DEVELOPMENT CASE STUDIES IN THE GULF OF MEXICO

Angus Marshall

2023 Joint Annual GoMCarb - SECARB Offshore Partnerships' Meeting

SECARB Offshore

STOREGGA

Important Notice

STOREGGA

This presentation, together including any printed or electronic copies, any information provided or communicated during any presentation or delivery of this presentation, any oral briefing that accompanies it, and any question-and-answer session that follows such briefing (the presentation), are provided by Storegga Limited (Storegga) on the understanding that, whilst every care has been taken to ensure accuracy, no representation, warranty or undertaking (express or implied) is made and no responsibility is taken by Storegga or any employee, consultant, officer or other representative acting on it or an affiliate of its behalf (the Storegga Group) regarding its content. The Storegga Group excludes all representations, warranties, obligations and liabilities in relation to the presentation to the maximum extent permitted by law. In particular, nothing in presentation constitutes a valuation or financial, tax or legal advice, nor does it constitute an invitation to invest or otherwise provide financial support.

STOREGGA INTRO

STOREGGA

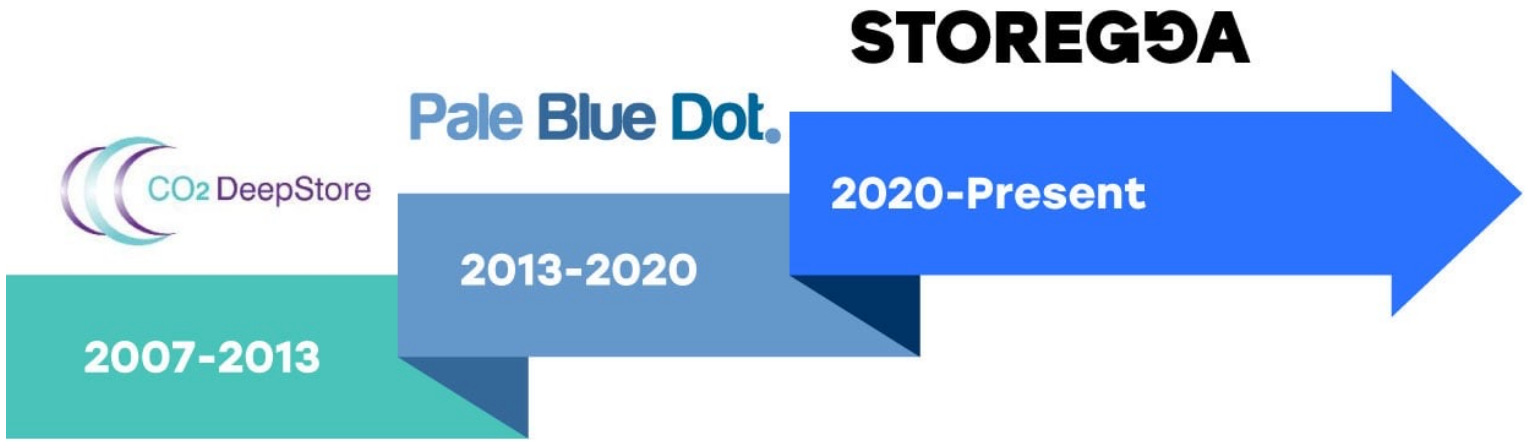
- Early stage developer of energy transition projects:

CO_2 Storage

Direct Air Capture

Hydrogen

- Backed by investors: Macquarie, Mitsui, GIC, M&G and Snam



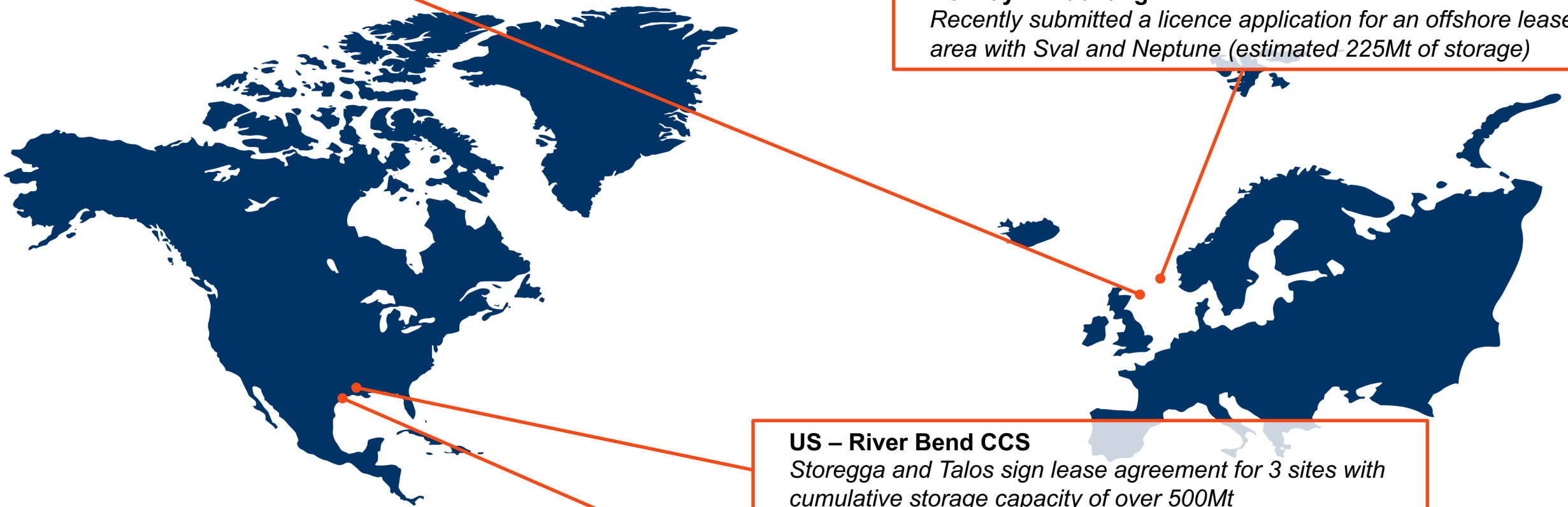
SECARB Offshore

STARTED IN THE UK...

STOREGGA

UK - Acorn
Preparing to apply for Department of Energy Strategy & Net Zero funding with Shell UK, Harbour Energy & NSMP

Norway – Trudvang
Recently submitted a licence application for an offshore lease area with Sval and Neptune (estimated 225Mt of storage)



