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CLEAN HYDROGEN
TECHNOLOGIES



CORTICAL
DYNAMICS

ADVANCED BRAIN MONITORING

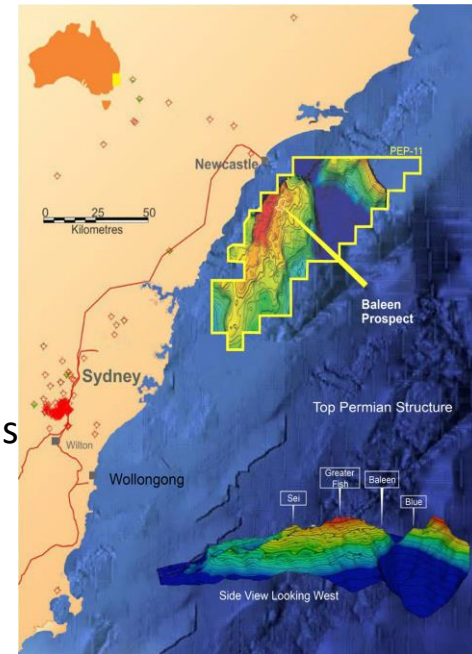
BPH Energy Ltd -Company Presentation 2022





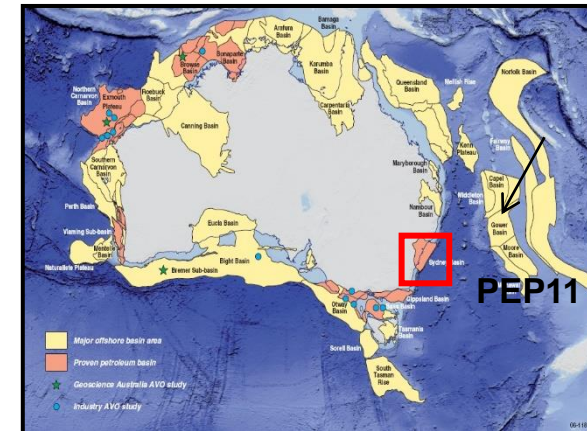
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- The PEP 11 Gas and proposed CCS Project at Baleen (Seablue1 well) in the Offshore Sydney Basin has potential national significance.
 - It addresses both forecast gas shortages and the objective of Net Zero Emissions. Advent has committed all gas from the project to Australia domestic supply
- Gas-Base load power ,Energy costs and employment**
- In NSW, est. 300,000 jobs rely on gas supply. Gas supplies around 1.3 million households and 33,000 businesses.
 - NSW's manufacturing sector, which is approximately 84% of the state's Industrial gas load, adds \$33 billion in industry value.
 - Without addressing NSW's looming gas shortfall these could be at risk. (NSW Business Chamber)
 - This prediction has now become a reality in the current global energy crisis
 - Confidence in Australia's main electricity market has suffered its sharpest ever collapse as the crisis engulfing the east coast energy industry hits home for consumers. (ABC 30082022)



CCS

- Carbon Capture, Usage and Storage (CCUS) technology is one of the priority technologies in Australia's Technology Investment Roadmap.
- Identified by the IEA as the only large-scale mitigation option available that can deliver the additional CO₂ emissions reductions to meet climate goals in 2050.
- The PEP11 project is the closest potential carbon storage area to the major Australian carbon sources- 30% of the entire Australian CO₂ output.



CHT Vs Competition



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Solutions	Feedstock	Efficiency (1)	Water kg / kg H2 (2)	Electricity kwh / kg H2 (3)	Estimated production \$/kg (4)	CO2 Emissions (5)	Space	Infrastructure
CHT - Cracking	Hydrocarbons	90%	0	~8	>\$2.00	None	Low	Majority Existing
Electrolysis	H ₂ O + electricity	50–70%	9.1– 18.04	30+	\$7.7 – \$11.1	None	High	Mostly New
Carbon Capture Storage	Hydrocarbons	NR	NR	++++	\$++++	some	Low	New
Steam reforming	Hydrocarbons	70–85%	21.869	8+	\$2.00	12T per H2T	Medium	Existing

1 <http://www.fukuzawa.co/Hydrogen.html>

Department of Chemical Engineering and Technology Indian Institute of Technology (BHU) Varanasi Varanasi-221005, Uttar Pradesh India

2 Nuria Sánchez-Bastardo*, Robert Schlögl, and Holger Ruland* *Ind. Eng. Chem. Res.* 2021, 60, 32, 11855–11881 <https://pubs.acs.org/doi/10.1021/acs.iecr.1c01679>

