

Number Lead People	Recommendation	Progress to 19 October 2014
1 JZ/SF	Exploration, Retention and Production Licences need to have terms (in years), area and conditions that take account of the life-cycle for finding, appraising, developing and producing unconventional petroleum	<p><b>Implemented.</b> Retention Licences pursuant to the <i>Petroleum and Geothermal Energy Act 2000</i> (PGE Act) provide appropriate security of title for a sufficient tenure to enable this recommendation to be implemented. Retention Licences are extendable at the end of 5-year licence terms if there is information to support a view – that it is more likely than not production can be established within the licence area(s) within 15 years. Having invested hundreds of millions of dollars proving the extent of its hot rock resource play – but still to meet the challenge of commercialisation – the grant of Geothermal Retention Licences (GRLs) to Geodynamics Limited in May 2012 delivered security of title and the Licence holders' ability to raise capital and persevere in its resource delineation effort – with the objective of commercialisation. Where relevant criteria are met, Petroleum Retention Licences (PRLs) and Petroleum Production Licences (PPLs) not held-by-production have, and will be offered to cover up to twice the demonstrated (productive with flow tests) extent of oil and gas resource plays held within pre-existing Petroleum Exploration Licences (PELs).</p> <ul style="list-style-type: none"> <li>In return for <b>Proven Productive Oil Plays</b> – a minimum exploration plus appraisal expenditure of AU\$4,500 per square km per annum over the whole of all 'grouped PRLs' (emanating from any one PEL) is required to avoid otherwise requisite surrender of one-third to one-half of the original licence area every 5 years. See <b>Attachment 1</b> for details.</li> </ul> <p>Any residual guaranteed work program remains a pre-requisite for licences to remain in good standing. This level of investment (AU\$4,500 per square km per annum) is the <b>statistical average</b> of all winning guaranteed work program bids for all Cooper-Eromanga Petroleum Exploration Licences (PELs) in the term 1998-2013 (in July 2013 dollars). There are now <b>25</b> companies in <b>11</b> Joint Ventures in the extent of the proven, productive, western flank oil play in the Cooper-Eromanga basins to sustain competition to implement innovation in the play area. Subject area deeds are offered where Licence holders agree to share the aggregate minimum level of investment over multiple "Grouped PRLs" that emanated from multiple PELs. Each of the "Grouped PRLs" specifies the relevant Subject Area Deed as a condition of the each licence.</p> <p>The same terms are posed as conditions on Grouped PRLs where just one PEL is involved.</p> <p>Any under-investment will trigger proportional relinquishment once every 5 years – with surrendered areas going back to market for competitive work program bidding. All details (including deeds and conditions on licences) are publicly available.</p> <p>In short, in return for a level of investment benchmarked to the highest bids lodged for PELs in the term 1998-2013, security of tenure and options to enable extensive portfolio management are available (to date) to 25 companies in 10 Joint Ventures.</p> <ul style="list-style-type: none"> <li>In return, for <b>Proven Productive Gas Plays</b> – the cost of drilling deeper for gas (in the Cooper Basin) than for oil in the Eromanga Basin sets the standard for a contestable level of exploration and appraisal investment in gas PRLs and the Santos operated Nappamerri Trough gas PPLs. To date – each Joint Venture with PPLs <u>not held by production</u> and PELs coincident with the proven productive gas plays has offered a minimum work program well in excess of the average of work program bids (lodged largely for oil prospects) in the term 1998-2013. As for oil PRLs, a minimum exploration plus appraisal expenditure per square km per annum is required over the whole of all 'Grouped PRLs' and 'Grouped PPLs'. Thus defers otherwise requisite surrender of one-third to one-half of the original licence area every 5 years. Any under-investment triggers proportional relinquishment once every 5 years – with surrendered areas going back to market for competitive work program bidding. There are now <b>31</b> companies in <b>9</b> Joint Ventures in the extent of the deep gas resource plays in the Cooper Basin to sustain competition to implement innovation in the play area. All details (including deeds and conditions on licences) are publicly available.</li> </ul> <p><b>An aggregate \$510,000,000 accelerated oil and gas exploration and appraisal investment will result in relevant licenses through 2019/20.</b></p> <p>Additionally, the continuity of large work programs in the Cooper-Eromanga can be expected to deliver economies of scale from greater activity levels. This is very important in relation to descending cost-curves, and being competitive in international markets for oil and gas.</p>
2 Bettina V	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.	<p><b>Implemented in part through <a href="#">Roundtable Working Group #1</a> and the <a href="#">Industry Participation Office</a>.</b></p> <p><a href="#">Working Group # 1</a> is the forum proposed in this 2<sup>nd</sup> most highly ranked recommendation.</p> <p>The State's largest oil and gas producers Santos, Beach Energy and Senex Energy are collaborating with the State Government and TAFE SA to establish an Onshore Petroleum Centre of Excellence (OPCE) training facility at Tonsley, co-located with the new State Core Library. The facility will provide a fully immersive simulated oil and gas production environment to be used for technical training, including safety, environmental and sustainable operational principles and key maintenance activities. Pilot training is planned for November 2014, with the facility fully operational in early 2015.</p> <p>A South Australia State Government research chair for unconventional reservoirs is being established in 2014 at the University of Adelaide. Funding is initially set at \$1 million over 4 years. This will complement existing/ongoing State Government funding for the State Chair in Petroleum Geology, funding for the CO2CRC, and funding for the State Chair in Geothermal Energy at the University of Adelaide. These cognate skills-building and research initiatives complement additional research grants, and are fully aligned with proposals (in progress) for the local universities to be a part of effort to focus on unconventional reservoirs.</p> <p>An oil and gas supplier's study tour of unconventional gas facilities in the USA was undertaken in January/February 2014 under the auspices of the Industry Participation Office, with a second tour planned for early 2015. This will foster local content in supply chains for the upstream petroleum industry in the State, nationally, and prospectively, world-wide. For details of the 2014 supplier study tour and research into the growing of guar as feedstock for fracture stimulation fluid manufacture – see pages 8 and 9 in: <a href="http://www.dmitre.sa.gov.au/files/1356_manufacturing_magazine_vol_4.pdf">www.dmitre.sa.gov.au/files/1356_manufacturing_magazine_vol_4.pdf</a>.</p> <p>For additional details of the suppliers' study tour, see. pages 22 and 23 in the Mesa Journal No 70 available at <a href="http://www.minerals.dmitre.sa.gov.au/mesa">www.minerals.dmitre.sa.gov.au/mesa</a>.</p>

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3  Dale W	Use of co-produced water for drilling and fracture stimulation fluids	<p><b>Implemented in part through <a href="#">Roundtable Working Group #3</a></b></p> <p>Working Group # 3 is the forum focused on this 3<sup>rd</sup> most highly ranked recommendation. Leading operators have agreed to pool historical and forecast water use for the Cooper-Eromanga (SA-Qld) to enable basin-wide modelling of water supply: demand balance, to deduce cost- and water-saving options. This is a fundamental step towards regional life-cycle water-use planning – will inevitably foster environmental sustainability, project economics, transparency/trust, and business opportunities. Santos is coordinating with Golders contracted for modelling with SA Government funding</p> <p>Additionally – a fully independent report on water use for the upstream petroleum operations is being commissioned by DSD. The research leader for this review of existing information is Dr Craig Simmons (Flinders University, director of the National Centre for Groundwater Research and Training, and Chair of the Commonwealth Government’s Independent Expert Scientific Committee (<a href="#">IESC</a>))</p>
4  Dom	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, 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	<p><b>Implemented.</b> Chart concluded for the Cooper Basin (<b>Attachment 2</b>). Others to follow. To end August 2014 - 719 wells have been fractured stimulated with 1687stages (zones) in South Australia - all safely without deleterious impacts. This includes fracture stimulation in 716 wells in the Cooper Basin, one well in the Adavale Basin and 2 wells in the Officer Basin. The extent of all perforated intervals has been compiled from existing databases. Near complete in compiling subsurface elevations (tops and bottoms) of potable water resources (aquifers) to prepare displays.</p> <p>No wells have been fracture stimulated in the Otway Basin, and a detailed SEO (and public consultation) will be required of any proposal for fracture stimulation in the Otway Basin. Meanwhile, displays for the Otway Basin will be prepared to illustrate the vertical separation (in which regional, geological sealing formations persist) between deep zones that have flowed petroleum and much shallower potable water supplies in the South Australian extent of the Otway Basin.</p>
5  Mike M / Joe Z	<p>Ensure legislation, regulation, policies and programs will provide for:</p> <ol style="list-style-type: none"> <li>1. Attractive licence tenure with expeditious land access for environmentally sustainable operations</li> <li>2. Regulatory certainty and efficiency without taint of capture (of the regulator) by special interests;</li> <li>3. Regulators and licensees with trustworthy capabilities (competence and capacity);</li> <li>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’;</li> <li>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;</li> <li>6. Timely notice of entry with sufficient operational details to effectively inform stakeholders;</li> <li>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;</li> <li>8. Fair and expeditious dispute resolution processes;</li> <li>9. Fair compensation to affected land-users for costs, losses, and deprivation due to operations;</li> <li>10. Reduction of risks to as low as reasonably practicable (ALARP), while also meeting community expectations for net outcomes;</li> <li>11. Licensees monitor and report (to the regulator) on the efficacy of their risk management processes, and the regulator probes same;</li> <li>12. Regulator can prevent and stop operations, require restitution, levy fines and cancel licenses;</li> <li>13. Industry compliance records are made public, so the efficacy of regulation is transparent; and</li> <li>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</li> </ol>	<p><b>Implemented.</b> The <i>Petroleum and Geothermal Energy Act 2000 (PGE Act)</i>, as amended in 2009, with regulations amended in 2013, and with further planned amendments (in 2015), subject to robust stakeholder consultation.</p> <p>Success is never done. Best in class legislation and regulation is leading practice, but not perpetual best practice, as regulation is evolutionary, given evolving technologies and new information</p> <p>A discussion paper is being developed in 2014 for consultation in 2015 and subsequent improvements via amendments to the PGE Act in 2015/16.</p> <p>The proposed amendments aspire to extend the PGE Act to the 3 nautical mile limit of State waters and become substantially equivalent to the Commonwealth’s <i>Offshore Petroleum and Greenhouse Gas Storage Act 2008</i> to enable conferral of operations in South Australia’s adjacent offshore “submerged lands” to NOPSEMA if agreed by all relevant Ministers. This would entail the replacement of the South Australian <i>Submerged Lands Act 1982</i> with a single Act that covers on- and off-shore South Australia</p> <p>Will insert the web-link to draft discussion paper when ready.</p> <p>For details – see <b>Attachment 3</b></p>

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6 MM/BAG	Bolster public understanding (with reliable information) re: hazards and risk management via FAQ on web	<p><b>Implemented.</b> But this is relentlessly updated in a timely manner</p> <ul style="list-style-type: none"> <li>• Implemented through timely stakeholder engagement jointly by DSD-ERD-PIRSA-DEWNR-EPA</li> <li>• Implemented through SEOs (prepared by PGE Act licence holders) and the SEO approvals process to inform people and enterprises potentially affected by area- and location-specific operations regulated by the PGE Act.</li> <li>• For the most recent initiative to inform potentially affected people and enterprises as to the nature of upstream petroleum operations: <ul style="list-style-type: none"> <li>✓ Published the Roadmap for Unconventional Gas Projects in South Australia in December 2012</li> <li>✓ Presented and published descriptions of the PGE Act in the proceedings of the Australian Mining and Petroleum Law Association annual conference in 2013 (to inform legal practitioners). Available from <a href="https://www.ampla.org.au/publications/yearbook">https://www.ampla.org.au/publications/yearbook</a>.</li> <li>✓ Published descriptions of the PGE Act in the <a href="#">October 2013 Bureau of Resources and Energy Economics (BREE) Annual Gas Report</a>, pp 66 – 84 (to inform the energy sector and governments).</li> <li>✓ Continue to update answers to Frequently Asked Questions (FAQs) for historical and potential upstream petroleum operations the South East (Otway Basin) since March 2014. This is done to inform the public, overall. See: <a href="#">DSD's Key Points and FAQ - South East Unconventional Gas and Oil Exploration</a></li> </ul> </li> </ul> <p>Informing stakeholders is an evergreen function of regulators</p>
7 Jim P / Bettina V	Paved lanes where now unpaved between Moomba and paved roads to east in Queensland	<p><b>Implementation in progress through <a href="#">Roundtable Working Group #2</a>.</b></p> <ul style="list-style-type: none"> <li>• An upgrade and road sealing to the Strzelecki Track was identified in the draft Integrated Transport and Land Use Plan to unlock oil and gas exploration and production in the Cooper and Eromanga Basins.</li> </ul>
8 Jim P / Bettina V	Paved, 14ft wide lanes where now unpaved between southern ports and Moomba	<ul style="list-style-type: none"> <li>• The State Government has made an application to Infrastructure Australia to fund the sealing of the track.</li> <li>• Options for sealing the Strzelecki Track have been established in dialogs involving the State Government, key operators of petroleum licences in the Cooper-Eromanga basins, and members of <a href="#">Working Group #2</a>.</li> </ul>
9 Jim P / Bettina V	Water crossings made more passable year-round. Paved roads ex Ports to Moomba. Paved roads ex Moomba to Queensland	<ul style="list-style-type: none"> <li>• The materials and equipment required for drilling wells to produce gas from deep unconventional reservoirs in the Cooper Basin (as listed in <a href="#">Appendix 2a and 2b of the Roadmap for Unconventional Gas</a>) have been converted to dimensions and weights to enable modelling of road and rail transport options well ahead of the absolute requirement to improve transport infrastructure listing of in full or in part under the Federal Government's Infrastructure Australia programs.</li> <li>• Options for rail into the Cooper Basin are being discussed with industry.</li> </ul> <p>To improve transport corridors, regulatory approvals have and will be given for environmentally sustainable road works and bridges over water courses in the Cooper-Eromanga basins.</p>
10 Jim P / Bettina V	Streamline approval of imported equipment - especially road regulations – in SA and the whole of Australia	<p><b>Implementation in progress through <a href="#">Roundtable Working Group #4</a></b></p> <p>The Queensland and South Australia state governments are cooperating to enable wharf to wellhead transport corridors without extraneous regulation e.g. minimizing red tape. Discussions have also involved the newly established <a href="#">National Heavy Vehicle Regulator</a>. The secondment of a transport strategy executive from South Australia Government to the HVNR is expected to foster progress. The Office of the Technical Regulator is preparing guidelines to assist with import of equipment not wired to Australian standards.</p>
11 MM/JZ	<p>Regulation will abide by the following principles:</p> <ol style="list-style-type: none"> <li>1. Certainty. The rights conferred by licenses 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.</li> <li>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 <ul style="list-style-type: none"> <li>• Allocation of title rights;</li> <li>• Managing of rights of other land owners with overlapping land rights;</li> <li>• Managing of rights of title holders to access land for the exploration and development of regulated resources;</li> <li>• 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 environment or other previously established rights;</li> <li>• Stakeholder consultation on the establishment of the environmental protection objectives; and</li> <li>• Appeal rights to those affected by decisions made under the legislation.</li> </ul> </li> <li>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.</li> <li>4. Flexibility. There is sufficient flexibility in the types of licenses 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.</li> <li>5. Practicality. The regulatory objectives are achievable and measurable.</li> <li>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.</li> </ol>	<p><b>Implemented.</b> The <a href="#">Petroleum and Geothermal Energy Act 2000</a>, as amended in 2009, with regulations amended in 2013, and with further planned amendments (in 2015), subject to robust stakeholder consultation</p> <p>Success is never done. Best in class legislation and regulation is leading, but not perpetual best practice, as leading practice is evolutionary given new technologies and information</p> <p>For some relevant details – see <b>Attachment 3</b></p>

