

s22

From: s22
Sent: Monday, 1 August 2022 5:06 PM
To: s22
Subject: RE: Exploring for the Future 2022 Showcase - 8-10 August [SEC=OFFICIAL]

Hi s22 ,

Thanks very much, that would be excellent. I will send you some dates, absolutely.

No worries at all, thanks for considering the testimonial.

I recorded my presentation late last week, so unfortunately I can't edit those slides, but I will make sure I include the Beach logo on the slides that are distributed to participants.

Thanks again!

Cheers,
s22

From: s22 <s22@beachenergy.com.au>
Sent: Monday, 1 August 2022 4:49 PM
To: s22 <s22@ga.gov.au>
Subject: RE: Exploring for the Future 2022 Showcase - 8-10 August [SEC=OFFICIAL]

Hi s22,

We should have some more core data coming in so s22 will probably send you a few more bits and pieces in the future which might also be helpful.

Early September would probably be better for us. Let me know a few possible dates and I'll see what fits best with our availability.

In regards to your questions, at this stage without knowing the outcomes of the study we wouldn't be in a position to provide a testimonial but happy for you to mention Beach as a data contributor. I have attached our logo.

Kind regards,
s22.

s22

| General Manager Exploration & Subsurface Cooper Basin Beach Energy Limited



80 Flinders Street, Adelaide, SA 5000
GPO Box 175, Adelaide SA 5001

s22

W: www.beachenergy.com.au

From: s22 <s22@ga.gov.au>
Sent: Thursday, 21 July 2022 4:56 PM
To: s22 <s22@beachenergy.com.au>
Subject: RE: Exploring for the Future 2022 Showcase - 8-10 August [SEC=OFFICIAL]

Hi s22 ,

First of all, thank you and the team very much for sending the core data - our CSIRO colleagues have been having a look and finding it very helpful. We have nearly completed our petrophysical appraisal of a set of fields in the central Australian basins, and while the report will be coming out in a few months, we'd be keen to show you and the team what we've done so far, perhaps in the second half of August or early September (some of our team are away until then)?

I also have a couple of questions for you.

As you know, the Exploring for the Future showcase will be held in August (details below), and I've been invited to give a presentation on our CO2-EOR-ROZ project. This presentation will largely focus on the workflow we've developed to assess potential ROZ and show some results from the petrophysical study, as well as mention our future work on the core-flooding and reservoir modelling modules of the project.

My first question:

I want to make sure to acknowledge all collaborators and contributors to our project. Would you be happy for me to mention Beach Energy explicitly as a contributor to this project? If not, I will just mention something more generic e.g. that we have been engaging with industry. Either way is absolutely fine, whatever you're comfortable with. If you are happy for me to mention your involvement, do you have a logo you'd like me to use, or is the name sufficient?

My second question is actually on behalf of the EFTF project management team.

As part of the showcase, they would like to include some testimonials from our external collaborators, contributors and end-users of our outputs. Would you be willing to be recorded on camera with a testimonial (or a voice recording if not video)? It would be at most a 20-30 second spot. For example, something along the lines of: "We are excited that GA is working in this new and important field, we see GA adding value to the fields of CO2 storage and oil security; we have contributed data to the study and are eagerly anticipating the results" - (obviously, this text can be whatever you would like).
Absolutely no worries at all if this is not something you are comfortable doing.

Thanks!

s22

s22 | Assistant Director
Low Carbon Geoscience and Advice | Advice, Investment Attraction and Analysis Branch
Minerals, Energy and Groundwater Division

s22 ga.gov.au

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From: s22
Sent: Tuesday, 28 June 2022 12:38 PM
To: s22 <s22@beachenergy.com.au>; s22

<s22 @beachenergy.com.au>; s22 <s22 @beachenergy.com.au>

Subject: FW: Exploring for the Future 2022 Showcase - 8-10 August [SEC=OFFICIAL]

Good afternoon s22 ,

For your interest - the Exploring for the Future 2022 Showcase will be held online over three days, 8-10 August, and you can now go to [Exploring for the Future 2022 Showcase](http://ga.gov.au/Showcase) (ga.gov.au/Showcase) to find out more and to register. Our CO2-EOR-ROZ project is one of many projects that are underway through the EFTF program (you can find out more about the EFTF program here: <https://www.ga.gov.au/eftf>.)

About the event:

The Australian Government's Exploring for the Future program, led by Geoscience Australia, is holding a virtual public Showcase during 8–10 August 2022.

Since 2016, the Exploring for the Future program has produced pre-competitive geoscience data, information and tools that are expanding our knowledge and understanding of Australia's geology, Earth systems and processes.

Our vision leading this work is to contribute to a strong economy, resilient society and sustainable environment for the benefit of all Australians through a better understanding of our mineral, energy potential and groundwater resources.

The 2022 Showcase is a free online event where Geoscience Australia's senior leaders and geoscientists will discuss scientific highlights, reflect on the value of the program and share future plans. It also provides a unique opportunity to discuss topics of interest and engage directly with our scientists through an open Q&A forum.

Please feel free to forward this to anyone who might be interested.