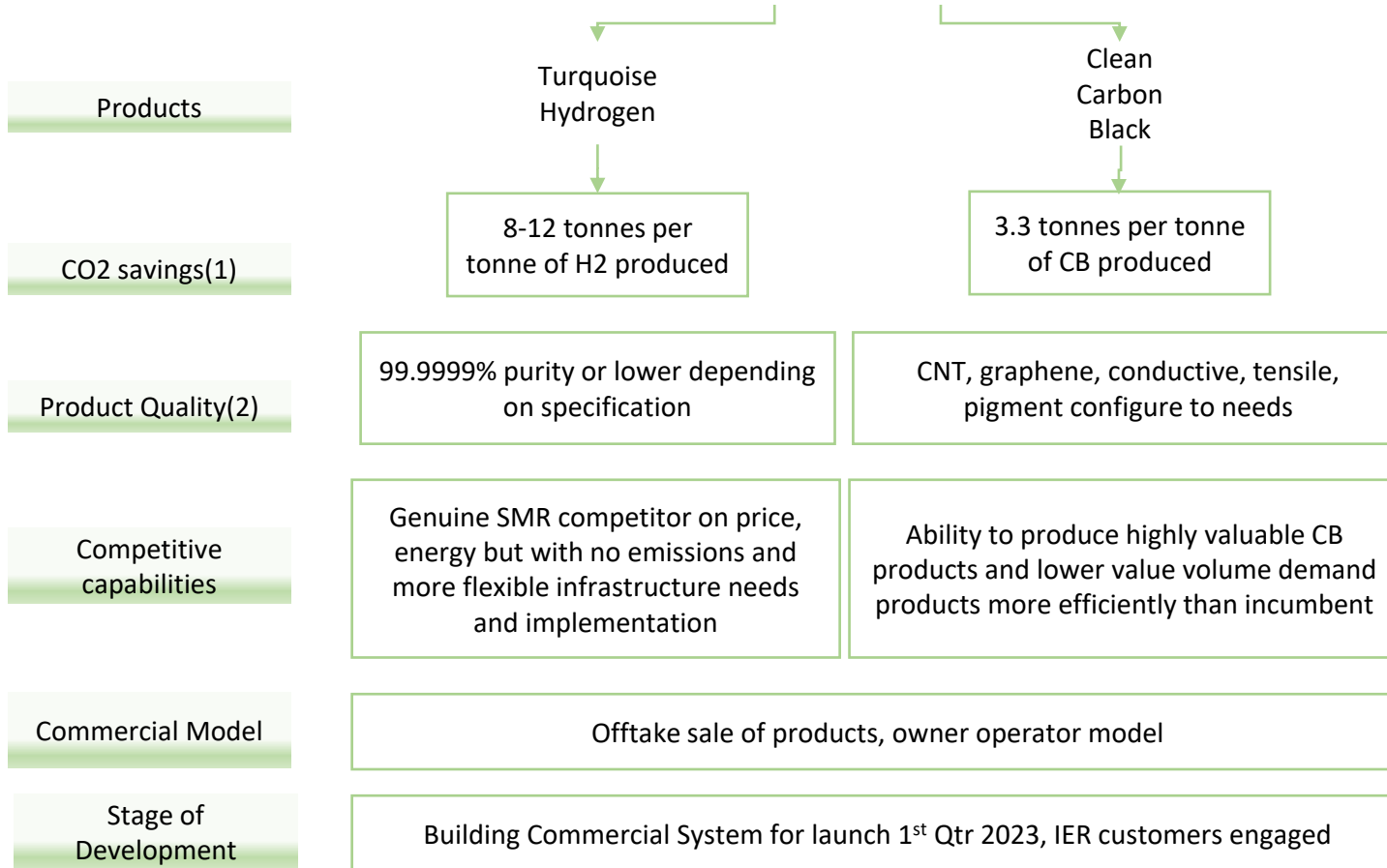
3 <https://thebulletin.org/2022/01/whether-green-blue-or-turquoise-hydrogen-needs-to-be-clean-and-cheap/>

(4) <https://www.tno.nl/en/technology-science/technologies/methane-pyrolysis/>

(5) <https://pubs.acs.org/doi/10.1021/acs.iecr.1c01679>

https://rmi.org/wp-content/uploads/2020/01/hydrogen_insight_brief.pdf

CHT in a snapshot



(1) https://rmi.org/wp-content/uploads/2020/01/hydrogen_insight_brief.pdf

(2) <http://www.fukuzawa.co/Hydrogen.html>

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https://rmi.org/wp-content/uploads/2020/01/hydrogen_insight_brief.pdf

<http://www.fukuzawa.co/Hydrogen.html>

The BARM™ System collects EEG data from the brain and expresses this information in the form of 2 indexes measuring depth of anaesthesia and pain

Technical Partners

2022 -AIT/ENCIVIS: Vienna, Austria- EEG artifact removal and signal enhancements

2022- Lorgan Pty Ltd ,Sydney ,Australia– AI /data analysis/deep learning capacity being currently developed for BARM™ conjunctionally with Cortical Dynamics

Commercial Partners

Philips USA and global- plug and play agreement in place for BARM™ DAM Intellibridge OR Monitor

Global Luck – South Korean Distributor
Innomed- Benelux Distributor



Cortical Dynamics is a Perth headquartered Australian medical device company that is developing BARM™, a new industry leading EEG (electrical activity) brain function monitor

Anaestheologists often do not have the confidence in existing EEG or DOA monitors that allows them to deliver accurate TIVA and Inhalation based Anaesthesia as a matter of course

Why?

