

6TH ROUNDTABLE FOR STUDYING ENERGY SITUATIONS

ENERGY SECURITY FOR JAPAN – A ROLE FOR VICTORIA

Ministry of Economy, Trade and Industry (METI), Tokyo

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Secretary, Department of Economic Development,
Jobs, Transport and Resources

Victorian State Government

19 February 2018



Economic Development,
Jobs, Transport
and Resources



VICTORIAN GOVERNMENT CLIMATE CHANGE COMMITMENT 2017

The four pillars for emissions reduction



Decrease the amount of energy required to run our homes and fuel our economy and produce more using less energy.

Increase electricity generation from zero emission sources and eliminate dependence on fossil fuels.

Shift from fossil fuel energy for activities such as transport and heating to the use of electricity and switch from gas, petrol, diesel and other fossil fuels to clean energy.

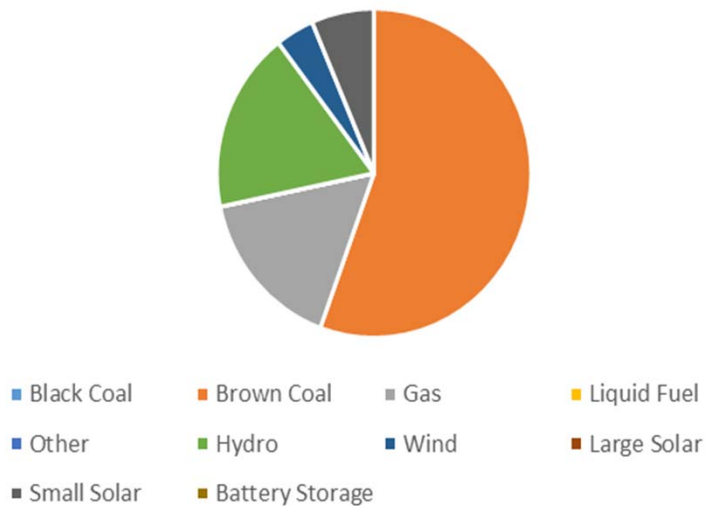
Change industrial processes and increase carbon storage in our natural environment.

“CCS technology could support emissions reduction action across multiple pillars including from industrial processes such as gas processing, refineries and chemical manufacturing.”

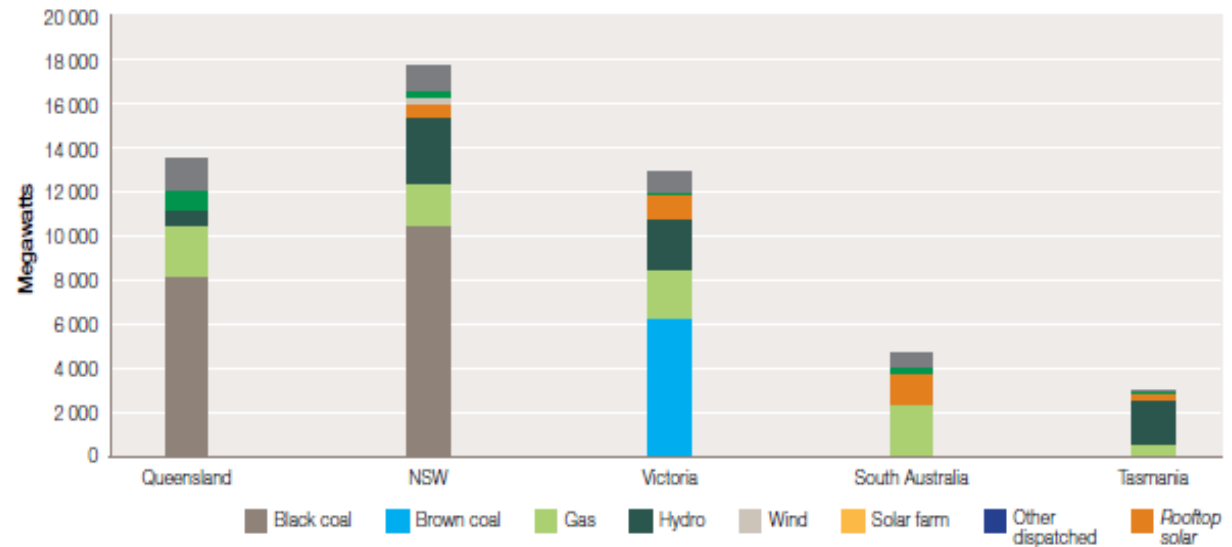
CAPACITY AND GENERATION BY FUEL SOURCE

- Brown coal's significant share of Victorian generation is decreasing
- First closure of large coal generator was 2017 (next forecast in 2020's)

Victoria's Energy Mix



Generation capacity in the NEM, by region and fuel source, 1 January 2017

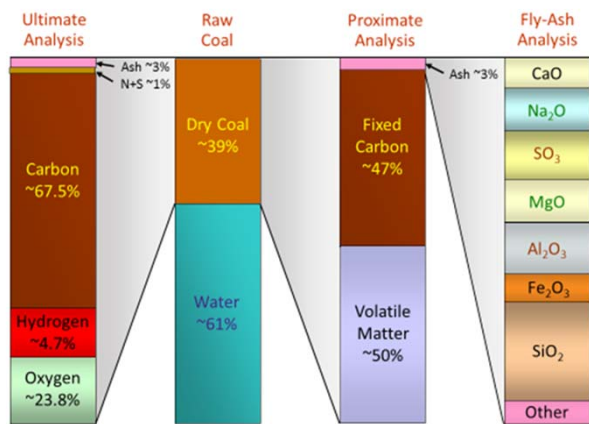


Note (figures 1.7 and 1.8): Rooftop solar generation is not traded through the NEM. Electricity generated from this source acts to reduce the demand for grid supplied electricity.

Sources (figures 1.7 and 1.8): AEMO; AER.