Cheers,
s22

Dr s22 s22 | Assistant Director
Low Carbon Geoscience and Advice | Advice, Investment Attraction and Analysis Branch
Minerals, Energy and Groundwater Division

s22 ga.gov.au

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s 22

From: s22 <s22@beachenergy.com.au>
Sent: Friday, 3 June 2022 3:09 PM
To: s22
Subject: Accepted: CO2-EOR and residual oil zone project follow up discussion (Beach Energy, GA, CSIRO) [SEC=OFFICIAL]

s22

| General Manager Exploration & Subsurface Cooper Basin Beach Energy Limited



beach

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From: s22 <s22@beachenergy.com.au>
Sent: Friday, 3 June 2022 3:06 PM
To: s22
Subject: Accepted: CO2-EOR and residual oil zone project follow up discussion (Beach Energy, GA, CSIRO) [SEC=OFFICIAL]

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| Manager Subsurface Development Cooper Basin | Beach Energy Limited



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s22

From: s22 <s22@beachenergy.com.au>
Sent: Wednesday, 4 May 2022 3:22 PM
To: s22
Subject: Accepted: FW: Discussion of GA's projects and collaborations on CO2-EOR, CCS, Hydrogen, hydrocarbon resources. [SEC=OFFICIAL]
Attachments: s 22

s22 | Manager Subsurface Development Cooper Basin | Beach Energy Limited



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From: s22 <s22@beachenergy.com.au>
Sent: Wednesday, 4 May 2022 1:43 PM
To: s22
Subject: Accepted: FW: Discussion of GA's projects and collaborations on CO2-EOR, CCS, Hydrogen, hydrocarbon resources. [SEC=OFFICIAL]
Attachments: s 22

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| Senior Geophysicist | Beach Energy Limited



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From: s22 <s22@beachenergy.com.au>
Sent: Wednesday, 4 May 2022 1:42 PM
To: s22
Subject: Tentative: FW: Discussion of GA's projects and collaborations on CO2-EOR, CCS, Hydrogen, hydrocarbon resources. [SEC=OFFICIAL]
Attachments: s 22

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| General Manager New Ventures & Portfolio | Beach Energy Limited



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From: s22 <s22@beachenergy.com.au>
Sent: Wednesday, 4 May 2022 1:31 PM
To: s22
Subject: Accepted: FW: Discussion of GA's projects and collaborations on CO2-EOR, CCS, Hydrogen, hydrocarbon resources. [SEC=OFFICIAL]
Attachments: s 22

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Sent: Wednesday, 4 May 2022 1:09 PM
To: s22
Subject: Accepted: Discussion of GA's projects and collaborations on CO2-EOR, CCS, Hydrogen, hydrocarbon resources. [SEC=OFFICIAL]

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| General Manager Exploration & Subsurface Cooper Basin Beach Energy Limited



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From: s22 @beachenergy.com.au>
Sent: Wednesday, 4 May 2022 11:00 AM
To: s22
Cc: s22
Subject: RE: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

Hi s22

That works for us.

Thanks,
s22

s22

| General Manager Exploration & Subsurface Cooper Basin | Beach Energy Limited



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From: s22 @ga.gov.au>
Sent: Wednesday, 4 May 2022 10:25 AM
To: s22 @beachenergy.com.au>
Cc: s22 @ga.gov.au>
Subject: RE: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

Hi s22

Thursday is looking tricky for us, but Friday 13th looks good, if that morning (10-12 Adelaide time) is still an option for you?

Cheers,
s22

From: s22 @beachenergy.com.au>
Sent: Wednesday, 4 May 2022 10:21 AM
To: s22 @ga.gov.au>
Cc: s22 @ga.gov.au>
Subject: RE: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

Hi s22

I've just checked with some colleagues who will also join us and it seems that Thursday 12, anytime between 9-11am, might be the only available day in the next week. Are you available that morning? If so, please send through Teams invite and I'll forward to others with Beach.

Kind regards,
s22

s22

| General Manager Exploration & Subsurface Cooper Basin | Beach Energy Limited



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From: s22 <@ga.gov.au>
Sent: Tuesday, 3 May 2022 5:17 PM
To: s22 <@beachenergy.com.au>
Cc: s22 <@ga.gov.au>
Subject: RE: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

Hi s22

Excellent! Friday the 6th at 11am (11:30 AEST) would work well for us.

If that time still suits you, I will send out the Teams meeting information along with a few points about what topics we'll cover.

Cheers,
s22

s22 | Assistant Director
Low Carbon Geoscience and Advice | Advice, Investment Attraction and Analysis Branch
Minerals, Energy and Groundwater Division

t s22 <ga.gov.au>

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From: s22 <@beachenergy.com.au>
Sent: Tuesday, 3 May 2022 9:59 AM
To: s22 <@ga.gov.au>
Cc: s22 <@ga.gov.au>
Subject: RE: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

Hi s22

We'll take you up on the offer for a meeting/discussion to find out more about the different projects you're working on. That would be good to provide context and also see where else we could be involved and provide assistance.

Of particular interest is:

- 1) CO2-EOR project
- 2) Hydrogen production and storage project
- 3) CCS

Would you be available for a Teams meeting during any of the following times (Adelaide time)?

- Friday 6 May 11am-1pm
- Tuesday 10 May 11am – 1pm
- Thursday 12 May 9am-11am
- Friday 13 May 10am-12pm

Thanks,
s22

s22

| General Manager Exploration & Subsurface Cooper Basin | Beach Energy Limited



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From: s22 <@ga.gov.au>
Sent: Tuesday, 26 April 2022 12:52 PM
To: s22 <@beachenergy.com.au>
Cc: s22 <@ga.gov.au>
Subject: RE: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

You don't often get email from s22 <@ga.gov.au>. [Learn why this is important](#)

Hi s22

Thanks very much for getting back to me so quickly, and thank you for looking into the potential for some oil samples, we really do appreciate it.

In addition to the CO2-EOR project, we would be very happy to discuss the broader energy resources work we're undertaking under the Exploring for the Future program, if that is of interest? This includes looking for conventional and unconventional resources, particularly in under-explored regions, as well as hydrogen production and storage, carbon capture and storage, and compiling new basin inventories.

I look forward to catching up when you're back in the office.

