chapter

9

**Recommendations**

**9.1 INTRODUCTION**

The recommendations contained in this Roadmap are the culmination of actions listed in Table 9.1.

Caveat: The recommendations listed in Table 9.1 were posed and considered by members of the Roundtable but this does not imply universal support for any or all recommendations or rankings from every Roundtable member.

**9.2 Development of**

**Recommendations**

A strength-weakness-opportunities- threat (SWOT analysis) was concluded by the Roundtable in November 2010 (Table 9.2). That informed subsequent engagement with stakeholders in the development of recommendations. To enable focussed discussions, prior to the

27th July 2012 meeting of the Roundtable

recommendations were split into three broad categories: Economies of Scale, Investment Attraction; and Regulations.

In the Roundtable’s 27th July meeting, three break-out groups focused separately on the above-stated three categories and then presented (for feedback) revised recommendations to the entire Roundtable (in attendance) to result in improved and added-to recommendations on 27th July

2012. The number of recommendations for each of these three broad categories increased as the result of discussions on 27th July 2012.

Following the 27th July Roundtable meeting, a detailed review merged equivalent entries, and a total of 125 unique recommendations were then established for ranking1 by

the Roundtable. All recommendations developed by the Roundtable for Unconventional Gas Projects in South Australia (Roundtable) are listed in Table 9.3

**9.3 Ranking of**

**Recommendations by Priority**

The (post 27th July 2012) updated list of recommendations was circulated to get further comments and a sense of priorities (ranking for implementation) from the

Roundtable. In this step, Roundtable

**Category Recommendations to 27 July 2012**

**Recommendations post 27 July 2012**

Economies of scale

Investment attraction

46 67

11 26

1 In the total 129 recommendations developed by

the Roundtable (to 27th July 2012), 4 recommendations

Regulation 28 48

**Totals 86 141**

have equivalents. Hence, there are 125 unique recommendations for ranking. Also, several ranked recommendations overlap in scope.

***Table 9.1*** *Milestones in the development of this Roadmap for Unconventional Gas Projects in South Australia.*

**Date Milestone**

16 -19 May 2010 Discussions with industry during the APPEA conference concluded a roundtable (interest group) to develop a roadmap for unconventional gas projects would foster efficiency in associated environmentally sustainable land access and investment

13-17 July 2010 Draft Terms of Reference and Strength-Weakness-Opportunity-Threat analysis provided to peak petroleum industry groups (APPEA and APIA) for comment prior to convening

1st meeting of the Roundtable

21 Sep 2010 Draft Terms of Reference and Strength-Weakness-Opportunity-Threat analysis sent to inaugural members of the Roundtable for comments and ranking prior to convening 1st meeting of the Roundtable

25 Nov 2010 **1st meeting of the Roundtable convened**. Terms of reference, SWOT table, focus of working groups and timelines for progress were agreed

Jan-March 2011 Devised Roundtable / Roadmap web pages on DMITRE’s website

28 Feb 2011 Supply chain working group met to progress agenda

28 March 2011 Working group focused on economic modelling met to progress agenda

18 April 2011 The Commonwealth Minister for Resources, Energy and Tourism states that his

Department will join the Roundtable

In July 2011 Contracted for spreadsheet economic modelling for conventional sales gas, LNG and Gas-to-Liquids, and subsequently made this available to the Roundtable, and then to the public from DMITRE’s website

20 July 2011 Infrastructure Demand Study Scenario Workshop for Transport/Logistics conducted by Parson Brinkerhoff (dual purpose being the State’s Infrastructure Plan and the Roadmap for Unconventional Gas.

18 August 2011 Scan / inventory concludes that South Australian has >24 JVs chasing at least 9 distinct unconventional gas plays in the State

8 Sept 2011 **2nd meeting of the Roundtable convened**. Draft table of contents for the Roadmap agreed. Economic modelling presented by Core Energy. Work groups agreed on next steps so that the preliminary 1st draft Roadmap could be concluded in March / April

2011, so that 1st draft Roadmap could be released for public comment just prior to, or during the APPEA conference in Adelaide in 13-16 May 2012.

9 Sept 2011 Fracture stimulation symposium (attended by 110 people from 44 organisations)

10 Sept 2011 Abstract for APPEA 2012 paper submitted (*Regulatory Nirvana for Low Permeability*

*Gas Reservoir Development*)

**9**

**Date Milestone**

4 Nov 2011 Convened 1st roundtable discussion with proponents coal gasification processes to

inform state-based policies

29 Nov 2011 Convened 2nd (last) roundtable discussion with proponents coal gasification processes

to inform state-based policies

19 April 2012 Preliminary draft Roadmap circulated to leaders of Roundtable Working Groups for comments before broadcast to all members of the Roundtable (on 11 May 2012)

24 April 2012 Dispatched Note to Cabinet through Minister Koutsantonis of intention to release the

Draft Roadmap for public comment

8 May 2012 DMITRE’s FAQ - Unconventional gas in South Australia (Shale gas, tight gas, coal

seam gas and regulation of activities) published. See web-page version by clicking [here](http://www.pir.sa.gov.au/petroleum/prospectivity/basin_and_province_information/unconventional_gas/frequently_asked_questions). Download by clicking [here](https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/ISP11.pdf).

11 May 2012 **Draft Roadmap circulated to the Roundtable for comments to 27 July 2012.** All who asked for an extension of time to pose comments subsequently given an extension to end August 2012 to provide comments

14 May 2012 **Premier Weatherill addressed the APPEA Conference and Minister Koutsantonis announced to release of the draft Roadmap for public comment**. Notice in The Advertiser seeking comments from the public by 27 July 2012. Draft Roadmap posted on DMITRE’s website. All who asked for an extension of time to pose comments subsequently given an extension to end August 2012 to provide comments

15-16 May 2012 DMITRE published/presented following at the APPEA Conference in Adelaide [Regulatory Nirvana for Low Permeability Gas Reservoir Development (.PDF - 1.8 MB)](http://www.pir.sa.gov.au/__data/assets/pdf_file/0005/171851/APPEA_-_Goldstein_-_Regulatory_Nirvana.pdf) *B. A. Goldstein et al (DMITRE) May 2012 APPEA*

[Emerging Continuous Gas Plays in the Cooper Basin, South Australia (.PDF - 5.15 MB)](http://www.pir.sa.gov.au/__data/assets/pdf_file/0004/171850/APPEA2012_EmergingContinuousGas.pdf)

*S.A. Menpes (DMITRE) May 2012 APPEA*

[The Changing Face of the South Australian Cooper Basin (.PDF - 1.8 MB)](http://www.pir.sa.gov.au/__data/assets/pdf_file/0005/171815/Alexander_and_Sansome_2012_final.pdf)

*E.M. Alexander & A Sansome (DMITRE) May 2012 - APPEA*

[2012 Petroleum Opportunities in South Australia (.PDF - 2.5 MB)](http://www.pir.sa.gov.au/__data/assets/pdf_file/0011/171848/PESA_DEAL_DAY_SA_2012.pdf)

*A. Sansome (DMITRE) May 2012 PESA Deal Day*

25 June 2012 Roundtable and the public given access to Core Energy financial analysis models

for natural gas use in: (1) Liquefied Natural Gas (LNG) for export; (2) Gas to Liquids (GTL) for export and domestic use; (3) Natural and Synthetic Gas for power generation; and (3) Natural Gas for sale to traditional gas Residential and Commercial (R&C)

and Industrial Markets. The models allow the user to determine break even gas price,

Net Present Value (NPV), Internal Rate of Return (IRR), cash flow, and royalties,

for a variety of scenarios based on numerous upstream, downstream and economic variables.

