

# REPURPOSING OFFSHORE INFRASTRUCTURE FOR CLEAN ENERGY



**ROICE: An Industry-Government-Public-Academia Collaborative to Develop the Project Implementation Framework for Clean Energy Repurposing Projects**



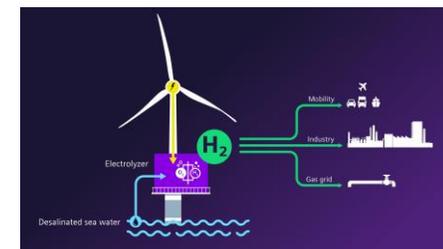
Division of Energy and Innovation  
UNIVERSITY OF HOUSTON

## ROICE Project Framework

**Leaders Monthly Meeting –  
July 25, 2023**



Courtesy: Endeavor Management



Courtesy: Siemens Gamesa

# UH Energy Repurposing Initiatives



## ROICE Techno-Economics

Techno-Economic Framework  
For Repurposing in US GOM

Initially Focused on Wind and  
Hydrogen

Advised by SHOWPLACE  
Collaborative (SPC)

Federal and State Funding

Led by UH Energy

## ROICE Project Framework

Project Implementation Framework For  
Repurposing in the US GOM

Initially Focused on Clean Energy and  
Carbon Storage

Open to All Stakeholders

Self Funded Participation

Coordinated by UH Energy

**REPURPOSING OFFSHORE  
INFRASTRUCTURE  
FOR CLEAN ENERGY**



*Common Objective: Develop a comprehensive framework for successful  
repurposing projects in the Gulf of Mexico*



# ROICE Workgroups – Project Framework

**Objective:** ROICE Workgroups will develop the implementation framework for clean energy repurposing projects – currently focused on wind, hydrogen and CO<sub>2</sub> sequestration

**Scope:** Three-pronged approach – Regulatory, Commercial and Technical; Informed by techno-economic results from Project SHOWPLACE

**Deliverable:** Project Implementation Framework via a set of white papers delivered by each sub-group by 1Q24

**Each Workgroup Needs to Address:**

- *What issues need to be worked?*
- *What is the current state of knowledge / processes?*
- *Any show-stopper challenges?*
- *What needs to change to make ROICE Projects feasible and successful?*
- *What does a roadmap for the change look like and what resources are needed?*

## 7 ROICE Workgroups

(# of Current Members)

### Regulatory Considerations (RC) Workgroups

- RC-1: Regulatory Requirements & Pathways (13)
- RC-2: Financial Assurance & Decommissioning (11)

### Commercial Considerations (CC) Workgroups

- CC-1: Project Scope, Scale & Business Models (8)
- CC-2: Financing, Uncertainties & Risk Management (7)

### Technical Considerations (TC) Workgroups

- TC-1: Decommissioning & Reuse (13)
- TC-2: Re-certification (7)
- TC-3: Transportation & Storage (9)