Progress towards implementing recommendations posed in the *Roadmap for Unconventional Gas* – as reported to the *Roundtable for Oil and Gas Projects* (Oct 2014)

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12  MM	A competent and capable one-stop-shop without taint of capture is to be sustained for the upstream petroleum industry	<b>Implemented.</b> The Energy Resources Division in the Department of State Development is arguably Australia's most trusted and competent regulator for upstream petroleum operations <ul style="list-style-type: none"> <li>• Success is never done. Best in class legislation and regulation is leading, but not perpetual best practice, as leading practice is evolutionary given new technologies and information</li> </ul> For some relevant details – see Attachment 3
13 Jim P / Bettina V	Devise resilient ways to 'weatherproof' operations	<b>Implementation in progress through <a href="#">Roundtable Working Group #2</a></b> <b>Also refer to Recommendation numbers 7, 8 and 9 (above)</b> Special Facilities Licence # 7 granted to Rossair to commence geotechnical site surveys for a planned all-weather airport near Innamincka. This will augment weatherproofing of air transport (in addition to the paved runways at the Moomba Airport operated by Santos).
14  Elinor/ Dave C	Institute on-line access to data and information with regular announcements of additions to open-files	<b>Implemented and ongoing (evergreen)</b> <ul style="list-style-type: none"> <li>• <a href="#">Petroleum Exploration and Production System – South Australia</a> (PEPS-SA) deployed</li> <li>• Implementation will be extended with enhancements to, and further integration of PEPS-SA with the <a href="#">South Australian Resources Information Geoserver</a> (SARIG)</li> <li>• PEPS SA upgraded fortnightly and now downloadable via SARIG</li> <li>• Unconventional Well Data (WCRs, including geomechanical, geochemical and petrological data) now linked to SARIG via dedicated web page and updated daily.</li> <li>• Fracture stimulation data loaded into PEPS and in process of being available via PEPS SA.</li> <li>• Tender in process for PEPS front end re-write and web enablement</li> </ul>
15  Dom	Foster consistent reporting of resource and reserve volumes (easy access to consensus definitions, pursuant to SPE/AAPG/etc)	<b>Implemented and ongoing (evergreen)</b> <ul style="list-style-type: none"> <li>• Effectively on road to implementation with ASX doing heavy lifting on a national basis by adopting the 2007 Society of Petroleum Engineers Petroleum Resource Management System (SPE-PRMS) guidelines, resulting in the ASX reporting rules that came into effect 1 December 2013. The new ASX reporting rules provide the framework for consistent reporting and disclosure for informed investment in both conventional and unconventional petroleum projects.</li> <li>• The Energy Resources Division in DSD continues to follow SPE-PRMS guidelines to consistently license and regulate under the PGE Act for both conventional and unconventional petroleum projects. Future amendments to the requirements and definitions of the PGE Act will also be in line with SPE-PRMS.</li> </ul>
16  Dale W/ Tony H	Set a program for basin-wide, base-line, water resource characterization	<b>Implemented in part through <a href="#">Roundtable Working Group #3</a></b> Also refer to Recommendation #3 (above) <ul style="list-style-type: none"> <li>• Just such studies kicked-off by licence holders in the Otway Basin to characterise the Late Cretaceous aquifers.</li> <li>• Signed Memorandum of Understanding that enables co-funding by the Federal and State of the Arkaringa and Pedirka basins. These assessments are in progress in cooperation with the Federal Government's Independent Expert Scientific Council and, Geoscience Australia, and the State Government's DSD and DEWNR</li> </ul>
17 MM/MJ	Additional petroleum pipelines – fit for demand	<b>Enabling licensing implemented.</b> Enabled with the <a href="#">Petroleum and Geothermal Energy Act 2000</a> : <ul style="list-style-type: none"> <li>• Granted a Petroleum License Survey Licences to Senex Energy for an additional oil pipeline from the Cooper-Eromanga basins to Port Bonython</li> <li>• Always ready to assist market-driven pipeline projects</li> </ul>
18 Bettina / JZ	Fit-for-purpose air strips and air services in proximity to operations	<b>Enabling licencing implemented.</b> Enabled with the <a href="#">Petroleum and Geothermal Energy Act 2000</a> : <ul style="list-style-type: none"> <li>• Granted a Special Facilities Licence to Rossair for an additional airport in the Cooper-Eromanga basins</li> <li>• \$4 million grant from the State Government to Rossair to foster timely construction and access for the community in addition to use by the oil and gas industry</li> <li>• Private airstrips enabled under Production Licences</li> <li>• Moomba airport continues to provide third-party access to services</li> </ul>
19 Nick P/ Nick Smith - EMP	Incentives to accelerate unconventional gas reserve bookings and gas deliverability via royalty and/or tax reductions or holidays at state and federal levels. Could limited to revenues associated with unconventional reservoir production. Could entail an R&D credit for the development of technologies e.g. high temperature tools for high temperature reservoirs. Could entail down-hole costs of fracture stimulation as a deduction against revenues on which royalties are calculated. Could be synched with the PRRT	<b>Implementation on track.</b> <ul style="list-style-type: none"> <li>• Committed to relief for royalties on 5 years of production of petroleum from unconventional reservoirs in South Australia</li> <li>• DSD is working with other jurisdictions and the Federal Government to illuminate opportunities to use gas for transport fuel, to add to gas markets (and incentives for gas exploration / development) while also having a prospective positive impact on national balance of payments and national transport fuel security</li> <li>• Will lobby for additional sensible, costed incentives</li> </ul>
20 MM/JZ	Additional petroleum processing plants – fit for demand	<b>Implemented.</b> Enabled with the <a href="#">Petroleum and Geothermal Energy Act 2000</a> . <ul style="list-style-type: none"> <li>• Special Facility Licences will enable third party processing plants in the State</li> <li>• Success by any one of the 5 Joint Ventures seek to commercialize gas in unconventional reservoirs in the Cooper Basin will be supported with expeditious but robust approvals processes for additional petroleum processing plants within Production Licences or Special Facility Licences, pursuant to the PGE Act</li> </ul>
21 MM/BAG	Require regulators to be transparent in decision-making	<b>Implemented. Enabled with the <a href="#">Petroleum and Geothermal Energy Act 2000</a>.</b> Overlaps with recommendation #88 <ul style="list-style-type: none"> <li>• Is a key aspect of <a href="#">Harmonized Framework for the Regulation of Coal Seam Gas</a> – e.g. the Framework will benefit the community and industry by providing increased levels of consistency, certainty and transparency in the management of natural gas from coal seams in Australia</li> <li>• Via CoAG Upstream Petroleum Working Group - ask governments across Australia to endorse transparent decision-making guidelines for all co-regulation</li> </ul>

Progress towards implementing recommendations posed in the *Roadmap for Unconventional Gas* – as reported to the *Roundtable for Oil and Gas Projects* (Oct 2014)

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22 MM/BAG	CO2 gathering systems for use in CO2 floods (for enhanced petroleum recovery) and to reduce carbon intensity	<b>Implementation in progress</b> <ul style="list-style-type: none"> <li>• South Australia participating in committees that set national and international standards to safely operate pipelines that will carry CO2</li> <li>• Undertake economic analysis in concert with industry to understand cost: benefit. Add to <a href="#">Working Group #5</a> projects</li> </ul>
23 Dale W/ Tony H	Resolve leading practices for sustainable water use with minimum red tape	<b>Implementation in progress through <a href="#">Roundtable Working Group #3</a></b> <ul style="list-style-type: none"> <li>• Water balancing study by Santos-Beach-Senex-Drillsearch for the Cooper-Eromanga basins in SA and Qld. \$60,000 grant from the State Government of South Australia for modelling to understand how to minimise both water use and associated costs</li> <li>• Contracting literature search to establish array of significant risks and relevant, effective risk management controls (the National Centre for Groundwater Research and Education study is this)</li> <li>• Establish composite DSD-DEWNR work-flow diagram for relevant approvals for the taking/use of water, and then analyse for red tape reduction</li> </ul>
24 EA/TH/ DOM/MM	Consider universities as a source of play mapping and play-by-play Original Hydrocarbons in Place (OHIP), Technically recoverable OHIP, probabilistic well productivity and production decline curves extending at least 10 years	<b>Implemented in part</b> <ul style="list-style-type: none"> <li>• Creating a research chair in unconventional reservoirs to focus on the rock characterization and the prediction of deliverability 'sweet spots'</li> <li>• Foster national approach with U Adelaide focused on Cooper Basin and possibly basins in the Northern Territories; U Qld focused on CSG and U WA and Curtin focused on the Perth and Canning basins</li> <li>• Ask these universities to elaborate competence and capacity as a prelude to developing a national industry-government-university study group for regional maps (DSD to consider joining)</li> </ul>
25 EA/TH	In cooperation with Geoscience Australia and other State and NT resource agencies, make calls for legacy information	<b>Implementation instigated</b> <ul style="list-style-type: none"> <li>• Establishing the scope of information that is not yet, but could usefully become part of public archives – and some has already been acquired (ex. fracture stimulation data). Will set a project plan.</li> <li>• Offer project plan to CoAG's Upstream Petroleum Working Group</li> </ul>
26 MM/PS	Pad drilling to minimize footprint, capex and opex	<b>Implemented by industry</b> <ul style="list-style-type: none"> <li>• Pad drilling has been implemented in the Cooper Basin (ex. Nephrite South, Tindilpie, Cowralie, Big Lake, etc)</li> <li>• International FAQs abound. See: <ul style="list-style-type: none"> <li>○ <a href="http://www.eia.gov/todayinenergy/detail.cfm?id=7910">http://www.eia.gov/todayinenergy/detail.cfm?id=7910</a></li> <li>○ <a href="http://www2.epa.gov/hfstudy/multi-well-pad-tight-gas-directional-drilling-program-protects-aquifers">http://www2.epa.gov/hfstudy/multi-well-pad-tight-gas-directional-drilling-program-protects-aquifers</a></li> </ul> </li> <li>• Develop (add) a more complete description of pad drilling to DSD's <a href="#">FAQ sheet</a> – in particular – some photos and a characterisation of commercial and environmental benefits</li> </ul>
27 EA/TH	Work with Geoscience Australia to augment the Orgchem database and update the characterization of unconventional gas and unconventional oil resources with: <ol style="list-style-type: none"> <li>1. updated Van Krevelen diagrams (for example Rockeval S2/TOC on Y-axis and Tmax on x axis)</li> </ol> update TOC histograms, etc	<b>Implemented in progress</b> <ul style="list-style-type: none"> <li>• DSD is supplementing GA databases being used by the USGS-GA-DSD teams for a new resource assessment of the Cooper Basin. This goes beyond the EIA assessment of just shale gas and shale oil. Expect results in 2015.</li> <li>• Offer project plan to CoAG's Upstream Petroleum Working Group for a national approach</li> </ul>
28 JZ/BAG	Areas where myriad, complex land holdings exist need a streamlined way to reach land access agreements.	<b>Implemented in South Australia pursuant to the <a href="#">Petroleum and Geothermal Energy Act 2000</a></b> Determine a location where land access is being sought for upstream petroleum operations and complex land holding are an impediment to expeditious licencing and/or activity approval. Analyse and resolve most efficient, effective process for land access.
29 MM/MJ	The approvals process for the construction of cross-border pipelines are streamlined by agreement between adjacent State/NT governments	<b>Implemented from South Australia's end.</b> Enabled pursuant to the <a href="#">Petroleum and Geothermal Energy Act 2000</a> through ERD-DSD Will work with APIA and CoAG's Upstream Petroleum Working Group to establish pertinent MoUs to streamline cross-border regulation.
30 MM/ Dale W	Multiple Joint Ventures cooperate in basin-wide monitoring for environmental impacts (to reap economies of scale)	<b>Implementation in progress</b> Foster basin-wide co-operative relationships for environmental studies and monitoring under the auspices of <a href="#">Working Group #3</a> Water balancing evaluation fostered with multi-JV cooperation and a \$60,000 grant from DSD-ERD is a good start.
31 EA/TH	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-trend areas for shale gas, shale oil, deep CSG, shallow CSG, tight Gas, and coals prospective for mining and/or underground gasification	<b>Implemented in part</b> <ul style="list-style-type: none"> <li>• DSD has provided to GA and the USGS its South Australian Cooper Basin: horizon, isopach, lithofacies, organic maturity, pseudo-TOC%, CO2 %, LPG bbls/mmcsf, condensate bbls/mmcsf, pressure, and play fairway maps.</li> <li>• Will progress nationally via mapping accord with GA and other jurisdictions</li> </ul>
32 EA/TH	Applied R&D at the ASP to determine fracture patterns at target levels from 3D seismic	<b>Implementation in progress</b> <ul style="list-style-type: none"> <li>• Create research chair in unconventional reservoirs to focus on the rock characterization and the prediction of deliverability 'sweet spots'</li> <li>• Geofrac consortia nearing completion of its research</li> </ul>
33 MM/ Dale W	Annual public reports to demonstrate the efficacy (or otherwise) of risk management and regulation;	<b>Implemented with Annual Reports by ERD-DSD.</b> See: <a href="http://petroleum.dmitre.sa.gov.au/legislation/compliance/petroleum_act_annual_compliance_report">http://petroleum.dmitre.sa.gov.au/legislation/compliance/petroleum_act_annual_compliance_report</a> Create FAQ sheet to say where to find annual reports; and DSD's annual compliance reports
34 TH/Dom	Update a pressure-depth database (based on DST,s RFT,s FITs, MDTs, and production tests) for all plays	<b>Implemented for the South Australian Cooper-Eromanga basins.</b> This is, however, an evergreen recommendation Add URLs to webpages to enable downloads of "what is where is" (pressures and pressure gradients - including pressure-depth cross-plots Work with GA and Qld (for the Cooper-Eromanga) and Vic (for Otway) in particular.– create plan to address