Source : <http://reneweconomy.com.au/nem-watch/> accessed 6 February 2018

ABUNDANT BROWN COAL AND STORAGE RESOURCES



- 2nd largest resource in the world
- Low in impurities
- Reactive
- Close to world class CO₂ storage site



VICTORIAN GOVERNMENT – COAL POLICY STATEMENT JULY 2017

- Framework for approving new coal projects
 - Consistent with *Climate Change Act 2017* and net zero emissions by 2050
- Sets initial emissions intensity at 0.45 t CO₂e/MWh
- Acknowledges strong interest in low emission - high value products for domestic and international markets
 - Eg: hydrogen and fertilisers
- New projects must mitigate emissions with CCS or offsets
 - Commits to completing CarbonNet
- Independent Expert Advisory Panel will review project proposals for compliance and viability
- See <http://earthresources.vic.gov.au/earth-resources/victorias-earth-resources/coal/policy-reviews/statement-on-future-uses-of-brown-coal>

STATEMENT ON FUTURE USES OF BROWN COAL

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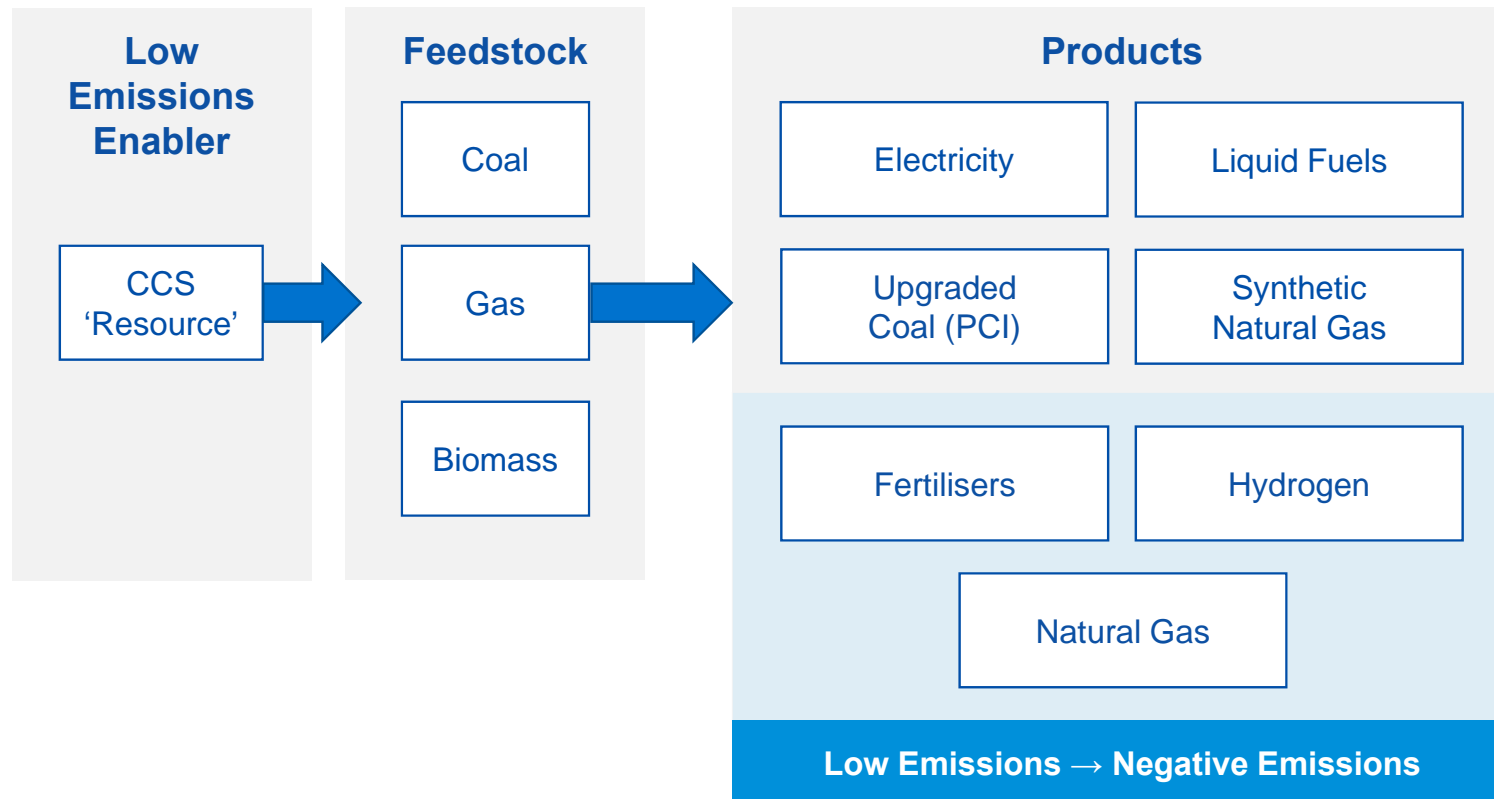
However, there is a fundamental change underway which will affect the way brown coal will be used in the future.

While brown coal-fired power generation supplies the majority of Victoria's electricity today, its share of generation will reduce over the coming decades with the retirement of existing generators, market conditions and the need to respond to climate change.

Climate change goals have been set at a global, national and local level. In the Paris Agreement, the global community agreed to limit warming to less than 2 degrees above pre-industrial levels. As part of its contribution to the Paris Agreement, Australia has set a domestic target to reduce greenhouse gas emissions to 26-28 per cent below 2005 levels by 2030. In Victoria, the *Climate Change Act 2017* provides the foundation for Victoria's action on climate change. The Act includes an economy-wide target of net zero greenhouse gas emissions by 2050, and as a first step, the Government has set an interim 2020 target of 15-20 per cent below 2005 levels. The Act requires progressively stronger legislated targets every five years from 2020. Decisions regarding new uses of brown coal will be made against the backdrop of these commitments.

At the same time, there is strong investor interest in using our valuable coal resources to make alternative high value, low emission products for domestic and international markets. These projects could provide new economic development and trade opportunities, bringing high-skilled jobs and investment to the Latrobe Valley and Gippsland.