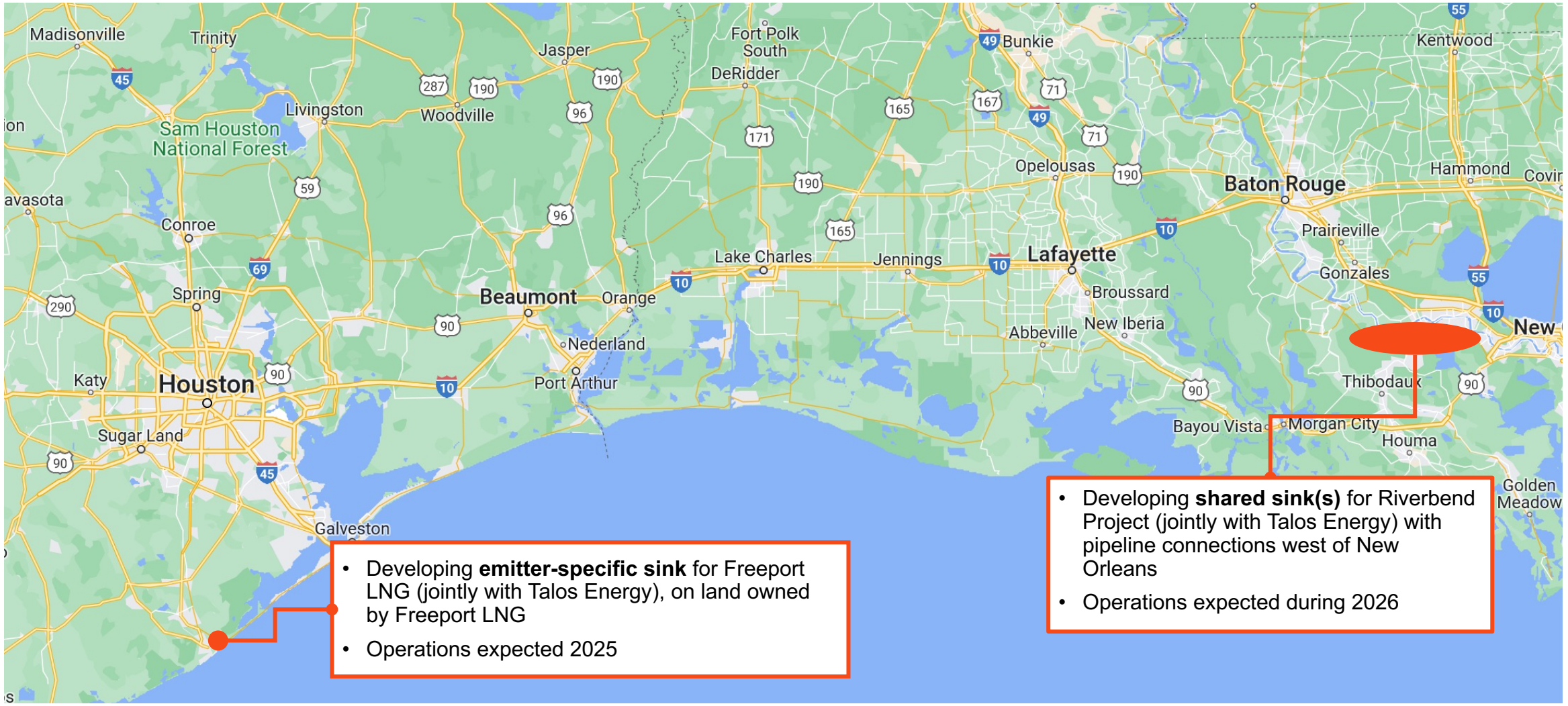
US – River Bend CCS
Storegga and Talos sign lease agreement for 3 sites with cumulative storage capacity of over 500Mt

US – Freeport LNG CCS
Letter of intent signed with between Storegga-Talos JV partnership and Freeport LNG to develop CCS project

SECARB Offshore

STOREGGA GULF COAST PROJECTS

STOREGGA



SECARB Offshore

Important Notice

STOREGGA

Storegga's participation in the SECARB-Offshore project is for research and knowledge sharing purposes only, in order to advance global decarbonization efforts through carbon capture and storage (CCS)

Storegga is **not** developing CO_2-enhanced oil recovery (EOR) projects of its own.

3 HISTORIC FIELDS

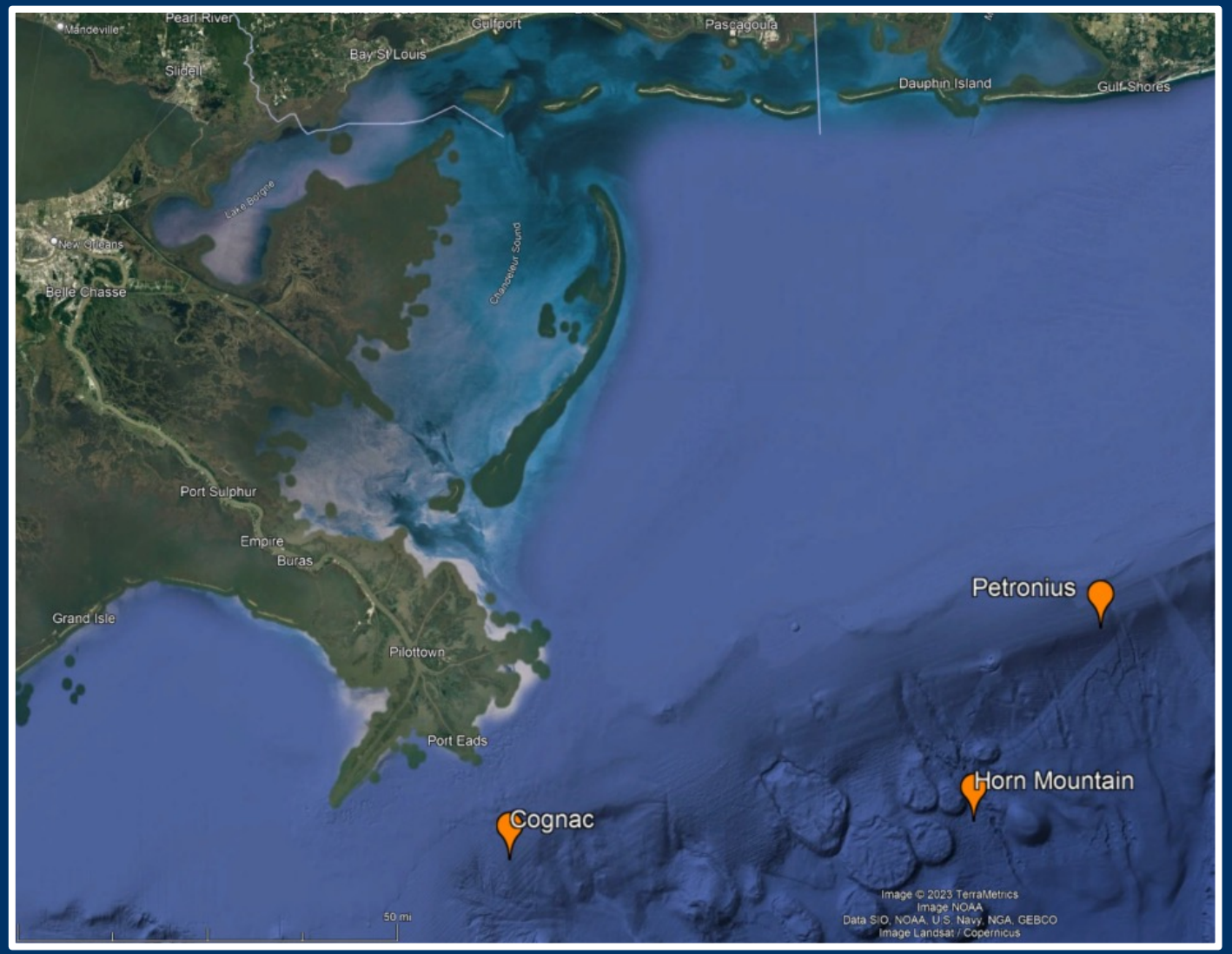
STOREGGA

1. Cognac
2. Petronius
3. Horn Mountain

Two business models:

CCS

CO_2-Enhanced Oil Recovery (EOR)



Att. to: Google Earth; image – TerraMetrics, NOAA, Landsat / Copernicus; data – SIO, NOAA, US Navy, NGA, GEBCO