20 July 2012 Draft recommendations for the Roadmap circulated to the Roundtable for consideration ahead of discussions on 27 July 2012. Download by clicking [here](http://www.petroleum.dmitre.sa.gov.au/prospectivity/basin_and_province_information/unconventional_gas/unconventional_gas_interest_group/roadmap_for_unconventional_gas_projects_in_sa/roadmap_recommendations).

16-17 July 2012 DMITRE published/presented following at the Central Australian Basins Symposium: Unconventional hydrocarbon potential of the Arckaringa Basin, South Australia

**Date Milestone**

27 July 2012 **3rd meeting of the Roundtable convened.** Draft recommendations reviewed, improved and added-to. Table of contents agreed adequate. Two presentations were:

Progress Towards a Common Language for Estimating Unconventional Resources - Presentation by Creties Jenkins (DeGolyer McNaughton). Download by clicking [here](http://www.petroleum.pir.sa.gov.au/__data/assets/pdf_file/0005/175316/Progress_Towards_a_Common_Language_for_Estimating_Unconv_Resources_DM_27Jul12.pdf) Unconventional Hydrocarbon Resources – Provided by Takehiko (Riko) Hashimoto (Geoscience Australia). Download by clicking [here](http://www.petroleum.pir.sa.gov.au/__data/assets/pdf_file/0006/175317/CABS_2012_Unconventional_hydrocarbon_resources_Hashimoto_et_al_120629.pdf)

10 August 2012 Final draft Roadmap recommendations posted on DMITRE’s we-pages for download and ranking by the Roundtable

21 Sept 2012 2nd Draft Roadmap covering all comments to 31 August dispatched to Roundtable for further comments by end October 2012

1 Nov 2012 Last comments from Roundtable received by DMITRE

5 Nov 2012 All comments accounted for and final proof-reading completed. Desk top publishing commenced on Executive Summary and Chapters 1 through 8, and Chapters 10 through 12 (while Chapter 9 Recommendations finalised)

8 Nov 2012 3rd and final Draft Roadmap covering all comments to 1 November dispatched to

Roundtable for final comments within 5 days (by 14 November)

29 Nov 2012 Final desktop published form with Cabinet Note to Minister Koutsantonis, and dispatched to other Government Agencies on the same day

10 Dec 2012 Cabinet to Consider for Publication

12 Dec 2012 Minister Koutsantonis to announce release via DMITRE website

January 2013 onwards

Convene Roundtable Working Groups to progress implementation of recommendations

July 2013 onwards

In consultation with the Roundtable – stock-take of:

- Roadmap implementation; and

- Incremental improvements to the Roadmap; and

Then report on progress and any improvements for the Roadmap in 1Q 2013, for publication in 2Q 2014

members were asked to rate (on a zero to ten scale, where ten is the most favourable rating) all recommendations as to the “materiality” (e.g. value of the outcome) and the “do’ability” (e.g. perception of the chance to implement).

Average (consensus) Roundtable rankings of recommendations are displayed in Figure 9.1, a matrix of “materiality” and “do’ability”. Figure 9.2 is an expanded version of the populated part of the same

illustration to allow for legible labels for rank as detailed in Table 9.3.

Table 9.3 lists the relative ranking of all recommendations on the basis of “materiality” and then “do’ability”. Table 9.3 also further categorises recommendations under one or more to the following nine generalised themes. The number of recommendations, including overlapping recommendations is noted in brackets.

1. Investor and public trust (41)

2. Subsurface knowledge (21)

3. Environmental protection (18)

4. Supply-chains (17)

5. Infrastructure (17)

6. Innovation in gas markets (16)

7. Efficiency (16)

8. Red tape reduction (8)

9. Fiscal framework (4)

In the 27th July meeting of the Roundtable, DMITRE undertook to compare the ranking of recommendations posed by industry with rankings posed by organisations principally focused on the conservation of the natural

and social environments. No stark differences were identified in this comparison. The vast majority of recommendations ranked highest priority (materiality ranking greater than or equal to 5 and do’ability ranking greater

than or equal to 5) were considered to be

so by both development and environmental organisations. Likewise, based on relative rankings, the recommendations given

lowest priority were considered to be so by both development and environmental organisations.

**9.4 Implementation of 9**

**Recommendations**

The recommendations listed in Table

9.3 will be the subject of planning for implementation by focused working groups of the Roundtable from mid December 2012. The ranking of recommendations will guide priorities within resource capacity.

It is reasonable to expect a considerable advance on a number of recommendations in 2013 and successive years.

That progress will be made by industry,

by government(s), and by public-private partnerships under the auspices of the Roundtable for Unconventional Gas Projects in South Australia.

To track that progress, in consultation with the Roundtable:

• a stock-take of the implementation of recommendations will be concluded by DMITRE in 4Q 2013;

• a report on progress (or otherwise) made with all recommendations will be published in 2Q 2014;

• the Roadmap will be sustained as a

‘living document’ updated at least once every other year, with its first update to be concluded in 2014; and

• consultation with stakeholders will continue with the overarching objective of environmentally sustainable development that meets community expectations for net outcomes.

**9.5 Post- Roundtable Ranking**

**Considerations**

Leading practice engagement and consultation has no cut-off date. However, for practical purposes, the Roundtable’s listing and ranking of recommendations

(as presented in Table 9.3) for the above stated analysis closed on 1 November 2012. In this context, the following incremental recommendations summarise comments from Roundtable members since 1

November 2012, and will be the subject of discussions with the Roundtable in 1Q2013.

• This Roadmap for Unconventional Gas Projects in South Australia should be open to alignment with parallel policy objectives such as innovation and clean energy For example – how might innovative technologies deployed locally in unconventional gas projects provide leverage for South Australian businesses become global leaders in water management and clean energy technologies?

• International and national standards for risk reduction to as low as reasonably practical (ALARP) while meeting community expectations for net outcomes is yet to catch-up to the aspirational IEA (2012) golden rules

for the golden age of gas in relation to the elimination of venting and minimising flaring. A working group of the Roundtable should be formed to develop options to inform community expectations in relation to the source, composition, volume, and potential significant risks associated with gases vented and flared in the life-cycle of production and use of unconventional gas. That will inform future project and policy options.

• Regional employment opportunities, and in particular, the subset of local content that relates to sustainable employment for the first people of Australia should be a consideration in planning unconventional gas projects. In particular – the early provision of pre- qualification requirements for tenders and contracts can support regional enterprises directly and in partnerships for service delivery.

***Table 9.2*** *Strength-weakness-opportunities-threat (SWOT analysis) concluded by the Roundtable through 25 November 2010* **9**