Cheers,
s22

s22 | Assistant Director
Low Carbon Geoscience and Advice | Advice, Investment Attraction and Analysis Branch
Minerals, Energy and Groundwater Division

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From: s22 <s22@beachenergy.com.au>
Sent: Friday, 22 April 2022 5:15 PM
To: s22 <s22@ga.gov.au>
Cc: s22 <s22@ga.gov.au>
Subject: RE: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

Hi s22

I'm talking to some people internally about the potential for providing some samples, still waiting to hear back. I'm on leave next week but will be in contact again week after that. It's likely we can provide some samples, just a matter of figuring out logistics.

I'd definitely be interested in hearing more about the project too.

Kind regards,
s22

s22

| General Manager Exploration & Subsurface Cooper Basin | Beach Energy Limited



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From: s22 <s22@ga.gov.au>
Sent: Wednesday, 20 April 2022 12:34 PM
To: s22 <s22@beachenergy.com.au>
Cc: s22 <s22@ga.gov.au>
Subject: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

You don't often get email from s22 <s22@ga.gov.au>. [Learn why this is important](#)

Dear s22

I hope you excuse this email out of the blue - my colleague s22 kindly passed me your contact details. I wanted to get in touch to let you know about our CO2-enhanced oil recovery project, and also to ask for some assistance with obtaining some oil samples.

My colleague s22 and I are collaborating with a team at CSIRO to investigate the application of CO2-enhanced oil recovery to residual oil zones (ROZ) in Australia – we're looking at the potential to both increase our oil

resources and to grow our portfolio of geological storage options for CO₂. This project is part of GA's Exploring for the Future program (<https://www.ga.gov.au/eff>), under the "Australia's Future Energy Resources" project (you can view a couple of our recent publications here <http://dx.doi.org/10.11636/Record.2022.003> and <https://www.publish.csiro.au/AJ/AJ20076>).

At the moment, we're undertaking two main activities:

First, we're trying to identify potential ROZ through geological and petrophysical analysis, with a focus on the Cooper Basin, although we will be looking further afield too.

Second, we want to better understand reservoir and fluid behaviour through core-flooding experiments and reservoir modelling work, so that we can get a handle on the potential additional oil production and CO₂ storage volumes in ROZ.

Regarding the second part of our project, we're currently trying to obtain some oil samples from Australian oil fields for our core-flooding experiments. I was wondering whether you might be in a position to assist with this? We're looking for about 20 litres in total (which can absolutely be de-identified by you, or by us – we just want a representative oil from Australia).

We'd be keen to have a chat with you and/or your colleagues about our project, if that is of interest to you? We'd certainly appreciate any insights or comments you might have on our approach and results to date.

Cheers,
s22

s22 | Assistant Director
Low Carbon Geoscience and Advice | Advice, Investment Attraction and Analysis Branch
Minerals, Energy and Groundwater Division
t s22 ga.gov.au



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s22

From: s22
Sent: Wednesday, 4 May 2022 10:29 AM
To: s22
Cc: s22
Subject: RE: GA-CSIRO project on CO2-EOR and residual oil zones [SEC=OFFICIAL]

No worries s22 I'm just checking if my colleagues are available on Thursday morning too and I will get back to you ASAP.

Cheers,
s22

s 22 - duplicate material

4 pages removed under s22 of the FOI Act as irrelevant information

s22


From: s22 <s22@beachenergy.com.au>
Sent: Tuesday, 12 July 2022 4:59 PM
To: s22
Subject: s22 shared the folder "Western Flank RCA SCAL and Cooper Oil MMP" with you.




s22

shared a folder with you

Hi s22,
 link to Western Flank SCAL data...
 kind regards
 s22


Western Flank RCA SCAL and Cooper Oil MMP

 This link will work for anyone.

Open



[Privacy Statement](#)



s22

| Staff Reservoir Engineer | Beach Energy Limited



beach

s22

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From: s22
Sent: Tuesday, 12 July 2022 5:50 PM
To: s22
Cc: s22 ; s22
Subject: RE: CO2-EOR and residual oil zone project follow up discussion (Beach Energy, GA, CSIRO) [SEC=OFFICIAL]

Hi s22,

Fantastic, thanks so much - this data will be extremely useful to us.

I've downloaded the data from the linked folder into a commercial-in-confidence space, so it will be restricted to our CO2-EOR project, and I'll make sure to share it securely with the CSIRO team.

We'll definitely be keen to discuss this further, and will be in touch soon.

Cheers,
s22

From: s22 <s22@beachenergy.com.au>
Sent: Tuesday, 12 July 2022 4:56 PM
To: s22 <s22@ga.gov.au>
Cc: s22 <s22@beachenergy.com.au>; s22
s22 @beachenergy.com.au>
Subject: RE: CO2-EOR and residual oil zone project follow up discussion (Beach Energy, GA, CSIRO) [SEC=OFFICIAL]

Hi s22,

I've pulled together routine and special core analysis reports which should hopefully help in evaluating potential for mobilising remaining/residual oil using CO2. These reports cover most of the reservoirs units we currently have oil production from, namely the Namur, McKinlay and Birkhead reservoirs.

The wells with RCA/SCAL available are:

Bauer 5, 14, 27, 28
Growler 2, 6, 10
Kalladeina 11
Kangaroo 2 (SCAL still in progress, but some useful data so far on Sor)
Snatcher 2
Spitfire 3
Charo 15

Also included are some CO2 miscibility and swelling tests carried out on Jurassic oil across the basin, these have very similar low GORs, and low methane/ethane to our crudes, and it's no surprise that they suck up CO2 like crazy, almost doubling the oil volume in some cases, so encouraging for immiscible mobilising remaining oil zones.

You should get a separate email with a link to the data. This shared area is set up for your email only and expires on the 27th July. Once downloaded, we're fine with sharing the data with the other interested parties from GA and CSIRO who've been working on CO2 EOR.

Let's hook up when you've all had a chance to review the data, very interested to get you thoughts on how this might impact CO2 EOR potential.

