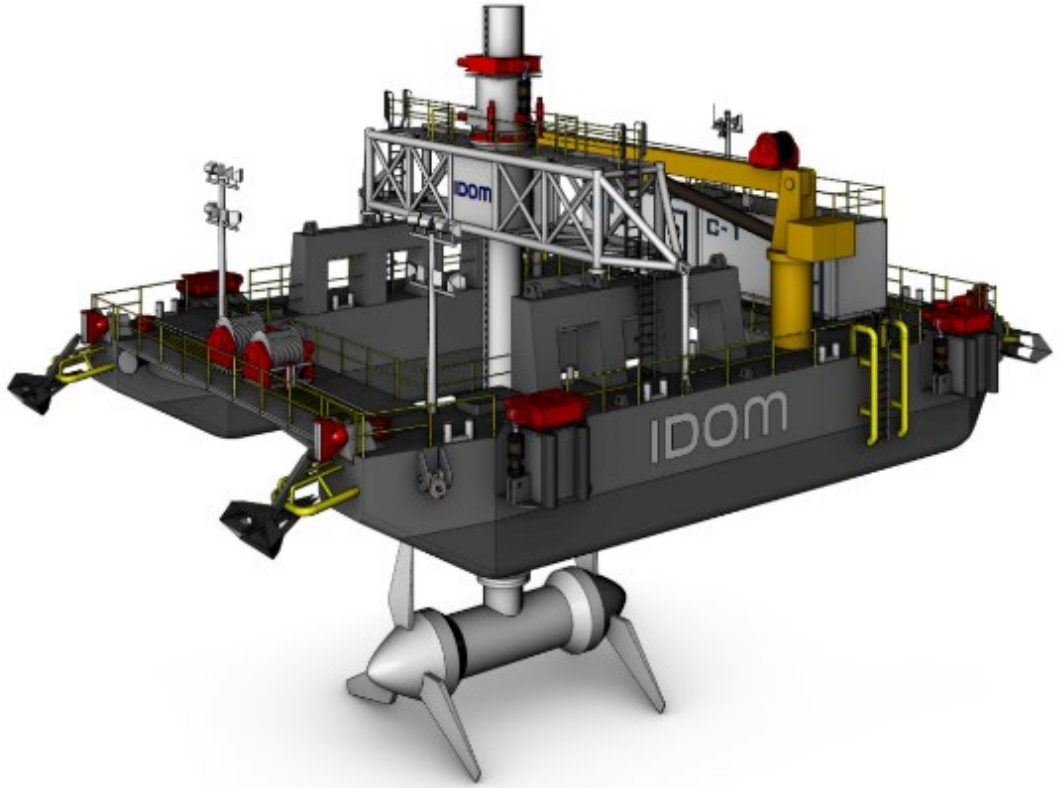
EE0009452 – Current Turbines Mobile Test Vessel



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07/21/2022

Project Overview

Project Summary

The current project aims to address the identified gap for testing large turbines (3-8 m rotor diameter) by developing and fabricating a mobile test vessel (MTV) which serves as a testing infrastructure for CEC devices, being adaptable to a variety of current speeds, depths, wave conditions and sea-bed types.

Intended Outcomes

The MTV is expected to be an innovative and versatile testing facility that boosts the development of CEC technologies providing an accredited platform for testing different maturity level technologies under diverse environments.

Project Information

Principal Investigator(s)

- Alvaro Garcia Fernandez

Project Partners/Subs

- Florida Atlantic University's Southeast National Marine Renewable Energy Center (SNMREC)
- National Laboratories: Sandia, NREL & PNNL