CCS: ENABLES LOW EMISSION USES OF BROWN COAL



RECOGNITION OF THE BENEFITS OF CCS

- Intergovernmental Panel on Climate Change (2015)
 - AR5 report re-emphasised the need for CCS to address climate change
 - 138% more expensive without CCS to meet COP21
- Global Carbon Capture and Storage Institute (2016)
 - 2016 Global status report: 21 large-scale projects operational by end 2017
 - call to policy makers to address barriers and accelerate deployment
- CSIRO (2015)
 - National Outlook to 2050: CCS important opportunity for Australia
- ClimateWorks (2014)
 - Pathways to Deep Decarbonisation in 2050: CCS and renewables important
- Commonwealth Energy White Paper (2015)
 - includes focus on CCS storage capacity
 - acknowledges opportunities for brown coal and hydrogen, with CCS

CCS IN AUSTRALIA

OTWAY DEMONSTRATION PROJECT (CO2CRC, Victoria)

- Established in 2008
- World's largest CCS demonstration (80,000 tonnes of CO₂ injected and stored)
- Comprehensive, internationally renowned, monitoring program that tests advanced technologies and techniques to reduce cost
- Community engagement from the outset

GORGON LNG PROJECT (WA)

- Currently being commissioned
- 3.4 - 4 million tonnes per year of CO₂ injected and stored in a deep saline formation
- World's largest dedicated geological storage

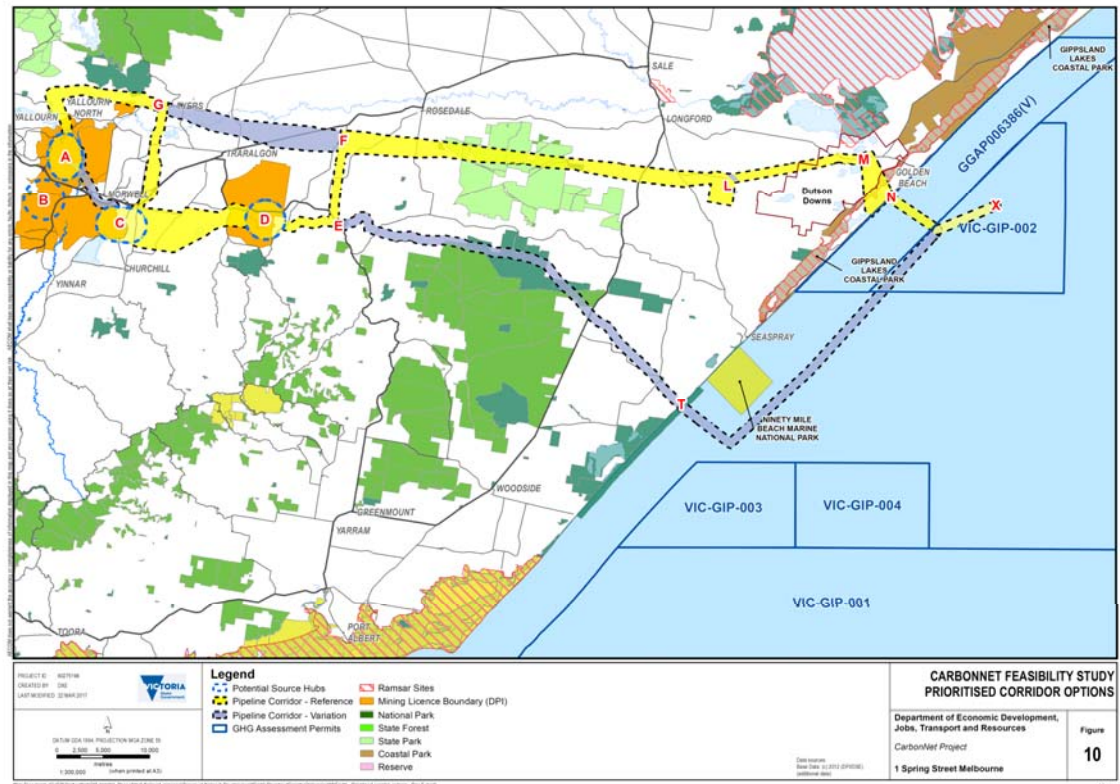


Source: CO2CRC

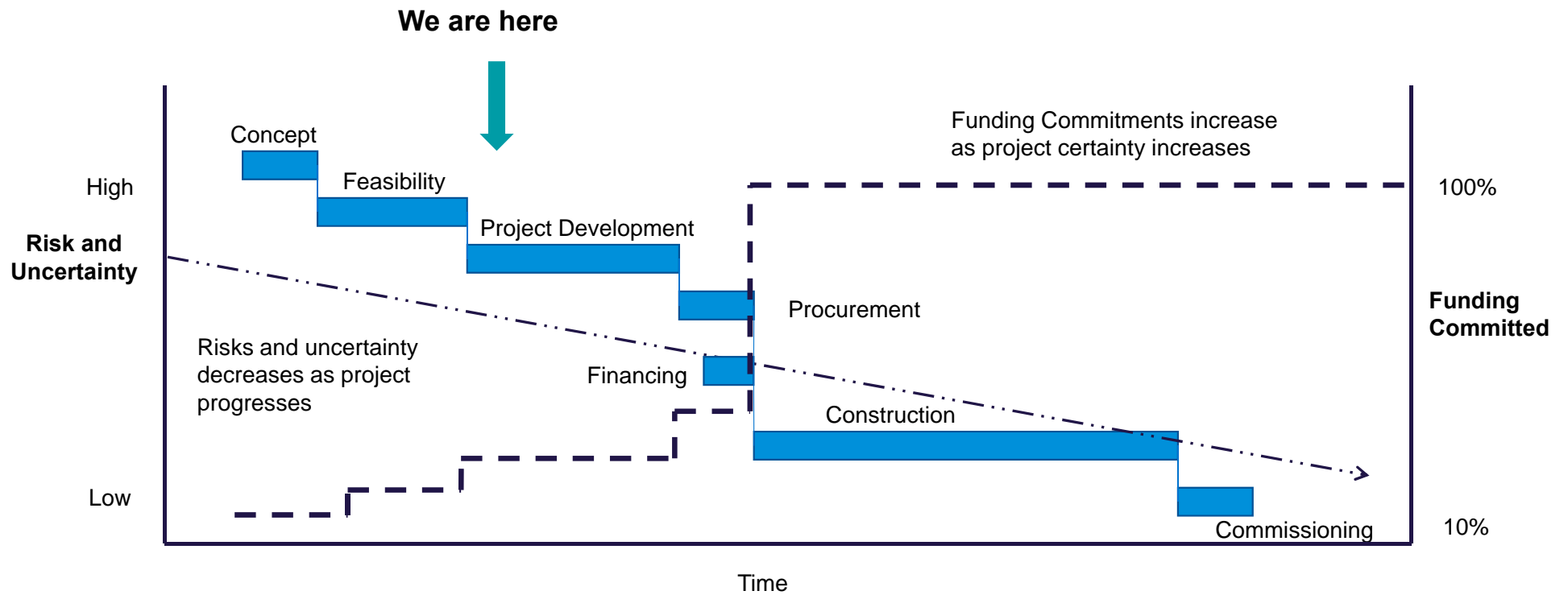


CARBONNET PROJECT

- Developing a large-scale, multi-user CCS network in Gippsland region
 - Near-shore injection for offshore storage
- Jointly funded by the Australian and Victorian Governments to 2020
 - \$A150m for feasibility and development
- CarbonNet's Pelican storage site has 125 million tonnes at P90
- Significant research investment
- Knowledge sharing via Global Carbon Capture and Storage Institute
- Collaboration with industry to secure customers and investors