Kind regards

s22

s22 | Staff Reservoir Engineer | Beach Energy Limited



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From: s22 <s22@ga.gov.au>
Sent: Thursday, 23 June 2022 2:09 PM
To: s22 <s22@beachenergy.com.au>; s22 <s22@beachenergy.com.au>; s22 <s22@beachenergy.com.au>; s22 (Energy, Kensington WA) <s22@csiro.au>; s22 (Energy, Kensington WA) <s22@csiro.au>; s22 (Energy, Kensington WA) <s22@csiro.au>; s22 <s22@ga.gov.au>; s22 <s22@ga.gov.au>
Subject: RE: CO2-EOR and residual oil zone project follow up discussion (Beach Energy, GA, CSIRO) [SEC=OFFICIAL]

Dear s22, s22 and s22,

Thank you very much for making the time for our discussion on our EOR/ROZ work on Tuesday, we appreciate your input and engagement, and we will definitely keep you informed regarding this project.

As discussed, we'd be grateful for any data and/or samples you could share with us for this project, and of course we can put in place all the required agreements/measures and support any logistics.

Cheers,
s22

-----Original Appointment-----

From: s22
Sent: Friday, 3 June 2022 2:17 PM
To: s22; s22; s22; s22; s22 (Energy, Kensington WA); s22 (Energy, Kensington WA); s22 (Energy, Kensington WA); s22
; s22
Cc: s22; s22; ADL80 8.06 Kupe (10p)
Subject: CO2-EOR and residual oil zone project follow up discussion (Beach Energy, GA, CSIRO) [SEC=OFFICIAL]
When: Tuesday, 21 June 2022 3:30 PM-4:30 PM (UTC+10:00) Canberra, Melbourne, Sydney.
Where: Microsoft Teams Meeting

Good afternoon,

Please join us for a follow-up discussion about our CO2-EOR-residual oil zone project.

We will review the petrophysical module of work that aims to identify and characterise potential ROZs, and discuss the upcoming reservoir modelling and experimental module (including potential data and sample availability).

Cheers,
s22

s22 | Assistant Director
Low Carbon Geoscience and Advice | Advice, Investment Attraction and Analysis Branch
Minerals, Energy and Groundwater Division

s22 ga.gov.au

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s 22 Australia, Sydney

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s22

From: s22 <s22@beachenergy.com.au>
Sent: Monday, 20 June 2022 10:56 AM
To: s22
Subject: Accepted: CO2-EOR and residual oil zone project follow up discussion (Beach Energy, GA, CSIRO) [SEC=OFFICIAL]

s22 | Staff Reservoir Engineer | Beach Energy Limited



80 Flinders Street, Adelaide, SA 5000
GPO Box 175, Adelaide SA 5001

s22 @beachenergy.com.au
W: www.beachenergy.com.au

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s22

From: s22 @beachenergy.com.au >
Sent: Friday, 24 June 2022 9:12 AM
To: s22

Subject: RE: CO2-EOR and residual oil zone project follow up discussion (Beach Energy, GA, CSIRO) [SEC=OFFICIAL]

Hi s22

Thanks for discussion and providing the additional background.

We will collate the relevant SCAL files and setup a sharefile folder or similar to transfer across. We can also have a bit more of a chat around any fluid sampling/core requirements when required.

Regards
s22

s22

| Manager Subsurface Development Cooper Basin | Beach Energy Limited



80 Flinders Street, Adelaide, SA 5000
GPO Box 175, Adelaide SA 5001

T: s22
E: s22 @beachenergy.com.au
W: www.beachenergy.com.au

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s 22 - duplicate material

1 page removed under s22 of the FOI Act as irrelevant information

s22

From: s22 <s22@santos.com>
Sent: Friday, 4 March 2022 2:49 PM
To: s22; s22 (s22); s22 (Energy, Kensington WA)
Cc: s22
Subject: RE: GA-CSIRO CO2-EOR/Residual oil zone project [SEC=OFFICIAL]

Hi s22,

Thanks for your email and sorry for not following up yet. This may take a little bit of time for us to follow through but we are working on it in the background.

Kind regards,

s22
s22

From: s22 <s22@ga.gov.au>
Sent: Thursday, 3 March 2022 5:21 PM
To: s22 <s22@santos.com>; s22 (s22) <s22@santos.com>; s22 (Energy, Kensington WA) <s22@csiro.au>
Cc: s22 <s22@ga.gov.au>
Subject: ![EXT]: GA-CSIRO CO2-EOR/Residual oil zone project [SEC=OFFICIAL]

Dear s22 and s22,

I'm following up on our conversation last week regarding CCS, and particularly our CO2-enhanced oil recovery residual oil zone project.

We are still very keen to explore opportunities for cooperation or collaboration on these topics (although I certainly understand that these things aren't always easy or quick to implement).

In the meantime, I wonder if I might trouble you regarding one of the points we discussed, which relates to the possibility of obtaining some oil from the Cooper Basin for our core-flooding experiments. Is this something that we could organise?

I have included Dr s22 from CSIRO here, as he is leading the experimental and reservoir modelling component of our project, and is far better placed than I am to provide more specifics about the experimental work components.

As discussed last week, we are looking for some 20 litres or so of a typical or representative oil from the basin, which doesn't need to be identified (if confidentiality is an issue) other than being from the broader region. We spoke about the possibility of arranging a confidentiality or collaborative agreement between Santos and GA to perhaps facilitate this and other data sharing, which we can/should certainly pursue (assuming you are still interested of course); in the meantime, my understanding is that you already have this sort of arrangement with CSIRO. In the interests of time, if some oil could be made available, perhaps we could organise this to go straight to CSIRO, for use in the experiments under your existing arrangement?

Please let me know whether this is possible, and if so, what you would need from our end, and if we can provide any further information.