SECARB Offshore

BACKGROUND

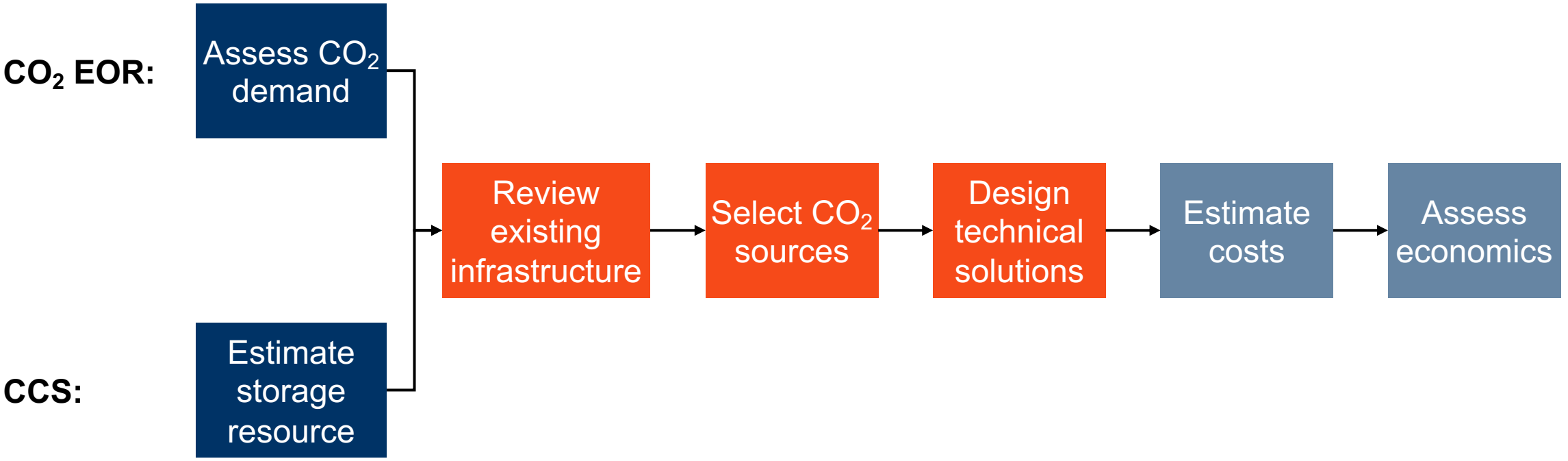
STOREGGA

	COGNAC	PETRONIUS	HORN MOUNTAIN
Type	Fixed leg	Compliant tower	Spar (truss type)
Water Depth	1,025 ft	1,754 ft	5,400 ft
Topsides weight	14,000t	8,800t	4,400t
Well slots	62	21	14
Blocks	MC-150, 151, 194, 191	VK-786, 742, 730	MC-126, 127, 82
Production Started	1979	2002	2002
Original recoverable Reserves	184 million barrels oil 762 billion scf gas	162 million barrels oil 200 billion scf gas	138 million barrels oil 127 billion scf gas
Produced	Essentially 100%	>85%	>96%

SECARB Offshore

WORKFLOW

STOREGGA

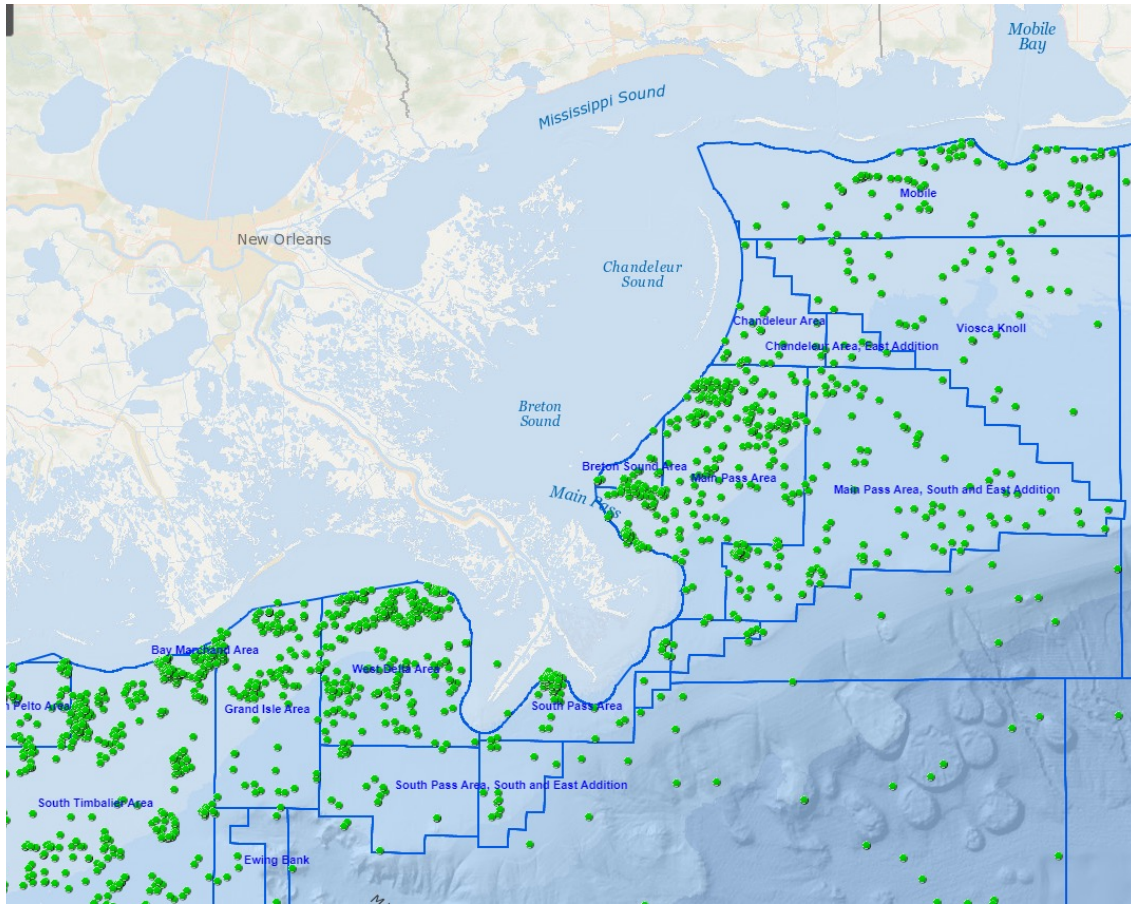


SECARB Offshore

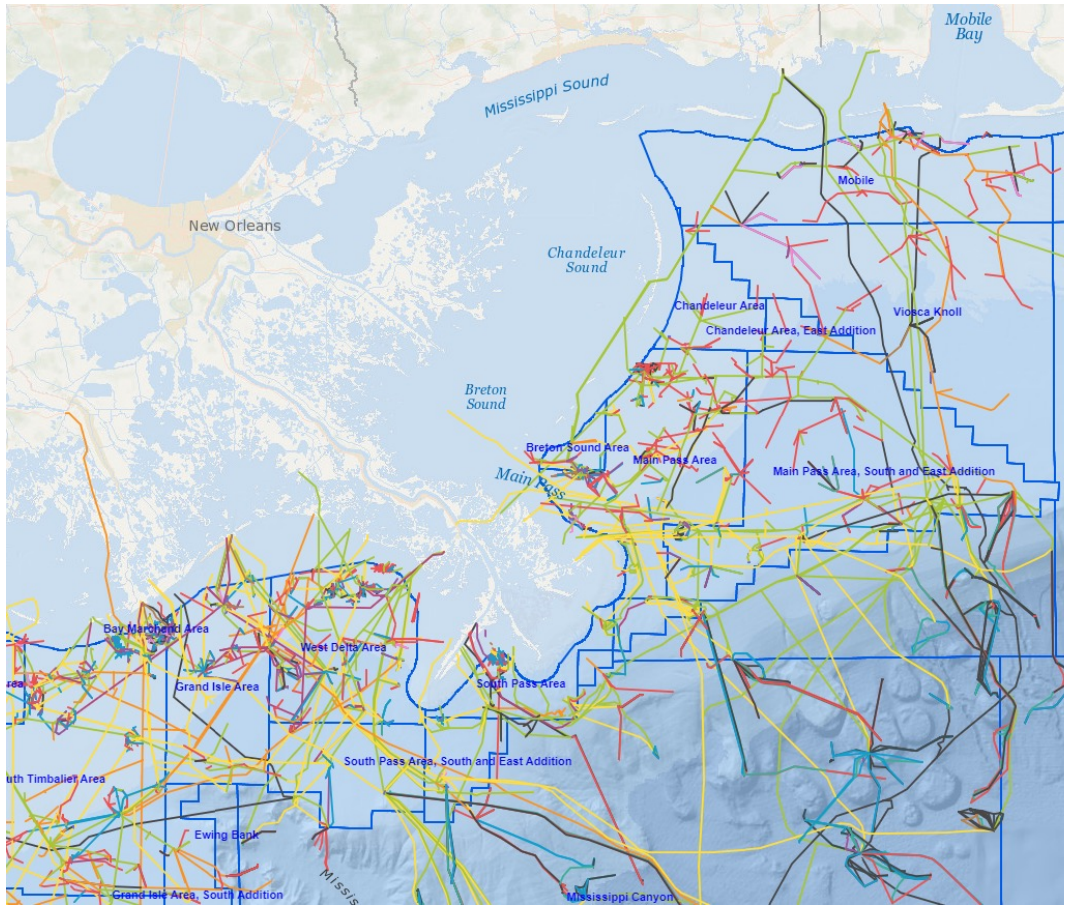
EXISTING INFRASTRUCTURE (BSEE)