Current tech is old school, does not operate in real time and is not based on the individual patient's EEG data as does BARM™

The consequences are intra and post operative complications relating to overdosing or underdosing that can lead to serious health and psychological conditions or even death



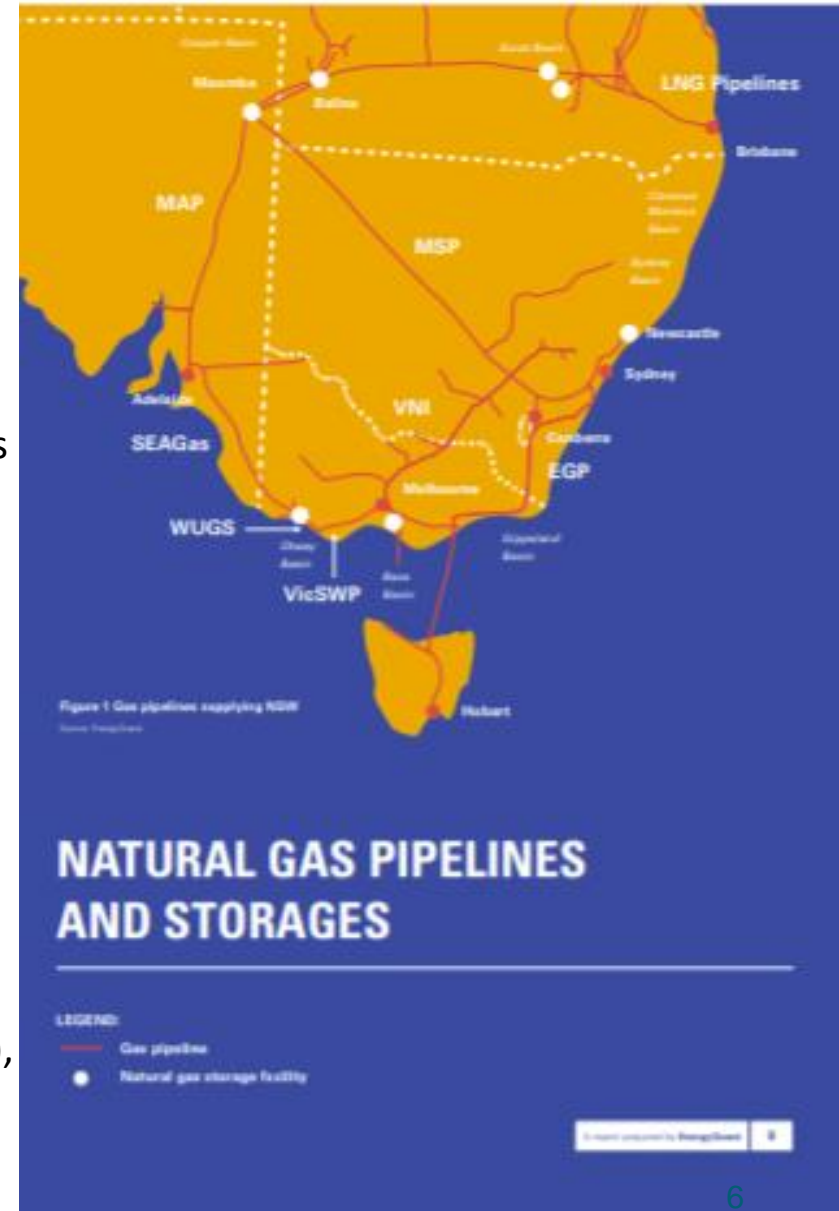


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CRUCIAL GAS SUPPLY ISSUES NSW

NSW GAS “Running on empty -NSW Business Chamber”

- NSW imports 98 per cent its gas requirements from other states
- A constrained national gas market will see further price rises for every household and business in NSW
- Inaction on gas and energy security are now holding the future of businesses in NSW to ransom, threatening employment losses and reduced investment
- As the southern (Victoria, Tasmania, NSW and South Australia) fields further decline in the future and if no more southern resources are developed, pipeline constraints (particularly in the pipelines from north) will impact
- **Victoria “Gas Substitution road map “**
- Gas supply outlook for Victoria For over fifty years, Victoria has had access to low cost, abundant natural gas, extracted from offshore gas fields located in Bass Strait. 1
- Australian Energy Market Operator (AEMO), However, as AEMO has indicated in its 2021 Gas Statement of Opportunities (GSOO), these gas fields are rapidly depleting. AEMO is **forecasting an overall decline in Victoria’s production of 43 per cent from 360 PJ per year in 2021 to 205PJ per year in 2025.**