# ROICE WORKGROUPS - STUDY REPORTS STRUCTURE

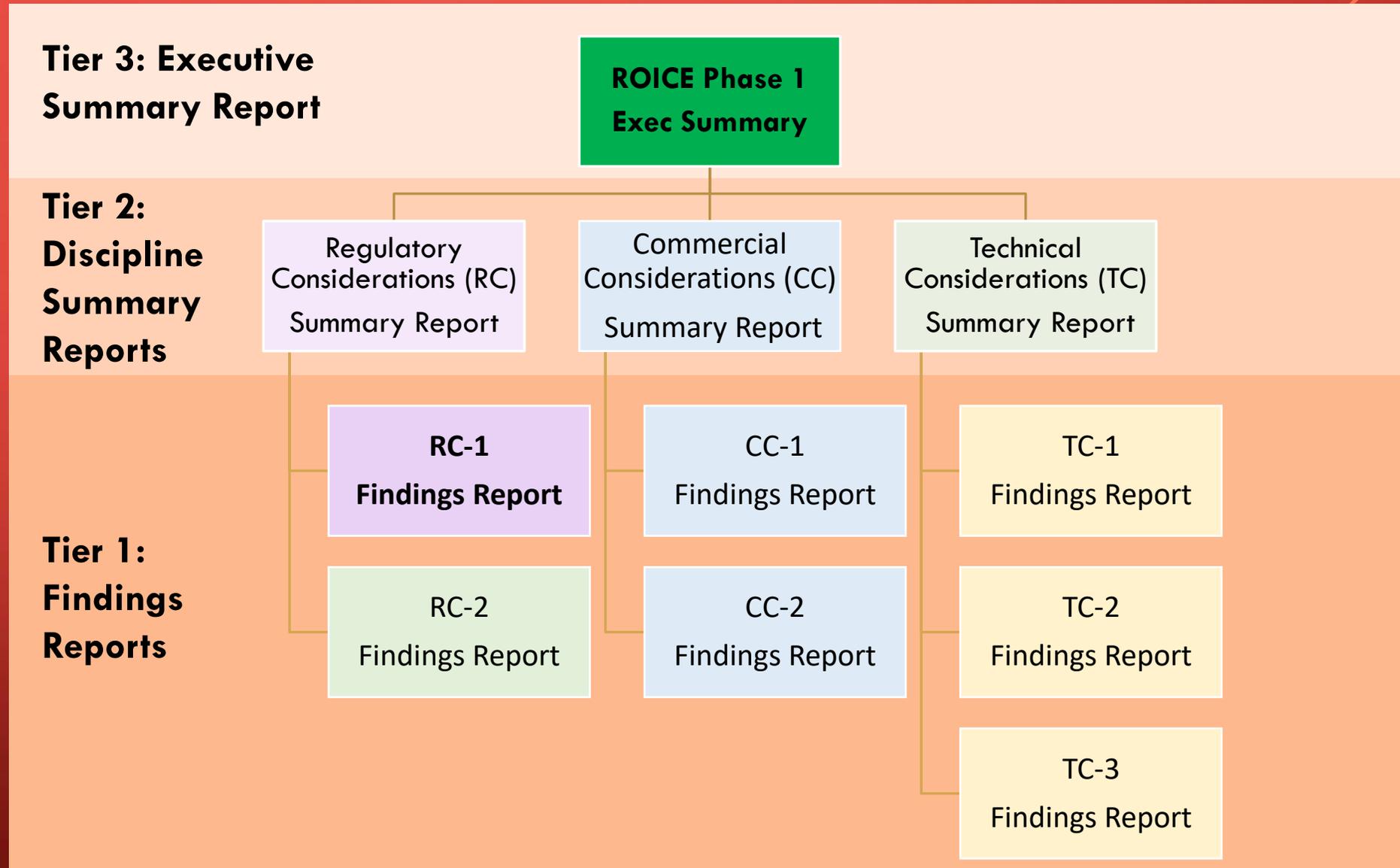
## ROICE Workgroup Deliverables

- White Paper Format
- Published by UH Energy
- Draft by Jan 31; Final By Feb 28
- 11 reports in 3 Tiers

*Note: Each report to be a stand-alone document but each report is to be referenced to the others*

Additional Dissemination Methods:  
Workshop and/or Webinars to present results  
Workgroup members can also present at conferences  
Peer Reviewed journals

Present @  
OTC '24 ??



# ROICE Workgroups – Working Process

## Governance and Process

- Each workgroup will have a Lead, Co-Lead
- One facilitator will be assigned from the ROICE Planning Committee (RPC)
- Working on assigning one student researcher to each group to help with research and documentation
- Groups meet independently (virtual meetings) - bi-weekly recommended
- Full set of Leaders will meet once a month
- All members workshop in September, November and January (BOEM and BSEE will attend)
- August Leadership Meeting: Develop plans for meeting timings for Tier 2 and Tier 3 report compilation
- Final white papers will be available to general public – no later than 1Q24
- *Report Format developed - available in ROICE Workgroup Collaboration folder*