Number Lead People	Recommendation	Progress to 19 October 2014
35 Mike M/ Piotr S /Elinor / Alan S	For unconventional petroleum wells, consult with industry, within CoAG and with international fora that have established leading practice standards for sample and data acquisition; reporting (including formats) to government; archival methodologies and technologies; and terms for confidentiality (within government files). Types of records, samples, data and information in scope include but are not limited to: cores, side wall cores, cuttings, mud-logs, wire-line logs, fluid and gas samples, micro-seismicity; well seismic surveys, etc. In this process, devise fit-for-purpose data requirements suited to closely-spaced development and pad drilling	<b>Implemented in part with existing guidelines</b> Overlaps with recommendation #93 Add URL to existing guidelines Data management committee through UPOM (now UPR) develop plan to address through CoAG Upstream Petroleum Resources Working Group
36 Elinor / Alan S	Develop effective delivery systems and formats for data and interpretations including but not limited to: stratigraphy, bio-stratigraphy, horizon structure-depth, unit thickness, temperature, pressure, organic geochemistry, gas composition, flow test measurements and interpretations, rock properties and interpretation, wireline log data and interpretation, fracture stimulation stage characterisation, spinner test, cement bond, etc	<b>Implemented through existing systems.</b> However - this is an evergreen recommendation Add relevant web-page and SARIG links to web-pages.
37 ExD	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	<b>Implemented through CoAG with South Australia as Chair – CSG Steering Group.</b> There is scope for further harmonization for efficiency and effectiveness – in particular in electrical wiring and heavy vehicle transport CoAG harmonisation initiative for the regulation of CSG. See: <a href="#">Terms of Reference</a> for the Steering Group that prepared the following documents <ul style="list-style-type: none"> <li>• National Harmonised Regulatory Framework for Natural Gas from Coal Seams (May 2013) (<a href="#">Word</a> / <a href="#">PDF</a>)</li> <li>• Coal Seam Gas Policy Statement (December 2011) (<a href="#">Word</a> / <a href="#">PDF</a>)</li> </ul> For additional details – see: <a href="http://www.scer.gov.au/workstreams/land-access/coal-seam-gas/">http://www.scer.gov.au/workstreams/land-access/coal-seam-gas/</a>
38 Dom / Mike Malavazos	Foster consistent reporting of exploration, appraisal and development results	<b>Implemented by SPE PMRS and ASX but this is an evergreen recommendation.</b> <b>See:</b> 1 July 2014 ASX document - <a href="http://www.asx.com.au/documents/rules/Chapter05.pdf">www.asx.com.au/documents/rules/Chapter05.pdf</a> The following summary comes <a href="http://stochasticsimulation.com/interesting-articles/asx-reserves-and-resources-reporting-for-oil-and-gas-companies">http://stochasticsimulation.com/interesting-articles/asx-reserves-and-resources-reporting-for-oil-and-gas-companies</a> <b>ASX reserves and resources reporting for oil and gas companies</b> In September 2012 ASX released new rules for reserves and resources reporting, which addressed many long recognised gaps in ASX's listing rules, and guidance notes, in regard to reserves and resources reporting by listed mining and oil and gas exploration and production companies. For the first time, listed oil and gas companies will be required to report under the Society of Petroleum Engineers Petroleum Resources Management System (SPE-PRMS). Chapter 5 of the ASX Listing Rules has brought in these changes and has also been updated with additional reporting requirements affecting all resource companies. The proposed Listing Rule revision will apply from 1 December 2013 and will impact on the reserves and resources reporting obligations of ASX listed mining and oil and gas companies; particularly in the small to mid-cap contingent. For oil and gas companies the revised reporting framework will consist of the following key requirements: <ul style="list-style-type: none"> <li>• Public reporting to accord with Society of Petroleum Engineers – Petroleum Resources Management System (SPE-PRMS) principles.</li> <li>• Specific reporting requirements for material disclosures by oil and gas companies in relation to their resource assets.</li> <li>• Greater disclosure of assumptions applied in deriving resource estimates.</li> <li>• Detailed disclosure of exploration and drilling information.</li> <li>• Disclosure of petroleum reserves for material projects.</li> <li>• Disclosure of contingent resources for material projects.</li> <li>• Disclosure of prospective resources for material projects.</li> <li>• Annual petroleum reserves statement to be included in the annual report.</li> <li>• Quarterly reporting to ASX, for release to the market.</li> <li>• Petroleum resources are to be classified in accordance with the scheme for classification in SPE-PRMS (that is, as petroleum reserves, contingent resources or prospective resources) and reported in the most appropriate resource category under that scheme.</li> </ul> In addition, from 1 December 2013, oil and gas reserve and resource estimate reporting by listed companies will require sign off by qualified petroleum reserves and resources evaluator in a similar fashion to the existing requirements imposed on minerals reporting which must be signed off by a Competent Person under Joint Ore Reserves Committee. To be recognised by ASX as a qualified petroleum reserves and resources evaluator, the person will need to satisfy each of the following criteria: <ul style="list-style-type: none"> <li>• hold a bachelors or advanced degree in petroleum engineering, geology, geophysics or other discipline of engineering or physical science;</li> <li>• have a minimum of five years practical experience in petroleum engineering, petroleum production geology or petroleum geology, with at least three years of such experience being in the evaluation and estimation of petroleum reserves, contingent resources and prospective resources; and</li> <li>• be a member of good standing of a professional organisation of engineers, geologists or other geoscientists whose professional practice includes petroleum reserves, contingent resources and prospective resources evaluations and/or audits.</li> </ul> The professional organisation must: <ul style="list-style-type: none"> <li>• require members to comply with the professional standards of competence and ethics prescribed by the organisation that are relevant to the estimation, evaluation, review or audit of petroleum reserves, contingent resources and prospective resources data; and</li> <li>• have disciplinary powers, including the power to suspend or expel a member.</li> </ul> For more information about the ASX reserves and resources reporting, take a look at the Download links and access some of the core documentation.

Progress towards implementing recommendations posed in the *Roadmap for Unconventional Gas* – as reported to the *Roundtable for Oil and Gas Projects* (Oct 2014)

Number Lead People	Recommendation	Progress to 19 October 2014
39 Mike Malavazos	Clarify process for assessing threats to the environment with DEWNR (and all other co-regulators) – add to Chapter covering Regulation	<p><b>Implemented.</b> See <a href="#">Chapter 5 – Roadmap for Unconventional Gas Projects in South Australia</a></p> <p>Overlaps with recommendation #88</p> <p>Augmented by publishing papers characterizing co-regulation for petroleum projects in South Australia as follows:</p> <ul style="list-style-type: none"> <li>• Chapter on regulation in BREE’s 2013 Gas Report (add URL)</li> <li>• Paper published in the proceedings of the AMPLA CONFERENCE IN 2013 (add URL)</li> <li>• Chapter on regulation and taxation in book to be published in late 2014 to detail prospects for using natural gas as a transport fuel (add URL)</li> </ul> <p>See attachment 4 – a process diagram for the co-regulation for petroleum projects to be uploaded to web (as provided as Cross-check updated form of Chapter on Regulation)</p>
40 Betina Bendall / Dave Cockshell	Applied R&D at the ASP to use magnetotellurics (MT) to delineate the propagation of fractures created during hydraulic stimulation (links to Item LVIII)	<p><b>Implementation in progress.</b></p> <p>Results of MT measurements prior to, during and post fracture stimulation at the Paralana 1 geothermal exploration well (in South Australia) are relevant to the petroleum industry. See: <a href="http://www.adelaide.edu.au/eer/research/energy/fluid-injection/">http://www.adelaide.edu.au/eer/research/energy/fluid-injection/</a></p> <p>Progress R&amp;D with Graham Heinsen and Martin Hand at the U of Adelaide</p>
41 Mike M / Mike J / Rebecca Knights / Vince Duffy / Simon Gramp	Transparency of rules (framework) and tolls for processing and transport (including pipelines and compression) of 3rd party gas and gas liquids in privately owned infrastructure to foster open access on commercial terms. (Links to Items XVI)	<p><b>Implementation in progress through CoAG initiatives.</b> Overlaps with recommendations #64 and #75</p> <p>Overlaps with recommendations #64, #74 and #111</p> <p>Bulletin board for tolls and unused (contracts and un-contracted) processing capacity</p> <p>For some details – see: <a href="http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/gas-supply-hub-trading-market/">http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/gas-supply-hub-trading-market/</a></p> <p>For Australian gas pipeline capacities – see: <a href="http://www.scer.gov.au/files/2013/05/Gas-Transmission-Pipeline-Capacity-RIS-Consultation-Paper-May-2013.pdf">http://www.scer.gov.au/files/2013/05/Gas-Transmission-Pipeline-Capacity-RIS-Consultation-Paper-May-2013.pdf</a></p> <p>Add links AEMO efforts, etc</p>
42 ExD	Manage the risk of losing key skilled people due to remuneration or job conditions that fail to be nationally and internationally competitive, as relevant	<p><b>Implemented for ERD – DED</b></p> <p>This is an evergreen task managed with accessing annual remuneration surveys from APESMA and more</p>
43 Nick P	Drilling subsidies (10-15%) Re-mobilization subsidies (trialed in WA)	<p><b>Under consideration</b></p> <p>Will examine USA ExIm support for mob/demob of drilling rigs</p> <p>From perspective of public - more realistic to have proximal JV operations share mob/demob</p>
44 Mike Malavazos	Effective probing for well integrity	<p><b>Implemented by ERD – DSD team.</b></p> <p>This is, however, an evergreen task</p> <p>load URL to provide description of compliance probing (measure and monitor) undertaken to assure well integrity</p> <p>Put results of relevant studies to date on-line to demonstrate – with transparency – the efficacy of regulation. Include references to water quality monitoring already implemented</p> <p>Cement research at the University of Adelaide to better inform the public and elucidate leading practices - worldwide</p> <p>Implement fit-for-purpose measurement and monitoring of water quality in proximity to petroleum production to identify significant impacts, if any.</p> <p>R&amp;D for methane emissions with University of Adelaide (subject of ARC grant)</p> <p>R&amp;D for methane emissions with UCL</p> <p>Publish statistics of wellhead pressure monitoring</p>
45 Elinor / Tony H	Publications describing Unconventional gas plays (to attract domestic and international investment and gas sales)	<p><b>Initial form of implementation complete</b></p> <p>Descriptions of plays in the Roadmap for Unconventional; Gas Projects in South Australia</p> <p>Play-by-play papers to be created by updating extracts from the Roadmap, by priority, so plays are characterised and characterisations at a fit-for-purpose pace</p>
46 Mike Malavazos	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	<p><b>Implemented through EIR-SEO process and Environmental Register</b> (also see recommendation 50)</p> <p>See:</p> <ul style="list-style-type: none"> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation">http://petroleum.dmitre.sa.gov.au/legislation/regulation</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/eir_intro">http://petroleum.dmitre.sa.gov.au/legislation/regulation/eir_intro</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/seo">http://petroleum.dmitre.sa.gov.au/legislation/regulation/seo</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/monitoring_and_reporting">http://petroleum.dmitre.sa.gov.au/legislation/regulation/monitoring_and_reporting</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/company_annual_reports">http://petroleum.dmitre.sa.gov.au/legislation/company_annual_reports</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/compliance/petroleum_act_annual_compliance_report">http://petroleum.dmitre.sa.gov.au/legislation/compliance/petroleum_act_annual_compliance_report</a></li> </ul> <p>This is, however, an evergreen task</p> <p>Continue to augment web-content and undertake stakeholder fora (outreach) to build awareness of rights and how/where to access trustworthy information. For example – outreach in the South East of South Australia in relation to oil and gas project operations</p> <p>Sustain outreach to inform stakeholders of the SEO - EIR process in South Australia</p>
47 Tony H/ Elinor A/ Others	R & D for fracture stimulation to make for more effective and therefore lower cost results. (Example: nano-technology). (links to Item XXIII, XXIV)	<p><b>Implementation in progress</b></p> <p>Supported GeoFrac consortia at the University of Adelaide</p> <p>Supporting research chair for unconventional reservoir at the University of Adelaide (\$250k for 4 years minimum with industry also supporting)</p> <p>Support for international experts to South Australia (\$200k in 2014)</p> <p>Supporting national and international approach to ‘cracking codes’ for unconventional reservoir development</p> <p>Play-by-play stress - strain - sensitivity characterization to be undertaken</p> <p>Convene workshops for the sharing of concepts</p>

Progress towards implementing recommendations posed in the *Roadmap for Unconventional Gas* – as reported to the *Roundtable for Oil and Gas Projects* (Oct 2014)