|  |  |
| --- | --- |
| **Strengths** | **Weaknesses** |
| • SA jurisdiction highly regarded by resources sector as a  “preferred place to do business”  • SA has good track record with resource development  • The Roundtable will foster early transparency to enable sensible planning  • Synfuel offers prospect of transport fuel security  (for Australia)  • Multiple unconventional gas plays with enormous resource potential  • Demand for energy, including gas, liquid fuels and power, is rising  • Micro LNG and/ or GTL offers prospect of transport fuel security  • Existing gas pipeline infrastructure and easements from  Moomba/ Ballera to Adelaide/Iron Triangle (ownership is independent of producers and major end-use customers)  • May be potential for the potentially higher value unconventional oil plays  • Willingness of government to foster and encourage the evaluation of the unconventional gas business  • The Cooper Basin is well positioned to meet multiple markets  • Strong demand for liquids | • Relatively high costs in Australia (potentially)  • Uncertain timing for each project can impede planning to share facilities – experience elsewhere shows that commercial drivers are unlikely to create cooperation and collaboration between different proponents  • Downside for the price of oil can hamper investment in synfuel manufacture  • Considerable cost to deploy facilities, including requirement for large numbers of wells  • Limited experience with unconventional gas in Australia  • Limited availability of required drilling and fracturing equipment in Australia  • Distance from export markets (LNG)  • High costs, energy requirements and emissions for synfuel projects (compared to conventional oil and/or LNG)  • No CNG market or proven infrastructure  • Difficult to achieve economic scale for international  competitiveness  • Currently insufficient contractor resources to carry out  the massive fracture stimulations that are required  • Licence framework not yet aligned with inherent high costs and risks and long timeframes for defining unconventional reserves.  • Long timeframes to build technical capability and technology to exploit unconventional reservoirs  • Perception of surplus CSG in Queensland and NSW  • Lack of firm cost estimates for syngas on world markets  • There is little information regarding quality of resources  • Potential funding issues  • Inadequacy of port infrastructure |
| **Opportunities** | **Threats** |
| • Stimulate investment to prove up resource potential  • Create environment that fosters collaboration and sharing of infrastructure  • Stimulate competition in gas supplies  • Potential beneficial use of produced water (e.g.  agricultural or other uses)  • Clarify full-cycle planning for the development of unconventional gas  • Ascertain and make plain the optimum location(s) and timing for deployment of facilities  • Co-ordinate and optimise supply lines and location and deployment of facilities, including production and transport hubs  • Inform industry strategies  • Inform government programs, policies and regulation to sustain supportive market frameworks while also protecting the natural, economic and social environment  • Stimulate new industry and employment  • Domestic gas market opportunities (e.g. increased electricity production from electricity, gas to liquids for transport, etc)  • Synfuel manufacture for domestic use and export  • Multiple-use wharf facilities  • Use of low emissions technologies and renewables to run plant to meet legislated standards and provide a comparative marketing advantage  • Joint marketing of gas for export | • Land access conflicts  • Inefficient infrastructure deployment  • Warehousing resources  • Competing LNG projects in Australia  • International competition for export markets  • Potential impact on groundwater systems (from subsurface and surface operations, e.g. disposal of produced water, etc)  • Unconventional gas potential is so widespread that those now importing LNG may become net producers  • High and/or sole carbon price regime in Australia  • Domestic competitors for domestic supply and export  • Unwillingness of parties to cooperate (impediments to sharing facilities) - leading to inefficiencies on sector- wide basis  • Uncertain Government policies and/or tax/royalty settings that could impact gas demand and supply  • Government intervention in markets to reserve gas for domestic supplies  • Barriers to accessing infrastructure  • Access to skilled people  • Prescriptive and/or precautionary rather than objective  (goal seeking) and risk management form of regulation |

**Table 9.3** List of recommendations in the order of ranking by the Roundtable. Rank order is first on the basis of “materiality” (e.g. value of the outcome) and then, “do’ability” (e.g. perception of the chance to implement). This listing also categorises recommendations under one or more of 9 generalised themes. The colour coding characterises recommendations in the **three categories** addressed by break-out groups in the

27th July 2012 meeting of the Roundtable for Unconventional Gas Projects e.g. Regulation (**R**), Economies of **9**

Scale (**E**); and Attract Investment (**A**) Colour coding reflects recommendation categories as follow: Economies

of scale; Regulation; and Investment attraction;

**Overall**

**Ranking**

**Category and**

**Comments All Recommendations** (sorted) **and numbered by overall rank** (materiality then do’ability)**\***

Exploration, Retention and Production Licences need to have terms (in years), area and

**Reference**

**Number**

**in Category**

**Ranking within Category**

**Summary Materiality Do’ability**

**Generalised Themes**

(9 total)

**1** R

**2** E

E –

Economies of

conditions that take account of the life-cycle for finding, appraising, developing and producing

unconventional petroleum

Manage the risk of a shortage of skills and people. Better training facilities and education programs for skilled trades people, para–professions and professionals. Need to establish realistic forecast demand to right-size the expansion of training facilities and educational programs. Suggest an industry forum for the forecast. This will also assist in forecast gaps to be filled with immigration targets and visas to bring in human resources necessary to keep projects on track. In short: fit for purpose training facilities and education resources/programs.

39 1 Effective license terms 8.6 8.4 Investor and Public Trust

Manage skills shortages with

56 1

education 8.4 6.0 Supply-chains

**3** scale 22 and Regulation 20 overlap

Use of co-produced water for drilling and fracture stimulation fluids 22 2 Co-produced water for frac fluid 8.3 7.2 Environmental Protection

Develop a chrono-stratigraphic correlation chart for all identified prospective basins and highlight for the (a) stratigraphic range of each shale gas, shale oil, deep CSG, shallow CSG,

**4** A

R – Regulation

7, 9, 22,

**5** 31, 42 and

Economies of

scale 35, 39,

52, 54, and 55 overlap

tight gas and underground coal gasification target, and (2) the position of over-lying and under-lying and overlying aquifers. This will illustrate the stratigraphic (and with annotations) the vertical separation of petroleum development targets and water resources that are to be protected with appropriate well construction

**Ensure legislation, regulation, policies and programs will provide for:**

1. Attractive licence tenure with expeditious land access for environmentally sustainable

operations

2. Regulatory certainty and efficiency without taint of capture (of the regulator) by special

interests;

3. Regulators and licensees with trustworthy capabilities (competence and capacity);

4. Effective (informative) stakeholder consultation by both project operators and regulators well-ahead of land access. This drives operators to establish terms for land access well before activity approvals are applied-for e.g. before any particular activity ‘gets personal’;

5. Public access to details of risks, reliable research to reduce key uncertainties and back-up

risk management strategies so the basis for regulation is contestable anytime, everywhere;

6. Timely notice of entry with sufficient operational details to effectively inform stakeholders;

7. Potentially affected people and organizations can object to land access -– while the regulator and prescribed dispute resolution processes do not support, and hence, minimise vexatious objections;

8. Fair and expeditious dispute resolution processes;

9. Fair compensation to affected land-users for costs, losses, and deprivation due to operations;

10. Reduction of risks to as low as reasonably practicable (ALARP), while also meeting

community expectations for net outcomes;

11. Licensees monitor and report (to the regulator) on the efficacy of their risk management processes, and the regulator probes same;

12. Regulator can prevent and stop operations, require restitution, levy fines and cancel

licences;

13. Industry compliance records are made public, so the efficacy of regulation is transparent;

and

14 Regulations are reviewed by exception, and no less frequently than once every 5-years, to stay current and sustain trust with the public and investors

Chrono-strat of gas & water

reservoirs 8.3 8.0 Subsurface Knowledge

1 1

9 2 Effective, trusted regulation 8.2 7.4 Investor and Public Trust

Bolster public understanding (with reliable information) re: hazards and risk management via

**6** R

FAQ on web 3 3 Informed public 8.2 7.9 Investor and Public Trust

E - Economy of scale 28,

**7** 29, 30 59 and regulation 21 overlap

E - Economy of scale 28,

**8** 29, 30 59 and regulation 21 overlap

E - Economy of scale 28,

**9** 29, 30 59 and regulation 21 overlap

Paved lanes where now unpaved between Moomba and paved roads to east in Queensland 30 3 Paved roads 8.1 7.3 Infrastructure

Paved, 14ft wide lanes where now unpaved between southern ports and Moomba 29 4 14 ft lanes 8.1 6.7 Infrastructure

Water crossings made more passable year-round. Paved roads ex Ports to Moomba. Paved

roads ex Moomba to Queensland 59 5 Weatherproof 8.0 7.0 Infrastructure

Streamline approval of imported equipment - especially road regulations – in SA and the whole

**10** E

of Australia 50 6

**Regulation will abide by the following principles:**

1. Certainty. The rights conferred by licences are certain and will not be subject to unreasonable change or challenge. Also the regulatory objectives and obligations under the regulatory regime are uniform, clear and predictable to all licensees.