## ROICE Planning Committee

- Ram Seetharam, UH Energy
- Brian Gibbs, Endeavor Management
- Elena Keen, Elena Keen Consulting
- Aimee Thurlow
- Brian Skeels, Technip FMC
- Paul Hughes, Subsea 7

## Objectives for First Workgroup Meeting

- Align and commit to meeting frequency and work process
  - Use student researcher to collect needed information and document as we go
  - Use facilitator to connect to cross-group resources
  - Group discussion format, or interview format, or other?
  - Report out at Sep / Nov workshops
  - Use meeting recordings to help with knowledge capture
- Discuss and align on topics, and order in which they will be tackled
- Reinforce schedule and deadlines including what will be completed in time for each workshop
- Identify any gaps in membership – are we missing any expertise?
- Any one we need to consult with (one-off basis)
- Set up guidelines on discussion boundaries / what can be shared



# ROICE Workgroups – Leaders Group

First Name	Last Name	Company	RC-1	RC-2	CC-1	CC-2	TC-1	TC-2	TC-3
Robert	Byrd	Consultant		CL			M		
Zach	Davis	Apache	CL	M					M
Luis	Feijo	ABS						L	
Brian	Gibbs	Endeavor	M				F	M	
Paul	Hughes	Subsea7							L
Ashutosh	Kak	Genesis		M	M	CL			
Elena	Keen	Elena Keen Consulting		L					
Liang-Hai	Lee	Smart Pipe					M		CL
Glenn	Legge	Endeavor	M	M	L				
Tershara	Matthews	WSP	L						
Peter	Perri	YAC				L			
Ram	Seetharam	UH Energy	M	F	F	M	M	M	F
Brian	Skeels	Technip FMC						F	
Matt	Speer	Oil States					CL	M	M
Sudhakar	Tallavajhula	Technip Energies						CL	
Aimee	Thurlow	Enterprize Energy	F			F	M		
Carlos	Vitale	Baker Hughes			CL	M			

# Regulatory Perspectives Workgroups

## RC-1: Regulatory Requirements & Pathways

- Define and collect reference materials for current set of regulations relevant to ROICE
- Document current regulatory expectations & concerns
- Expand on Alt Use RUE / Competitive Interest Determination
- Potential use of lease transfer / research lease options for ROICE projects
- Document relevant pipeline regulations
- Document relevant platform regulations; well abandonment requirements
- Restrictions or regulations for the ROICE scope (e.g., wind, H2)
- Predecessor notification requirements for ROICE projects
- Impact of need to meet API regulations – showstopper?
- Assets close to or in “Significant centre of resources”

### Opening meeting notes (8/11)

- All members except for Kent and Zach attended meeting
- Introductions
- ✓ Align and commit to meeting frequency (every other week – Friday afternoon) and work process
  - Use student researcher to collect needed information and document as we go
  - ✓ Use facilitator to connect to cross-group resources
  - Group discussion format,
  - ✓ Report out at Sep / Nov workshops
  - ✓ Use meeting recordings to help with knowledge capture
- ✓ Discuss and align on topics, and order in which they will be tackled
- ✓ Reinforce schedule and deadlines including what will be completed in time for each workshop
- ✓ Identify any gaps in membership – are we missing any expertise?
  - Any one we need to consult with (one-off basis)
  - Set up guidelines on discussion boundaries / what can be shared
- Next meeting to be scheduled for 8/25; continue discussion on non-checked topics above
- Need conversation with BOEM / BSEE on use of assets that don't meet API RP2A 22<sup>nd</sup> edition for ROICE projects – showstopper or potential to define pathway

First Name	Last Name	Company	RC-1
Aiman	Al-Showaiter	Wood PLC	M
Kristin	Carman	DNV	M
Zach	Davis	Apache	CL
Brian	Gibbs	Endeavor	M
Tracy	Hester	UH Law	M
Ken	Jackson	Cox Oil	M
Glenn	Legge	Endeavor	M
Tershara	Matthews	WSP	L
Shashikant	Sarada	WSP	M
Kent	Satterlee	GORI	M
Ram	Seetharam	UH Energy	M
Cheryl	Stahl	DNV	M
Aimee	Thurlow	Enterprize Energy	F



