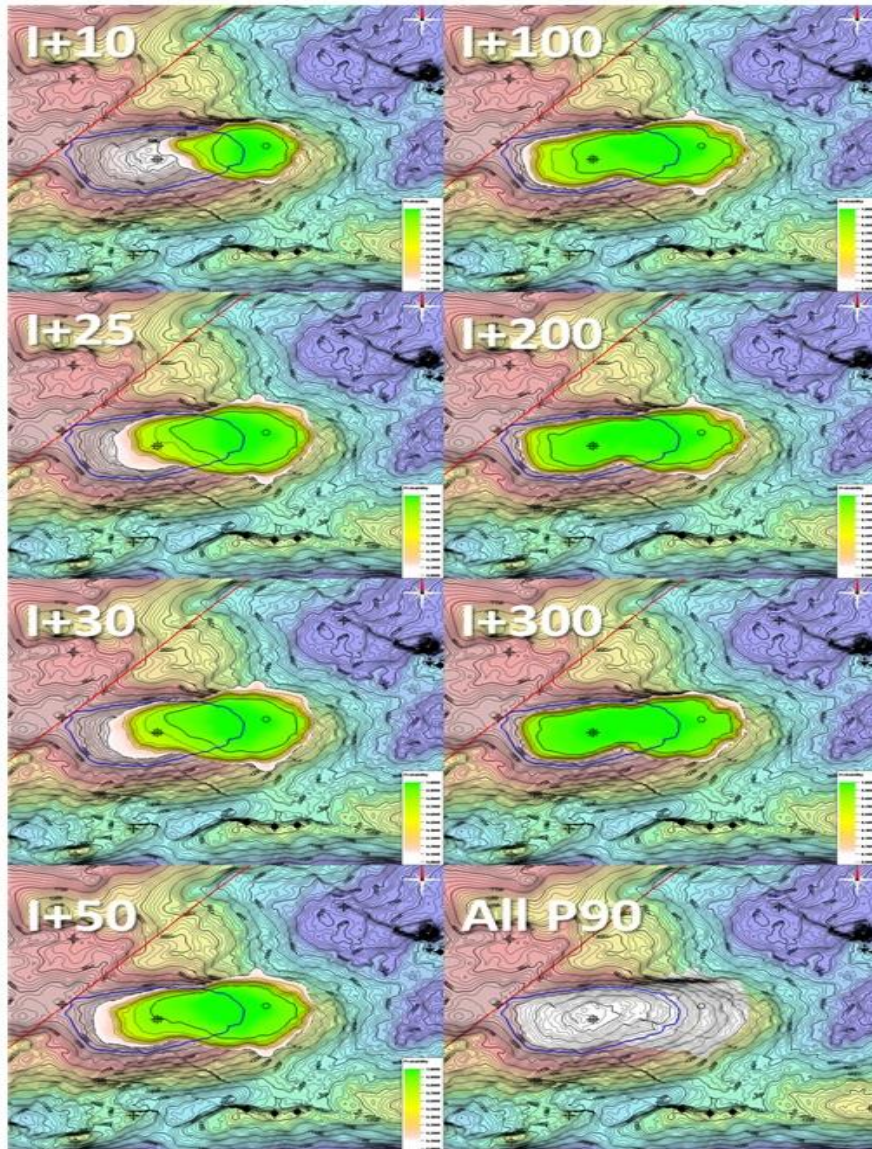
300 Years



1000 Years



# MODELLING FOR UNCERTAINTY AND SENSITIVITY



We have modelled the probability distributions for potential plume paths

Conclusion:

We know enough for the next regulatory approval step-

Declaration of Identified Storage Formation

When combined with DNV's certification this would represent a **bankable asset in resource development terms.**

# STORAGE SITE APPRAISAL- 3D MARINE SEISMIC SURVEY

CarbonNet is planning to conduct the 3D marine seismic survey in Bass Strait during the summer of 2017-18.