2. Openness. Decision-making processes are designed so the legal rights of all stakeholders are not unfairly compromised. This entails the need for fair and equitable processes for the

• Allocation of title rights;

• Managing of rights of other land owners with overlapping land rights;

• Managing of rights of title holders to access land for the exploration and development of regulated resources;

• Provision of access to natural resources governed by this legislation where surface access within the licence area may be restricted by the sensitivity of the natural

Reduce redtape to expand rig

fleet 8.0 6.1 Reduce Red tape

R –

Regulation

7, 9, 22,

**11** 31, 42 and

Economies of

scale 35, 39,

52, 54, and 55 overlap

R - Regulation

environment or other previously established rights;

• Stakeholder consultation on the establishment of the environmental protection objectives;

and

• Appeal rights to those affected by decisions made under the legislation.

3. Transparency. The objects and intent of the regulatory regime are clearly communicated and understood by all stakeholders. Also, stakeholders are provided with the opportunity to input into the development of these objects and intent. The decision-making processes are visible and comprehensible to all stakeholders and that industry performance in terms of compliance with the regulatory objectives is apparent to all stakeholders.

4. Flexibility. There is sufficient flexibility in the types of licences that can be granted so as to more adequately reflect the purpose of the activities to be undertaken and the stage of development of the resource under the licence. The level of intervention (including enforcement) needed to ensure compliance is determined on the basis of the individual company being regulated and the outcomes needed to be achieved.

5. Practicality. The regulatory objectives are achievable and measurable.

6. Efficiency. The compliance costs imposed on both government and the company by the regulatory requirements are minimized and justified. Negative impacts on communities are minimized and companies remain liable for the cost of their impacts. An appropriate rent is paid to the community of South Australia from the value realized from the development and production of its natural resources.

7 4 Principled regulation 8.0 7.4 Investor and Public Trust

**12** 6 and 37 are the same

A competent and capable one-stop-shop without taint of capture is to be sustained for the

upstream petroleum industry

6 5 Trusted one-stop-shop for

regulation

7.9 7.4 Investor and Public Trust

**9**

|  |  |  |  |
| --- | --- | --- | --- |
| **13**  **14**  **15**  **16**  **17**  **18**  **19**  **20**  **21**  **22**  **23**  **24**  **25**  **26** | E - Economy of scale 28,  29, 30 59 and Devise resilient ways to ‘weatherproof’ operations 28  regulation 21  overlap | 7 Weatherproof operations | 7.9 6.1 Infrastructure |
| A – Attract  2, 4, 6, 7,  8, 16, 21,  23, ,24 and Institute on-line access to data and information with regular announcements of additions to  economies of open-files 21  scale 25, 65 and 66 overlap (databases) | 2 Better on-line Databases | 7.8 8.2 Subsurface Knowledge |
| R – Regulation Foster consistent reporting of resource and reserve volumes (easy access to consensus  1, 4 and 11 definitions, pursuant to SPE/AAPG/etc) 2 overlap | 6 Consistent reserves reporting | 7.8 6.8 Investor and Public Trust |
| R Set a program for basin-wide, base-line, water resource characterization 18 7 Regional water studies 7.8 6.8 Environmental Protection | | |
| E Additional petroleum pipelines – fit for demand 2  E Fit-for-purpose air strips and air services in proximity to operations 46  Incentives to accelerate unconventional gas reserve bookings and gas deliverability via  E – royalty and/or tax reductions or holidays at state and federal levels. Could limited to revenues  23, 24, 47 and associated with unconventional reservoir production. Could entail an R&D credit for the 47  development of technologies e.g. high temperature tools for high temperature reservoirs.  58 overlap Could entail down-hole costs of fracture stimulation as a deduction against revenues on which  royalties are calculated. Could be synched with the PRRT  E Additional petroleum processing plants – fit for demand 1 | 8 Add’l Pipelines  9 Air services  10 Tax - Royalty Incentives  11 Add’l Processing | 7.8 5.8 Infrastructure  7.7 7.2 Infrastructure  7.7 7.0 Fiscal framework  7.6 4.9 Infrastructure |
| R – Regulation  7, 9, 22,  31, 42 and  Economies of Require regulators to be transparent in decision-making 42 scale 35, 39,  52, 54, and 55 overlap | 8 Transparent regulation | 7.6 6.4 Investor and Public Trust |
| E CO2 gathering systems for use in CO2 floods (for enhanced petroleum recovery) and to  reduce carbon intensity 21 | 12 CO2 for EOR | 7.6 5.1 Efficiency |
| E –  Economies of  scale 22 and Resolve leading practices for sustainable water use with minimum red tape 20  Regulation 20  overlap | Leading practice water use  9 | Environmental Protection /  7.6 5.6 Reduce Red tape |
| Consider universities as a source of play mapping and play-by-play Original Hydrocarbons  A in Place (OHIP), Technically recoverable OHIP, probabilistic well productivity and production 13  decline curves extending at least 10 years  A – Attract  2, 4, 6, 7,  8, 16, 21,  23, ,24 and In cooperation with Geoscience Australia and other State and NT resource agencies, make  economies of calls for legacy information 23  scale 25, 65 and 66 overlap (databases) | 3 Play & Field Statistics from  Universities  4 Add legacy info to Databases | 7.5 8.0 Subsurface Knowledge  7.5 7.3 Subsurface Knowledge |
| E Pad drilling to minimize footprint, capex and opex 27 | 13 Multi-well pads | 7.3 6.9 Environmental Protection / Efficiency |

|  |  |  |  |
| --- | --- | --- | --- |
| **27**  **28**  **29**  **30**  **31**  **32**  **33**  **34**  **35**  **36**  **37** | A – Attract  2, 4, 6, 7, Work with Geoscience Australia to augment the ORGCHEM database and update the  8, 16, 21, characterization of unconventional gas and unconventional oil resources with:  23, ,24 and 1. updated Van Krevelen diagrams (for example Rockeval S2/TOC on Y-axis and Tmax on x 8 economies of axis)  scale 25, 65 2. update Toc histograms  and 66 overlap 3. etc  (databases) | 5 Update ORGCHEM database | 7.3 7.3 Subsurface Knowledge |
| E –  Economies of  scale 54, 55 Areas where myriad, complex land holdings exist need a streamlined way to reach land access  and regulation agreements 55  9 and 31 overlap | Streamline Land Access | 7.2 6.5 Reduce Red tape |
| R The approvals process for the construction of cross-border pipelines are streamlined by  agreement between adjacent State/NT governments 12  R Multiple Joint Ventures cooperate in basin-wide monitoring for environmental impacts (to reap  economies of scale) 14 | Consistent regulation between  11 JVs for environmental monitoring | 7.2 5.1 Reduce Red tape  7.2 5.7 Environmental Protection / Efficiency |
| Develop state-wide maps (that can be extended into adjacent jurisdictions in cooperation with  A Geoscience Australia, the NT, Queensland, NSW, Victoria and WA) that delineate the following 3  play-trend areas for shale gas, Shale Oil, Deep CSG, Shallow CSG, Tight Gas, and Coals  prospective for mining and/or underground gasification | 6 National play maps | 7.2 7.7 Subsurface Knowledge |
| E  Applied R&D at the ASP to determine fracture patterns at target levels from 3D seismic (links  to Item LVIII) 24  23, 24, 47 and  58 overlap | 15 Detect fractures with 3D | 7.2 6.8 Subsurface Knowledge |
| R Annual public reports to demonstrate the efficacy (or otherwise) of risk management and  regulation; 17 | Rpt on the efficacy of risk | 7.2 7.4 Investor and Public Trust |
| A – Attract  2, 4, 6, 7,  8, 16, 21,  23, ,24 and Update a pressure-depth database (based on DST,s RFT,s FITs, MDTs, and production tests)  economies of for all plays 7  scale 25, 65 and 66 overlap (databases)  A – Attract  2, 4, 6, 7, For unconventional petroleum wells, consult with industry, within CoAG and with international  8, 16, 21, fora that have established leading practice standards for sample and data acquisition; reporting  (including formats) to government; archival methodologies and technologies; and terms for  23, ,24 and confidentiality (within government files). Types of records, samples, data and information in 16 economies of  scale 25, 65 scope include but are not limited to: cores, side wall cores, cuttings, mud-logs, wire-line logs,  and 66 overlap fluid and gas samples, micro-seismicity; well seismic surveys, etc. In this process, devise fit-  (databases) for-purpose data requirements suited to closely-spaced development and pad drilling  A – Attract  2, 4, 6, 7,  8, 16, 21, Develop effective delivery systems and formats for data and interpretations including but not  limited to: stratigraphy, bio-stratigraphy, horizon structure-depth, unit thickness, temperature,  23, ,24 and pressure, organic geochemistry, gas composition, flow test measurements and interpretations, 24 economies of  scale 25, 65 rock properties and interpretation, wireline log data and interpretation, fracture stimulation  and 66 overlap stage characterisation, spinner test, cement bond, etc  (databases) | 7 Database for pressure data  8 Leading practice data sampling & Reporting standards  9 Database capacity and flexibility | 7.1 8.0 Subsurface Knowledge  7.1 7.4 Subsurface Knowledge  7.1 6.6 Subsurface Knowledge |
| R Take account of legislative and regulatory regimes in all States and the NT through CoAG –  and freely adopt ever better legal frameworks for unconventional gas projects 40 | 13 Adaptive learning for regulation | 7.1 6.2 Investor and Public Trust |