Cheers,
s22

s22 | Low Carbon Geoscience and Advice
Minerals, Energy and Groundwater Division

s22 www.ga.gov.au

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s22

From: s22
Sent: Tuesday, 8 February 2022 7:01 PM
To: s22 ; s22 (s22)
Cc: s22 (DEM); s22 ; s22 ; s22
Subject: Re: ![EXT]: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

Fantastic, I'll send out meeting details shortly. Looking forward to the discussion!p

Cheers,

s22

From: s22 <s22@santos.com>
Sent: 08 February 2022 5:37 PM
To: s22 <s22@ga.gov.au>; s22 (s22) <s22@santos.com>
Cc: s22 (DEM) <s22@sa.gov.au>; s22 <s22@ga.gov.au>; s22 <s22@ga.gov.au>; s22 <s22@ga.gov.au>
Subject: Re: ![EXT]: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

Hi s22 ,

Thanks for getting back in touch. Yes definitely available to catch up – s22 and I are free on morning of Mon 21st and 22nd Feb 10.30 am to 12.30 pm.

Look forward to the meeting.

Regards,

s22

m: s22

From: s22 <s22@ga.gov.au>
Date: Tuesday, 8 February 2022 at 4:29 pm
To: s22 <s22@santos.com>, "s22 (s22)" <s22@santos.com>
Cc: "s22 (DEM)" <s22@sa.gov.au>, s22 <s22@ga.gov.au>, s22 <s22@ga.gov.au>, s22 <s22@ga.gov.au>
Subject: RE: ![EXT]: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

Hi s22 and s22 ,

I hope you've had a relaxing summer. I'm just following up on our correspondence in January, having recently returned from leave myself.

Would you be available for a chat with us sometime in the next couple of weeks?

Cheers,
s22

s22 | Geoscientist | Low Carbon Geoscience and Advice
Minerals, Energy and Groundwater Division

s22 www.ga.gov.au

From: s22 <s22@santos.com>
Sent: Thursday, 13 January 2022 1:58 PM
To: s22 <s22@ga.gov.au>
Cc: s22 (DEM) <s22@sa.gov.au>; s22 <s22@ga.gov.au>; s22 <s22@ga.gov.au>; s22 <s22@ga.gov.au>; s22 (s22) <s22@santos.com>
Subject: Re: ![EXT]: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

Hi s22,

Thank you for reaching out and great to hear about the work you are doing in this space.

My colleague s22 is most likely the best person to connect with, but he is on leave at the moment. I'll discuss with him when he is back in two week's time and then get back to you.

Kind regards,

s22 s22

From: s22 <s22@ga.gov.au>
Date: Wednesday, 12 January 2022 at 4:11 pm
To: s22 <s22@santos.com>
Cc: "s22 (DEM)" <s22@sa.gov.au>, s22 <s22@ga.gov.au>, s22 <s22@ga.gov.au>, s22 <s22@ga.gov.au>
Subject: ![EXT]: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

Dear s22,

I was fortunate to (virtually) attend the SA Roundtable for Oil and Gas in December and greatly enjoyed hearing from you about progress on the Moomba CCS project. Thanks very much s22 for passing on s22's contact details.

My colleague, s22, and I both work in the Low Carbon Geoscience and Advice team at GA, where we've been focusing on CCS, CO2-EOR, hydrogen, and other low emissions energy resources. We are currently leading a project with colleagues at CSIRO to investigate the application of CO2-EOR to residual oil zones in Australia. This project follows a national screening study for CO2-EOR potential in Australia that we completed in 2020 for CO2CRC, and some other work that we have done on maximising CO2 storage during EOR operations through the CO2-EOR+ approach (<https://www.publish.csiro.au/AJ/AJ20076> and <https://www.youtube.com/watch?v=i0-d9hvXe00>).

We are initially focusing our residual oil zone study on the Cooper-Eromanga region, and we are keen to discuss this project with you, both to let you know about the work we're doing, and to identify opportunities for cooperation or collaboration. In particular, we were wondering whether it would be possible for us to obtain a small amount of crude oil from you, for some core-flooding experiments that our colleagues at CSIRO will be conducting as part of our project?

Some additional background information...

Our residual oil zone project is one of several energy-focused project modules under the banner of "Australia's Future Energy Resources" (AFER), which is led by Dr s22 (cc'd here), and supported through Geoscience Australia's Exploring for the Future (EFTF) program (<https://www.ga.gov.au/eftf/projects/australias-future-energy-resources>). Other modules within AFER are concentrating on conventional, unconventional and CO2 geological storage resources assessments, and hydrogen production and storage. Our focus is largely on the strategic central Australian basins region, including the Cooper-Eromanga basins and underlying/adjacent under-explored basins, and we are working closely with our colleagues at the South Australian and Northern Territory Geological Surveys on these projects.

Regarding the ROZ project, we would be very interested to discuss our proposed workflow and preliminary direction with you. The workflow includes petrophysical analysis to identify ROZ, experimental work and modelling to understand reservoir behaviour, and developing an online tool that combines technical and economic factors to guide decision making and planning (similar to our hydrogen economic fairways tool, or HEFT - <https://portal.ga.gov.au/persona/hydrogen>). We could also provide an update on the other AFER projects, and/or on CCS and hydrogen related work that we are doing as part of the Low Carbon Geoscience team led by s22 (cc'd here) (www.ga.gov.au/ccs).

Would you be available to have a chat with us, perhaps in early February?