Project Status

New

Project Duration

- BP1: 10/01/2021 - 03/31/2023
- BP2: 04/01/2023 - 09/30/2025

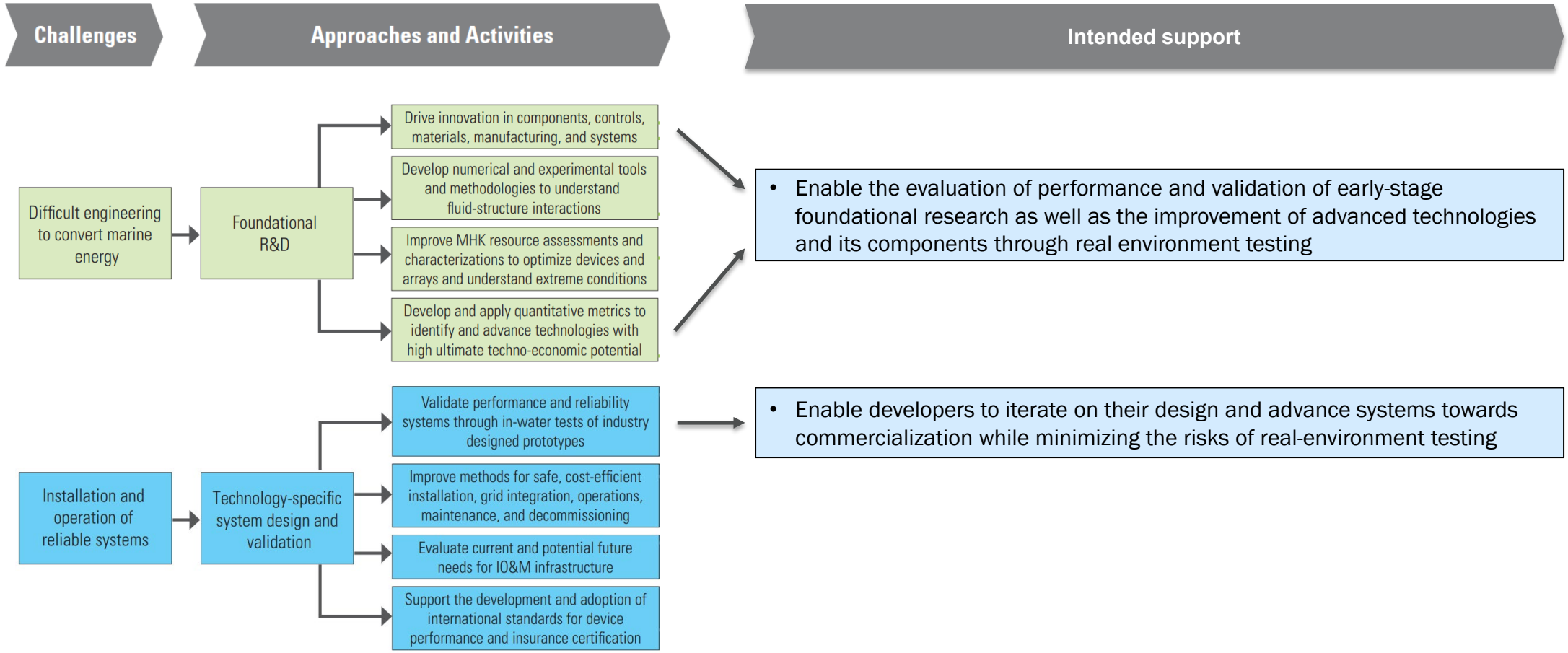
Total Costed (FY19–FY21)

$ 0

Project Objectives: Relevance

Relevance to Program Goals:

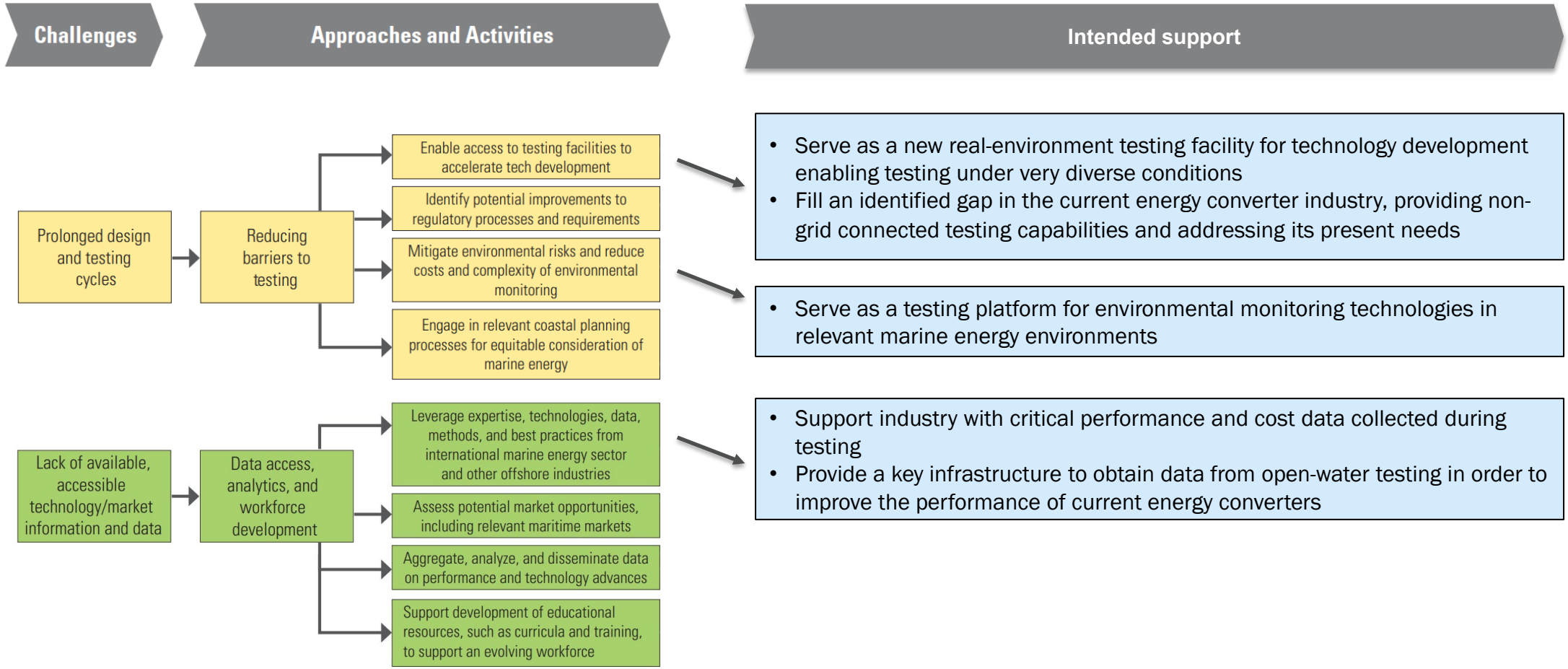
Marine Energy Program Activity 3 - Reducing Barriers to Testing Performance Goals