CARBONNET STATUS



COMMUNITY SUPPORT IS CRITICAL



Community Education

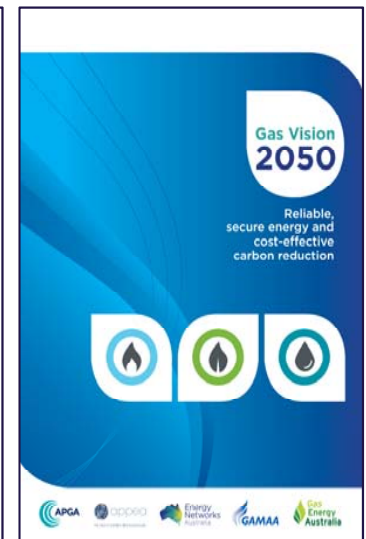
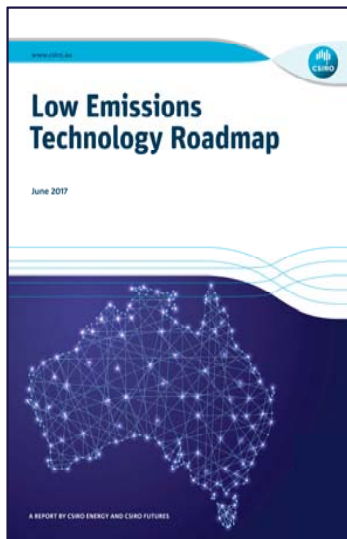
Improved understanding of new low emissions coal opportunities, including the role of CCS

Access to information

Engagement – strategic and accessible factsheets, presentations and web content

HYDROGEN AS A DOMESTIC ENERGY SOURCE

Growing recognition in Australia of the future importance of hydrogen

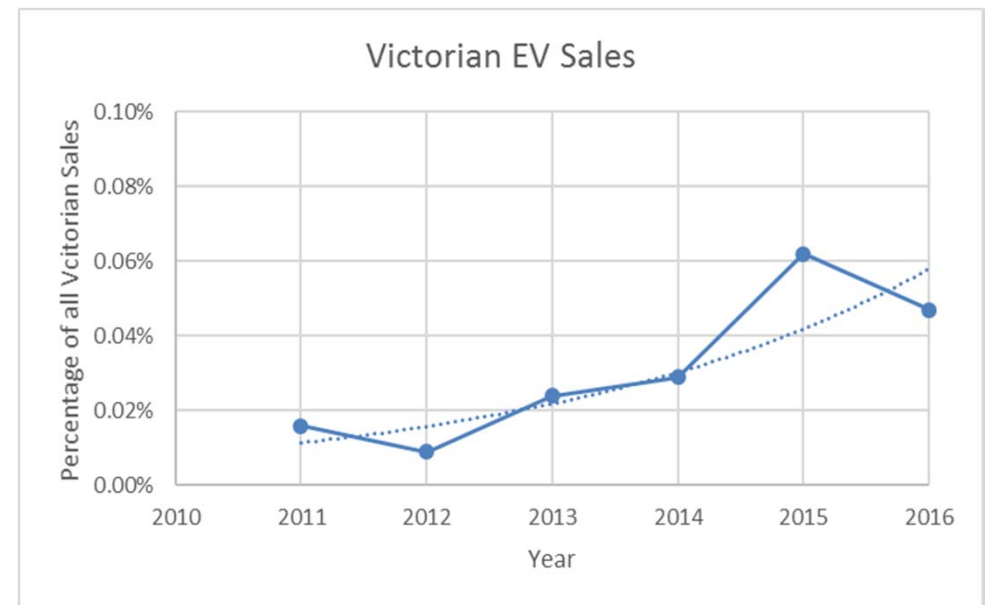


POTENTIAL DOMESTIC USES

- Growth in renewable power will need gas-fired generation, batteries and pumped hydro to balance the grid
- As renewables share grows and emission caps tighten, hydrogen should become more important
 - A growing renewable surplus could become a large second source
- Hydrogen may also be a key source of industrial heat in place of fossil fuels
- There is a growing focus on reducing vehicle emissions
 - Hydrogen may become an important transport fuel, complementing battery-electric vehicles
- Hydrogen exports would provide Victoria and Australia with a key option for domestic energy security

ELECTRIC AND HFC VEHICLES

- Electric vehicles are less than one per cent of light vehicles sales in Victoria, due to:
 - limited model choice (only two brands)
 - lack of charging infrastructure
 - perceived low vehicle range
 - high purchase price
- Battery electric vehicles projected to increase in the next decade, assuming:
 - costs equal conventional vehicle prices
 - more models are available
- Less clear when hydrogen fuel cell vehicles could enter the local market
 - may displace larger, long-distance vehicles (trucks, trains, buses)



SUMMARY

- The world has begun a major transformation to reduce carbon emissions while providing secure and affordable energy
- Victoria's brown coal resources will move from producing electricity with high emissions to other products with low emissions
- Victoria's large coal and carbon storage resources combined with Japanese technology could contribute to energy security in both countries
- The Hydrogen Energy Supply Chain project builds on a mature and trusting relationship