# Regulatory Perspectives Workgroups

## RC-1: Regulatory Requirements & Pathways

- Define and collect reference materials for current set of regulations relevant to ROICE
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- Document relevant pipeline regulations
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- Predecessor notification requirements for ROICE projects

## RC-2: Financial Assurance (FA) & Decommissioning

- What does FA look like for ROICE projects
- Review recently issued set of rules and understand impact / relevance to ROICE projects
- Schedule and process (e.g., maintenance and monitoring plans)
- Reuse of bankrupt assets / assets transferred back to the state
- Liabilities – decommissioning, spills & clean ups
- Current owner leasing assets to new developer
- Asset sale for repurposing
- Pre- and post-ROICE repurposing subsets
- Liability transfer for deferred elements
- Deferral while evaluating repurposing

First Name	Last Name	Company	RC-1
Aiman	Al-Showaiter	Wood PLC	M
Kristin	Carman	DNV	M
Zach	Davis	Apache	CL
Brian	Gibbs	Endeavor	M
Tracy	Hester	UH Law	M
Ken	Jackson	Cox Oil	M
Glenn	Legge	Endeavor	M
Tershara	Matthews	WSP	L
Shashikant	Sarada	WSP	M
Kent	Satterlee	GORI	M
Ram	Seetharam	UH Energy	M
Cheryl	Stahl	DNV	M
Aimee	Thurlow	Enterprize Energy	F

First Name	Last Name	Company	RC-2
Robert	Byrd	Consultant	CL
Zach	Davis	Apache	M
Ken	Jackson	Cox Oil	M
Ashutosh	Kak	Genesis	M
Elena	Keen	Elena Keen Consulting	L
Ryan	Lamothe	Hess	M
Glenn	Legge	Endeavor	M
Kent	Satterlee	GORI	M
Ram	Seetharam	UH Energy	F
Cheryl	Stahl	DNV	M
Julie	Traylor	Apache	M



# Commercial Perspectives Workgroups

## CC-1: Project Scope, Scale & Business Models

- Minimum size; repeatable
- Potential for small projects
- Types of projects
- Revenue Streams – convert to Ammonia?
- H2 market development – transportation
- Dependence on the product / revenue stream
- Partnerships model
- PPL model? No royalty or revenue sharing for CCS?
- Hybrid model – equity + debt; combine CO2 sequestration with another commodity product
- Platform investment – multiple projects – to derisk the investment
- Supply chain / workforce development – credits from Fed Govt.
- Financial / Legal / Technical Stability requirements
- Tax Credits
- Who would own / operate / fund or invest?
- ESG Drivers
- Operator issues & concerns as stakeholders (including identify additional stakeholders)

First Name	Last Name	Company	CC-1
Jack	Highberger	Hatenboer Water	M
Ken	Jackson	Cox Oil	M
Ashutosh	Kak	Genesis	M
Glenn	Legge	Endeavor	L
Ram	Seetharam	UH Energy	F
Kamil	Siddiqi	DNV	M
Julie	Traylor	Apache	M
Carlos	Vitale	Baker Hughes	CL

# Commercial Perspectives Workgroups

## CC-2: Financing, Uncertainties & Risk Management

- P&A / decommissioning liability; assumption of liability for CO2 storage
- Offtake contracts – and temporary purchase of carbon credits while waiting on permits
- H2 market (market development, pricing evolution) vs Power Market (regulated); uncertainty on carbon tax cap & trade
- Contracts with CO2 emitters
- Understand and monitor/influence development of 45 Q / 45 V application rules
- Class VI permitting risk and schedule delays; uncertain regulatory regime for offshore CCS wells
- Insurance products for these projects still under development
- Funds availability - DOE Loan Program Office; strategic investors
- Funds availability - Private Equity; Europe funds; green project investors;
- Interest from O&G Majors vs. Medium and Small Operators;
- Funding rounds – early-stage funding; interest in investment into asset-based projects
- 45 Q / 45 V; Credit worthiness of offtakers
- Project Economics; expected rate of return - Unlevered returns in upper teens vs less than ten for normal utility projects
- Cost competitiveness with high carbon alternatives
- Cost competitiveness with new build