14 Agreements

10 jurisdictions

12 management

R – Regulation

**38** 1, 4 and 11 overlap

**9**

Foster consistent reporting of exploration, appraisal and development results 1 14 Consistent reporting to markets 7.1 7.3 Investor and Public Trust

Clarify process for assessing threats to the environment with DEWNR (and all other co-

**39** R

regulators) – add to Chapter covering Regulation 30 15

Clarify standards for

environmental threat assessment 7.1 6.6 Environmental Protection

**Duplicate**

Regulation 6 and 37 are the same

Regulators must have fit-for-purpose competence and capacity e.g. capabilities 37 16 Regulator competence and

capacity

7.1 6.6 Investor and Public Trust

E –

**40** 23, 24, 47 and

58 overlap

E – Regulation

7, 9, 22,

Applied R&D at the ASP to use magnetotellurics (MT) to delineate the propagation of fractures

created during hydraulic stimulation (links to Item LVIII) 23 16 MT R&D 7.0 6.6 Subsurface Knowledge

Transparency of rules (framework) and tolls for processing and transport (including pipelines

**41** 31, 42 and

Economies of

scale 35, 39,

52, 54, and 55 overlap

and compression) of 3rd party gas and gas liquids in privately owned infrastructure to foster

open access on commercial terms. (

52 17 Transparency of tolls 7.0 5.6 Efficiency

Manage the risk of losing key skilled people due to remuneration or job conditions that fail to

**42** E

be nationally and internationally competitive, as relevant 57 18 Manage skills retention 7.0 5.3 Supply-chains

**43** E Drilling subsidies (10-15%) Re-mobilization subsidies (trialed in WA) 49 19 Drill Subsidies 7.0 4.8 Fiscal framework

R –

**44** Regulation 16

and 35 overlap

Effective probing for well integrity 16 17 Effective probing by regulators 6.9 6.1 Investor and Public Trust /

Environmental Protection

Publications describing Unconventional gas plays (to attract domestic and international

**45** A

investment and gas sales) 10 10 Publications to attract investment 6.9 7.9 Subsurface Knowledge

R – Regulation 7,

9, 31, 42 and

**46** Economies of scale 35, 39,

52, 54, and 55 overlap

Clarify requirements for rigorous environmental assessments and requirements to inform stakeholders of findings with sufficient time for informed views to be established, and all ahead of land access approvals for associated activities

31 18 Enable Stakeholders being well

informed

6.9 6.3 Investor and Public Trust /

Environmental Protection

**47** E - 23, 24, 47 and 58 overlap

Economies of scale 10, 11,

**48** 12, 13, 14, 15,

53 and 61 overlap

R & D for fracture stimulation to make for more effective and therefore lower cost results.

(Example: nano-technology). 58 20 Frac Stim R&D 6.9 6.0 Subsurface Knowledge

Multiple Joint Ventures tender for equipment/services to reap economies of scale 14 21 JVs to share equip 6.9 4.2 Efficiency

Prepare a reference list of papers pertaining to impacts of unconventional gas projects so

**49** R

assessments most easily build-on pre-existing knowledge 28 19

Build on experience in project

assessment 6.8 7.1

Investor and Public Trust /

Environmental Protection

**50** R

For all unconventional gas projects, pre-activity approval public consultation and intra- government will be undertaken on the basis of fit-for-purpose Environment Risk Reports and Statements of Environmental Objectives. Scope will cover all potentially significant location- specific hazards, associated leading practice risk mitigation strategies, and expected controlled risks.

13 20 Fit-for-purpose environmental performance standards

6.8 6.0 Investor and Public Trust /

Environmental Protection

**9**

|  |  |  |  |
| --- | --- | --- | --- |
| **51**  **52**  **53**  **54**  **55**  **56**  **57**  **58** | DMITRE regulators will gain accreditation to provide once-for-all (purposes) assessments for  R Commonwealth (for example – pursuant to the EPBC Act) and State co-regulation of upstream 11 petroleum operations | 21 SA Government regulators delegates for EPBC Act | 6.8 5.3 Environmental Protection /  Reduce Red tape |
| For each play – as practical - develop state-wide maps (that can be extended into adjacent jurisdictions in cooperation with Geoscience Australia, the NT, Queensland, NSW, Victoria and WA) that delineate the following play ingredients:  1. For key stratigraphic levels –structure in two-way seismic travel time and in depth below  expressed datums  2. For relevant stratigraphic levels – CO2 % of Total Gas  A – Attract 3. For relevant stratigraphic levels – Ethane richness  2, 4, 6, 7, 4. For relevant stratigraphic levels – LPG richness  8, 16, 21, 5. For relevant stratigraphic levels – Condensate richness  23, ,24 and 6. For key structural levels – mean Rv% at depth (for example – Rv% at top Patchawarra) 4 economies of 7. Semi-log cross plots of mean Rv% (+/- range) versus temperature at sample elevation  scale 25, 65 8. Temperature gradient maps ‘down to’ key structural levels  and 66 overlap 9. Temperature maps at key structural levels (based on multiplying temperature gradient x  (databases) depth maps)  10. Using Rv% versus temperature correlation, convert temperature at key horizon maps to  Rv% at key horizons (ex at top and base Patchawarra) to delineate relative prospectivity  11 In cooperation with Geoscience Australia’s national unconventional resource assessment, for each unconventional gas play, characterize and map Original Hydrocarbons in Place (OHIP), Technically recoverable OHIP, probabilistic well productivity and production decline curves extending at least 10 years | 11 Gas composition, organic  maturity and temperature maps | 6.8 6.8 Subsurface Knowledge |
| A – Attract  2, 4, 6, 7,  8, 16, 21, Establish best practice / fit-for-purpose protocols and technologies for data and information  sharing. This could underpin industry’s social license to operate. The website [http://fracfocus.](http://fracfocus.org/)  23, ,24 and [org/](http://fracfocus.org/) is cited as an exemplar. Is this a facility that industry can run collectively (maybe through 65 economies of  scale 25, 65 APPEA) or is a public-private partnership better? For introductory details – visit: [http://](http://fracfocus.org/welcome)  and 66 overlap [fracfocus.org/welcome](http://fracfocus.org/welcome)  (databases)  E Truck assembly in South Australia (fracture stimulation road trains, etc) 34  E Find local supplier of proppant 64 | 22 Data sharing - Fracfocus  23 Build frac trucks in SA  24 Local proppant | 6.8 6.6 Subsurface Knowledge  6.8 6.7 Supply-chains  6.8 4.9 Supply-chains |
| Regulation  32, 33 and 34 Post activity audits can attest to the efficacy (or otherwise) of environmental protection plans. 33 overlap  R – Regulation  7, 9, 22,  31, 42 and Sustain effective regulation while minimize regulatory imposts 22  Economies of  scale 35, 39,  52, 54, and 55 overlap  Fund targeted environmental research in ways that build public trust in outputs 43 | 22 Post activity audits for environmental outcomes  23 Minimise red tape  24 Targeted environmental research | 6.7 6.2 Investor and Public Trust /  Environmental Protection  6.7 5.4 Investor and Public Trust /  Reduce Red tape  6.6 5.9 Environmental Protection /  Public and Investor Trust |
|  | | | |