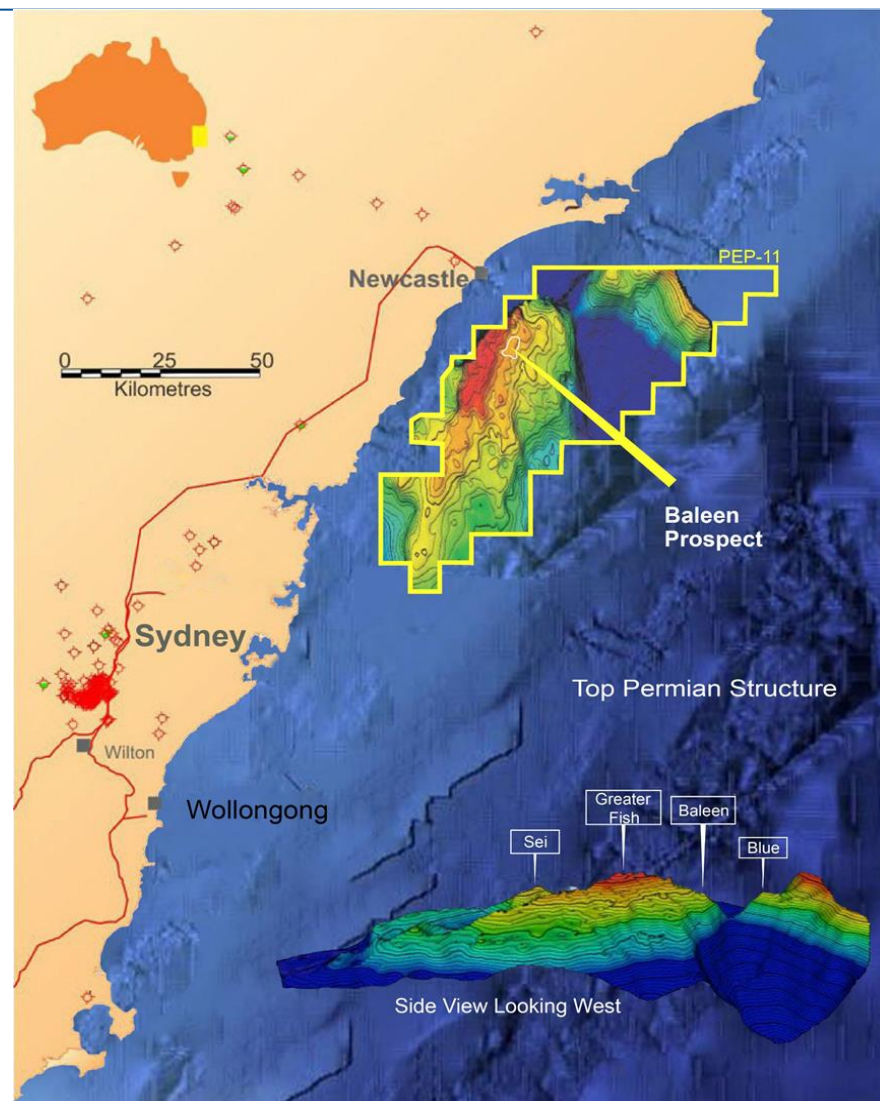




PEP11-85% Interest

PEP11– Offshore Sydney Basin:

- The Sydney Basin is a proven hydrocarbon basin with excellent potential for further discovery of natural gas / significant multi-Tcf natural gas project
- PEP11 covers 4,649 km² on the doorstep of Sydney-Newcastle & extensive gas infrastructure (<50km).
- Analogues to major discoveries -the offshore Sydney Basin contains all the elements seen in other producing world class petroleum basins, including Prospective Resources of 5.7 Tcf (P50) in structural targets.
- Current application to NOPTA to enable drilling as next step –Federal Court Application pending
- Significant interest in the project is driven by the gas market dynamics Shortfall forecast in gas supply east coast
- Two new gas fired power stations for NSW firming generation
- CCS potential (independently verified)
- Key attributes for Hydrogen role
- Significant potential employment driver