First Name	Last Name	Company	CC-2
Ashutosh	Kak	Genesis	CL
Elliot	McDonald	Xodus	M
Peter	Perri	YAC	L
Ram	Seetharam	UH Energy	M
Kamil	Siddiqi	DNV	M
Aimee	Thurlow	Enterprize Energy	F
Carlos	Vitale	Baker Hughes	M

# Technical Perspectives Workgroups

## TC-1: Decommissioning & Reuse

- Jackets, Decks, Equipment, Wells, Utility systems
- Adapting materials and equipment for new use, noting different operating conditions
- Keep operations in mind – not just build, but have to operate for decades
- 2010 or newer? Post-updated version of RB2A(?)  
Anything older may be harder to certify
- Cost competitiveness with new build
- Shallow water vs deeper; relocating movable structures
- Repurposing more suited for demonstration projects vs commercial ones?
- Decommissioning scope split pre-and post-repurposing
- Complete topsides liftoff vs partial
- Wells and pipelines

First Name	Last Name	Company	TC-1
Jose	Alana	Genesis	M
Robert	Byrd	Consultant	M
Brian	Gibbs	Endeavor	F
Ken	Jackson	Cox Oil	M
Liang-Hai	Lee	Smart Pipe	M
Carlos	Machado	ABS	M
Marcus	Marinos	Wood PLC	M
James	Martin	Gulf Wind	M
Kent	Satterlee	GORI	M
Ram	Seetharam	UH Energy	M
Matt	Speer	Oil States	CL
Basil	Theckumpurath	Genesis	M
Aimee	Thurlow	Enterprize Energy	M

# Technical Perspectives Workgroups

## TC-2: Re-certification

- Asset lists and current status
- Desired characteristics of assets
- Remaining life / integrity / life extension potential
- Removal mandates
- Ranking of assets
- Codes, analysis, design; critical joints testing; cathodic protection
- Remaining Life estimation – re-baselining the remaining fatigue life
- Analysis techniques have advanced – revisit conservatism around safety factors
- Life extension methods; use data on condition of the asset; history of inspections
- Older platforms and newer codes (higher air gap requirements)
- Removing conductors and topsides increases fatigue life by several decades

First Name	Last Name	Company	TC-2
Luis	Feijo	ABS	L
Brian	Gibbs	Endeavor	M
Marcus	Marinos	Wood PLC	M
Ram	Seetharam	UH Energy	M
Brian	Skeels	Technip FMC	F
Matt	Speer	Oil States	M
Sudhakar	Tallavajhula	Technip Energies	CL

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- Next meeting to be scheduled for 8/28; continue discussion on non-checked topics above



# Technical Perspectives Workgroups

## TC-3: Transportation & Storage

- Pipeline Re-Use
- Blending with natural gas
- Mitigate H2 leakage; subsea losses - economic risk vs hazard?
- Pipeline operating specs and design code updates – impact on repurposing pipelines?
- Tanks and tankers
- Gas vs liquid H2 vs. H2 with a substrate
- CO2 service
- Role in power to shore projects?

First Name	Last Name	Company	TC-3
Jose	Alana	Genesis	M
Aiman	Al-Showaiter	Wood PLC	M
Zach	Davis	Apache	M
Jack	Highberger	Hatenboer Water	M
Paul	Hughes	Subsea7	L
Liang-Hai	Lee	Smart Pipe	CL
Ram	Seetharam	UH Energy	F
Luiz	Soriano	Siemens Energy	M
Matt	Speer	Oil States	M