Number Lead People	Recommendation	Progress to 19 October 2014
48 Don Hogben/ James Mraz / Bettina Venner/ Rob Faunt / ExD	Multiple Joint Ventures tender for equipment/services to reap economies of scale	<p><b>Implementation in progress</b></p> <p>Enable fora for Operators to cooperate and share supply chains.</p> <p><a href="#">Working Group # 2</a> is focused on shared transport infrastructure. DPTI is chair with DSD's support.</p> <p>DSD-ERD has offered Special Facility Licences for supply chain depots and a new airport near Innamincka – all for shared services:</p> <p>DSD-MIPO managing implementation of \$4 million grant to Rossair for a new airport at Innamincka</p> <p>DSD-ERD has fostered multi-operator JV for water use in the Cooper-Eromanga basins under <a href="#">Working Group #3</a>.</p>
49 Mike Malavazos/	Prepare a reference list of papers pertaining to impacts of unconventional gas projects so assessments most easily build-on pre-existing knowledge	<p><b>Implementation in part via FAQ sheet</b></p> <p>See: <a href="http://petroleum.dmitre.sa.gov.au/_data/assets/pdf_file/0003/218109/FAQ_-_South_East_Unconventional_Gas_and_Oil_11_September_14.pdf">http://petroleum.dmitre.sa.gov.au/_data/assets/pdf_file/0003/218109/FAQ_-_South_East_Unconventional_Gas_and_Oil_11_September_14.pdf</a></p> <p>This is an evergreen task</p>
50 Mike Malavazos/	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.	<p><b>Implemented through EIR-SEO process and Environmental Register</b> (also see recommendation 46)</p> <p>Overlaps with recommendation #95. Also see:</p> <ul style="list-style-type: none"> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation">http://petroleum.dmitre.sa.gov.au/legislation/regulation</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/eir_intro">http://petroleum.dmitre.sa.gov.au/legislation/regulation/eir_intro</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/seo">http://petroleum.dmitre.sa.gov.au/legislation/regulation/seo</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/monitoring_and_reporting">http://petroleum.dmitre.sa.gov.au/legislation/regulation/monitoring_and_reporting</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/company_annual_reports">http://petroleum.dmitre.sa.gov.au/legislation/company_annual_reports</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/compliance/petroleum_act_annual_compliance_report">http://petroleum.dmitre.sa.gov.au/legislation/compliance/petroleum_act_annual_compliance_report</a></li> </ul> <p>This is, however, an evergreen task</p> <p>Continue to augment web-content and undertake stakeholder fora (outreach) to build awareness of rights and how/where to access trustworthy information. For example – outreach in the South East of South Australia in relation to oil and gas project operations</p> <p>Sustain outreach to inform stakeholders of the SEO - EIR process in South Australia</p>
51 Mike M / Dave C/ Dale W	DSD-ERD regulators will gain accreditation to provide once-for-all (purposes) assessments for Commonwealth (for example – pursuant to the EPBC Act) and State co-regulation of upstream petroleum operations	<p><b>Implementation in progress</b></p> <p>CoAG regulatory reform will enable States to provides environmental assessment once-for-all (State and Federal) regulation</p>
52 Elinor/ Dave C / Mike M / et al	<p>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:</p> <ol style="list-style-type: none"> <li>1. For key stratigraphic levels –structure in two-way seismic travel time and in depth below expressed datums</li> <li>2. For relevant stratigraphic levels – CO<sub>2</sub> % of Total Gas</li> <li>3. For relevant stratigraphic levels – Ethane richness</li> <li>4. For relevant stratigraphic levels – LPG richness</li> <li>5. For relevant stratigraphic levels – Condensate richness</li> <li>6. For key structural levels – mean Rv% at depth (for example – Rv% at top Patchawarra)</li> <li>7. Semi-log cross plots of mean Rv% (+/- range) versus temperature at sample elevation</li> <li>8. Temperature gradient maps 'down to' key structural levels</li> <li>9. Temperature maps at key structural levels (based on multiplying temperature gradient x depth maps)</li> <li>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</li> <li>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</li> </ol>	<p><b>Implemented in progress</b></p> <p>New maps of CO<sub>2</sub> %, LPG richness and condensate richness produced (See <b>attachment 5</b>)</p> <p>Consider ethane % map</p> <p>Next task - list existing downloads and status of updates planned (if any) of:</p> <ul style="list-style-type: none"> <li>• depth maps</li> <li>• temperature maps</li> <li>• RV% data, maps, depth x-plots, etc</li> <li>• Indicative well production type curves for flow rate decline by play</li> <li>• Endowment by basin-play based on DSD-ERD/USGS/GA analysis</li> </ul>
53 Mike Malavazos	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 <a href="http://fracfocus.org/">http://fracfocus.org/</a> is cited as an exemplar. Is this a facility that industry can run collectively (maybe through APPEA) or is a public-private partnership better? For introductory details – visit: <a href="http://fracfocus.org/welcome">http://fracfocus.org/welcome</a>	<p><b>Implementation in progress</b></p> <p>The equivalent of a fracfocus website will be established for South Australian operations – as a forerunner of a national approach fostered under the UPWG. Implementation will entail consultation with industry and environmental regulators</p> <p>Have recommended at the Upstream Petroleum Working Group of SCER. Yet to sense full national agreement on a common approach</p>
54 Paul Goiak, et al	Truck assembly in South Australia (fracture stimulation road trains, etc)	<p><b>To be fostered as practical – given scale of demand</b></p> <p>Discuss with MIPO – DSD, others</p>
55 Paul Goiak/ Bettina Venner / MRD	Find local supplier of proppant	<p><b>Implementation in progress with industry</b></p> <p>Sand and ceramic supply chains are now actively being investigated and developed by local and national businesses. MIPO-DSD is tracking/assisting.</p>

Number Lead People	Recommendation	Progress to 19 October 2014
56 Mike M & Dave C	Post activity audits can attest to the efficacy (or otherwise) of environmental protection plans.	<p><b>Implemented</b></p> <p>This is, however, an evergreen task</p> <p>For some background – see:</p> <ul style="list-style-type: none"> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/compliance">http://petroleum.dmitre.sa.gov.au/legislation/compliance</a></li> <li>• add links to detail compliance probing programs</li> </ul>
57 Don Hogben/ Mike M / Dave C	Sustain effective regulation while minimize regulatory imposts	<p><b>Implemented in part through EIR/SEO process.</b> Transport and wiring red tape being assessed under Working Groups #2. Interstate red tape is being addressed under Working Group #4. This is, however, an evergreen task and scope arises to sustain effective regulation with minimum imposts – for example – in relation to: native vegetation, double-handling of environmental regulations under SEOs by DSD – ERD and federal (for example EPBC Act) and State (for example EP Act), etc,</p> <p>Audit compliance and process imposts</p>
58 Mike M, Annie Ngo, et al	Fund targeted environmental research in ways that build public trust in outputs	<p><b>Implementation in progress on a number of themes</b></p> <ul style="list-style-type: none"> <li>• Research by the National Center for Groundwater Research and Training to separate fact from myth in regard to protecting water resources under Working Group #3</li> <li>• Water balancing modelling in the Cooper under Working Group #3</li> <li>• Research to develop accurate but more cost effective means to measure and monitor fugitive greenhouse gas emissions under Working Group #5</li> <li>• Research to clarify the materiality of emissions from alternative sources of greenhouse gas under Working Group #5</li> <li>• Reference CSIRO's evaluation of CSG wells in Qld and NSW (4 cow equivalent conclusion)</li> <li>• Reference additional, relevant national and state-based R&amp;D</li> <li>• Studies and illustrations to underpin informed views (See Attachment 2)</li> </ul>
59 Dave C & Betina Bendall	Work with Geoscience Australia to upgrade national well and seismic databases in general	<p><b>Implementation instigated</b></p> <p>Work through CoAG fora to establish a national approach to augment databases so collection and access is enabled for:</p> <ul style="list-style-type: none"> <li>• Microseismic</li> <li>• MT</li> <li>• Azimuthal seismic</li> <li>• Add – in work being done with Irena Kivior – Archimedes</li> </ul>
60 Elinor / Tony, / /Mike M/ Dave C and others as approp	<p>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:</p> <ol style="list-style-type: none"> <li>1. Shale Gas</li> <li>2. Shale Oil</li> <li>3. Deep CSG</li> <li>4. Shallow CSG</li> <li>5. Tight Gas; and</li> <li>6. Coals prospective for mining and/or underground gasification</li> </ol>	<p><b>Implemented in a first phase</b> – Published in the Roadmap for Unconventional Gas</p> <p>Create type-section catalog with:</p> <ul style="list-style-type: none"> <li>- well logs, lithofacies</li> <li>- type curves</li> <li>- well EURs</li> <li>- micro-seismic</li> <li>- other useful information</li> </ul>
61 Paul G / Bettina V/ Don H/ Mike M/ Simon Gramp and Nick Smith in Energy Markets	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	<p><b>Implementation instigated.</b> Book to be published in Dec 2014 on using natural gas for transport in Australia</p> <p>Work with MIPO, Energy Markets, and UPR to develop FAQ sheets for gas-fueled oil and gas operations</p> <p>Scan for impediments with DPTI, others. Develop paper to describe scope for progress in using CNG for transport</p> <p>Overlaps with recommendation #110, #115 and #120</p>
62 Dave C	Large multi-client 3D surveys	<p><b>Enabling regulation implemented.</b> Overlaps with recommendation #91</p> <p>Amended <i>Petroleum and Geothermal Energy Act 2000</i> regulations to have effectively attractive terms for multi-client seismic surveys</p> <p>At least one seismic contractor has marketed large multi-client seismic surveys</p> <p>Grouped PRLs and PPLs under Subject Area Agreements enable multi-licence and multi-JV seismic surveys</p>
63 Bettina V/ Don H / G&W/ Mike Wilde	Rail transport options to the Cooper Basin	<p><b>Analysis undertaken – implementation under consideration.</b> To be fostered as practical – given scale of demand</p> <p>Reference conversion of AFEs to weights and volume loads</p> <p>Reference 'shale-rail' presentations</p> <p>Summarize Working Group #2 actions</p> <p>Scan for impediments with DPTI, others. Develop paper to describe scope to progress rail transport infrastructure to connect the Cooper with ports</p>

Progress towards implementing recommendations posed in the *Roadmap for Unconventional Gas* – as reported to the *Roundtable for Oil and Gas Projects* (Oct 2014)

Number Lead People	Recommendation	Progress to 19 October 2014
64 Mike M / Mike J / Rebecca Knights / Vince Duffy / Simon Gramp	3rd party tolled (on commercial terms) access to petroleum processing and transport facilities	<b>Implemented.</b> 3 <sup>rd</sup> party tolled use of facilities is implemented in the Cooper-Eromanga basins and feasible in the Otway Basin – subject to commercial negotiations. Overlaps with recommendations #41 and #75 Greater transparency in price discovery and available, unused capacity in processing plants and pipelines is a high priority objective for the CoAG Standing Council for Energy and Resources. Bulletin board for tolls and unused (contracts and un-contracted) processing capacity For some details – see: <a href="http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/gas-supply-hub-trading-market/">http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/gas-supply-hub-trading-market/</a> For Australian gas pipeline capacities – see: <a href="http://www.scer.gov.au/files/2013/05/Gas-Transmission-Pipeline-Capacity-RIS-Consultation-Paper-May-2013.pdf">http://www.scer.gov.au/files/2013/05/Gas-Transmission-Pipeline-Capacity-RIS-Consultation-Paper-May-2013.pdf</a> Add links AEMO efforts, etc
65 Dom P / Mike M	Bolster investor understanding of resource and reserve definitions	<b>Implementation in progress</b> Support SPE-AAPG/PESA fora focused on reserve and resource definitions Link SPE-PRMS and ASX guidelines to DSD ERD web-pages if not already done and change to implemented when done
66 Tony/ Mike M / Mike J/ Paul G / Bettina V	Assess state-based, national and international analytical capabilities to enable quality control, economies of scale and foster local content in sample analysis	<b>Implementation planned</b> Stock-take of capabilities in partnership with APPEA, APIA, and others. Tony H (to find web-based list of relevant fluid, gas, core and cuttings analyses), Mike J (for pipeline measurements – non-destructive, etc), MIPO (for stock take of companies with relevant capabilities). MIPO is working with laboratories to develop local capabilities.
67 Paul G / Bettina V	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	<b>Implementation commenced.</b> Roadmap for Unconventional Gas Projects contains a list of services and materials required for deep vertical and deep horizontal wells in the Cooper-Eromanga basins. Convening Oil and Gas Supplier Forum (working group #6) with supply-chain managers on demand-side to progress.
68 EA/ relevant ICT and other people in DSD	Update SA's online Petroleum (and geothermal) Services Directory	<b>Implementation planned</b> Elaborate how might CRM be used Seek support from relevant DSD division(s) May alternatively use ICN database
69 DSD-ERD (everyone)	Feature SA projects in government pronouncements	<b>Implemented.</b> This is an evergreen task Enabling petroleum projects in the State now part of EDCC's highest priorities Regular outreach is undertaken locally, nationally, and internationally to lift awareness of investment opportunities in petroleum projects (including investment in supply chains and relevant infrastructure) In short – building realistic awareness of SA's upstream petroleum sector is standard practice
70 ExD, et al	Benchmark SA approach to IEA 'golden rules'	<b>Implementation in progress</b> 'IEA's golden rules noted in the Roadmap for Unconventional Gas Projects in South Australia Create a scorecard Add this scorecard to web-pages for download under Roundtable for Unconventional Gas
71 Mike M, et al	Extract leading practice risk mitigation defined in various SEOs and associated EIRs for addition to DSD-ERD'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.	<b>Implemented in part.</b> FAQ sheet for petroleum operations in the South East of South Australia is a start on this. See: <a href="http://www.misa.net.au/data/assets/pdf_file/0003/218109/FAQ_-_South_East_Unconventional_Gas_and_Oil.pdf">http://www.misa.net.au/data/assets/pdf_file/0003/218109/FAQ_-_South_East_Unconventional_Gas_and_Oil.pdf</a> A synopsis of risk mitigation across all SEOs is to be compiled
72 Elinor, et al	Consult with industry to establish priorities for pre-competitive data and interpretations	<b>Implementation planned</b> Undertake survey and then convene a workshop in 2014/15 Devise project plan
73 Joe Z/ Shane F / Jenny Hart's CSO team	Conjunctive ILUAs for operations and facilities (that are fair to aboriginal people and sustainable in relation to development)	<b>Implemented in part</b> Have conjunctive ILUAs agreed for 2 of 3 native title holders/claimant groups in the South Australia Cooper-Eromanga basins. Working towards a conjunctive ILUA with the 3 <sup>rd</sup> group in the South Australia Cooper-Eromanga basins. Set a project plan for additional areas.
74 Mike M, et al	Cross reference <i>Petroleum and Geothermal Energy Act 2000</i> 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	<b>Implemented in part.</b> Essentially the same as recommendation #71 FAQ sheet for petroleum operations in the South East of South Australia is a start on this. See: <a href="http://www.misa.net.au/data/assets/pdf_file/0003/218109/FAQ_-_South_East_Unconventional_Gas_and_Oil.pdf">http://www.misa.net.au/data/assets/pdf_file/0003/218109/FAQ_-_South_East_Unconventional_Gas_and_Oil.pdf</a> A synopsis of risk mitigation across all SEOs is to be compiled in 2014/15
75 Mike M / Mike J / Rebecca Knights / Vince Duffy / Simon Gramp	Publicly accessible maps and lists of gas processing and transport infrastructure with details of facility capacity, gas composition limitations, rules for access, etc.	<b>Implemented in part.</b> Overlaps with recommendations #41, #64, and #111 Greater transparency in price discovery and available, unused capacity in processing plants and pipelines is a high priority objective for the CoAG Standing Council for Energy and Resources. Bulletin board for tolls and unused (contracts and un-contracted) processing capacity For some details – see: <a href="http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/gas-supply-hub-trading-market/">http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/gas-supply-hub-trading-market/</a> For Australian gas pipeline capacities – see: <a href="http://www.scer.gov.au/files/2013/05/Gas-Transmission-Pipeline-Capacity-RIS-Consultation-Paper-May-2013.pdf">http://www.scer.gov.au/files/2013/05/Gas-Transmission-Pipeline-Capacity-RIS-Consultation-Paper-May-2013.pdf</a> Add links AEMO efforts, etc