Cheers,

s22

s22 | Geoscientist | Low Carbon Geoscience and Advice
Minerals, Energy and Groundwater Division

s22 www.ga.gov.au



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s22

From: s22 (s22) <s22 @santos.com>
Sent: Friday, 11 February 2022 9:17 AM
To: s22
Subject: Accepted: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

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s22

From: s22 (s22) <s22@santos.com> on behalf of s22 <s22@santos.com>
Sent: Friday, 11 February 2022 9:18 AM
To: s22
Subject: Accepted: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

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s22

Subject: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]
Location: Microsoft Teams Meeting
Start: Mon 21/02/2022 11:00 AM
End: Mon 21/02/2022 12:00 PM
Show Time As: Tentative
Recurrence: (none)
Meeting Status: Not yet responded
Organizer: s22
Required Attendees: s22 ; s22 (s22); s22 ; s22 ; s22 (Energy, Kensington WA); s22 @csiro.au; s22 (DEM), s22

Dear all,

Please find below meeting details for our discussion about some of the work we’re undertaking through the CO2-EOR residual oil zone project.
Looking forward to the discussion!

Cheers,
s22

Microsoft Teams meeting

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s22 Australia, Sydney

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s22

From: s22 (s22) <s22 @santos.com>
Sent: Thursday, 13 January 2022 2:37 PM
To: s22
Subject: Automatic reply: ![EXT]: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project)
[SEC=OFFICIAL]

I'm out of the office on leave, if urgent please call me on mobile.

Best regards,

s22

s22

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s22

From: s22
Sent: Thursday, 13 January 2022 2:36 PM
To: s22
Cc: s22; s22 (DEM); s22; s22; s22; s22
Subject: RE: ![EXT]: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

Wonderful, thanks very much s22. I look forward to hearing from you and s22 in a couple of weeks.

Cheers,

s22

s22

Subject: GA ROZ Discussion [SEC=OFFICIAL]
Location: Skype Meeting
Start: Tue 17/11/2020 3:00 PM
End: Tue 17/11/2020 3:30 PM
Recurrence: (none)
Meeting Status: Accepted
Organizer: s22 , s22 (s22)

-----Original Appointment-----

From: s22 , s22 (s22) <s22@santos.com>
Sent: Monday, 16 November 2020 10:49 AM
To: s22 , s22 (s22); s22
Cc: s22
Subject: GA ROZ Discussion
When: Tuesday, 17 November 2020 2:30 PM-3:00 PM (UTC+09:30) Adelaide.
Where: Skype Meeting

Hi s22, I've had an internal meeting come up tomorrow afternoon – hopefully you are available 30mins earlier? If not please advise and I'll find an alternate. Skype details at bottom of invite.

Thanks

s22

Per previous email,

Dear s22 ,

I believe we have “met” a couple of times in the past at the Global Institute events on CCS. I was hoping I might be able to get your input on some CO2-EOR related matters in the Cooper Basin.

Just as a background, I am currently leading a national CO2-EOR assessment study, which is being conducted with the CO2CRC and LETA. It's a very high level study where we look at the various oil bearing basins in the country and rank them for their CO2-EOR potential. This report is currently in the review stage. This work has led onto to further work in the CO2-EOR space, specifically in the area of residual oil zones as potential candidates for CO2-EOR. We have actually proposed a work program in residual oil zones as part of the newly funded Exploring for the Future programme here at GA, and we are also writing up a general paper for APPEA.

Our intention is to look at the Cooper/Eromanga as a template/starting point to develop a methodology and also try and understand the magnitude of the ROZ resource. I am not looking to get access to any confidential data, but was hoping to get some input from you regarding appropriate starting points, such as good areas or fields that might have some good well coverage and log data. We are really in the background stage here, and this is definitely more in depth than our previous national study, but as a first step I was thinking of trying to characterise the residual oil zone thicknesses and extent using well log data that might be out there. So, in short I thought it might be a good idea to get some input from you or one of your colleagues. By email, or by video chat would be fine if you were amenable.

Let me know your thoughts.

Warm regards

s22

s22 | Senior Scientist, Geomechanics
Low Carbon Geoscience and Advice | Minerals Energy and Groundwater Division

s22 www.ga.gov.au



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s22

From: s22 (s22) <s22@santos.com>
Sent: Wednesday, 18 May 2022 10:35 AM
To: s22 ; s22
Cc: s22
Subject: RE: Residual Oil Zone APPEA paper [SEC=OFFICIAL]

Hi s22, thanks for sharing. Regards,

s22

From: s22 <s22@ga.gov.au>
Sent: Wednesday, 18 May 2022 5:10 AM
To: s22 s22 @santos.com>; s22 (s22 s22 @santos.com>
Cc: s22 <s22@ga.gov.au>
Subject: ![EXT]: Residual Oil Zone APPEA paper [SEC=OFFICIAL]

Hi s22 and s22 ,

In case you're interested, our latest APPEA paper on residual oil zones is out.

Here is the link.

<https://www.publish.csiro.au/AJ/AJ21077>

FYI we do mention Moomba in the paper.

Regards

s22

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s22

From: s22
Sent: Thursday, 19 May 2022 4:28 PM
To: s22 s22 (s22)
Cc: s22
Subject: RE: Oil Samples query [SEC=OFFICIAL]

Hi s22,
Thanks for getting back to us. No problem at all. Best of luck.
Regards
s22

From: s22 <s22@santos.com>
Sent: Thursday, 19 May 2022 12:56 AM
To: s22 <s22@ga.gov.au>; s22 (s22) <s22@santos.com>
Cc: s22 <s22@ga.gov.au>
Subject: RE: Oil Samples query [SEC=OFFICIAL]

Hi s22,

Firstly – apologies for the long delay in getting back to you.

As I flagged, I was first seeking approval internally to provide GA the oil sample and other data we might have to assist you, however the steer is that we don't have capacity at the moment given our priorities on CCS (this lack of capacity is reflected in how long it has taken me to get back to you!)

All the best with the study – potentially we may be in a different position at some point in the future, however we are just not in a position to support at the moment.