STOREGGA

Platforms



Pipelines



Both att. to Esri, GEBCO, DeLorme, NaturalVue | BOEM / BSEE | Esri, GEBCO, IHO-IOC GEBCO, DeLorme, NGS,

SECARB Offshore

CO_2 SOURCES

STOREGGA

EPA Greenhouse Gases Reporting Program GGRP Facility Level Information on Greenhouse gases (FLIGHT) tool

Emissions Sources:

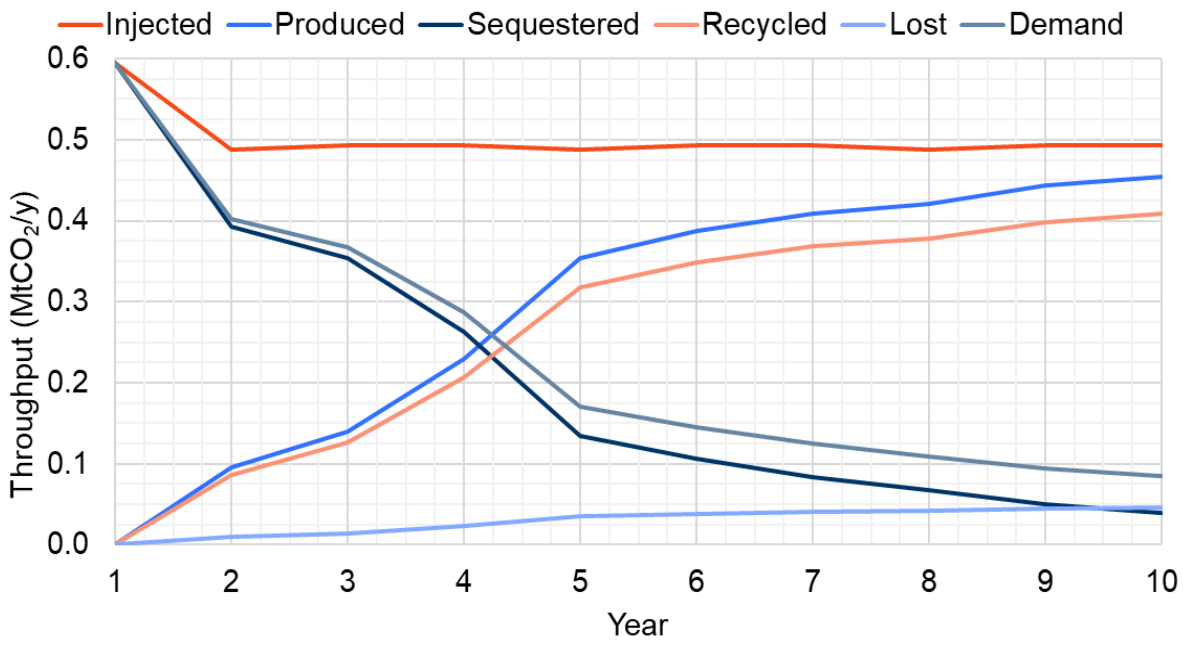
Att. US EPA

SECARB Offshore

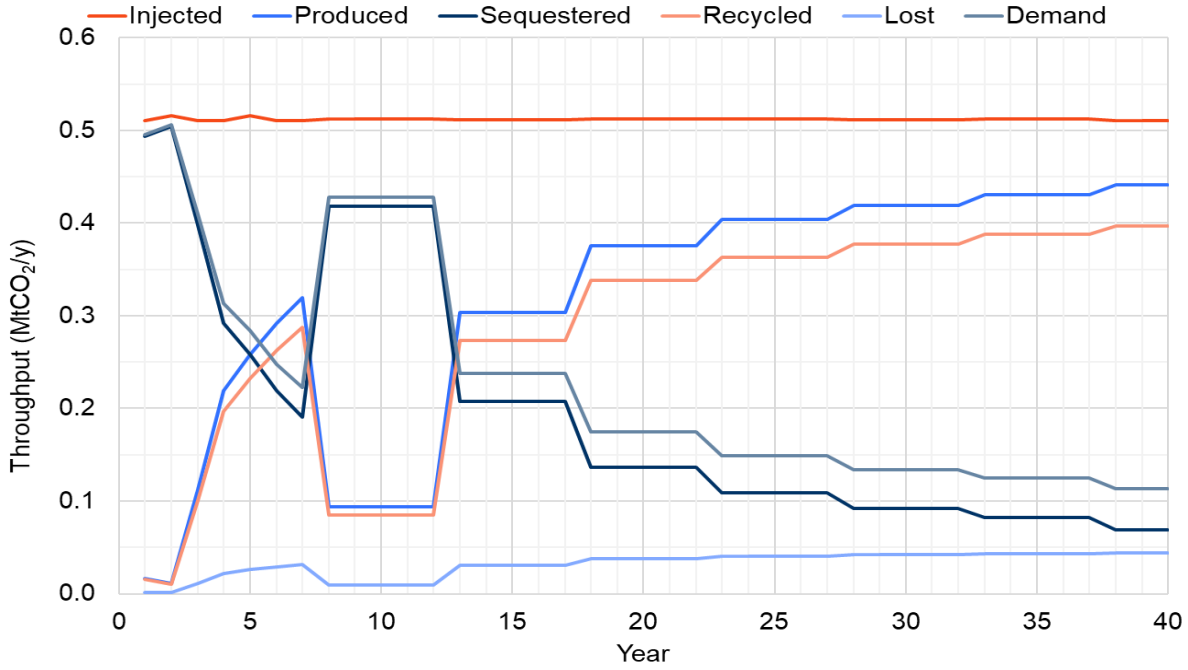
CO_2 MASS BALANCE (EOR)

STOREGGA

Cognac



Petronius



Based on modelling carried out by Advanced Resources International

- **Cognac (J-Sand):** http://www.adv-res.com/pdf/ARI_NETL_CognacOffshoreOilFieldCaseStudy_061620.pdf
- **Petronius (J-2 Sand):** http://www.adv-res.com/pdf/ARI_NETL_PetroniusOffshoreOilFieldCaseStudy_061620.pdf

SECARB Offshore

CONSERVATIVE ASSESSMENT

STOREGGA

CO_2-EOR Performance

- Only 1 major sand CO_2-flood modelled in each case (information availability)
- Could expand assessment to additional reservoirs within field
- Could expand to adjacent fields (ie tieback opportunities)