A – Attract

2, 4, 6, 7,

8, 16, 21,

23, ,24 and

**59** economies of

scale 25, 65 and 66 overlap (databases)

**9**

Work with Geoscience Australia to upgrade national well and seismic databases in general 25 25 National Databases 6.6 8.3 Subsurface Knowledge

**60** A

Already a part of some play descriptions in the form of cross-sections – but good to determine a TYPE- section for each play (well logs, lithology log, seismic character, core analysis,

special core analysis, etc) – create a web page for each. This can be extended to include well petrophysical studies to characterize relative quality of the following plays in an unconventional reservoir rock catalog a ‘rock catalog’. Could expand to include petrophysical interpretation guidelines. This can be extended into adjacent jurisdictions in cooperation with Geoscience Australia, the NT, Queensland, NSW, Victoria and WA:

1. Shale Gas

2. Shale Oil

3. Deep CSG

4. Shallow CSG

5. Tight Gas; and

6. Coals prospective for mining and/or underground gasification

5 12 Web-based type sections for plays

6.6 6.7 Subsurface Knowledge

E –

**61** Economies of scale 4 and

20 overlap

E –

Economies of

**62** scale 10, 11,

12, 13, 14, 15,

53 and 61 overlap

CNG for transport and equipment (drilling/work-over rigs, etc) e.g. substitute gas for diesel in

field operations and more generally for transport everywhere 4 26 Use CNG 6.6 5.3 Innovation / Gas Markets

Large multi-client 3D surveys 12 27 Multi-client 3D 6.6 5.0 Efficiency

**63** E Rail transport options to the Cooper Basin 62 28 Rail 6.6 5.0 Infrastructure

**64** E 3rd party tolled (on commercial terms) access to petroleum processing and transport facilities 16 29 tolls to share facilities 6.6 5.8 Infrastructure / Efficiency

R – Regulation

**65** 1, 4 and 11 overlap

Bolster investor understanding of resource and reserve definitions 4 25 Investor certainty for reserve estimates

6.6 7.7 Investor and Public Trust

Assess state-based, national and international analytical capabilities to enable quality control,

**66** A

economies of scale and foster local content in sample analysis 19 13 Gap analysis for lab capabilities 6.6 6.1 Supply-chains

R – Regulation 7,

9, 31, 42 and

**67** Economies of scale 35, 39,

52, 54, and 55 overlap

E 35 = E39

Operators reveal forecast supply-chain requirements (equipment, materials, and services) to entice competitive suppliers e.g. well and fracture stimulation (spread) equipment, services and materials

35 30 Demand-side Supply Chain Co-

Ops

6.6 4.1 Supply-chains

R – Regulation 7,

9, 31, 42 and

Economies of

**68** scale 35, 39,

52, 54, and 55

overlap

E 35 = E39

**9**

Update SA’s online Petroleum (and geothermal) Services Directory 42 31 Services Directory 6.6 8.6 Supply-chains

**69** A Feature SA projects in government pronouncements 11 14 Market prospects in SA 6.6 8.3 Investor and Public Trust

R –

**70** Regulation 5

and 46 overlap

Benchmark SA approach to IEA ‘golden rules’ 5 26 Benchmark SA regulation to IEA Golden Rules

6.6 7.0 Investor and Public Trust

R-

**71** Regulation 39

& 57 overlap

Extract leading practice risk mitigation defined in various SEOs and associated EIRs for addition to DMITRE’s website. This will be a ready reference to current leading practice without having to download and digest a number of SEOs and EIRs. This will be an expression of industry’s current leading practice strategies to meet regulatory objectives.

47 27 Summarise leading practice in

SEOs and EIRs

6.6 6.9 Investor and Public Trust / Efficiency

A – Attract

2, 4, 6, 7,

8, 16, 21,

**72** 23, ,24 and economies of

scale 25, 65 and 66 overlap (databases)

Consult with industry to establish priorities for pre-competitive data and interpretations 2 15 Set priorities for pre-competitive

assessments

6.6 6.8 Subsurface Knowledge

Conjunctive ILUAs for operations and facilities (that are fair to aboriginal people and

**73** R

sustainable in relation to development) 40 28 Progress conjunctive ILUAs 6.6 6.4 Reduce Red tape

A – Attract

2, 4, 6, 7,

8, 16, 21,

23, ,24 and

**74** economies of

scale 25, 65 and 66 overlap (databases)

Cross reference Petroleum and Geothermal Energy Act 2000 Environmental Impact Research Reports and Statements for Environmental Objectives so cohesive state-wide risk management is most easily understood, and easily accessible. This could be accomplished either by Government, by Industry or by an Industry-Government partnership. It would create a single, readily accessible document or database of leading practice risk mitigation

66 32 Stock take of environmental risk management

6.5 7.3 Environmental Protection /

Public and Investor Trust

Publicly accessible maps and lists of gas processing and transport infrastructure with details of

**75** A

facility capacity, gas composition limitations, rules for access, etc. 51 33

Transparency for infrastructure

capacity 6.5 6.9 Supply-chains / Efficiency

**76** R

Have the relevant sub-committee of the CoAG’s Standing Council for Energy and Resources review the Commonwealth Energy White Paper to align associated initiatives with best practice harmonisation of legal frameworks for unconventional gas

45 29 Stock take vs. Energy White

Paper

6.5 6.1 Investor and Public Trust

**77** R Require ‘best practice’ reporting of non-compliance e.g. unplanned and undesirable outcomes 44 30 Leading practice reporting for

non-compliance

6.5 6.5 Investor and Public Trust

R –

**78** Regulation 5

and 46 overlap

Take account of lessons learnt nationally and internationally (USA, Canada, NZ, IEA Golden

Rules, etc) – 46 31

Benchmark with international

experience 6.4 7.2 Investor and Public Trust

R –

**79** Regulation 16

and 35 overlap

Best practice objective-based regulation requires management systems and operational plans to reduce risks to as low as reasonably practical and to meet community expectations for net outcomes, requires monitoring for the efficacy of risk management and operational plans, and entails probing of management systems and operations

**9**

Probe operator management

35 32

systems for efficacy 6.4 6.7 Investor and Public Trust

Convene PESA-AAPG/SPE/ASEG-SEG workshops and conferences focused on

**80** A

unconventional gas in South Australia (with case studies a key focus) 26 34 Play Workshops 6.4 8.8 Subsurface Knowledge

A – Attract

2, 4, 6, 7,

8, 16, 21,

**81** 23, ,24 and economies of

scale 25, 65 and 66 overlap (databases)