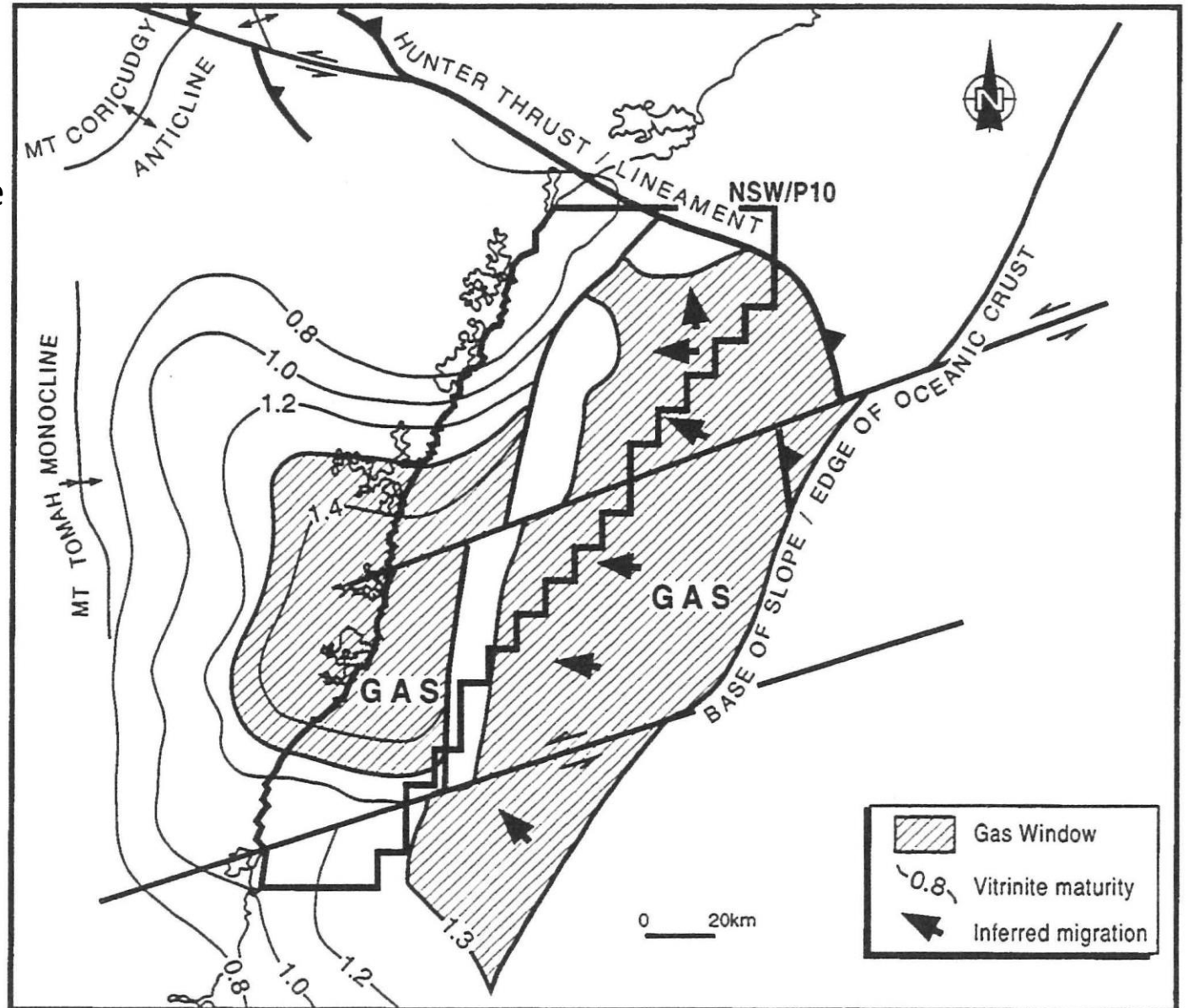
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“The late Permian coal measures could provide a viable ,mature ,gas /condensate source along the length of the Offshore Uplift with simple migration pathways updip to the crest of the uplift....”

“This model results in all of the Late Permian Coal Measures being in the gas window”

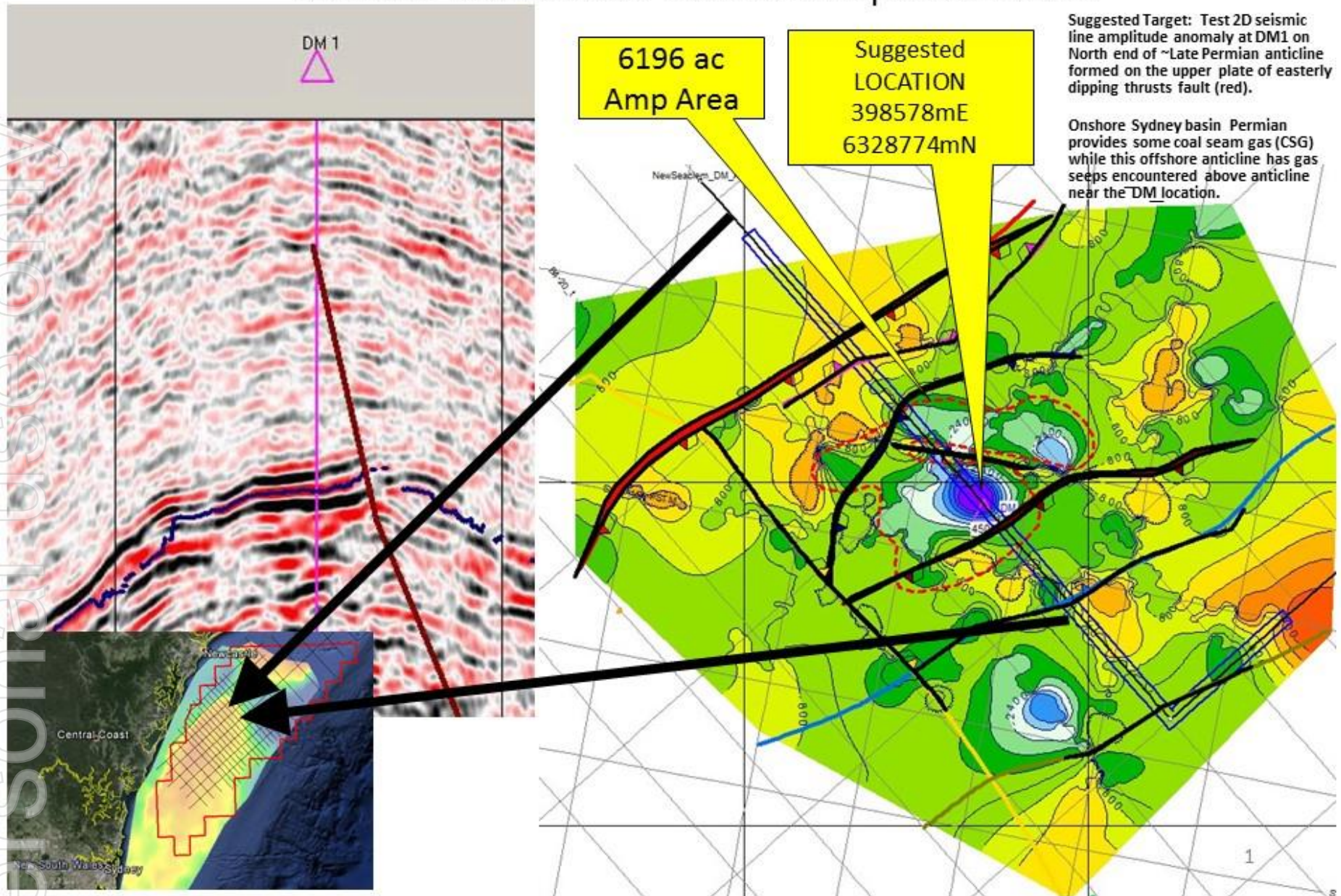
Figure-Offshore Sydney Basin –Inferred Maturity and Migration Pathways