Progress towards implementing recommendations posed in the *Roadmap for Unconventional Gas* – as reported to the *Roundtable for Oil and Gas Projects* (Oct 2014)

Number Lead People	Recommendation	Progress to 19 October 2014
76 Mike M / Dave C/ ExD	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	<b>Implementation instigated</b> Amendments to the EPBC Act to require referral to the IESC for any/all resource projects with regional impacts on environments are mooted White pare released and needs be reviewed Assess Energy White paper in relation to regulation for seismic, wells, plant and pipelines for upstream petroleum projects
77 Mike M / et al	Require 'best practice' reporting of non-compliance e.g. unplanned and undesirable outcomes	<b>Implemented in South Australia.</b> Enabled pursuant to the <i>Petroleum and Geothermal Energy Act 2000</i> . This is, however, an evergreen task Scan for options outside SA, and compare
78 Mike M / et al	Take account of lessons learnt nationally and internationally (USA, Canada, NZ, IEA Golden Rules, etc) –	<b>Implemented in South Australia.</b> This is, however, an evergreen task FAQ sheets reference ever-increasing number of relevant assessments Research by the National Center for Groundwater Research and Training is relevant
79 Mike M / et al	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	<b>Implemented in South Australia.</b> Enabled pursuant to the <i>Petroleum and Geothermal Energy Act 2000</i> . This is, however, an evergreen task
80 Elinor / Tony / Dom / Mike M / Uni Adelaide / Flinders U / Fyfe	Convene PESA-AAPG/SPE/ASEG-SEG workshops and conferences focused on unconventional gas in South Australia (with case studies a key focus)	<b>Implemented in part.</b> This is, however, an evergreen task <ul style="list-style-type: none"> <li>• SPE APOGCE attracted to Adelaide in 2014</li> <li>• Published at / participated in SPE-AAPG-SEG URTEC conferences in 2013 and 2014</li> <li>• \$200,000 grant from DSD-ERD to the University of Adelaide to bring experts to South Australia</li> <li>• \$250,000 grant x 4 years to hire a researcher for unconventional reservoir characterisation within the University of Adelaide</li> <li>• Fyfe ran workshop with DSD-ERD support</li> <li>• University of Adelaide ran workshop with DSD-ERD support</li> <li>• ACOLA to convene workshop with \$50,000 DSD-ERD support – good to co-brand this as SPE-AAPG-SEG</li> <li>• Attract relevant conferences to Adelaide</li> </ul>
81 Mike M, et al	Develop a leak-off test database that can help guide drilling, cementing, and fracture stimulation operations	<b>Plan to be implemented</b> Design and implement post discussions with industry in 2013/14
82 Mike M, et al	Extract guidelines from SEOs for: (1) cementing casing and (2) for plug and abandonment as a trend-by-trend guide to leading practices	<b>Implementation plan has been set</b> Research contracted at the University of Adelaide with DSD-ERD and industry funding in due course
83 ExD/ Mike M/ Helen T	Add a section on leading practice engagement practices to this Chapter (regulation)	<b>Implemented</b> Find and specify pages in Roadmap Add links to LAWG Multiple Land Use document here
84 Don Hogben/ James Mraz / Bettina Venner	Resolve leading practices for actions that 'weather-proof' operations (bridges / paved roads / etc)	<b>Implementation underway</b> <ul style="list-style-type: none"> <li>• Have brought in InvestSA to elaborate DPTI cash flow analysis to enable company perspective to be elucidated</li> <li>• Convened Working Group #2 meetings with operators and co-regulatory agencies – and undertaking SWOT for ranking opportunities</li> <li>• DPTI and DSD meeting one-on-one with Cooper-Eromanga JV Operators</li> <li>• Wharf-to-wellhead infrastructure to be considered with Qld and NT under auspices of Working Group #4</li> </ul>
85 Elinor /Dom/ Paul G	Team – South Australia booths at peak events in Australia	<b>Implemented.</b> This is an evergreen task Booths at DUG – Brisbane, SPE APOGCE, APPEA, NAPE, G'day USA AACC Petroleum event in Houston Augmented with Suppliers' Study Excursions to the USA
86 Mike M	License holders should undertake sufficient post-activity environmental investigations of pilot and full-scale projects, and reported on by tenement holders	<b>Enabling licencing implemented.</b> Enabled with the <a href="#">Petroleum and Geothermal Energy Act 2000</a> . This is an evergreen task
87 Susan Andrews / Paul G	Telecommunications improved. Industry – Government forum to elaborate cost: benefit for such improvements	<b>Implemented.</b> ICT Roadmap for Minerals and Energy Resources convened Add link to relevant web-pages
88 ExD/ Helen T	Align the Roadmap narrative on regulation with CoAG's narrative for harmonizing to leading practice regulation frameworks	<b>Implemented.</b> Overlaps with recommendation #39. Leading practice regulation described in the <i>Roadmap for Unconventional Gas Projects in South Australia</i> Enabled with the <a href="#">Petroleum and Geothermal Energy Act 2000</a> Also – see the <a href="#">Harmonized Framework for the Regulation of Coal Seam Gas</a> Augmented by publishing papers characterizing co-regulation for petroleum projects in South Australia as follows: <ul style="list-style-type: none"> <li>• Chapter on regulation in BREE's 2013 Gas Report (add URL)</li> <li>• Paper published in the proceedings of the AMPLA CONFERENCE IN 2013 (add URL)</li> <li>• Chapter on regulation and taxation in book to be published in late 2014 to detail prospects for using natural gas as a transport fuel (add URL)</li> <li>• Add link to the Multiple Land Use framework here</li> </ul> See attachment 4 – a process diagram for the co-regulation for petroleum projects to be uploaded to web (as provided as Cross-check updated form of Chapter on Regulation)
89 ExD/ Mike M	Sustain supply-side competition between multiple Joint Ventures	<b>Implementation in progress</b> Enable appropriate PPL and PRL areas and tenure for at least 3 JVs competing to sell gas to markets Commercialisation by multiple JVs in South Australia remains to be seen All gas supplies currently via Santos JV in South Australia

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Number Lead People	Recommendation	Progress to 19 October 2014
90 Completed	A stick and carrot approach can be deployed to reward Operators who consistently 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	<b>Implemented</b> Low and high surveillance operators differentiated. Well run operations are rewarded with a 25% discount on PGE Act licence fees
91 Dave C	Pooling of seismic crews	<b>Enabling regulation implemented.</b> Overlaps with recommendation #62 <i>Amended Petroleum and Geothermal Energy Act 2000</i> regulations to have effectively attractive terms for multi-client seismic surveys At least one seismic contractor has marketed large multi-client seismic surveys Grouped PRLs and PPLs under Subject Area Agreements enable multi-licence and multi-JV seismic surveys
92 ExD	Review paper - 'Conserving Nature' (First need to confirm if this is the CSIRO's publication in Nature or website <a href="http://www.hphpcentral.com/articles-research/conserving-nature">http://www.hphpcentral.com/articles-research/conserving-nature</a> or another source)	<b>Implemented</b>
93 Mike M/ Piotr S /Elinor / Alan S	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	<b>Implemented in part with existing guidelines</b> Overlaps with recommendation #35 Add URL to existing guidelines Data management committee through UPOM (now UPR) Prepare action plan for the consideration of CoAG's Upstream Petroleum Resources Working Group
94 Mike M// et al	Create / update (annually?) economic nomographs for quick-look analysis for web pages	<b>Implemented.</b> DCF spreadsheets for gas development and processing (developed by Core Energy) can be downloaded from DSD-ERD web-pages. These cover conventional gas plants, LNG plants and GTL plants Updates to be scheduled. Mike M to elaborate – provide QA
95 Mike M// et al	Add a section on leading practice consultation processes to this Chapter (Regulation)	<b>Implemented through EIR-SEO process and Environmental Register</b> (also see recommendation 46) Overlaps with recommendation #50. Also see: <ul style="list-style-type: none"> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation">http://petroleum.dmitre.sa.gov.au/legislation/regulation</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/eir_intro">http://petroleum.dmitre.sa.gov.au/legislation/regulation/eir_intro</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/seo">http://petroleum.dmitre.sa.gov.au/legislation/regulation/seo</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/regulation/monitoring_and_reporting">http://petroleum.dmitre.sa.gov.au/legislation/regulation/monitoring_and_reporting</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/company_annual_reports">http://petroleum.dmitre.sa.gov.au/legislation/company_annual_reports</a></li> <li>• <a href="http://petroleum.dmitre.sa.gov.au/legislation/compliance/petroleum_act_annual_compliance_report">http://petroleum.dmitre.sa.gov.au/legislation/compliance/petroleum_act_annual_compliance_report</a></li> </ul> This is, however, an evergreen task Continue to augment web-content and undertake stakeholder fora (outreach) to build awareness of rights and how/where to access trustworthy information. For example – outreach in the South East of South Australia in relation to oil and gas project operations Sustain outreach to inform stakeholders of the SEO - EIR process in South Australia
96 Paul G & Bettina V for MIPO and Joe Z, et al	Assess supply depot capacities versus prospective, future activity	<b>Implementation in progress.</b> Some improvements to supply chain depots already established (e.g. have granted Special Facilities Licences (SFL) with minimum red tape. MIPO in close contact with JV Operators and prospective supply-chain entrants in the Cooper-Eromanga basins – and is developing a strategic understanding of prospective demand.
97 Joe Z, et al	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.	<b>Implemented in part.</b> This is, however, an evergreen task Implemented with conjunctive RTN and ILUA agreements – and certainty of tenure provided with PRLs with expenditure conditions.
98 Mike M, ExD	Additional LNG export facilities in the south, from South Australia, as / if market demand justifies that	<b>Watching brief.</b> Will implement action as resources are converted to sufficient reserves to underpin any possible additional LNG plants. Micro-LNG, included. Essentially the same as recommendation #109 and #112
99 Nick	Tax rates tiered versus cost by field and/or reservoir to beget supply side competition	<b>Implementation in progress.</b> Have Minister's backing for a deferral of royalties on petroleum produced from (to be defined) unconventional reservoirs. While Mining Tax has been rescinded – PRRT remains. Worth investigating status of tax incentives being considered – if any – at the Federal level.
100 Mike M and Dave C	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	<b>Implemented</b> Evergreen action
101 B Venner/ Paul G/ Don Hogben / Mike M-Dale W/ ExD	Planning forums and cost sharing frameworks suited to most enterprises in the Cooper Basin	<b>Implemented in part and in progress.</b> This is an evergreen initiative. Essentially the same as recommendation # 106 and #116. Implementation to date by DSD-ERD/MIPO/DPTI through Working Groups #1 (training), #2 (infrastructure), #3 (water), and #6 (new supplier's forum) and further work in progress to – for example – demonstrate how aggregating demand into optimum co-investment can deliver basin-wide economies of scale – while creating opportunities for new businesses. Oil and Gas Supplier's Forum to include forum for offshore Bight Basin JVs. Overlaps with recommendation #116.
102 B Venner/ Paul G	ICN to get involved to match local content capabilities to emerging supply-chain demand (pre-screen for demand-side)	<b>Implemented in part and in progress.</b> This is an evergreen initiative. Implementation to date by DSD-MIPO.
103 ExD/ James Mraz/ Mike M	Awareness of minimum economic threshold volume/rates for commercialization options	<b>Implementation planned.</b> Action: Back-calculate from Core Energy cash flow analysis tools