Develop a leak-off test database that can help guide drilling, cementing, and fracture

stimulation operations 6 16 Leak-off test Database 6.4 7.5 Subsurface Knowledge

R-

**82** Regulation 39

& 57 overlap

Extract guidelines from SEOs for: (1) cementing casing and (2) for plug and abandonment as a

trend-by-trend guide to leading practices 39 33

Summarize leading practice for

well integrity and abandonment 6.4 7.2

Environmental Protection /

Public and Investor Trust

**83** R Add a section on leading practice engagement practices to this Chapter 10 34 Elaborate leading practices for engagement

6.4 7.4 Investor and Public Trust

E - Economy of scale 28,

**84** 29, 30 59 and regulation 21 overlap

Resolve leading practices for actions that ‘weather-proof’ operations (bridges / paved roads /

etc)

21 35 Resolve leading practices to weatherproof transport

6.4 5.9 Infrastructure

**85** A Team – South Australia booths at peak events in Australia 9 17 SA booths at peak events 6.3 7.8 Investor and Public Trust

Regulation

**86** 32, 33 and 34 overlap

License holders should undertake sufficient post-activity environmental investigations of pilot

and full-scale projects, and reported on by tenement holders

34 36 Operators post-activity audit for environmental outcomes

6.3 6.7 Investor and Public Trust

Telecommunications improved. Industry – Government forum to elaborate cost: benefit for

**87** E

such improvements 60 35 Telecom 6.3 6.6 Infrastructure

Align the Roadmap narrative on regulation with CoAG’s narrative for harmonizing to leading

**88** R

practice regulation frameworks 8 37

Harmonize with CoAG CSG

framework for regulation 6.3 6.6 Investor and Public Trust

E – Economies of Scale 17,

**89** Regulation

24 and

Investment attraction 25 overlap

Sustain supply-side competition between multiple Joint Ventures 17 36 Supply-side competition 6.3 5.5 Gas Markets

A stick and carrot approach can be deployed to reward Operators who consistently

**90** R

demonstrate compliant operations that meet regulatory objectives, and more risk management controls are in place for all other Operators – to account for experience, and encourage exemplar operations

Reward exemplary compliance to

drive compliance 6.3 6.0

36 38

Environmental Protection /

Public and Investor Trust

Economies of scale 10, 11,

**91** 12, 13, 14, 15,

53 and 61 overlap

Pooling of seismic crews 11 37 Pool Seismic Crews 6.3 4.9 Efficiency

**92** R

Review paper - ‘Conserving Nature’ (First need to confirm if this is the CSIRO’s publication in Nature or website <http://www.hphpcentral.com/articles-research/conserving-nature>or another source)

24 39 Review salient publications for benchmarking

6.3 7.9 Investor and Public Trust

**93** A

For unconventional petroleum well information, consult with industry, within CoAG and with international fora that have established leading practice standards for sample handling and analysis to foster comparable measurements and reporting standards

18 18 Leading practice sample and data

report standards

6.3 6.3 Subsurface Knowledge

**94** A Create / update (annually?) economic nomographs for quick-look analysis for web pages 27 40 Web-based information for project economics

**95** R Add a section on leading practice consultation processes to this Chapter 9 41 Elaborate leading practice for

consultation

6.2 6.2 Investor and Public Trust

6.2 7.1 Investor and Public Trust

**96** Assess supply depot capacities versus prospective, future activity 38 38 Supply Chain Depots 6.1 6.2 Supply Chains /

Infrastructure

R – Regulation

7, 9, 22,

**97** 31, 42 and

Economies of

scale 35, 39,

52, 54, and 55 overlap

Clarify land access – look for ways to streamline. Seek a normalized, efficient, fair and transparent process for agreeing the terms for land access for all landowners, not just for the Right to Negotiate and Indigenous Land Use Agreement processes.

54 39 Streamline Land Access 6.0 6.7 Reduce Red tape

Additional LNG export facilities in the south, from South Australia, as / if market demand

**98** E

justifies that 33 40 LNG Plant in SA 6.0 4.3 Infrastructure / Efficiency

**99** E Tax rates tiered versus cost by field and/or reservoir to beget supply side competition 48 41 Minimize threshold economic

reserves

6.0 4.0 Fiscal framework

**100** R

Economies of scale 10, 11,

Statements of Environmental Objectives need be open to change (adaptive learning) – and reviewed regularly to stay modern. Current SA requirements are for 5 – yearly reviews of SEOs or more frequently as determined by the regulator

38 42 Adaptive learning for ALARP 6.0 6.4 Environmental Protection /

Public and Investor Trust

**101**

12, 13, 14, 15,

53 and 61 overlap

E- Economies

Planning forums and cost sharing frameworks suited to most enterprises in the Cooper Basin 61 42 Cost sharing 5.8 6.4 Efficiency

**102**

of scale 37,

43, 44 and 45 overlap

Industry Capability Network (ICN) to get involved to match local content capabilities to

emerging supply-chain demand (pre-screen for demand-side) 43 43 ICT assist 5.8 5.9

Supply Chains /

Infrastructure

**103** A Awareness of minimum economic threshold volume/rates for commercialization options 26 43 Elucidate break-even reserves 5.7 4.5 Investor and Public Trust

**104**

Economies of scale 10, 11,

12, 13, 14, 15,

53 and 61 overlap

Pooling of pipeline/flow line crews 13 44 Pool pipeliners 5.7 4.6 Supply-chains / Efficiency

**105**

E- Economies of scale 36,

43, 44 and 45 overlap

Economies of scale 10, 11,

Cross-reference supply-chain demand (equipment, materials, and services) with enterprise

capabilities and form supply-chain clusters 36 45

Incentives for industry cooperation to reap economies of scale for gas development,

Supply-side Supply Chain

clusters

**9**

5.7 3.8 Supply-chains / Efficiency

**106**

**107**

**108**

**109**

12, 13, 14, 15,

53 and 61 overlap

R – Economies of Scale 17, Regulation

24 and

Investment attraction 25 overlap

Economies of scale 10, 11,

12, 13, 14, 15,

53 and 61 overlap

E – Economies of scale 32 and

31 overlap

production, processing and transport, without reducing supply-side competition 53 46 Incentives for Industry Co-Ops 5.7 4.4 Fiscal framework

Protect public interest in sustaining upstream gas supply competition in domestic markets

while also supportive of joint arrangements to compete internationally 25 44 Add to supply-side competition 5.6 4.3 Gas Markets

Pooling of rigs 10 47 Pool rigs 5.6 4.6 Supply-chains / Efficiency

Link Cooper gas with LNG export facilities in Gladstone 32 48 Moomba-Gladstone gas 5.6 4.9 Infrastructure / Gas Markets

**110** E LNG for transport 5 49 LNG Trucks 5.5 4.5 Innovation / Gas Markets

**111** A Generalize economic information – costs per GJ, etc will fall within a range 12 19 XII. Transparent economic information

5.4 6.1 Investor and Public Trust

**112**

E – Economies of scale 32 and

31 overlap

E – Regulation

Link Cooper gas with LNG export facilities in Darwin, as / if market demand justifies that 31 50 Moomba-Darwin Gas 5.4 3.6 Infrastructure / Gas Markets

**Duplicate**

7, 9, 42 and Economies of scale 39, 52, and 54 overlap

I (shifted from R) R Economies of Scale 17,

Provide caveat emptor transparency as to future development scenarios – to beget timely local

content in supply chains 34 51 Supply Chain Forecasts 5.3 4.8

Supply Chains /

Infrastructure

**113**

**114**

Regulation

24 and Investment attraction 25 overlap

R – Regulation

Attract exploration / appraisal investment so widely and by so many independent Joint

Ventures / companies so that supply-side competition keeps gas prices competitive

Clarify process to pay and lead to more environmental research relevant to unconventional gas