CCS Performance

- Rudimentary “replacement method” employed (focus on development assessment)
- Based on production volumes only, CO_2 being stored in depleted reservoirs
- Greater study could assess saline aquifers within reach of the platforms
- Leverage economies of scale

SECARB Offshore

DESIGN BASIS

STOREGGA

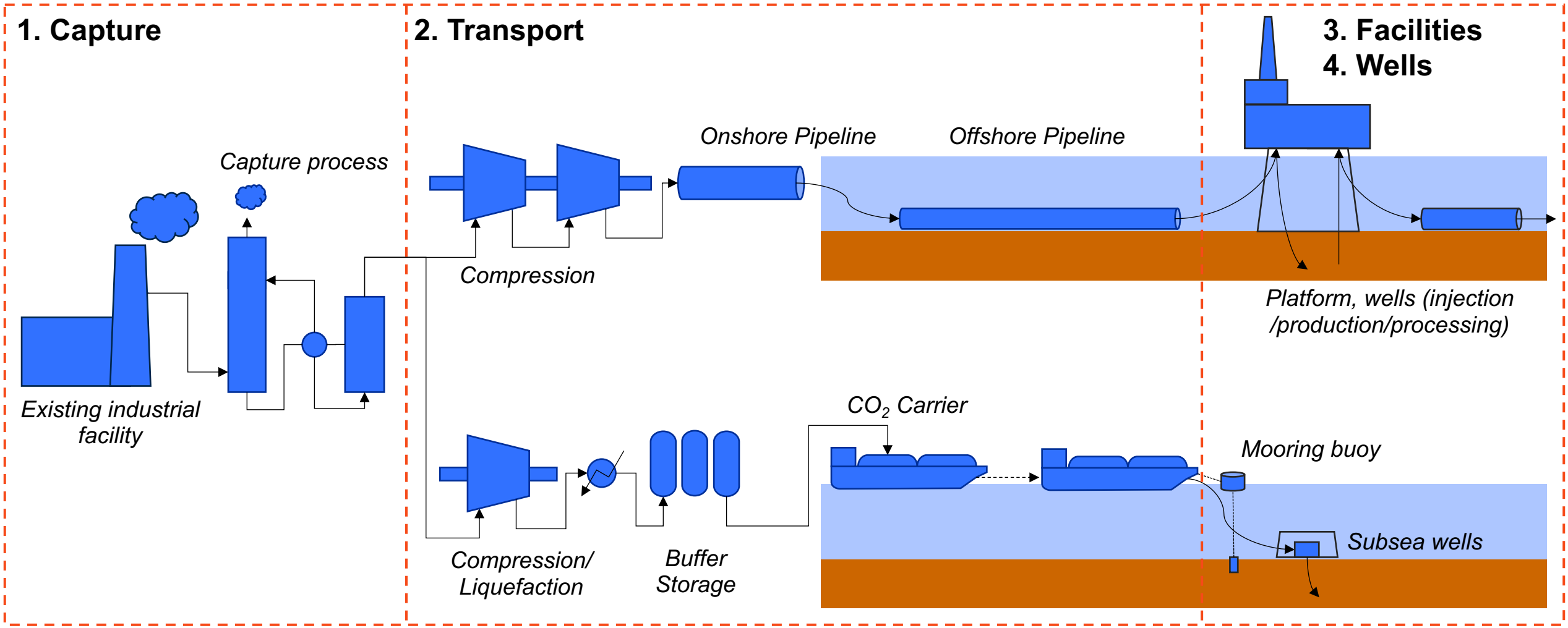
CO_2 EOR	COGNAC	PETRONIUS
Concept options assessed	• Different industrial emissions sources • Pipeline section reuse • New offshore pipeline	• CO_2 carrier with offshore buffer storage • Direct injection from carrier • Pipeline transport
Maximum CO_2 injection rate	0.59 $MtCO_2$/yr	0.51 $MtCO_2$/yr

CCS	COGNAC	PETRONIUS
Concept options assessed	• Platform facilities • Subsea facilities	• CO_2 carrier with offshore buffer storage • Direct injection from carrier • Pipeline transport
Estimated CO_2 storage resource (depleted sands only)	27.4 Mt	17.6Mt

SECARB Offshore

DEVELOPMENT CONCEPTS

STOREGGA



Split into 4 sections for like-for-like comparisons and easy sensitivity analysis

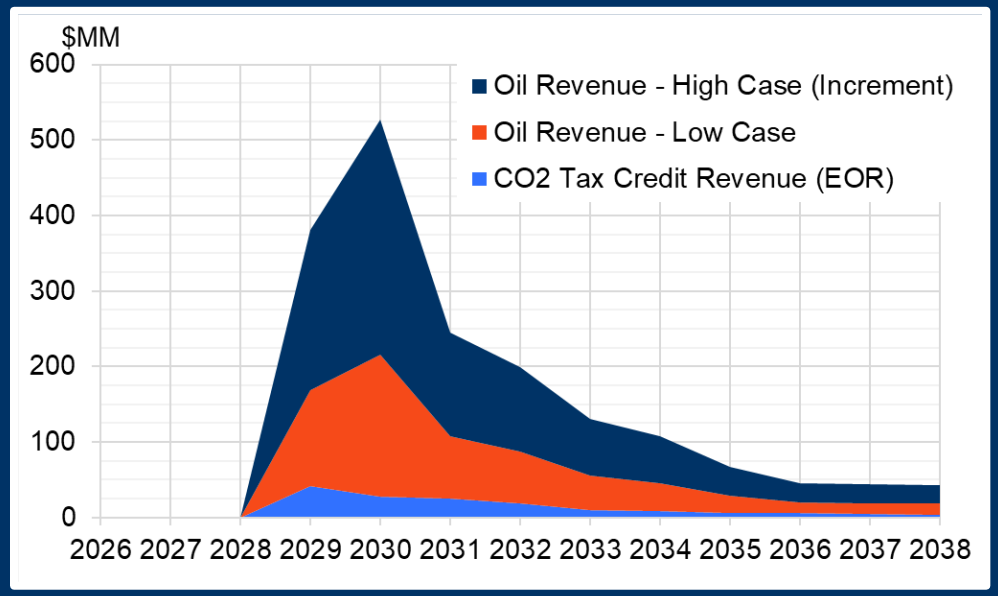
- e.g. ship vs pipeline transport
- e.g. platform vs subsea