**This will be the baseline for future timelapse 4D**

**Covers plume P90 to 1000 years**

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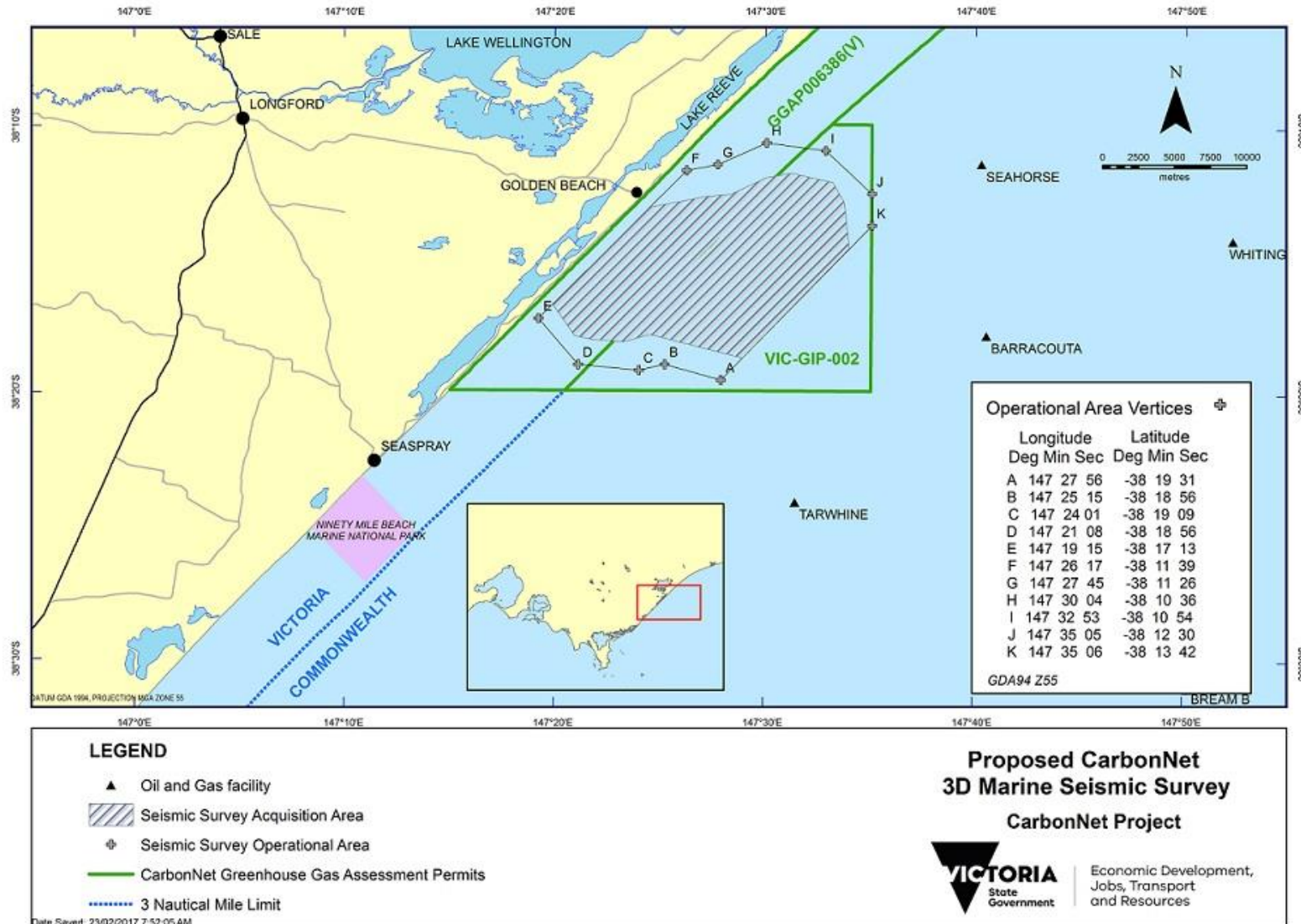
## Survey indicative parameters:

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Vessel size	4,000 – 7,000 tonnes
Number of streamers	Up to 6
Streamer length	4 km
Survey area	166 km <sup>2</sup>
Duration	Up to 15 days

---

# 3D MARINE SEISMIC SURVEY - LOCATION



This map shows the expected recording and operational area of the seismic vessel during normal operations, including turn areas. Support vessels will operate both inside and outside this area



# MARINE SEISMIC SURVEY – STAKEHOLDER ENGAGEMENT PLAN

Stakeholder engagement is a fundamental requirement to inform the Environment Plan (EP) to be submitted to regulators for approval:

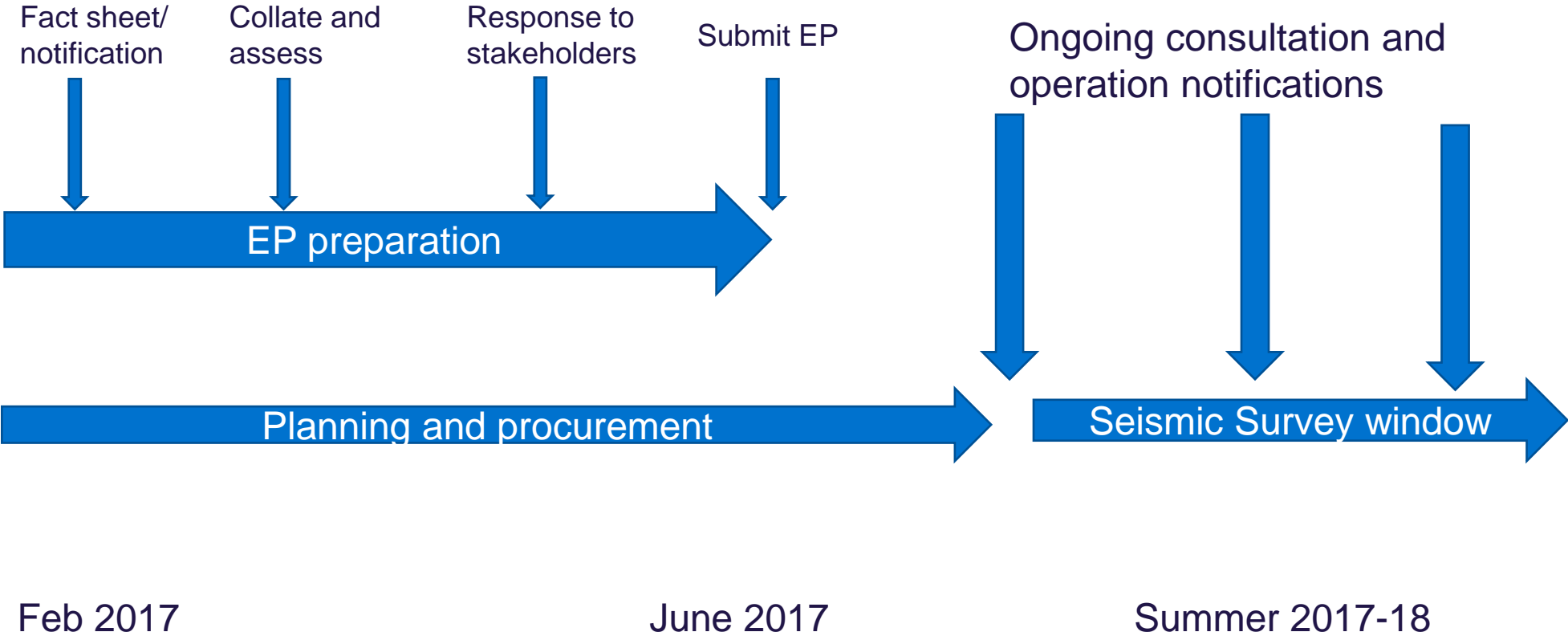
- Commercial fishing industry
- Oil and gas industry
- Local councils
- Local groups



CarbonNet also undertaking environmental impact assessments: field observations and modelling

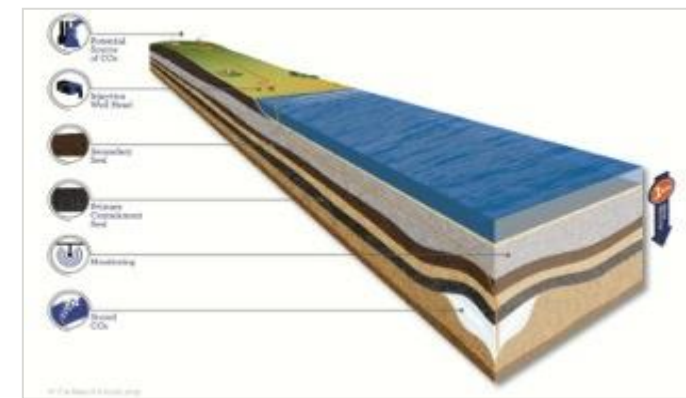
# MARINE SEISMIC SURVEY – STAKEHOLDER ENGAGEMENT PLAN

Stakeholder engagement will be ongoing throughout the planning and operation of the activity:



# PUBLIC PERCEPTION

- Public perception critical
  - Understanding local issues and interests
- Access to information
  - Fact sheets
  - Website and e-newsletter
  - Presentations
- GCCSI / CarbonNet partnership:
  - Publication of 9 Knowledge Share Reports
  - Technical Papers in peer reviewed journals
- CO2CRC / CSIRO / UoM partnership:
  - GipNet environmental baseline validation
  - Building community confidence in CCS



# GIPNET - ENVIRONMENTAL BASELINE TECHNOLOGY VALIDATION

## Commonwealth Education Investment Fund

- secured by CO2CRC as CarbonNet's lead research organisation
- approx \$6M for GipNet research assets
- co investment (assets and research) by proponents.
  - CSIRO
  - University of Melbourne
  - ANLEC R&D (ACALET & Commonwealth)
- technologies to be validated at CarbonNet's offshore storage sites
- important to build community awareness and regulatory confidence
- knowledge share report available on GCCSI website