Source “Evolution and Hydrocarbon Prospectivity of the Offshore Sydney Basin
Bradley G New Petroleum Symposium
1993”



Near Top Permian / Base Triassic amplitude extraction

Estimate: 6196 acres of estimated amplitude closure



(25 sq km)*

Offshore Sydney Basin – Direct Hydrocarbon Indicators PEP11

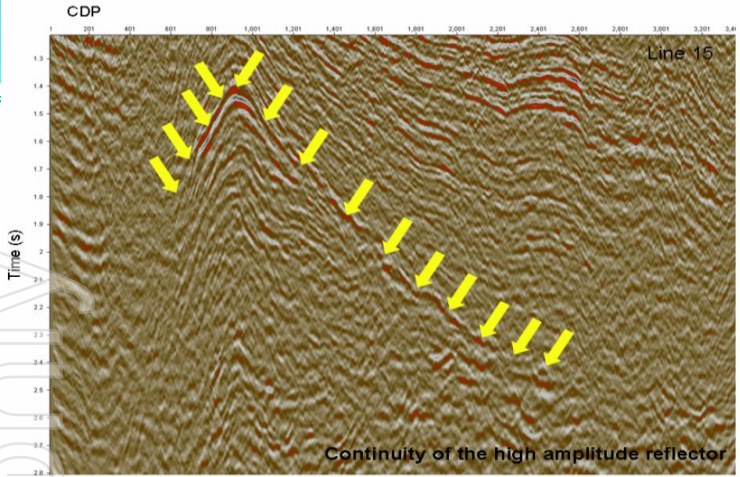


Figure 69: Display of Line B4-15. The continuity of high amplitude reflector has been mapped.

“Strong energy reflections present on seismic section can be associated with major lithologic changes as well as hydrocarbon accumulations.”

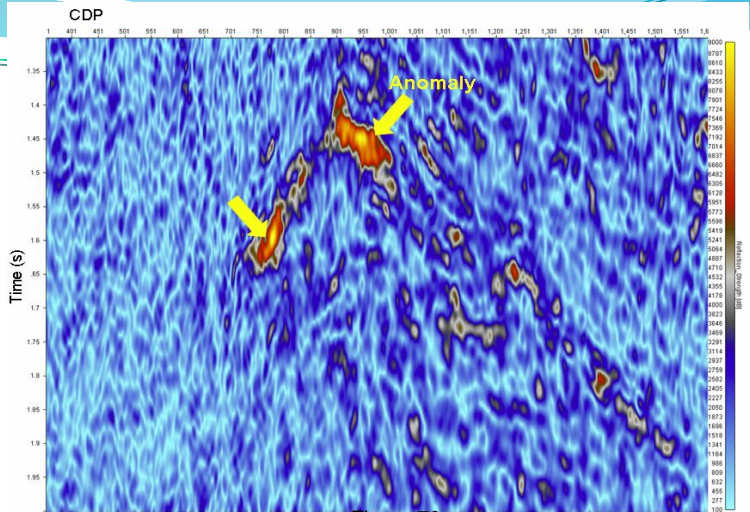


Figure 70: Reflection Strength plot of the high amplitude reflector

“Gas reservoirs, in particular, appear as high amplitude “bright spot” reflections.”