QUESTIONS



Economic Development,
Jobs, Transport
and Resources

第6回エネルギー情勢懇談会 日本のエネルギー安全保障 – ビクトリア州の役割

経済産業省

オーストラリア ビクトリア州政府
経済開発・雇用・運輸・資源省次官

リチャード・ボルト

2018年2月19日



Economic Development,
Jobs, Transport
and Resources



ビクトリア州政府の気候変動公約 2017

排出削減の4本柱



エネルギー効率と生産性の向上



電カクリーン化



電化・燃料転換



非エネルギー部門の排出削減とCCS拡大



日常生活に要するエネルギーの消費量を削減し、より少ないエネルギーで経済を回し、生産性の向上

ゼロエミッション発電を促進し、化石燃料への依存を断つ

運輸や暖房等にも電力を利用し、ガス・石油・ディーゼル等の化石燃料をクリーンエネルギーで代替

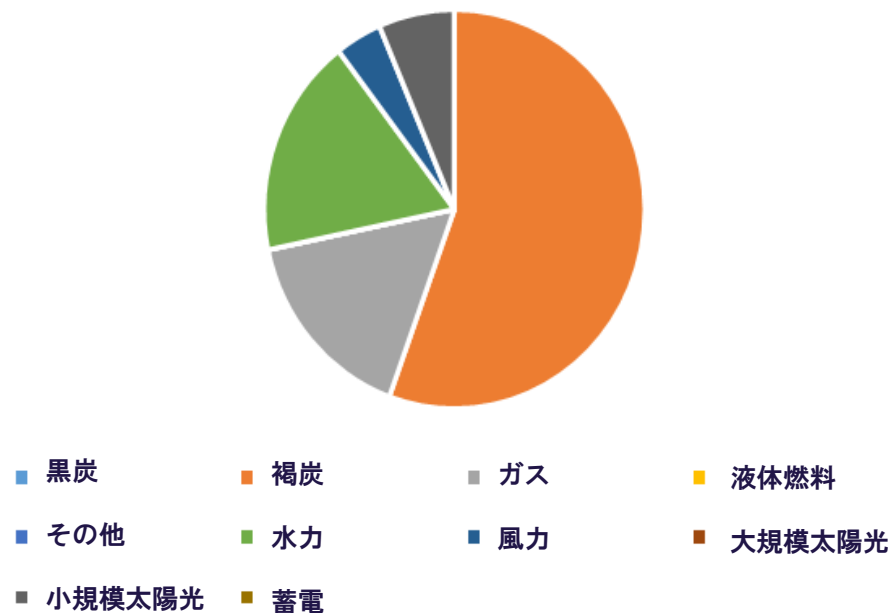
産業プロセスを変え、自然環境におけるCCSを拡大

「ガス処理・精製・化学品製造など、産業工程からのGHG排出低減に対し、CCS技術は分野横断的に貢献が可能」

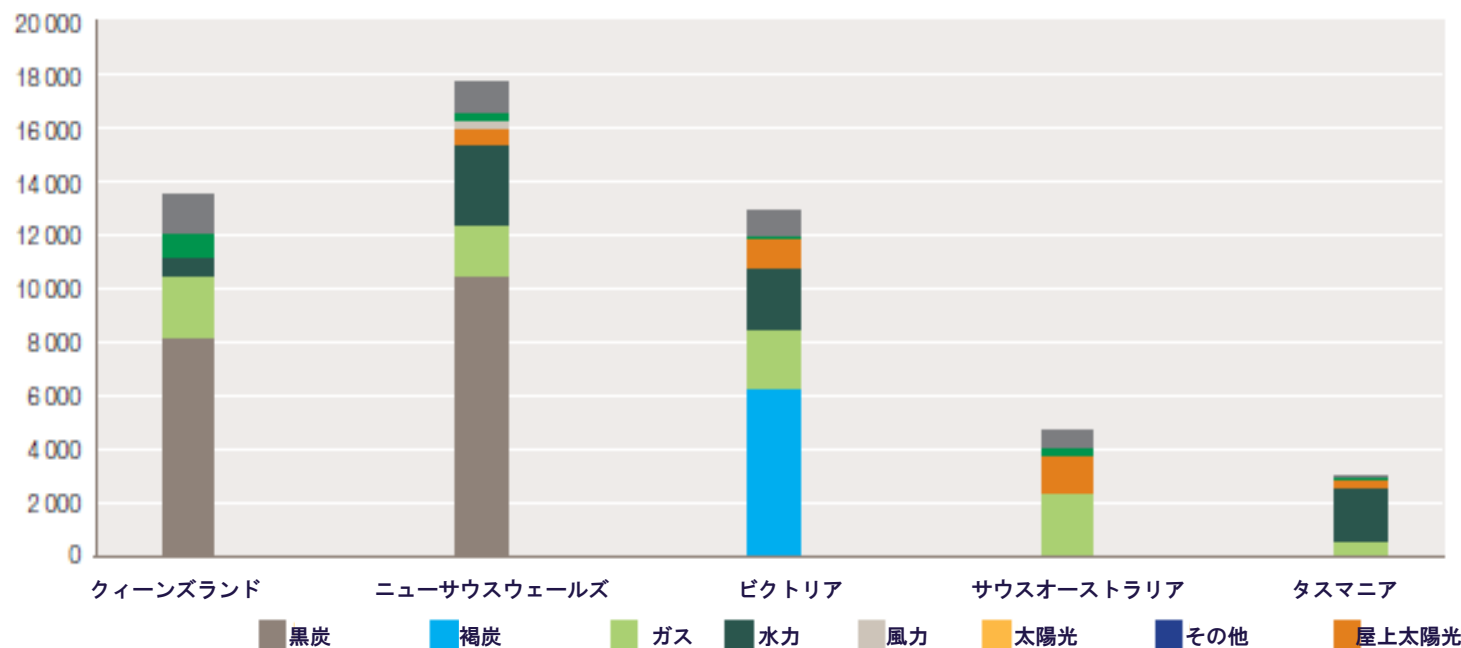
燃料源別発電容量

- ビクトリア州で著しく高かった褐炭の割合は減少中。
- 大規模石炭火力発電所が2017年に初めて閉鎖（次の閉鎖予定は2020年代）

ビクトリア州のエネルギーミックス



NEM（電力取引市場）における州・エネルギー別の発電容量（2017年1月1日時点）

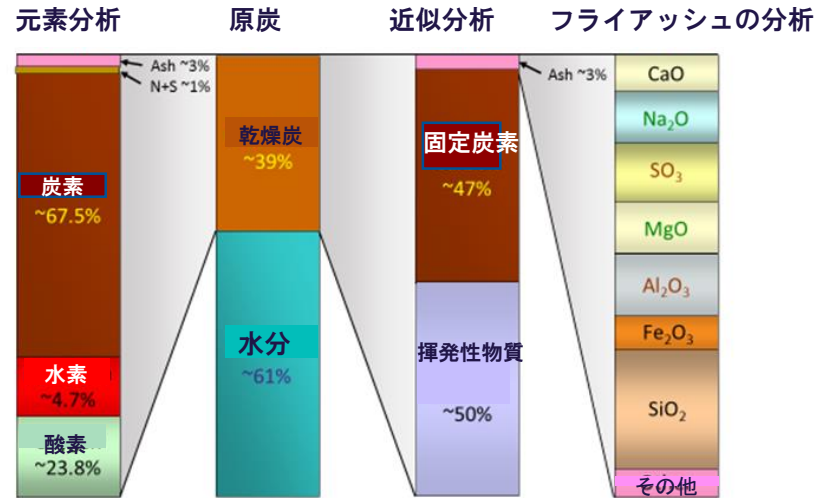


Source : <http://reneweconomy.com.au/nem-watch/>
2018年2月6日にアクセス

注（図1.7と1.8）：屋上太陽光発電による電力はNEMで取引されていないものの、
系統電力の需要の削減には貢献している。

出典（図1.7と1.8）：AEMO、AER

豊富な褐炭資源と莫大なCO2貯留容量



- 資源量では世界第2位
- 不純物が少ない
- 反応性が高い
- 世界有数のCO₂ 貯留地に近い