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Number Lead People	Recommendation	Progress to 19 October 2014
104 Mike M / Mike J / Paul G/ Bettina V	Pooling of pipeline/flow line crews	<b>Implementation planned.</b> Action: Convene industry forum with MIPO. Deduce if temporary oil flow-lines might be economically deployed to reap maximum early cash flow.
105 Paul G / Bettina V	Cross-reference supply-chain demand (equipment, materials, and services) with enterprise capabilities and form supply-chain clusters	<b>Implemented in part (e.g. proppant) and progressing.</b> Convene industry fora with MIPO – working group #6 (new supplier's forum).
106 B Venner/ Paul G/ Don Hogben / Mike M-Dale W/ ExD	Incentives for industry cooperation to reap economies of scale for gas development, production, processing and transport, without reducing supply-side competition	<b>Implemented in part (e.g. grouped PRLs offered) and progressing.</b> This is an evergreen initiative. Essentially the same as recommendation # 101 and #116. Implementation to date by DSD-ERD/MIPO/DPTI through Working Groups #1 (training), #2 (infrastructure), #3 (water), and #6 (new supplier's forum) and further work in progress to – for example – demonstrate how aggregating demand into optimum co-investment can deliver basin-wide economies of scale – while creating opportunities for new businesses. Oil and Gas Supplier's Forum to include forum for offshore Bight Basin JVs.
107 Elinor A / Joe Z / Nick P / ExD	Protect public interest in sustaining upstream gas supply competition in domestic markets while also supportive of joint arrangements to compete internationally	<b>Implemented in progress.</b> Now have 16 companies under 8 operators exploring for gas resources in the Cooper Basin and 4 companies under 3 operators in the Otway Basin. Basin-on-basin supply-side competition already exists but demand for LNG feedstock is putting upward pressure on price because of (international plus domestic) demand-side competition. Supply-side competition is the objective of the proposed opportunity for JVs to defer royalties on gas and gas liquids produced from (to be defined) unconventional reservoirs. This is an evergreen action Overlaps with recommendation #113
108 Mike M / Piotr S / Paul G/ Bettina V	Pooling of rigs	<b>Implementation planned.</b> Action: Convene industry forum with MIPO.
109 Mike M / Mike J	Link Cooper gas with LNG export facilities in Gladstone	<b>Implemented</b> Describe on web-pages
110 Paul G / Bettina V/ Don H/ Mike M/ Simon Gramp and Nick Smith in Energy Markets	LNG for transport	<b>Implementation instigated.</b> Book to be published in Dec 2014 on using natural gas for transport in Australia Work with MIPO, Energy Markets, and CoAG's Upstream Petroleum Resources to develop FAQ sheets for gas-fueled oil and gas operations. Scan for impediments with DPTI, others. Develop paper to describe scope for progress in using CNG for transport. Overlaps with recommendation #61.
111 Mike M / Mike J / Rebecca Knights / Vince Duffy / Simon Gramp	Generalize economic information – costs per GJ, etc will fall within a range	<b>Implementation in progress</b> Overlaps with recommendations #41, #64, and #74. Greater transparency in price discovery and available, unused capacity in processing plants and pipelines is a high priority objective for the CoAG Standing Council for Energy and Resources. Bulletin board for tolls and unused (contracts and un-contracted) processing capacity For some details – see: <a href="http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/gas-supply-hub-trading-market/">http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/gas-supply-hub-trading-market/</a> For Australian gas pipeline capacities – see: <a href="http://www.scer.gov.au/files/2013/05/Gas-Transmission-Pipeline-Capacity-RIS-Consultation-Paper-May-2013.pdf">http://www.scer.gov.au/files/2013/05/Gas-Transmission-Pipeline-Capacity-RIS-Consultation-Paper-May-2013.pdf</a> Add links AEMO efforts, etc
112 Mike M, ExD	Link Cooper gas with LNG export facilities in Darwin, as / if market demand justifies that	<b>Watching brief.</b> Will implement action as resources are converted to sufficient reserves to underpin any possible additional LNG plants. Micro-LNG, included. Essentially the same as recommendation #98 and #109
113 Elinor A / Joe Z / Nick P / ExD	Attract exploration / appraisal investment so widely and by so many independent Joint Ventures / companies so that supply-side competition keeps gas prices competitive	<b>Implemented in progress.</b> Now have 16 companies under 8 operators exploring for gas resources in the Cooper Basin and 4 companies under 3 operators in the Otway Basin. Basin-on-basin supply-side competition already exists but demand for LNG feedstock is putting upward pressure on price because of (international plus domestic) demand-side competition. Supply-side competition is the objective of the proposed opportunity for JVs to defer royalties on gas and gas liquids produced from (to be defined) unconventional reservoirs. This is an evergreen action Overlaps with recommendation #107
114 Mike M, Annie Ngo, et al	Clarify process to pay – for and lead to more environmental research relevant to unconventional gas operations, and in particular, well operations	<b>Implemented in part and progressing.</b> Progress includes: <ul style="list-style-type: none"> <li>• Research by the National Center for Groundwater Research and Training to separate fact from myth in regard to protecting water resources under Working Group #3</li> <li>• Water balancing modelling in the Cooper under Working Group #3</li> <li>• Research to develop accurate but more cost effective means to measure and monitor fugitive greenhouse gas emissions under Working Group #5</li> <li>• Research to clarify the materiality of emissions from alternative sources of greenhouse gas under Working Group #5</li> <li>• Reference CSIRO's evaluation of CSG wells in Qld and NSW (4 cow equivalent conclusion)</li> <li>• Reference additional, relevant national and state-based R&amp;D</li> </ul>
115 Paul G / Bettina V/ Don H/ Mike M/ Simon Gramp & Nick Smith	Gas – to – synfuel	<b>Implementation instigated.</b> Book to be published in Dec 2014 on using natural gas for transport in Australia. Work with MIPO, Energy Markets, and UPR to develop FAQ sheets for gas-fueled oil and gas operations. Scan for impediments with DPTI, others. Develop paper to describe scope for progress in using CNG for transport. Overlaps with recommendation #61 and #110.

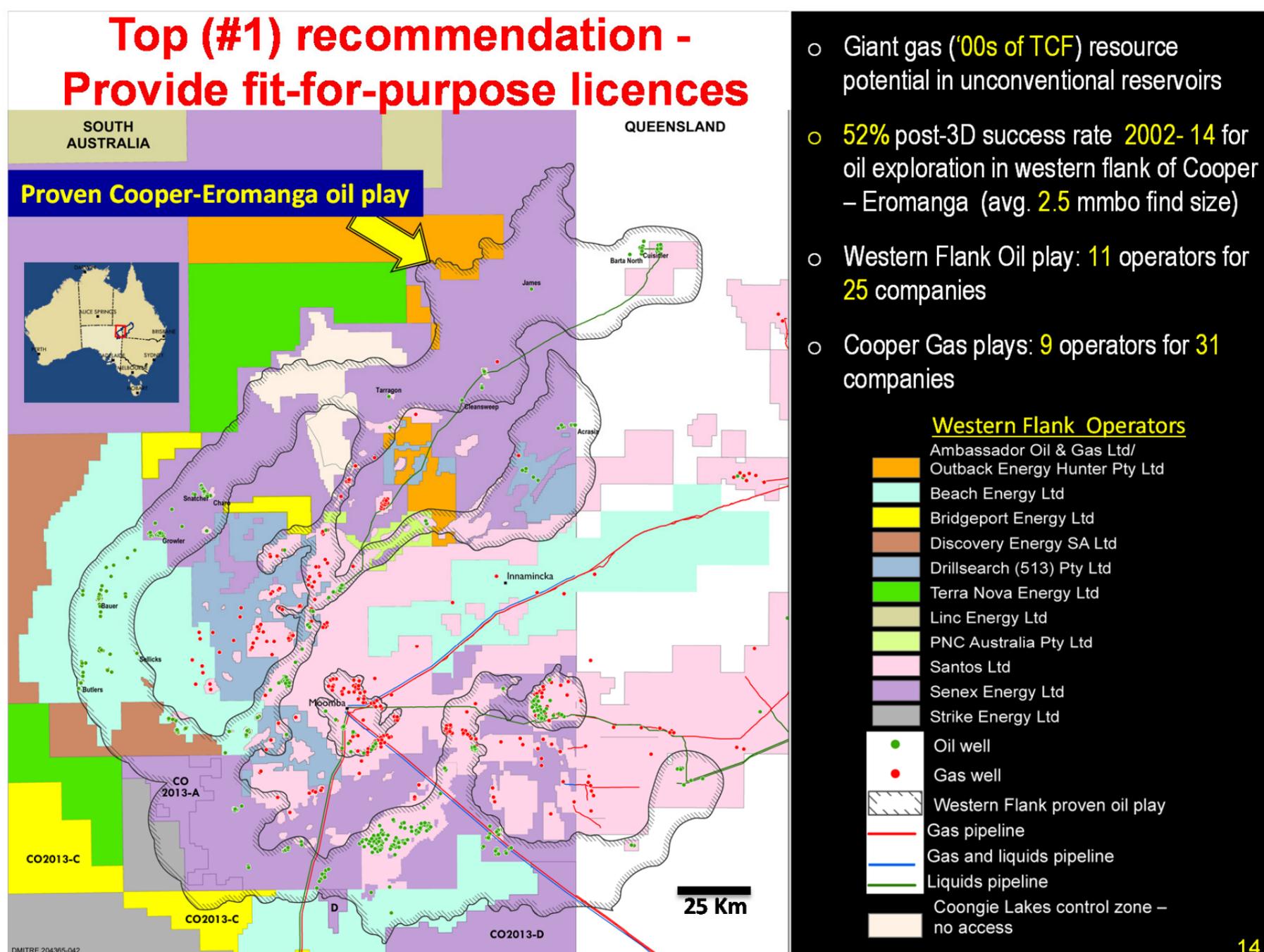
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Number Lead People	Recommendation	Progress to 19 October 2014
116 B Venner/ Paul G/ Don Hogben / Mike M-Dale W/ ExD	Convene a workshops that could band together enterprises into clusters worth IPO to start-up and get competitive	<b>Implemented in part and in progress.</b> This is an evergreen initiative. Essentially the same as recommendation # 101 and # 106. Implementation to date by DSD-ERD/MIPO/DPTI through Working Groups #1 (training), #2 (infrastructure), #3 (water), and #6 (new supplier's forum) and further work in progress to – for example – demonstrate how aggregating demand into optimum co-investment can deliver basin-wide economies of scale – while creating opportunities for new businesses. A forum for offshore Bight Basin JVs will be formed by DSD-ERD/MIPO.
117 Paul G and Bettina V	Work with Commonwealth Enterprise Connect (or similar) to foster shift of enterprises to petroleum supply chain purposes	<b>Implementation in progress</b> Align with Greg Combet's efforts
118 Paul G / Bettina V	Gas as feedstock for fertilizer	<b>Implementation planned</b> MIPO to consider a project plan to elucidate prospective uses of gas, including fertilizer.
119 ExD	Basin-wide operator for drilling to reap economies of scale	<b>Watching brief</b> This is a matter for industry Outreach as appropriate
120 Paul G / Bettina V/ Don H/ Mike M/ Simon Gramp and Nick Smith in Energy Markets	Use CNG vehicles in the field	<b>Implementation instigated.</b> Book to be published in Dec 2014 on using natural gas for transport in Australia Work with MIPO, Energy Markets, and UPR to develop FAQ sheets for gas-fueled oil and gas operations Scan for impediments with DPTI, others. Develop paper to describe scope for progress in using CNG for transport Overlaps with recommendation #61, #110, and #115
121 ExD	Entice large customers for gas into upstream investment	<b>Watching brief</b> This is a matter for industry – and has been implemented by Orica and others Outreach as appropriate
122 ExD	Equity capital raisings (IPOs) for supply chain clusters	<b>Implementation in progress</b> Outreach as appropriate has and will be undertaken. Financiers are being made aware of investment (equity) opportunities
123 ExD	Liquids stripping linked to gas storage where gas market demand < gas deliverability	<b>Watching brief</b> This is a matter for industry, and has already been implemented by Santos at Mereenie in the NT Outreach as appropriate
124 Rebecca Knights / Mike M	Syngas to Power	<b>Implementation planned</b> Prepare FAQ sheet and indicative economics
125 Rebecca Knights / Mike M	Syngas to synfuel	<b>Implementation in part and planned</b> Economics of synthetic gas to liquids on DSD-ERD's web-pages Prepare FAQ sheet and indicative economics

**Attachment 1. Petroleum Retention Leases (PRLs) for oil in the Cooper-Eromanga basins**

The highest priority defined by the Roundtable for Unconventional Gas is the appropriate recognition of the life-cycle for finding, appraising, developing and producing resources. Fit-for-purpose licenses terms are the most direct way to recognize this life cycle. This is equally relevant to all mineral and energy resource sectors. The Subject Area Arrangement:

- Avoids 18 -24 months delay in exploration/discoveries after: intermittent relinquishments; call for bids; bids; negotiation of land access agreements; and grant of successively smaller PELs;
- Accelerates investment at contestable levels through renewal terms in ways not achieved with PELs;
- Delivers investment, jobs, production and royalties, sooner - clearly in the interest of the People of South Australia;
- Industry as a whole has greater investment efficiency;
- Attains very competitive levels of investment without the perverse outcome of ‘winner’s curse’ bidding;
- Based on DSD’s mapping of the proven play trends – the number of companies competing to bring petroleum to markets (stimulating supply-side competition) are, for:
  - oil - 25 companies in JVs under 10 Operators may opt into Subject Area Agreements (e.g. cross-section of industry will benefit, including service companies who will get more extensive contracts);
  - gas – 15 companies in JVs under 6 operators
  - Have negotiated levels of investment benchmarked with guaranteed winning bids for oil and with even stronger investment for deep gas plays (that are more expensive to explore and appraise);
  - PRL investment is a multiple of what would otherwise be attracted through surrender of smaller areas for re-cycling through work program bids;
  - Greater levels of ‘guaranteed’ activity drive more extensive contracts and efficiencies;
- Nurtures small enterprises to become medium to large in size enterprises;
- Attracts secure investment at a time the State needs stronger investment;
- Overcomes a looming issue: Ever-smaller licences attracting bids that too easily stretch the financial competence of ASX IPOs and private capital raisings. The foible of financial competence of bid parties is real;
- Certainty of tenure makes PRLs more valuable than PELs – underpinning capital raisings, farm-outs and M&A– an excellent net economic outcome;
- Farm-in’s and acquisition remain options to get-in
- Underspenders result in proportional relinquishment for re-cycling at 5-yr junctures



- Giant gas ('00s of TCF) resource potential in unconventional reservoirs
- 52% post-3D success rate 2002- 14 for oil exploration in western flank of Cooper – Eromanga (avg. 2.5 mmo find size)
- Western Flank Oil play: 11 operators for 25 companies
- Cooper Gas plays: 9 operators for 31 companies