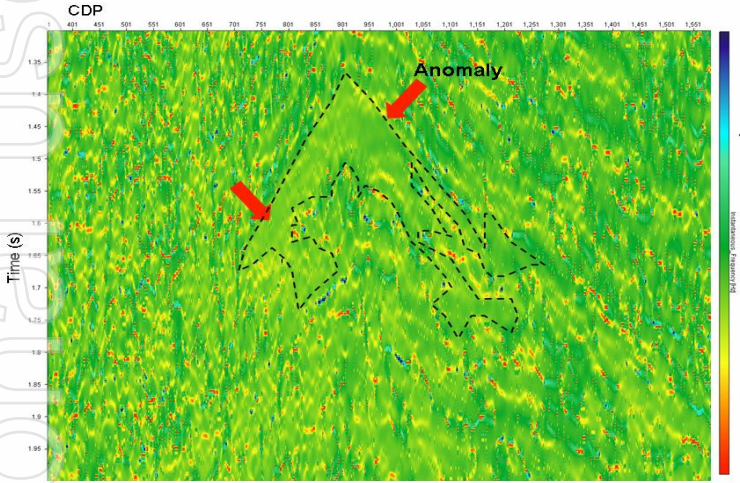


Figure 72: Instantaneous frequency plot for the high amplitude reflector. It is showing low frequency anomaly.

“Instantaneous frequency content is of interest in that high frequencies are attenuated by gas and condensate reservoirs.”

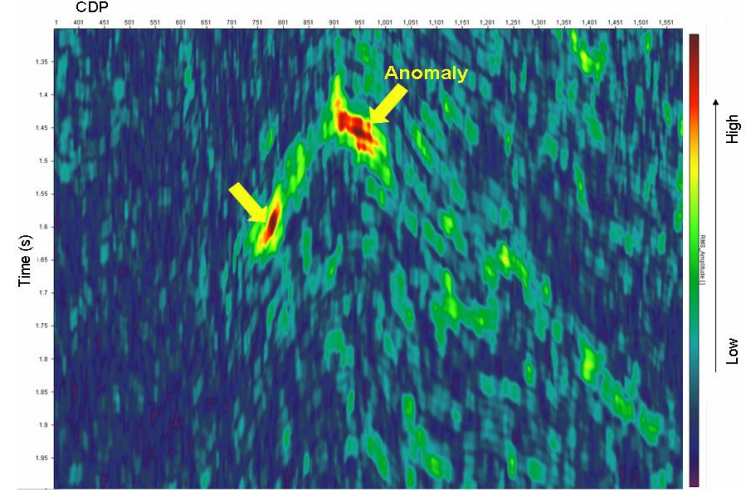
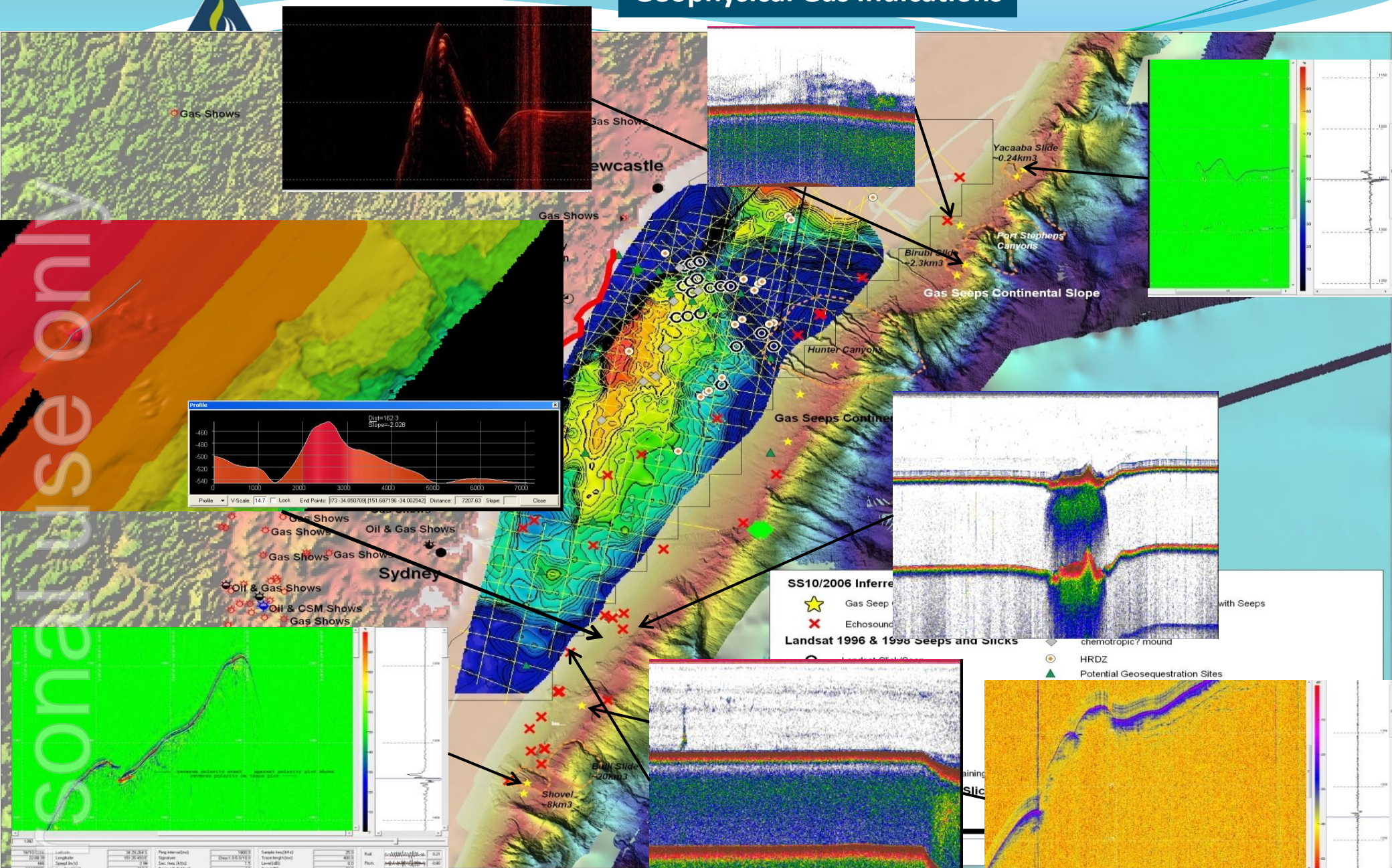