ビクトリア州政府 – 石炭政策の概要（2017年7月）

- 新規石炭プロジェクトの認証条件
 - 気候変動法令（2017年）に準拠し、2050年までにネット排出量がゼロとなること。
- 排出原単位は0.45 t CO₂e/MWhとする。
- 国内外市場向けの低排出・高加価値製品に対する関心の高まりを認識
 - 例：水素と肥料
- 新規プロジェクトについてはCCSによって排出を削減または相殺
 - CarbonNetプロジェクトの確実な実施。
- 独立した専門家による諮問機関が法令準拠と実行可能性の観点からプロジェクトのプロポーザルを審議。
- 参照先 <http://earthresources.vic.gov.au/earth-resources/victorias-earth-resources/coal/policy-reviews/statement-on-future-uses-of-brown-coal>

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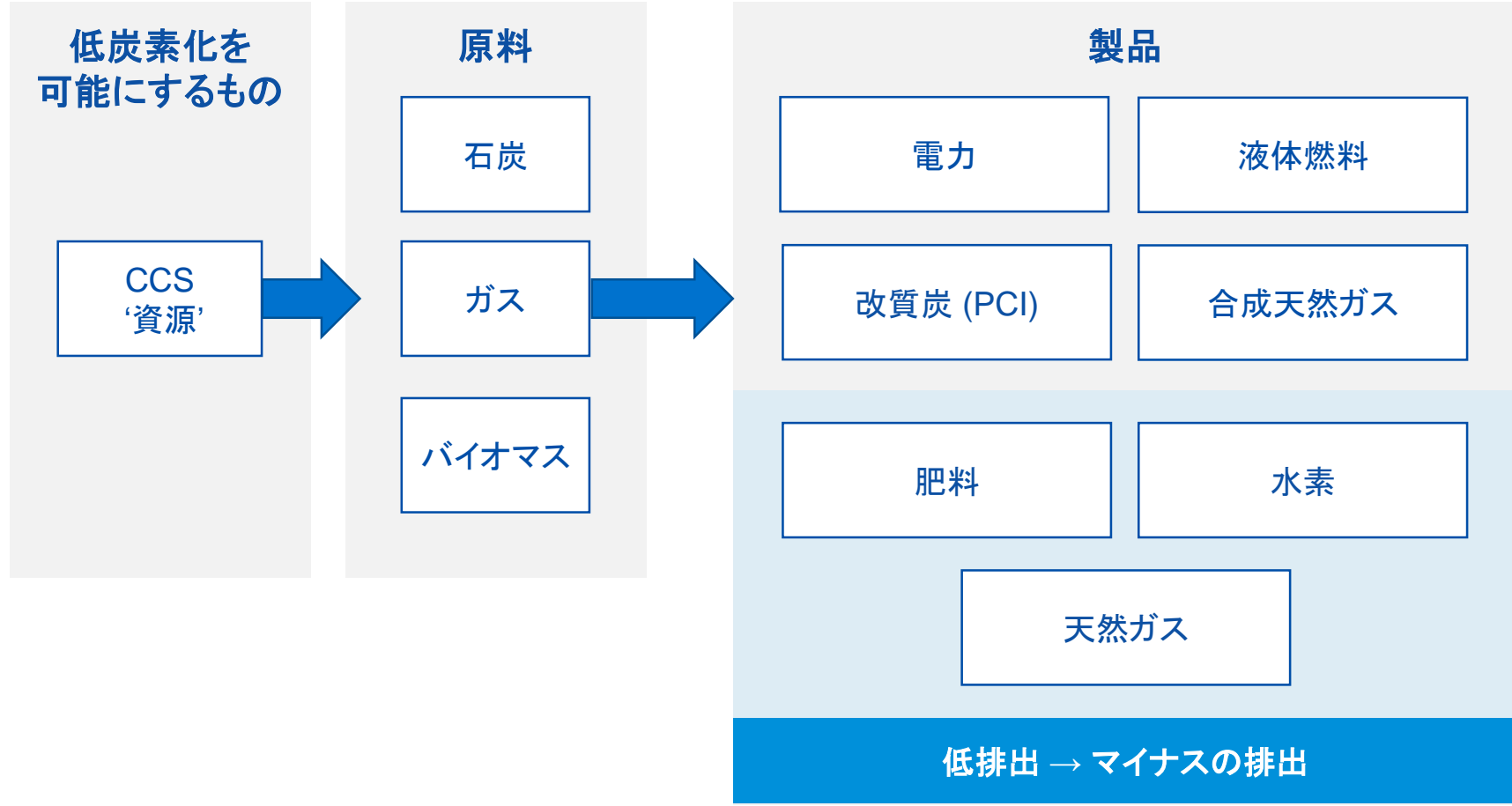
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CCS: 褐炭の低CO2排出的利用を実現



CCS便益について確認

- 気候変動に関する政府間パネル（2015）
 - 気候変動に対処する上でのCCSの必要性をAR5報告書が改めて強調
 - CCSなしでCOP21の目標を達成する場合のコストは138%増し
- Global Carbon Capture and Storage Institute (2016)
 - 2016年世界状況報告書：2017年末までに21の大規模プロジェクトが稼働
 - 政策立案者に障壁の撤廃と導入の促進を要請
- CSIRO (2015)
 - 2050年に向けた国家展望: オーストラリアにとってはCCSの重要な機会
- ClimateWorks (2014)
 - 2050年の脱炭素社会に向けた道筋: CCS と再生可能エネルギーが重要
- 連邦エネルギー白書 (2015)
 - CCS容量の重視を含む
 - CCSと併せ、褐炭と水素の可能性を認識

オーストラリアにおけるCCS

オットウェー実証プロジェクト (CO2CRC, ビクトリア州)