SECARB Offshore

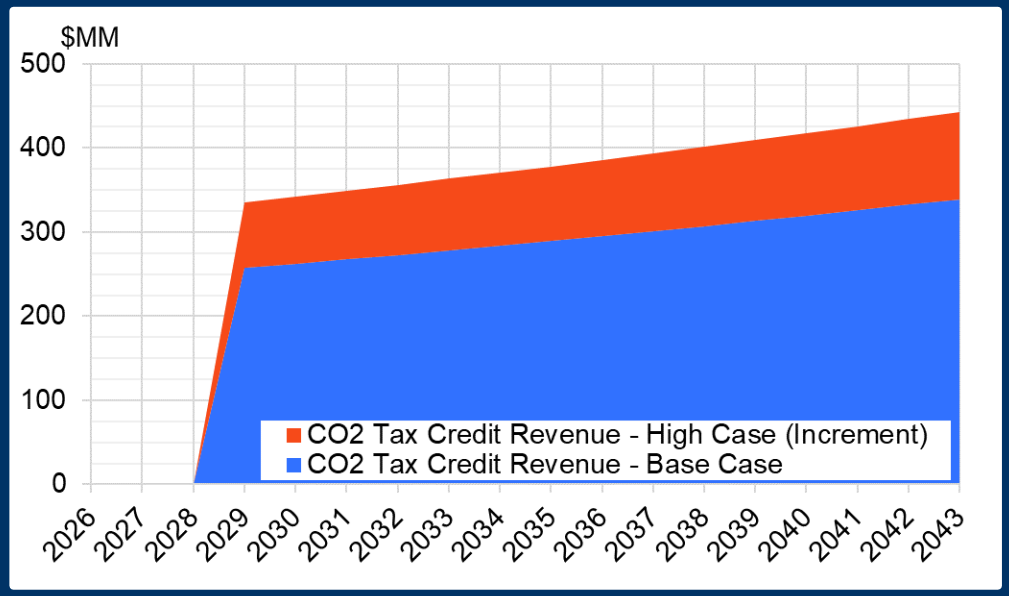
COGNAC REVENUE

STOREGGA

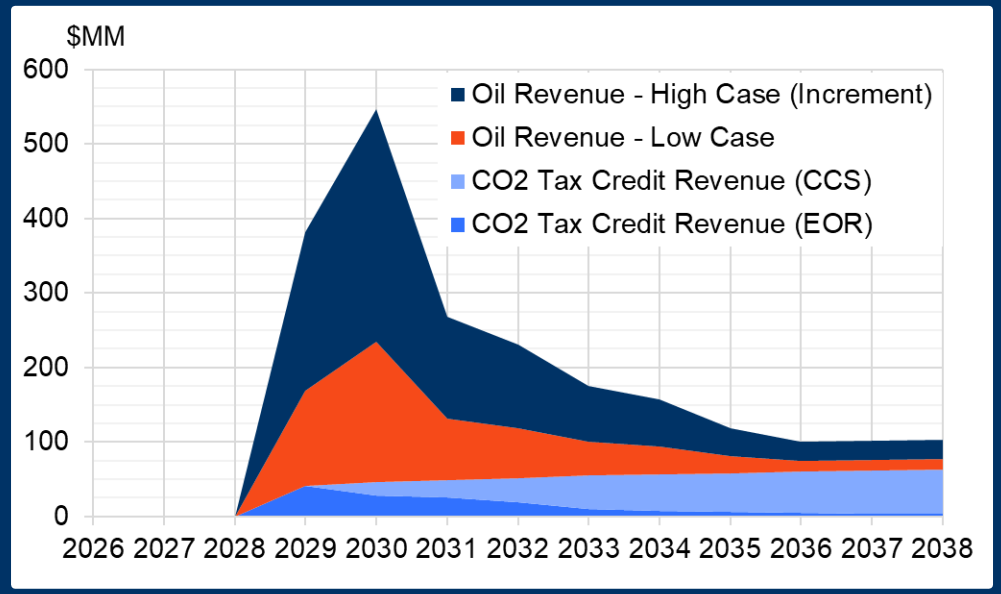
CO_2-EOR:



CCS:



Sequester residual CO_2?