Figure 74: RMS of seismic amplitude over the area of Line B4-15, where high amplitude reflector is mapped.

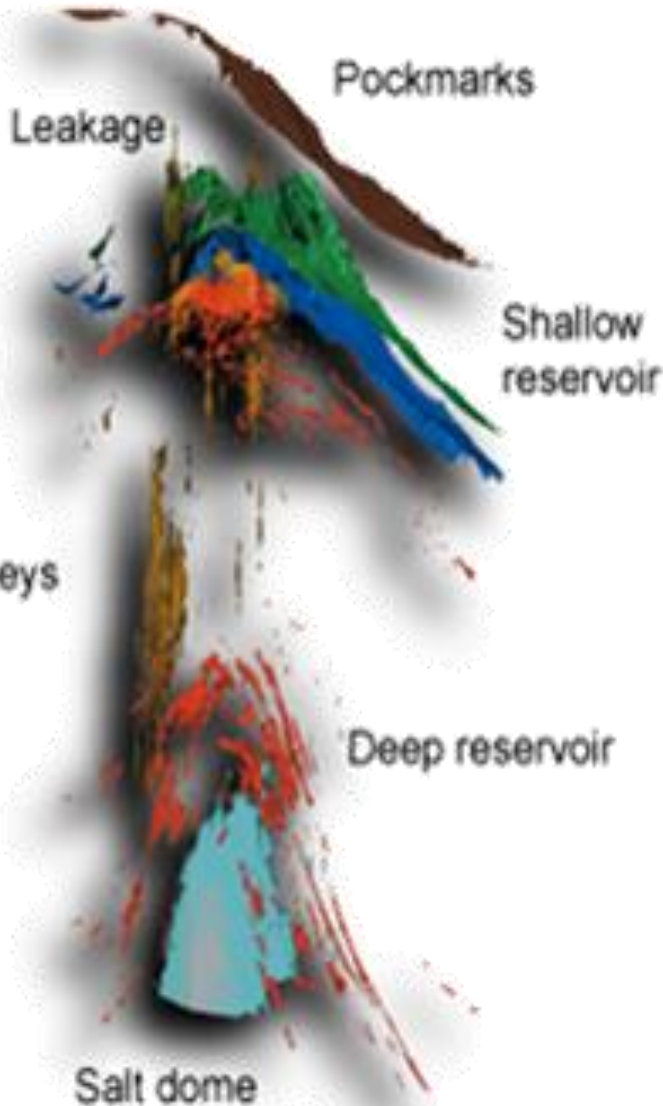
“The Root Mean Square (RMS) amplitude ... may be used to map direct hydrocarbon indicators in a zone.”

“The RMS of seismic amplitude for the 700ms window have been calculated. This indicates a bright spot like feature, which is a prime indicator for the occurrence of gas.”

Geophysical Gas Indications



TOPAS Sub bottom profiles from SS10 / 2006 2011 PEP11 Permit Boundary Shown



Chimneys and pock marks indicating focus areas of fluid flow above the top reservoir

- “seismic chimneys are visible in 90% of all Mesozoic and Tertiary basins.”
- Gas chimneys have been observed to tie in to features associated with gas seepage like pockmarks andshallow gas accumulations and faults
- Recent studies have revealed that chimneys can represent a link to deeper hydrocarbon accumulations
- Active seeps and migrated hydrocarbons are a key indicator of ongoing hydrocarbon generation (Abrams M Hydrocarbon migration and its near surface expression: AAPG Memoir 66)
- The mapping of chimneys has significance in geohazards interpretation
- High concentrations of chimneys are observed in areas where discovery wells and oil and gas fields are present
- Schumacher D “A recent review of more than 850 wildcat wells –all drilled after geochemical surveys finds that 79% of wells drilled in positive anomalies resulted in commercial oil and gas discoveries “(Surface geochemical exploration, D. Schumacher, 2000,)



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