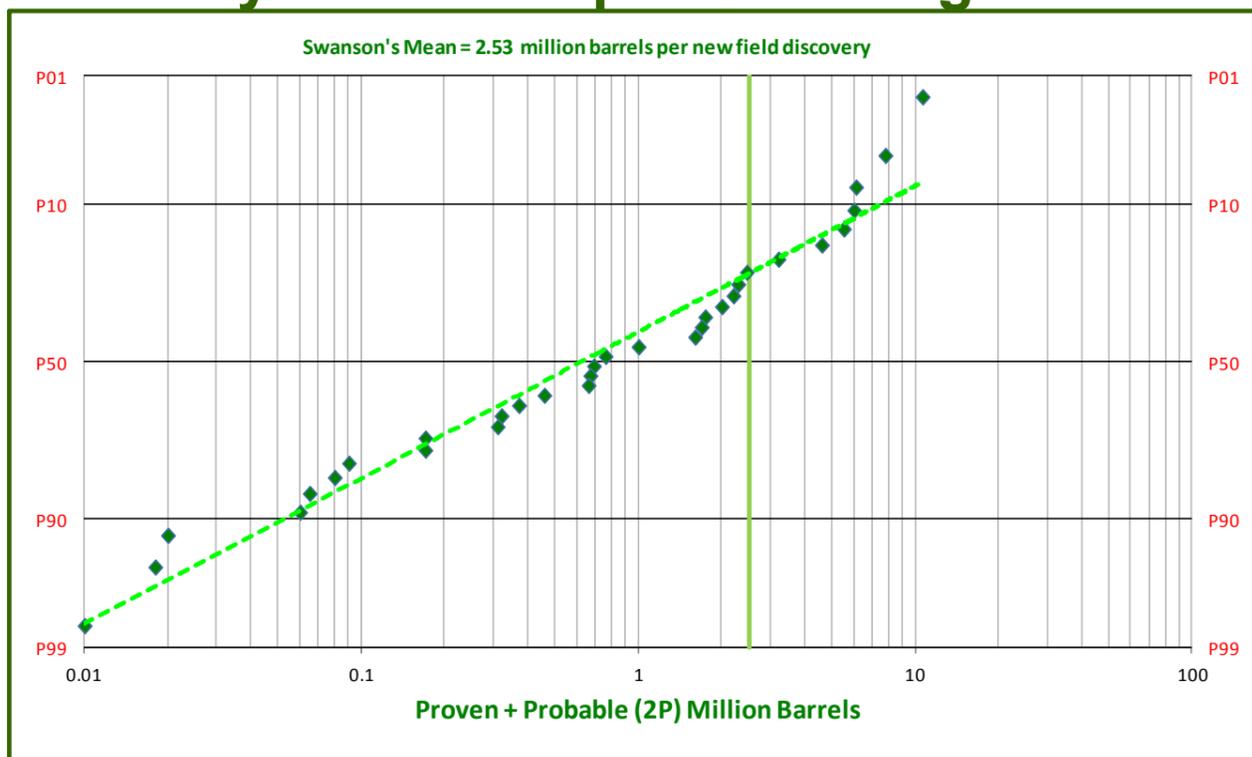
**Assessment of contestable levels of PEL bids, 1997 – 2013 (in July 2013 \$s) for the Cooper-Eromanga basins, South Australia. The majority of work program bids 1997 – 2013 were predicated on exploring for Eromanga Basin oil prospects**



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\$4,500 per sq km pa set for oil PRLs for the whole of retained areas, rather than just for the areas that would otherwise need be surrendered and re-cycled for work program bids results a multiple of investment that could be expected (on average) from recycling modest-in-size blocks. Any expenditure below minimum eligible expenditures that are a condition of PRLs will result in proportional surrender of land, for contestable work program bidding

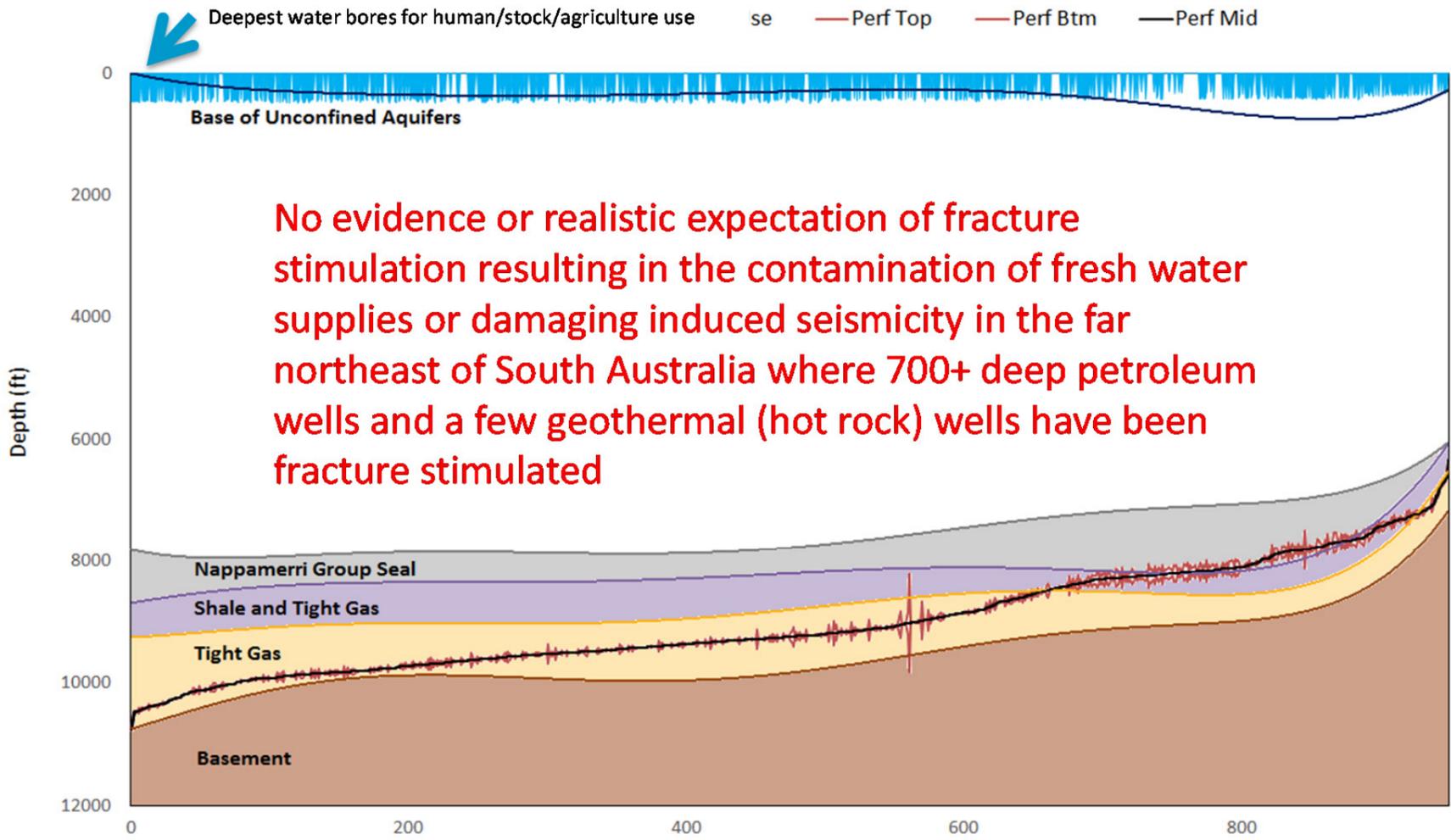
**Field Size Distribution – Proven Productive Oil Play in the Cooper-Eromanga Basins**



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For an investment of in 200 sq km 3D seismic (at \$25,000 per sq km, Au\$5,000,000) and two exploration wells (one dry hole at ~\$1,700,000 and one discovery with a flow test at ~\$2,300,000; \$4,000,000 or circa \$9,000,000 total) – companies are on average finding 2,500,000 barrels of oil (56% of the time) that will be produced over 6 to 10 years with revenues (in dollars of the day) of circa \$306,000,000 (assumes Tapis at US\$114 per barrel of oil and US\$0.93 per Au\$ for 2,500,000 barrels of oil produced). This is a great investment opportunity for small to medium sized petroleum enterprises – while insufficiently material to be a meaningful incremental reward for large petroleum companies with very large reserve (production) replacement targets.

# Separation of fracture stimulation in the Cooper Basin from fresh water supplies



Number of fracture stimulated stages in 716 fracture stimulated wells in the Cooper Basin to end Aug.'14

**Attachment 3.** Description of the Petroleum and Geothermal Energy Act 2000 (as amended to date)

How the State of South Australia (SA) simultaneously meets community and investor expectations for net outcomes

- SA's **Petroleum and Geothermal Energy Act 2000** (PGE Act) defines the **environment** as: land, air, water, soil; plants & animals; social, cultural & heritage features; visual amenity; economic & other land uses.
- **Statements of Environmental Objectives (SEOs)** set standards for the protection of social, natural and economic environments – and quote relevant co-regulation under other Acts. Hence, for example, a breach of standards under SA's **Environmental Protection Act 1993**, where specified in SEOs is also a breach of the PGE Act.
- **SEOs** are the subject of robust public consultation that also targets all potentially affected people and enterprises before a Licence Holder can apply to conduct on-ground activities with potential **significant** risks to social, natural and economic environments.
- Co-regulators (for resources, environment, OH&S, planning, etc) jointly determine level of risk for activities covered in SEOs, and if just one agency determines more than low risk, public consultation is undertaken. For example – all SEOs that entail drilling and /or fracture stimulation go to public consultation
- Regulated Activities cannot be carried out unless there is an approved Statement of Environmental Objectives (SEO) in place.
  - ✓ SEOs set standards for outcomes from regulated activities e.g. seismic, well operations, production, processing, pipelines, gas storage, etc.
  - ✓ SEOs are objective-based, public and hence are transparent drivers for risk management and the protection of environments.
  - ✓ SEOs standards are: risks reduced to ALARP while also meeting community expectations for net outcomes
- **Owners of land** means all persons and enterprises potentially directly affected by regulated activities,
- **NoEs** must provide timely information to enable potentially affected people and enterprises to reach informed views regarding impacts on their interests.
- **Owners of land** must be given **NoEs** at least 21 days in advance of the start of any activities – and have 14 days to lodge objections
- All potentially directly affected people and enterprises have **rights to object** to the approval of land access for regulated activities, and **all such objections are a show-stopper** until objections are resolved.
- These **Owner of Land** rights are sustained without support for vexatious objections.
- **Owners of land** are due compensation from relevant PGE Act licence holders for reasonable costs of assessing NoEs (including the cost of legal advice) and for any loss or deprivation that might result from activities regulated pursuant to the PGE Act.
- The **dispute resolution process** for objections to NoEs
  - ✓ starts with engagement between the concerned stakeholder and the relevant PGE Act Licence holder;
  - ✓ can escalate to mediation stewarded by the Minister; but
  - ✓ court proceedings are the ultimate dispute resolution process.
- Efficacy of verging to regulatory nirvana via South Australia's SEOs and NoEs:
  - ✓ 13,500+ notices of entry for operations issued since Sept. 2000 – without a single person or enterprise taking up their rights to take the matter to Court (Licensee Nirvana is never having to say "your Honor"; in court)
  - ✓ Experienced, skilled and motivated people with competence and capacity are the foundation for successful regulation (everywhere). South Australia has been able to attract and retain skilled and motivated regulators e.g. has sustained capacity have very competent regulators

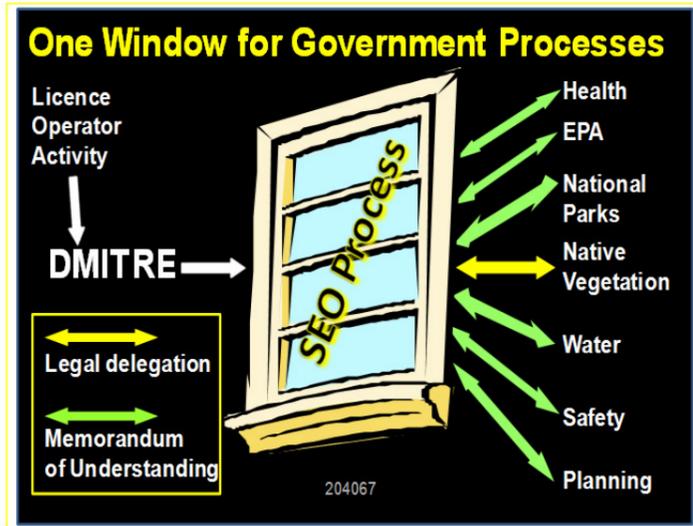
## Efficacy of Regulatory Nirvana via South Australia's SEOs and NoEs



### Australia's Productivity Commission:

**One-Stop-Shops** are the most efficient regulatory approach when well managed without **CAPTURE**

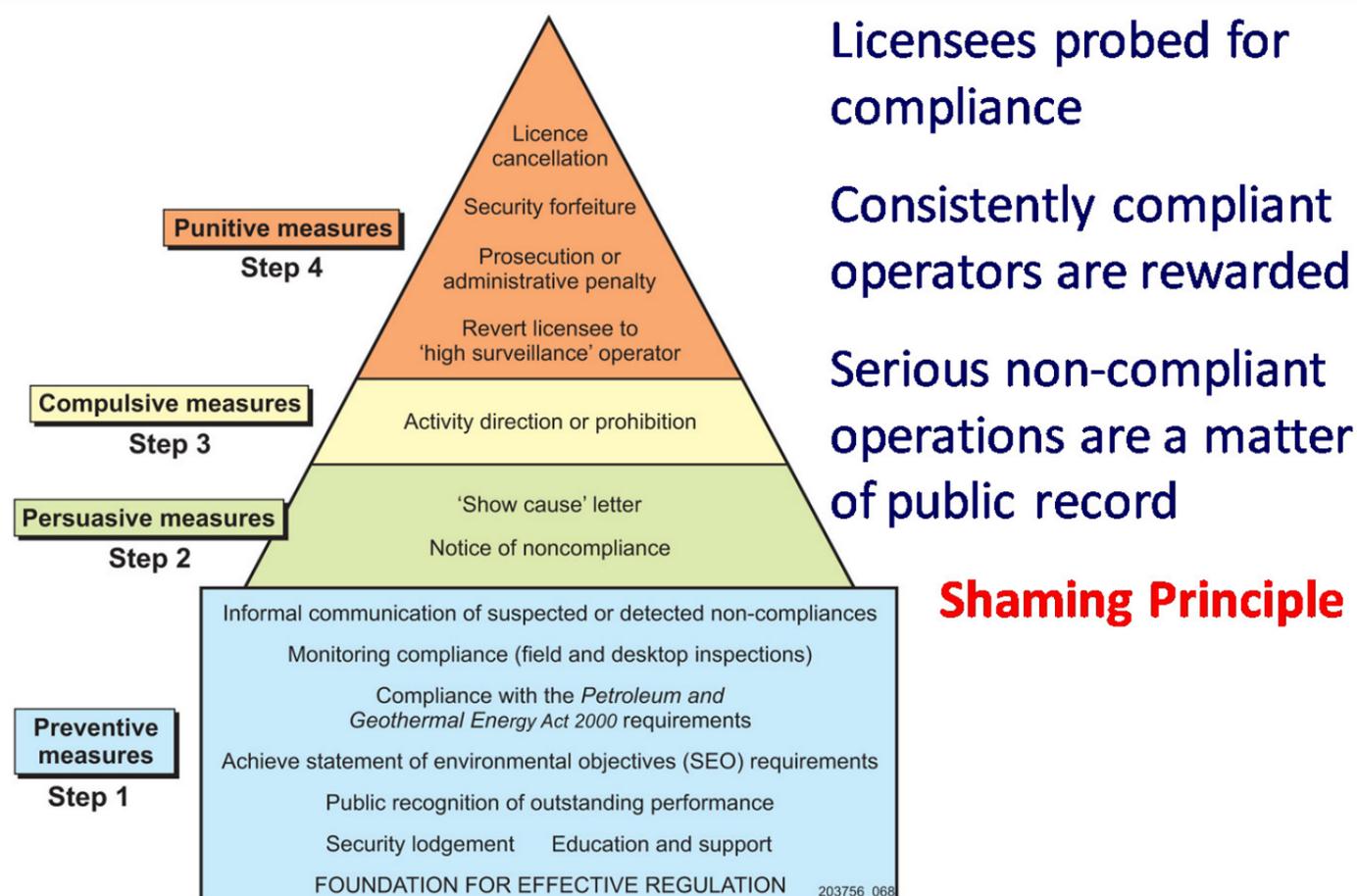
*Establish lead agencies*



*South Australia is widely seen as a model for other jurisdictions to emulate.*

*With appropriate governance, experience in South Australia suggests that such an agency can achieve an appropriate balance between enforcing legislative provisions and expediting approvals*