# GIPNET - ENVIRONMENTAL BASELINE TECHNOLOGY VALIDATION

## Microseismic

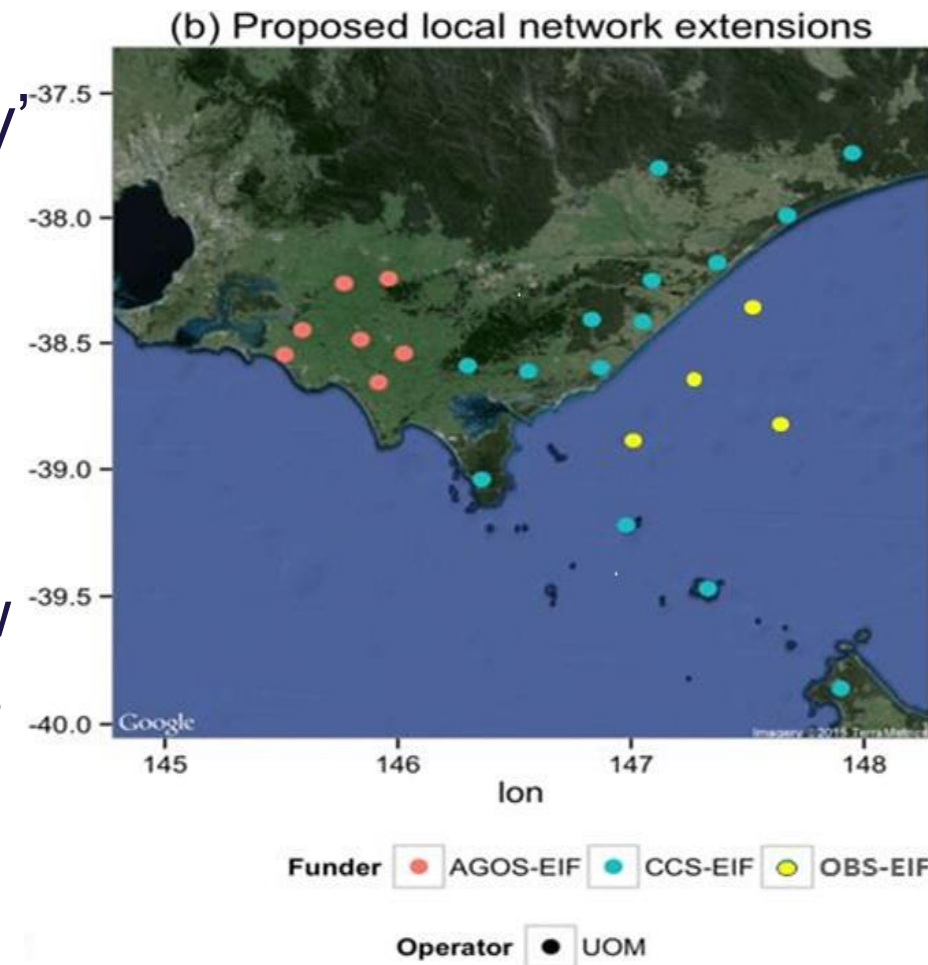
- validate monitoring protocols in ‘noisy’ nearshore environment

## Marine MMV

- builds on precursor ANLEC scoping study (7-0314-0230)
- Validate monitoring methods in shallow waters, including autonomous vehicles

## Atmospheric MMV

- Applies proven open path technology but across the onshore and offshore environment over longer distances



# GIPNET TIMELINE



GipNet Coordination  
– CO2CRC

CSIRO

Sea Bed Processes  
CN2015-02  
Part 1  
Desktop

Sea Bed Processes  
CN2015-02  
Part 2 In Field  
(Gipp)

Marine MMV Stage 2 Sea Trials (Tas)

Marine MMV Stage 3 (Bass Strait)

UoM

Atmospheric  
Local Area  
Network  
Onshore  
(Woll)

Deploy  
Atmospheric  
On/Offshore  
(Gipp)



Seismic  
Stage 1  
Deploy  
Onshore &  
Island based  
Local Area  
Network  
(Gipp)

Seismic  
Stage 2  
Deploy  
Offshore  
OBS (Gipp)\_



CarbonNet  
Baseline  
MMV  
Commences

# WHERE TO FROM HERE - CARBONNET

## Feasibility Stage key outcomes (2012-2016):

- Secure full access to portfolio of prioritised storage sites
- Prepare Application for Declaration for prioritised storage site
- Finalise a business case for next stage outlining:
  - a vision of what a CCS network in Gippsland and its estimated costs
  - what is the level of commitment from industry
  - what next steps government should take

## Project Development Stage (2017-2020):

- **Storage Site Appraisal** and GipNet environmental baseline validation
- Progressing industry collaboration – investment facilitation activities
- Transitioning CarbonNet to the private sector around 2020

## MORE INFORMATION

### Contact CarbonNet:

W: [www.earthresources.vic.gov.au/carbonnet](http://www.earthresources.vic.gov.au/carbonnet)

E: [carbonnet.info@ecodev.vic.gov.au](mailto:carbonnet.info@ecodev.vic.gov.au)

P: 03 8392 7535

GCCSI publications:

<https://www.globalccsinstitute.com/publications/CarbonNet>