24 45 Supply-side competition 5.3 4.5 Gas Markets

Environmental Protection /

32, 33 and 34 overlap

operations, and in particular, well operations 32 46 Foster environmental research 5.3 5.6

Public and Investor Trust

53 Clusters

**\*Overall rank-wise overlaps:** (**7, 8, 9, 13** & **84**) (**3** & **23**) (**5, 11, 22, 28, 41, 46, 67, 68, & 97**); (**14, 25, 27, 34, 35, 36, 52, 53, 59, 72, 74 \***

|  |  |  |  |
| --- | --- | --- | --- |
| **115**  **116**  **117**  **118**  **119**  **Duplicate**  **120**  **121**  **Duplicate**  **122**  **123**  **124**  **125** | I –  Investment  attraction 6 Gas – to – synfuel 8 and 8 are  same  E- Economies  of scale 37, Convene a workshops that could band together enterprises into clusters worth IPO to start-up  43, 44 and 45 and get competitive 44  overlap  E- Economies  of scale 37, Work with Commonwealth Enterprise Connect (or similar) to foster shift of enterprises to  43, 44 and 45 petroleum supply chain purposes 45  overlap  E Gas as feedstock for fertilizer 3  10, 11, 12,  13, 14, 15, Basin-wide operator for drilling to reap economies of scale 15  53 and 61  overlap  E –  Economies of Gas to synfuel 6 scale 6 and 8  are same  E –  Economies of Use CNG vehicles in the field (links to Item IV) 20 scale 4 and  20 overlap | 52 GTL  Workshops for Supply Chain  54 C’wealth Enterprise Connect help  55 Gas-to-Fertilizer  56 Basin-wide operator  57 GTL  58 CNG Use | 5.0 3.5 Innovation / Gas Markets  4.9 6.6 Supply Chains  4.9 5.1 Supply Chains  4.9 5.1 Gas Markets  4.8 3.8 Efficiency  4.8 3.4 Innovation / Gas Markets  4.8 3.1 Innovation / Gas Markets |
| Regulation  13 and  Investment Entice large customers for gas into upstream investment 23  Attraction 9 are same | 47 Add to supply-side competition | 4.7 4.3 Gas Markets |
| Regulation  13 and  Investment Entice large customers for gas into upstream investment 9  Attraction 9 are same  E- Economies  of scale 37, Equity capital raisings (IPOs) for supply chain clusters 37  43, 44 and 45  overlap  E Liquids stripping linked to gas storage where gas market demand < gas deliverability 19  E Syngas to Power 7  E Syngas to synfuel 8 | 59 Demand-side explores  60 Supply Chain IPOs  61 Liquid stripping  62 Syngas to Power  63 Syngas to synfuel | 4.6 4.0 Gas Markets  4.6 4.8 Supply Chains  4.6 4.5 Innovation / Gas Markets  4.1 3.5 Innovation / Gas Markets  3.9 3.5 Innovation / Gas Markets |

**81**); (**5, 11, 21, 41, 97**); (**15, 38** & **65**); (**19, 32, 40** & **47**); (**70** & **78**); (**44** & **79**); (**82** & **39**);(**89,107** & **113**); (**16** & **35**);(**109** & **112**); (**102, 116,**

**117** & **122**).

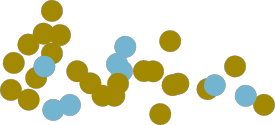
**Overall rank-wise with a duplicate lesser ranked recommendation are:** (**16**); (**37**); (**123**); and (**115**)

Regulation **(R)**, Economies of Scale **(E)**; and Attract Investment **(A)**

Colour coding reflects recommendation categories as follow: Economies of scale; Regulation; and Investment attraction.

10.0

**Materiality**



Upper to medium priority for implementation

**All recommendations**

High priority for implementation

9.0

8.0

**1**

**2 3**

**4**

**5 6**

**8 7**

**10 9 11**

**13 12**

**17 1156 14**

7.0

**20 22 23**

**29 30**

**43 42 41**

**48**

**21**

**28**

**37 36**

**39**

**40**

**47 44 46**

**19 18**

**25**

**26 27**

**33**

**35**

**32**

**38**

**49**

**24**

**31 34**

**45**

**55**

**67 62**

**51**

**61 57**

**50**

**56**

**64 58 66**

**76**

**53 5452**

**60**

**73 72**

**77 79**

**7170**

**75**

**65**

**827874 8381**

**6599 68**

**80**

6.0

**99 98**

**91 89**

**84**

**90 94 93**

**96**

**100**

**888786 85**

**92**

**95**

**97**

5.0

**112**

**115**

**105**

**107106**

**101304**

**108**

**110**

**113**

**109**

**111817**

**114**

**102**

**111**

**101**

**116**

**120 119**

**121**

**123 122**

4.0

**124**

**125**

3.0

2.0

1.0

**6** Regulation (public interest)

**5** Investment attraction

**4** Economies of scale

0.0

0.0

Low priority for implementation

1.0

2.0

Low to medium priority for implementation

3.0 4.0 5.0 6.0 7.0 8.0 9.0

10.0

**Do’ability**

204218-136

***Figure 9.1.*** *Roundtable’s ranking of Roadmap recommendations in a matrix of “materiality” (e.g. value of the outcome) and “do’ability” (e.g. perception of the chance to implement) from lowest (zero) to highest (ten) ratings. Recommendations are numbered by rank as listed in Table 9.3.*

9.0

8.0

**Materiality**

Upper to medium priority for implementation

**All recommendations**

**2**

**10**

**13**

**17**

**3 5**

**8 7**

**9 11**

**12**

**1156**

**9**

High priority for implementation

**1**

**6 4**

**14**

7.0

**20 22 23**

**29 30**

**43 42 41**

**48**

**21**

**28**

**37 36**

**39**

**40**

**47 44 46**

**19 18**

**25**

**26 27**

**33**

**35**

**32**

**38**

**49**

**24**

**31 34**

**45**

**55**

**67 62**

**51**

**61 57**

**50**

**56**

**64 58 66 73**

**53 5452**

**60**

**72**

**7170**

**65 6599 68**

6.0

**99 98**

**91 89**

**76**

**84**

**90 94 93**

**96**

**77**

**100**

**79**

**888786**

**97**

**75 827874**

**95**

**8381 80**

**85**

**92**

5.0

**112**

**115**

**105**

**107106**

**101304**

**108**

**110**

**113**

**109**

**111817**

**114**

**102**

**111**

**101**

**116**

4.0

**120 119**

**124**

**125**

**121**

**123 122**

**6** Regulation (public interest)

**5** Investment attraction

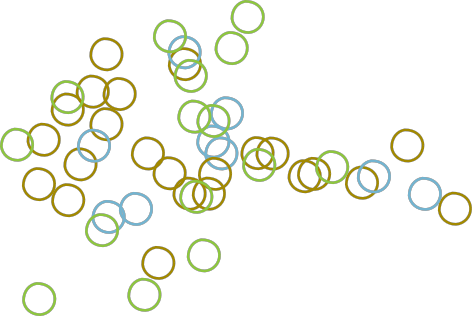
**4** Economies of scale

3.0

Low priority for implementation

Low to medium priority for implementation

3.0 4.0 5.0 6.0 7.0 8.0 9.0



**Do’ability**

204218-137

***Figure 9.2.*** *Roundtable’s ranking of Roadmap recommendations in a matrix of “materiality” (e.g. value of the outcome) and the “do’ability” (e.g. perception of the chance to implement). Recommendations are numbered by rank as listed in Table 9.3. See is a expanded version of the populated part (3 to 10 on both ranking scales) of the same illustration to allow for legible labels for rank as detailed in Table 9.3*

**D E C E M B E R 2 0 1 2**

**227**