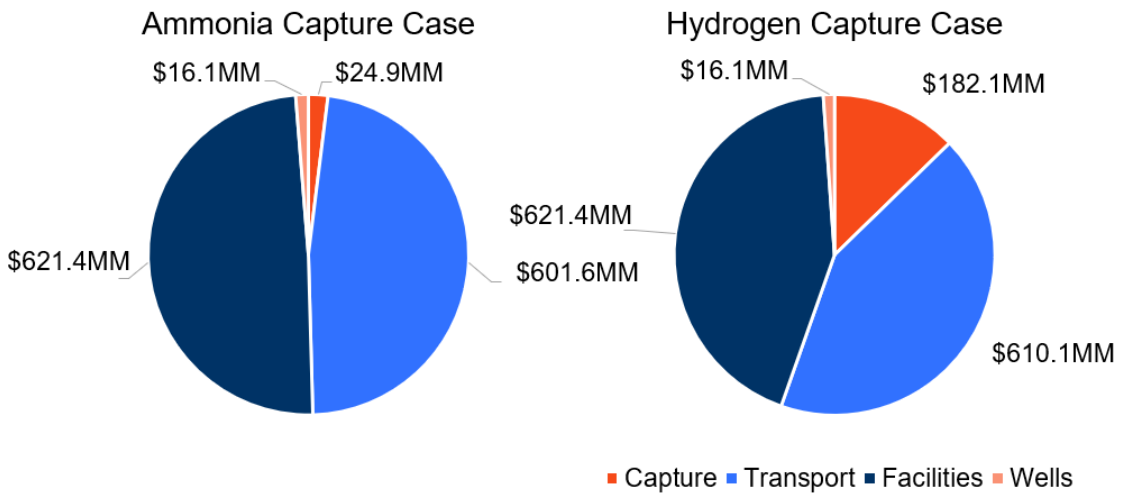


SECARB Offshore

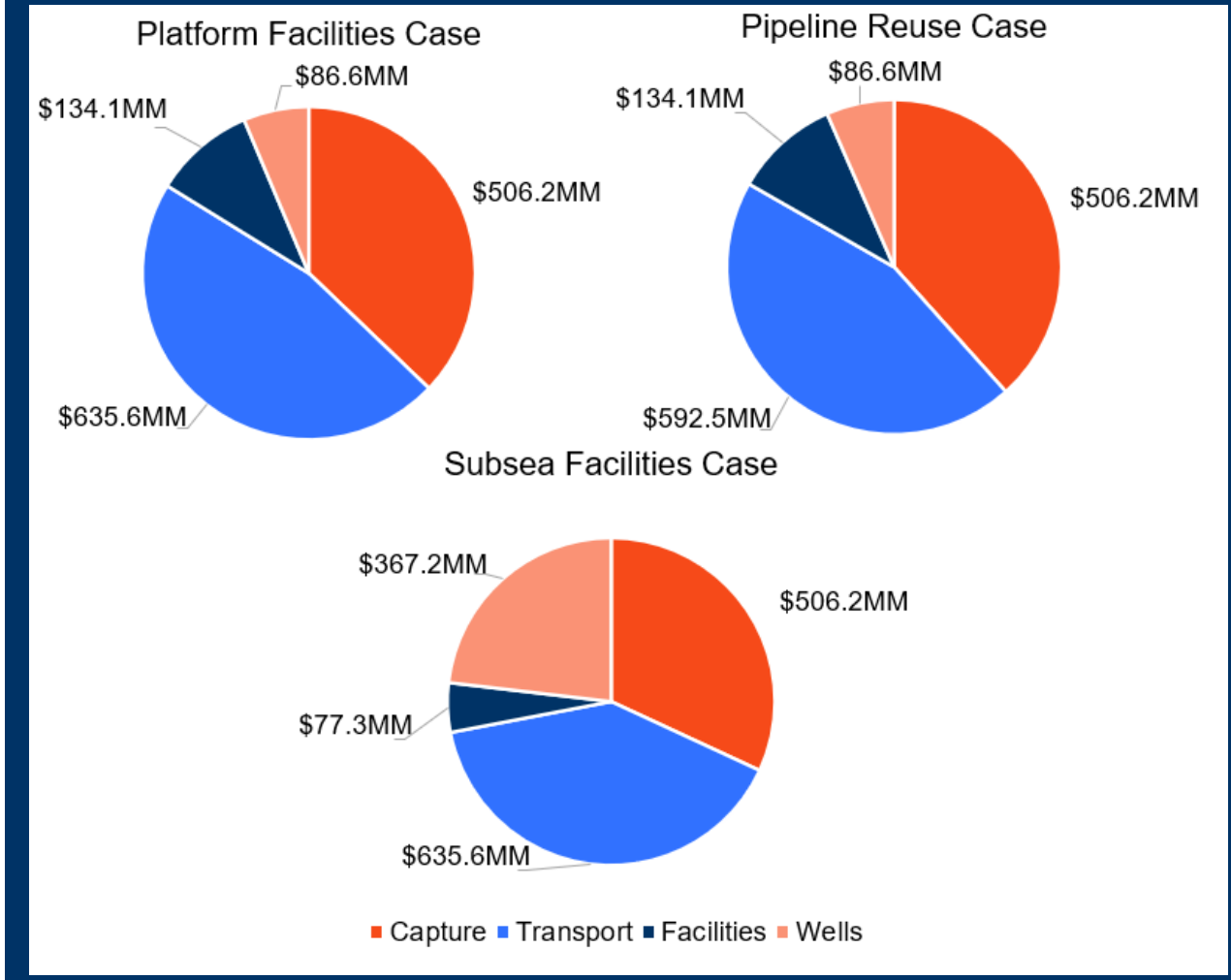
COGNAC COST/ECONOMICS

STOREGGA

CO_2-EOR



CCS



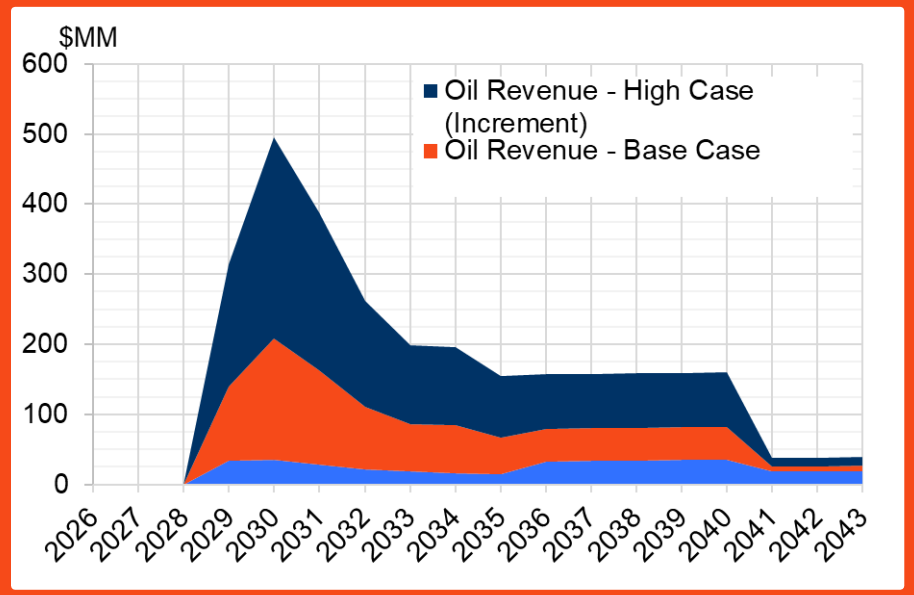
SECARB Offshore

Note: provisional estimates awaiting review

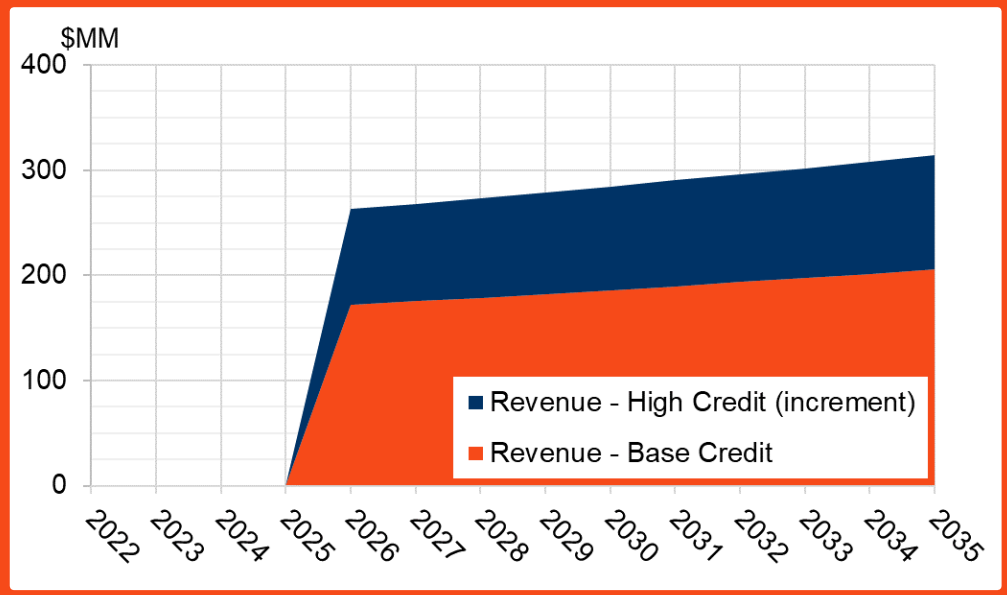
PETRONIUS REVENUE

STOREGGA

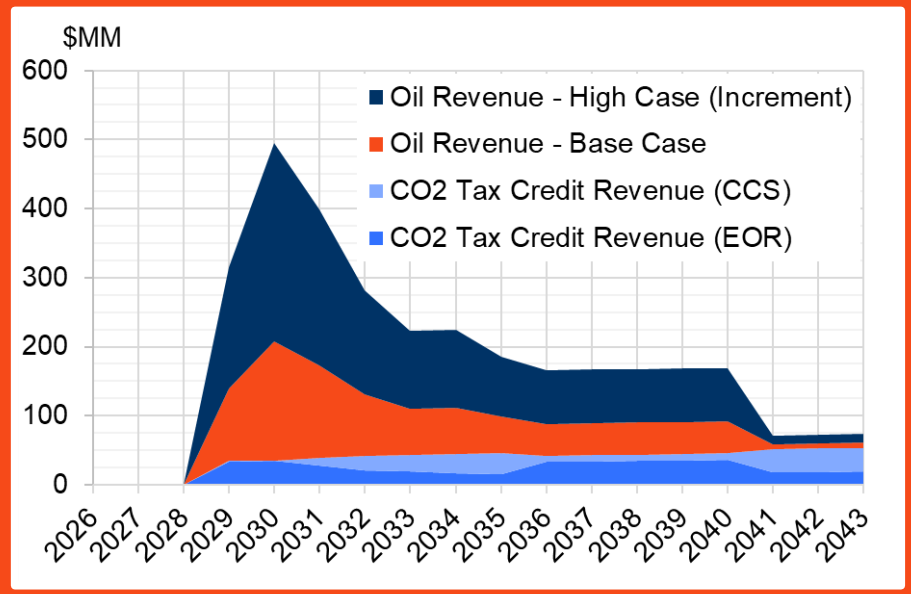
CO_2-EOR:



CCS:



Sequester residual CO_2?