- 2008年設立
- 世界最大のCCS実証プロジェクト
(8万トンのCO₂を注入・貯留)
- コスト削減のための先進技術・処理方法を実証する国際的に有名な総合モニタリング・プログラム
- スタート時点から地域社会が関与



出典: CO2CRC

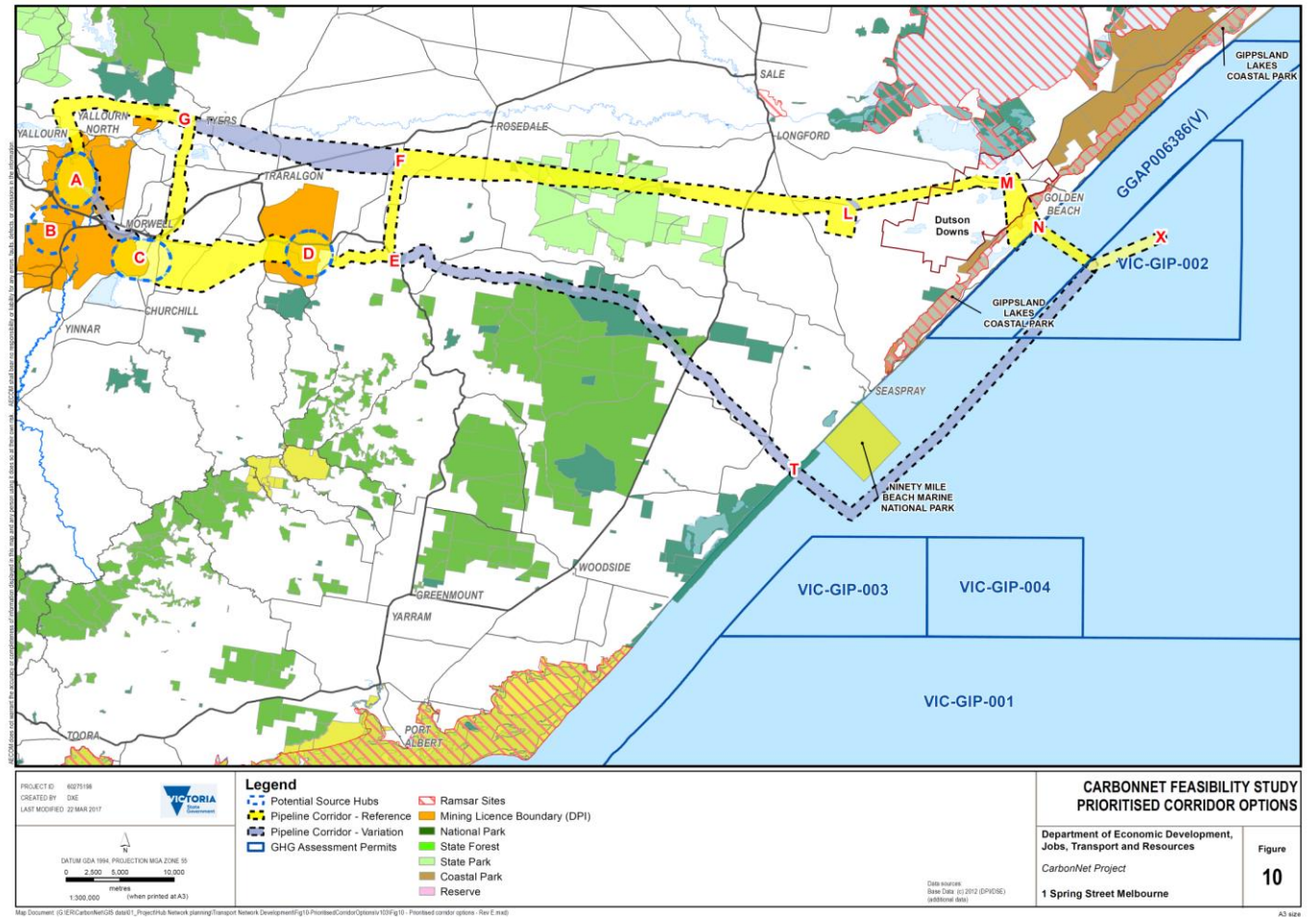
ゴーゴンLNGプロジェクト (西オーストラリア州)