## From Theory To Practice



**VISION: The unconventional gas revolution will deliver decades of safe, secure, competitive gas**

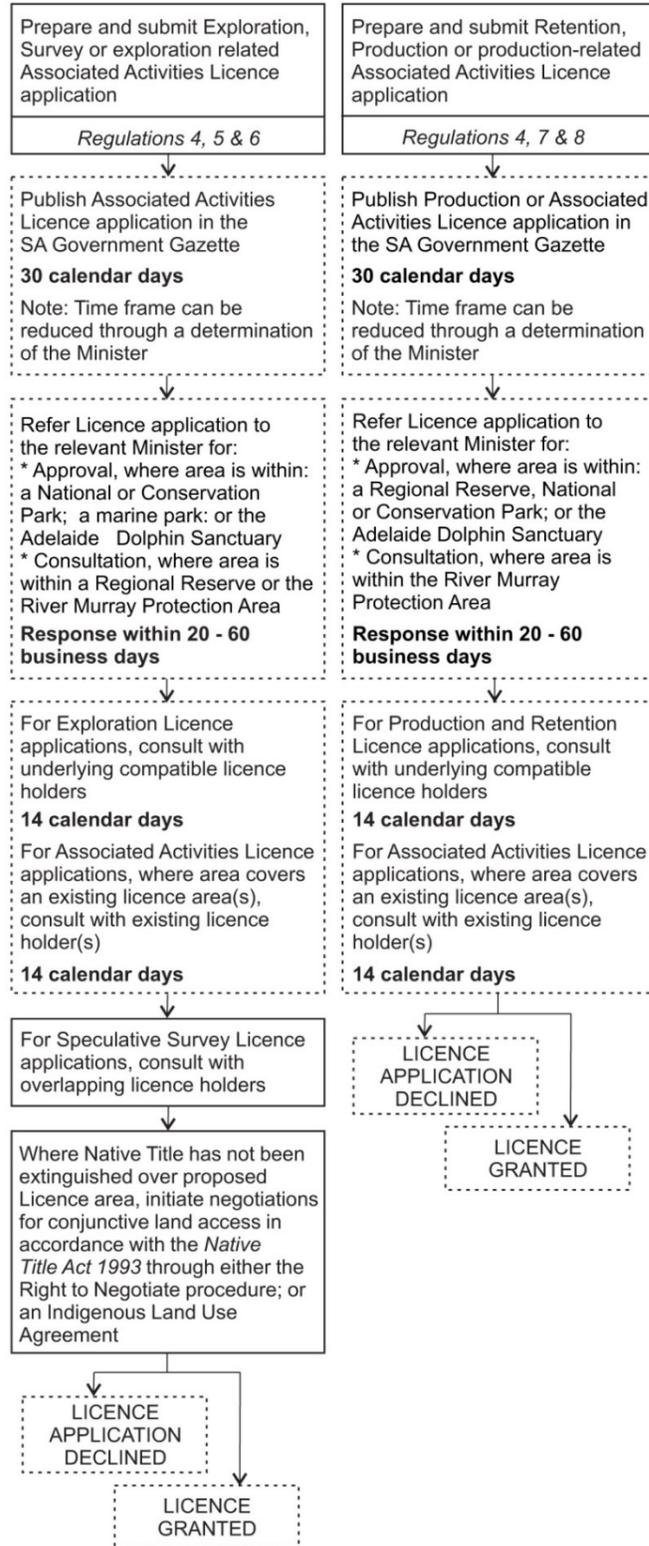
### To reach the vision

- Potential risks to social, natural and economic environments are *reduced to as low as reasonably practical (ALARP)*; and meet community expectations for net outcomes **BEFORE IT IS PERSONAL** – before approval sought for land access;
- Affected people and enterprises get timely, credible information describing risks and rewards to enable informed opinions – so all can reach informed positions well ahead of notices of entry – when they have a right to object. **Dispute resolution process is in Court**;
- Convene **roundtables** to deliver **roadmaps** for unconventional petroleum projects to inform: the **PUBLIC, GOVERNMENTS, INVESTORS, AND REGULATORS** and in doing so – enable welcomed unconventional petroleum projects.
- **South Australia's Roadmap published Dec. 2012**  
5 working groups formed in 2013

Attachment 4 – Process flow diagrams for co-regulation of petroleum projects in South Australia

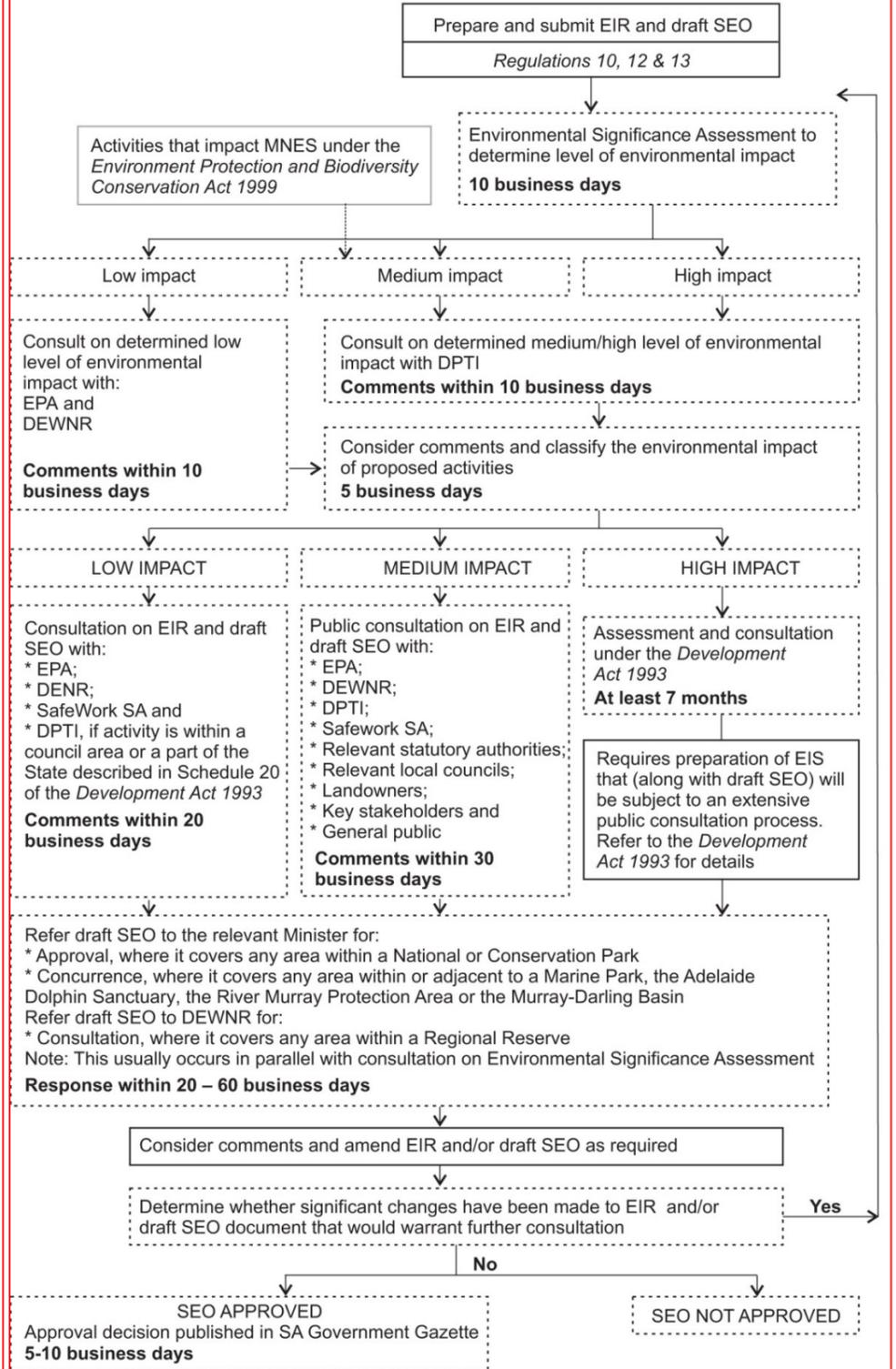
**Stage 1 of licensing and approval process for exploration, retention and production activities pursuant to South Australia's Petroleum and Geothermal Energy Act 2000.**  
 (Black box = initiated by proponent/Licensee and Dashed box = initiated by DSD/ SA Government)

**STAGE 1: LICENSING**



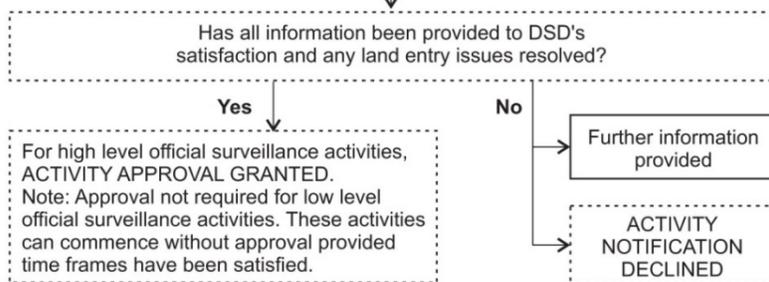
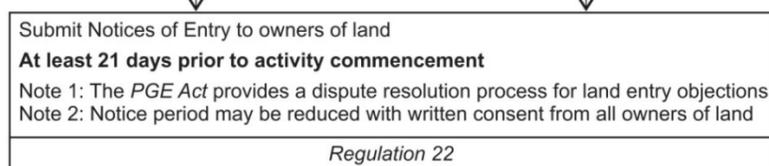
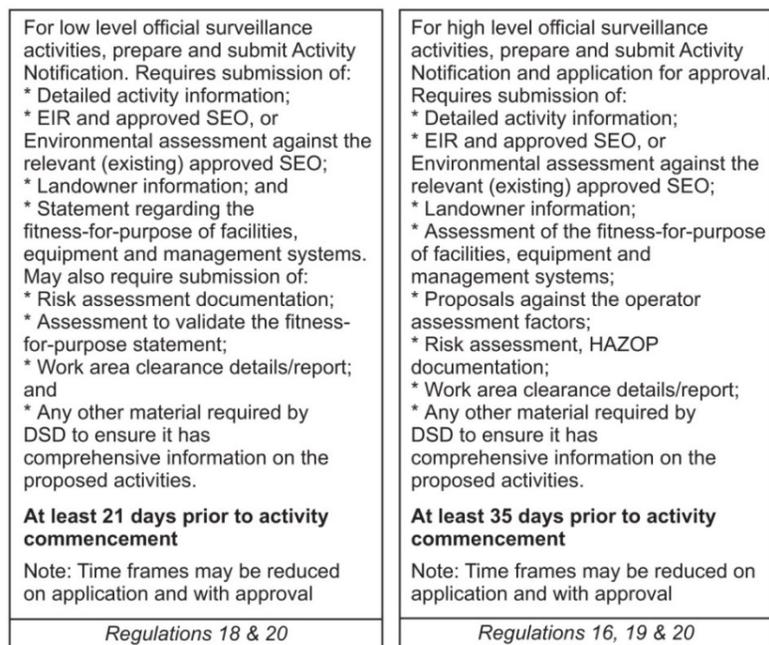
**Stage 2 of licensing and approval process for exploration, retention and production activities pursuant to South Australia's Petroleum and Geothermal Energy Act 2000.**  
 (Black box = initiated by proponent/Licensee and Dashed box = initiated by DSD/ SA Government)

**STAGE 2: ENVIRONMENTAL ASSESSMENT AND APPROVAL OF ENVIRONMENTAL OBJECTIVES**



**Stage 3 of licensing and approval process for exploration, retention and production activities pursuant to South Australia's *Petroleum and Geothermal Energy Act 2000*.**

**STAGE 3: ACTIVITY NOTIFICATION AND APPROVAL**



DEWNR: Department of Environment, Water and Natural Resources  
 DPTI: Department of Planning, Transport and Infrastructure  
 DSD: Department of State Development  
 EIR: Environmental Impact Report  
 EIS: Environmental Impact Statement  
 EPA: Environment Protection Authority  
 HAZOP: Hazard and Operability Study  
 MNES: Matter of National Environmental Significance  
 PGE Act: Petroleum and Geothermal Energy Act  
 SA: South Australia  
 SEO: Statement of Environmental Objectives

Black box = initiated by proponent/Licensee

Dashed box = initiated by DMITRE/SA Government

# Separation of fracture stimulation in the Cooper Basin from fresh water supplies