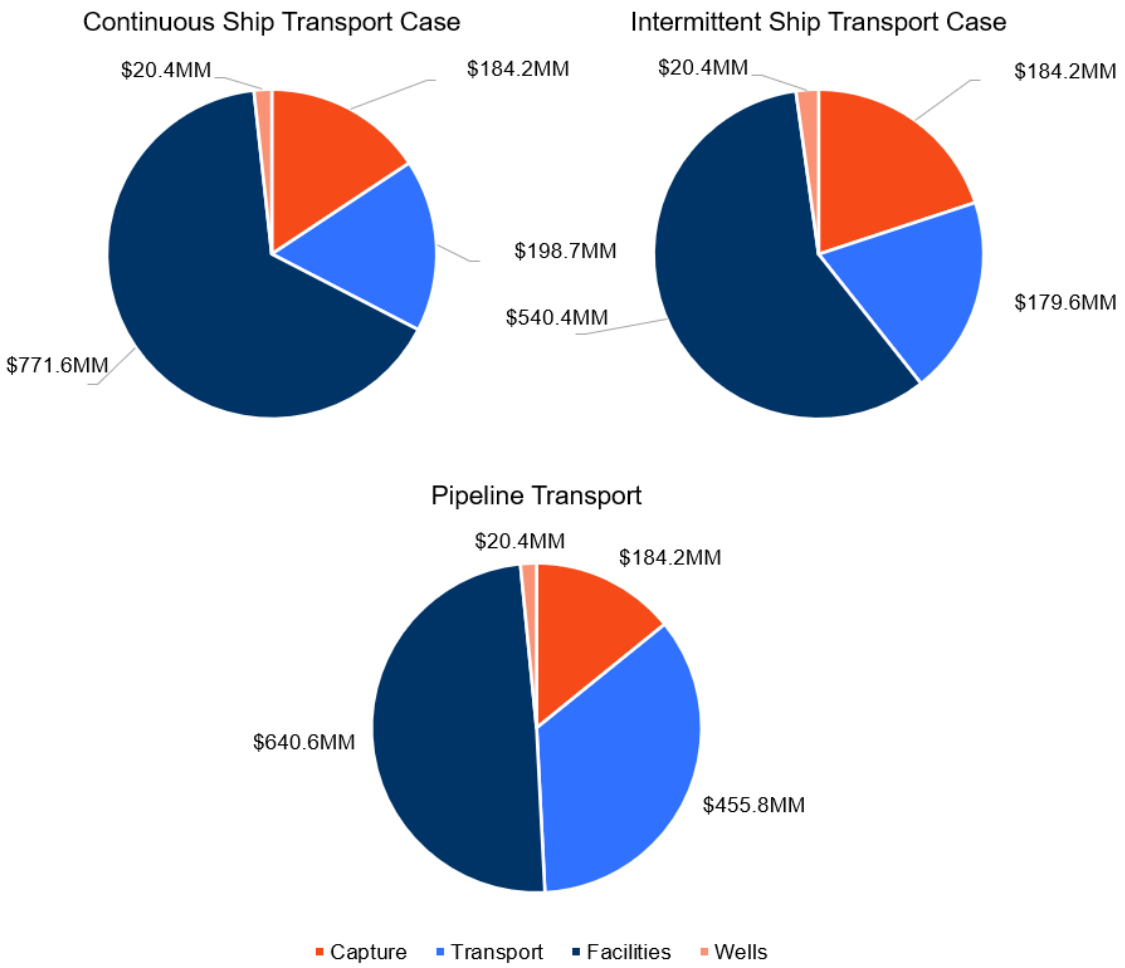


SECARB Offshore

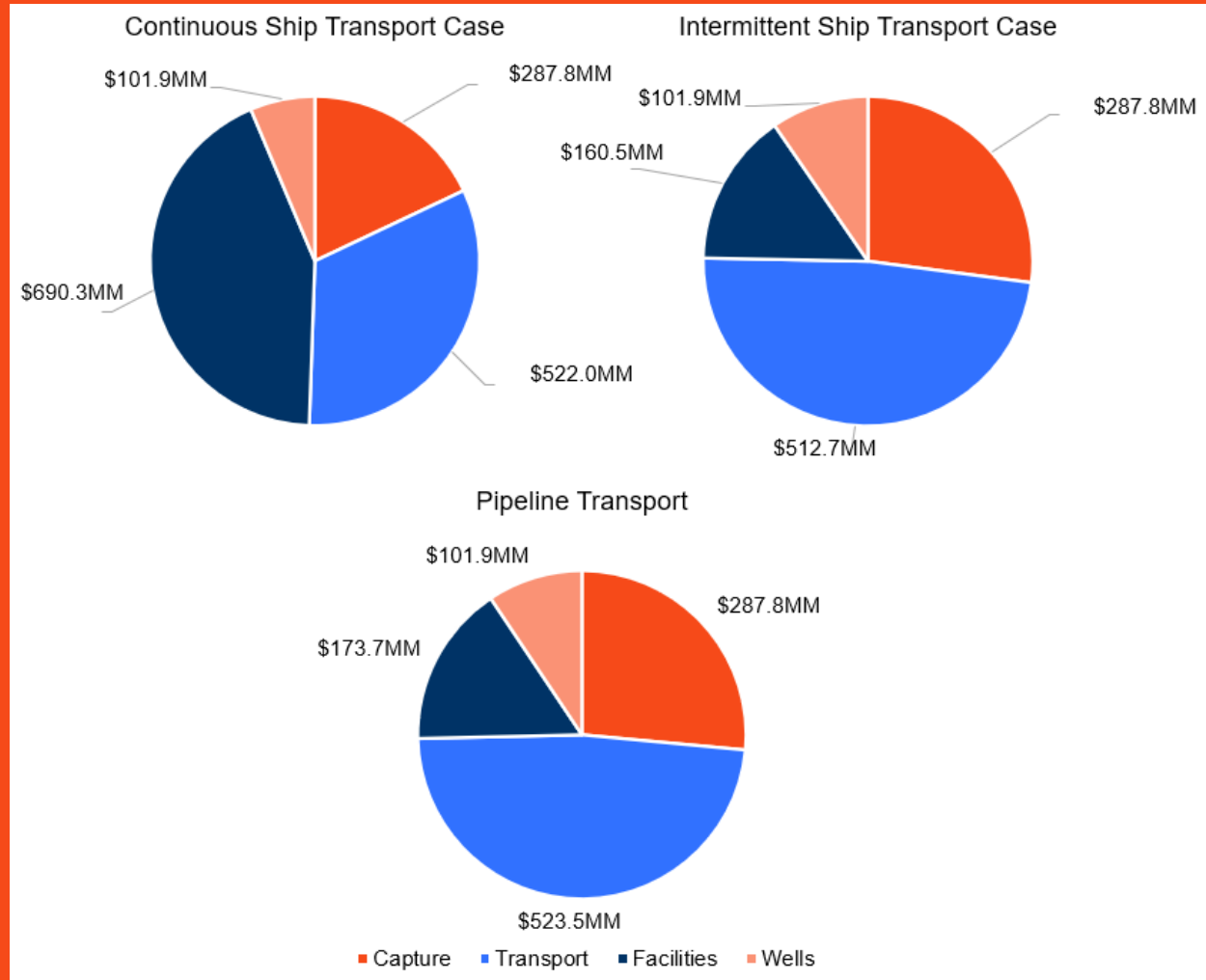
PETRONIUS COST/ECONOMICS

STOREGGA

CO_2-EOR



CCS



SECARB Offshore

Note: provisional estimates awaiting review

SHIP VS PIPELINE

STOREGGA

	PIPELINE	SHIP
Advantages	• Low opex • High uptime • Suits longer project life	• Low capex • Easily diverted to other projects at end of project/as EOR demand drops
Disadvantages	• High capex • Inflexible route	• High opex • More affected by weather conditions • Requires offshore storage if intermittent injection proves detrimental
Suitable for	Longer project lifetimes Large volumes	Shorter project life Small volume or long distances >200mile

SECARB Offshore

DISCUSSION POINTS

STOREGGA

Incentivizing Offshore CCS/CO_2-EOR

- Offshore developments more capital intensive
- Further policy incentives, eg: capex grants (FOA-type), offshore provision in 45Q

Shared Infrastructure

- Spread pipeline costs across multiple projects with “arterial” trunklines

Permitting

- Combined CO_2-EOR/CCS developments – to what extent is this possible?
- Opportunity for diverse revenue streams

Decommissioning Liability

- Who covers costs of decommissioning on transfer of ownership?
- How will risks be managed through commercial agreements?

SECARB Offshore

STOREGGA

Thanks for Listening!

Contact: angus.marshall@storegga.earth

SECARB Offshore