Kind regards,

s22

m: +61 408 013 123

From: s22 <s22@ga.gov.au>
Sent: Sunday, 17 April 2022 2:44 AM
To: s22 s22 @santos.com; s22 (s22) s22 @santos.com>
Cc: s22 <s22@ga.gov.au>
Subject: ![EXT]: Oil Samples query [SEC=OFFICIAL]

Hi s22 and s22 ,

Following up on our previous discussions about our Exploring for the Future EOR work on the Cooper Basin, we just wanted to enquire about the possibility around getting some oil from Santos to conduct our core flooding experiments. Unfortunately we are really at a standstill with our work program because we can't seem to get our hands on any. Is there the possibility of getting some oil which is de-identified so that even we don't know what field it comes from? It would just be a generic oil type and it would at least let us move forward with the experiments and might also be simpler than trying to get this entire data sharing agreement worked out. Very keen to hear your thoughts as to whether this might be possible.

Many thanks in advance,
s22

s22 | Senior Scientist, Geomechanics
Low Carbon Geoscience and Advice | Minerals Energy and Groundwater Division

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s22

From: s22
Sent: Tuesday, 22 February 2022 5:00 PM
To: s22 ; s22 (s22); s22 ; s22 ; s22 ; s22
; s22 @csiro.au; s22 , s22 (Energy, Kensington
WA); s22 (DEM)
Cc: s22 ; s22 (DEM)
Subject: RE: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone
study (an Exploring for the Future energy/CCS project) [SEC=OFFICIAL]

Hello everyone,

Thank you very much for your time yesterday, and for an interesting and productive discussion.
Looking forward to talking further about EOR, CCS, and other resources soon.

Cheers,
s22

-----Original Appointment-----

From: s22
Sent: Thursday, 10 February 2022 5:20 PM
To: s22 ; s22 ; s22 (s22); s22 ; s22 ; s22 ;
s22 @csiro.au; 's22 (Energy, Kensington WA)'; s22 (DEM)
Cc: s22 ; s22 (DEM)
Subject: Discussion with Geoscience Australia about GA-CSIRO CO2-EOR-residual oil zone study (an Exploring for the
Future energy/CCS project) [SEC=OFFICIAL]
When: Monday, 21 February 2022 11:00 AM-12:00 PM (UTC+10:00) Canberra, Melbourne, Sydney.
Where: Microsoft Teams Meeting

Dear all,

Please find below meeting details for our discussion about some of the work we're undertaking through the CO2-
EOR residual oil zone project.
Looking forward to the discussion!

Cheers,
s22

Microsoft Teams meeting

Join on your computer or mobile app

[Click here to join the meeting](#)

Or call in (audio only)

s22 Australia, Sydney

Phone Conference ID: s22

[Find a local number](#) | [Reset PIN](#)

[Learn More](#) | [Meeting options](#)

s22

From: s22 (s22) <s22 @santos.com>
Sent: Thursday, 12 November 2020 6:12 AM
To: s22
Subject: RE: Cooper Residual Oil Zones [SEC=OFFICIAL]

Hi s22

Would be keen to have a chat over the phone to better understand your objectives and see where we can contribute.

FYI, I've been liaising with s22 in support of the CO2 EOR study that s22 and s22 from s 22 are conducting – assume this is related/complementary?

I'll send you a skype invite for next week to discuss further – please let me know if the time doesn't suit.

Kind Regards,

s22



s22 CPEng NER RPEQ
 Energy Solutions CCS
 Santos Limited, 60 Flinders Street, Adelaide SA 5000
 s22



From: s22 <s22 @ga.gov.au>
Sent: Monday, 9 November 2020 2:23 PM
To: s22 (s22) <s22 @santos.com>
Subject: ![EXT]: Cooper Residual Oil Zones [SEC=OFFICIAL]

Dear s22 ,

I believe we have “met” a couple of times in the past at the Global Institute events on CCS. I was hoping I might be able to get your input on some CO2-EOR related matters in the Cooper Basin.

Just as a background, I am currently leading a national CO2-EOR assessment study, which is being conducted with the CO2CRC and LETA. It's a very high level study where we look at the various oil bearing basins in the country and rank them for their CO2-EOR potential. This report is currently in the review stage. This work has led onto to further work in the CO2-EOR space, specifically in the area of residual oil zones as potential candidates for CO2-EOR. We have actually proposed a work program in residual oil zones as part of the newly funded Exploring for the Future programme here at GA, and we are also writing up a general paper for APPEA.

Our intention is to look at the Cooper/Eromanga as a template/starting point to develop a methodology and also try and understand the magnitude of the ROZ resource. I am not looking to get access to any confidential data, but was hoping to get some input from you regarding appropriate starting points, such as good areas or fields that might have some good well coverage and log data. We are really in the background stage here, and this is definitely more in depth than our previous national study, but as a first step I was thinking of trying to characterise the residual oil zone thicknesses and extent using well log data that might be out there. So, in short I thought it might be a good idea to get some input from you or one of your colleagues. By email, or by video chat would be fine if you were amenable.

Let me know your thoughts.

Warm regards

s22

| Senior Scientist, Geomechanics
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s22

Subject: FW: GA ROZ Discussion [SEC=OFFICIAL]
Location: Skype Meeting
Start: Tue 17/11/2020 4:00 AM
End: Tue 17/11/2020 4:30 AM
Show Time As: Tentative
Recurrence: (none)
Meeting Status: Not yet responded
Organizer: s22 (s22)

s 22 - duplicate material

2 pages removed under s22 of the FOI Act as irrelevant information

s22

From: s22
Sent: Wednesday, 18 November 2020 10:59 PM
To: s22 @santos.com
Subject: Information re CO2-EOR project [SEC=OFFICIAL]
Attachments: APPEA_ROZ-EOR_ABSTRACT_APPROVED VERSION.pdf; EFTF_E ROZ proposal.docx

Hi s22 ,

Thanks for the chat the other day.