- 現在委託中
- 年間3.4~4 百万トンのCO₂を含塩層に注入・貯留
- 世界最大のCO₂専用の地下貯留所

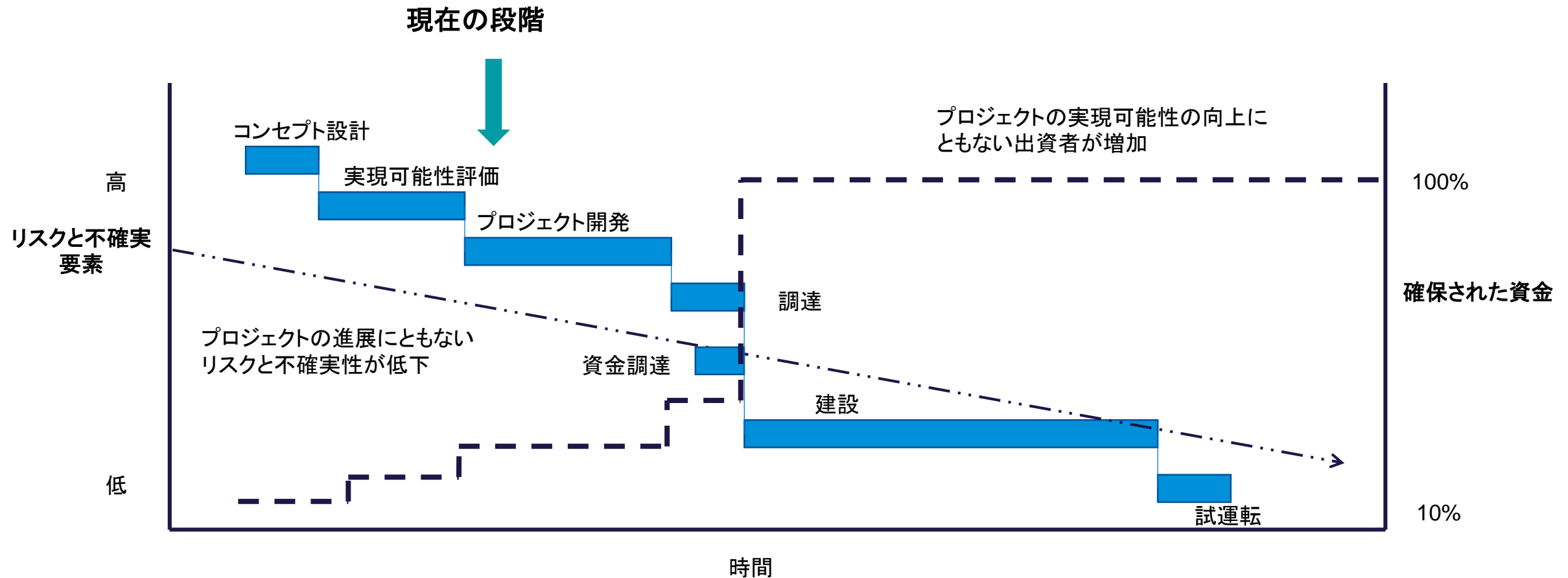


CARBONNETプロジェクト

- ギプスランド地域で複数の利用者を対象とした大規模なCCSネットワークを構築
 - 沖合貯蔵に向けた海岸付近への注入
- 2020年に向けてオーストラリア連邦政府とビクトリア州政府が共同出資
 - 予備調査と開発に1億5000万オーストラリアドルを出資
- CarbonNetプロジェクトのペリカン地区はP90において1億2500万トン进行貯蔵可能
- 莫大な研究投資
- Global Carbon Capture and Storage Instituteを介して知見を共有
- 顧客と投資家の確保に向けて産業界と協力



CARBONNETプロジェクトの現状



地域社会の協力が重要



住民の教育

CCS含め新規の
低排出石炭技術に
関する知識の向上

情報へのアクセス

積極的な発信 –

戦略的かつアクセスしやすい
ファクトシート、プレゼンテー
ション、ウェブコンテンツ

国産エネルギー資源としての水素

オーストラリアでは、水素の将来的な重要性に対する認識が高まっている。

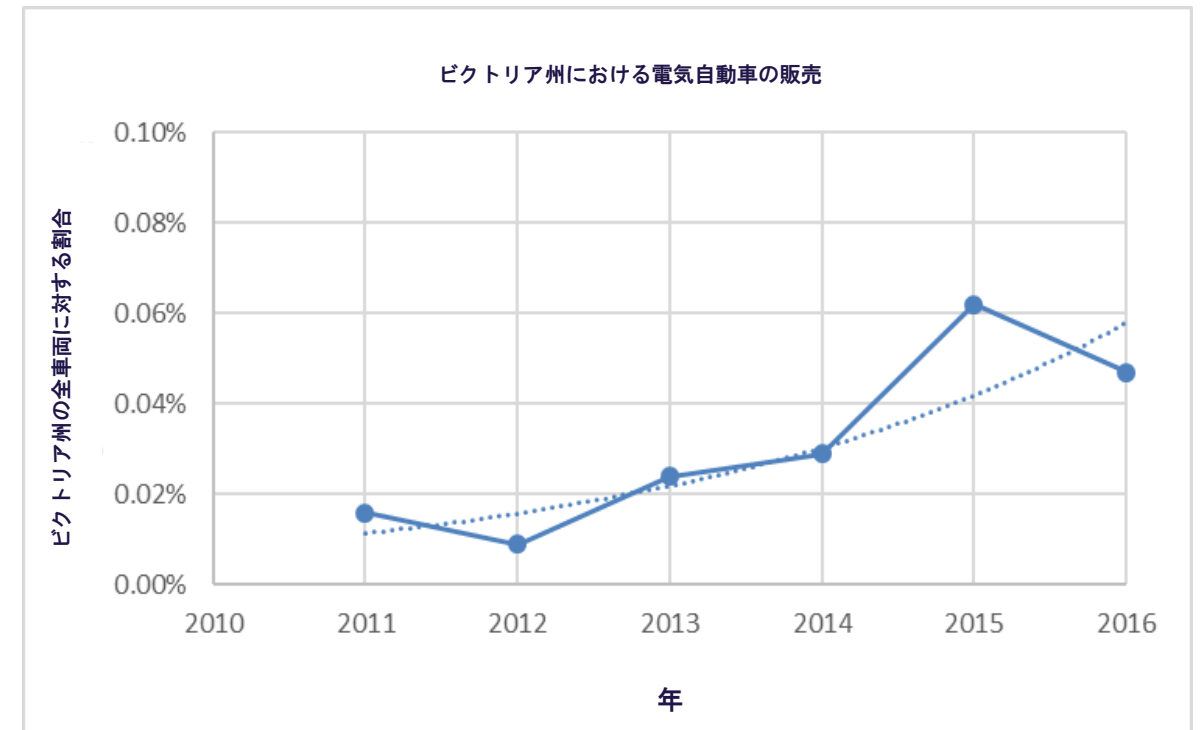


国内で想定される利用法

- 再生可能エネルギーの発展には、送電網の需給調整維持のために、ガス火力発電・蓄電池・揚水発電が必須。
- 再生可能エネルギーの割合が増え、排出制限が厳しくなるに従い、水素の重要度は上昇。
 - 再生可能エネルギーの余剰電力が大きくなれば、第2の重要な水素製造用エネルギー源となる可能性あり。
- 将来的には水素は化石燃料に代わる重要な産業部門の熱需要用燃料になる
- 今後の焦点は自動車排ガスの削減
 - 電気に代わり、水素が重要な運輸燃料となる可能性あり。
- 水素の輸出はビクトリア州とオーストラリアの双方にとって、エネルギー安全保障を確保するための重要なオプションとなる可能性がある。

電気自動車・水素自動車

- ビクトリア州では電気自動車の割合は軽自動車販売の1%以下。その理由は以下。
 - 車種が限定的(2メーカーのみ)
 - 充電設備が不足
 - 航続距離が短いという認識
 - 高価格
- 以下を前提として電気自動車は今後10年で増加の見通し
 - 従来の自動車並みの価格
 - 車種の増加
- 水素燃料電池自動車の普及時期はさらに不透明
 - 大型の長距離走行車を代替する可能性あり(トラック・列車・バス等)



まとめ

- CO2排出を削減し、安全かつ安価なエネルギーを確保するための大改革が世界で進行中。
- ビクトリア州の褐炭用途は、GHG排出の多い発電からGHG排出が低い製品製造へと移行する見込み。
- ビクトリア州の豊富な石炭資源と莫大な炭素貯蔵容量に日本の技術が合わされば、両国のエネルギー安全保障に貢献する。
- 「水素エネルギーサプライチェーン」プロジェクトの基本は成熟した信頼関係。

質疑応答