I've attached the (accepted) abstract of our APPEA paper for your information, which gives you a picture of the messaging we are looking to put out there. In summary, the paper will focus on the potential for CO2 storage (and to a lesser extent, additional oil production) through CO2-EOR in Australia, and covers the following topics: the definition and worldwide examples of CO2-EOR+; how net-negative emission oil production works; CO2 storage and oil production from residual oil zones; and the potential application of all of the above in Australia, including some discussion of barriers and ways forward.

I have also attached the high level proposal we put together for a project that will investigate the production and storage potential of residual oil zones in Australia. This project forms part of the "Energy" component of the Government's / Geoscience Australia's new, 4-year Exploring For The Future program (2021-2024). We are hoping to use the Cooper Basin as one of the case studies for this project, with the aim of gaining a better understanding of ROZ and developing methodology to assess their distribution and potential in Australia. We would be extremely keen on further discussing this project and/or collaborating with you, if this is of interest.

In terms of the APPEA paper, here is a wish list of the type of information we are looking for. And if it was more palatable to get information on older, inactive fields, or small uneconomic fields, that would be fine too. We might be able to gain valuable insights from these cases.

- 1) Any presentations regarding EOR or ROZ that Santos have presented in the past in public forums.
- 2) Access to well data and/or core that might provide information on saturation variations with depth
- 3) Any slim tube measurements or core flooding measurements
- 4) Hydrodynamic or well information that might tell us about tilted oil water contacts and the potential associated ROZ
- 5) Geological models of fields that we could interrogate.

Many thanks,

s22

PS- sounds like it's a busy and sensitive time for Santos CCS at the moment, so not expecting anything to necessarily happen right now. But perhaps as things evolve over the next year or so....

s22 | Senior Scientist, Geomechanics
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CO₂-EOR+ in Australia: achieving net negative emissions oil and unlocking residual oil resources **s22**

The petroleum industry contributes to global greenhouse gas emissions through the production and consumption of oil and gas. However, the industry's leadership and experience in underground injection and storage of CO₂, especially through CO₂-Enhanced Oil Recovery (CO₂-EOR), is not well acknowledged.

With the ongoing concerns over elevated atmospheric CO₂ levels, CO₂-EOR+ has been proposed as a solution to dispose of anthropogenic emissions while at the same time reducing reliance on imported oil. Unlike traditional CO₂-EOR, which tends to be a net carbon emitter due to the use of predominantly natural CO₂, rather than anthropogenic, CO₂-EOR+ focuses on storing a larger volume of CO₂, with the aim being to completely offset the emissions from the produced oil. Increased industry and policy maker interest in CO₂-EOR+ projects, capable of net negative emissions, reflect the improved operations practices that are becoming more prevalent in recent times.

Residual oil zones (ROZ) below the current oil-water contact provide an excellent target for the application of CO₂-EOR+, as they are believed to be prevalent and widespread. As a result, efforts are being focussed on converting ROZ into resources and reserves through CO₂-EOR. Existing fields in the Surat and Cooper-Eromanga Basins are already well placed to utilise anthropogenic CO₂ sources to achieve conventional CO₂-EOR metrics. ROZs in these basins will hopefully allow potential EOR projects to increase the CO₂-tonnes stored per incremental barrel of oil well past traditional levels (0.2-0.3 tCO₂/bbl), and in doing so, achieve net negative emission oil.

Exploring for the Future – Extension

Draft Project Proposal

Determining Australia’s Residual Oil Zone resource potential

Residual Oil Zone (ROZ) designates part of an oil-bearing reservoir that contains a mixture of water and potentially producible hydrocarbons. These zones can occur beneath the oil-water contact associated with hydrocarbon accumulations or in reservoirs separate to any economic hydrocarbon accumulations. The occurrence, distribution, and oil production potential of these zones is not yet well understood, but they offer both a potentially large, economic hydrocarbon resource as well as opportunities for CO₂ storage, where hydrocarbon production is enabled with CO₂-EOR. The potential of ROZ’s has recently been gaining interest, for example, in the United States, where the USGS is developing a methodology to assess the potential of ROZ in the United States, and where the world’s only hydrocarbon-producing ROZ is located (Permian Basin).

The LCGA Section is in the process of completing an assessment of the potential for CO₂-EOR in Australia’s oil-producing basins. One of the recommendations of this, and other, similar studies, is to consider the potential for application of CO₂-EOR in ROZs, with the aims of both augmenting Australia’s oil resources and providing an economic method of permanently storing CO₂, thereby assisting with meeting Australia’s commitments to reducing carbon dioxide emissions to the atmosphere.

The proposed study aims to develop a methodology to define and assess ROZs in Australia, and apply the methodology to assessing the ROZ potential in some of Australia’s key oil-producing basins (e.g. Cooper-Eromanga; Gippsland; Carnarvon; Bowen-Surat). The study flows logically from the national CO₂-EOR assessment and would make use of the extensive datasets already assembled, in addition to creating and assembling other relevant datasets. Aside from collaboration with other teams at GA (particularly the Onshore Energy and Groundwater Sections), this project would benefit from state government and industry engagement (e.g. state geological surveys; Santos in the Cooper-Eromanga region), which could be facilitated through existing arrangements with the CO₂CRC and/or other agreements.

Outputs of the study will include the methodology for identifying and assessing ROZ potential with respect to Australian geological conditions; an integrated scientific report outlining Australia’s ROZ potential at a high level, with one or more detailed pilot studies in selected basins; identification of prospective areas for further, in-depth study; and the production or compilation of associated spatial and other relevant data packages.

Outcomes of the study include gaining an understanding of the potential (or lack thereof) of this new hydrocarbon asset in Australia, which has implications for Australia’s economy, energy security/reliance on imported oil, and potentially jobs in the hydrocarbon and CO₂ storage sectors.

Timeframe: early 2021 – end 2022 (24 months)

Potential partners: s47E(d)