Project Objectives: Relevance

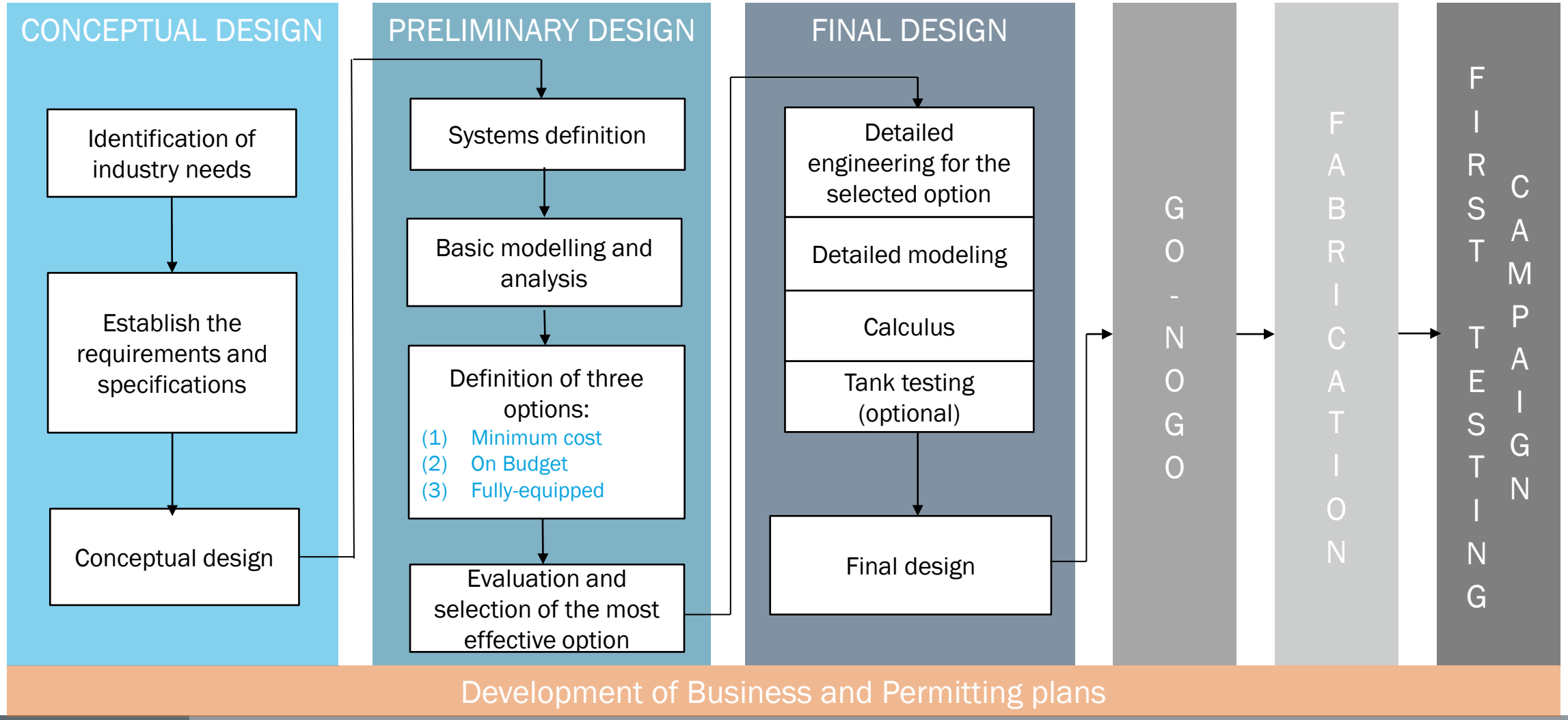
Relevance to Program Goals:

Marine Energy Program Activity 3 - Reducing Barriers to Testing Performance Goals



Project Objectives: Approach

Approach:



Project Objectives: Expected Outputs and Intended Outcomes

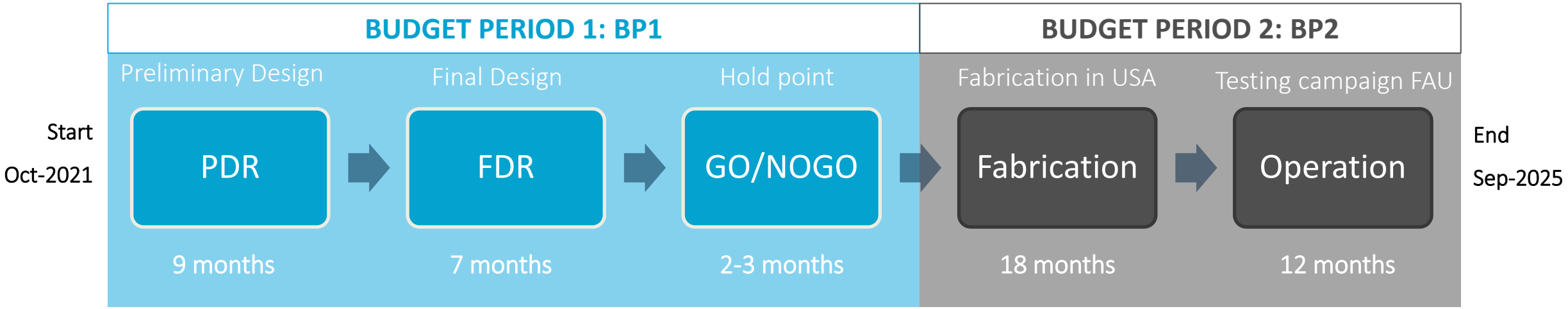
Outputs:

- BP1
  - Trade Space Report
  - Metocean study report for the selected sites
  - Detail design of the MTV selected option and its related sub-systems
  - Preliminary business plan
  - Preliminary Permitting and NEPA compliance plans
  - Operation & Maintenance plan
  - Cost Estimate for Fabrication
  - Tank testing report (optional)
  - Continuation Application to BP2
  - Go-nogo decision
- BP2
  - Final ICD between MTV and other stakeholders
  - MTV fabrication and as built report
  - Cost Estimate for first year O&M
  - Final business plan
  - Permitting plans for the selected 2-3 sites
  - MTV commissioning and staff training
  - First testing campaign completion

Outcomes:

- Short term
  - Overcome the identified gap to test large CEC prototypes
  - Test CEC devices at diverse environments and conditions (tidal, river and ocean current)
  - Enable real-marine environment testing, not only for incoming CEC technologies but any new physical hardware, material, tools…
- Long term
  - Contribute to the development of different current energy converter technologies offering timely and cost-effective testing capabilities.
  - Provide testing capacities to fully characterize the performance and reliability of technologies, tools, materials…
  - Help improve robust suite of testing capabilities for all levels of technology maturity at different testing sites.

Project Timeline



Proposed Strategy

3 options:

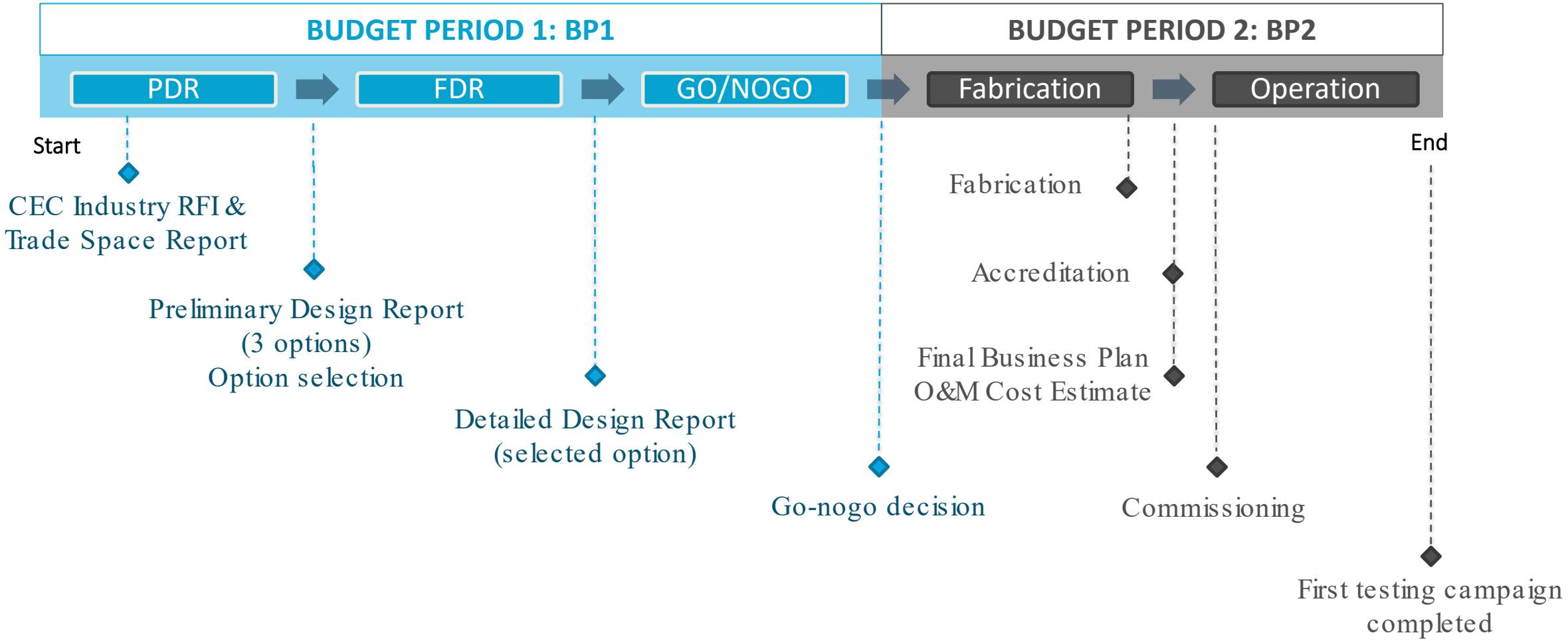
- MINIMUM FUNCTIONALITIES
- ON BUDGET
- FULL EQUIPMENT

Meeting with DOE (PDR)

Focus on the selected option.

Preliminary Design → Final Design

Project Timeline



Project Budget

	Total Project Budget – Award Information		
	DOE	Cost-share	Total
TOTAL	$5,000K	$556K	$5,556K
BP1	$943K	$186K	$1,129K
BP2	$4,057K	$370K	$4,427K

FY19	FY20	FY21	Total Actual Costs FY19–FY21
Costed	Costed	Costed	Total Costed
$0K	$0K	$0K	$0K

- No variations expected.
- No other funding sources.
- National Lab support is provided by WPTO through Technical Assistance outside the budget/scope of the award.

End-User Engagement and Dissemination

- End User Engagement
  - **Close contact with current energy converter industry** to anticipate and address their testing challenges and needs during the design phase.
  - Release of a Request For Information to worldwide current energy converter industry by different dissemination methods.

• Newsletter	
• Water Column	(January 2022)
• Offshore Energy	(January 2022)
• Tethys Engineering Blast	(January 2022)
• Offshore Energy	(January 2022)
• Tethys Blast	(February 2022)
• The Maritime Executive	(February 2022)
• Basque Maritime	(April 2022)
• National Hydropower Association	
• Email	

End-User Engagement and Dissemination

- Key stakeholders

- Department of Energy's Water Power Technologies Office (DOE's WPTO) reviewing and providing advice and guidance throughout the project
- CEC technology developers (main end-user) informing about their testing needs and challenges
- Florida Atlantic University's South National Marine Renewable Energy Center (FAU's SNMREC) being responsible for the business plan, permitting & NEPA plan, accreditation and standardization and for MTV commissioning and operation.
- Pacific Northwest National Laboratories (PNNL) developing a roadmap in order to meet NEPA and other specific state and local requirements for permitting.
- National Renewable Energy Laboratory (NREL) providing guidance on standards compliance and collaboration in the standardized data collection system.
- Sandia National Laboratories supporting on the design requirements, load cases definition as well as sites characterization.

End-User Engagement and Dissemination

- Incoming dissemination activities
  - Conference presentations
    - ICOE 2022 (San Sebastian, Spain)

  - MHK data repository
    - Collected data will be uploaded to MHK data repository

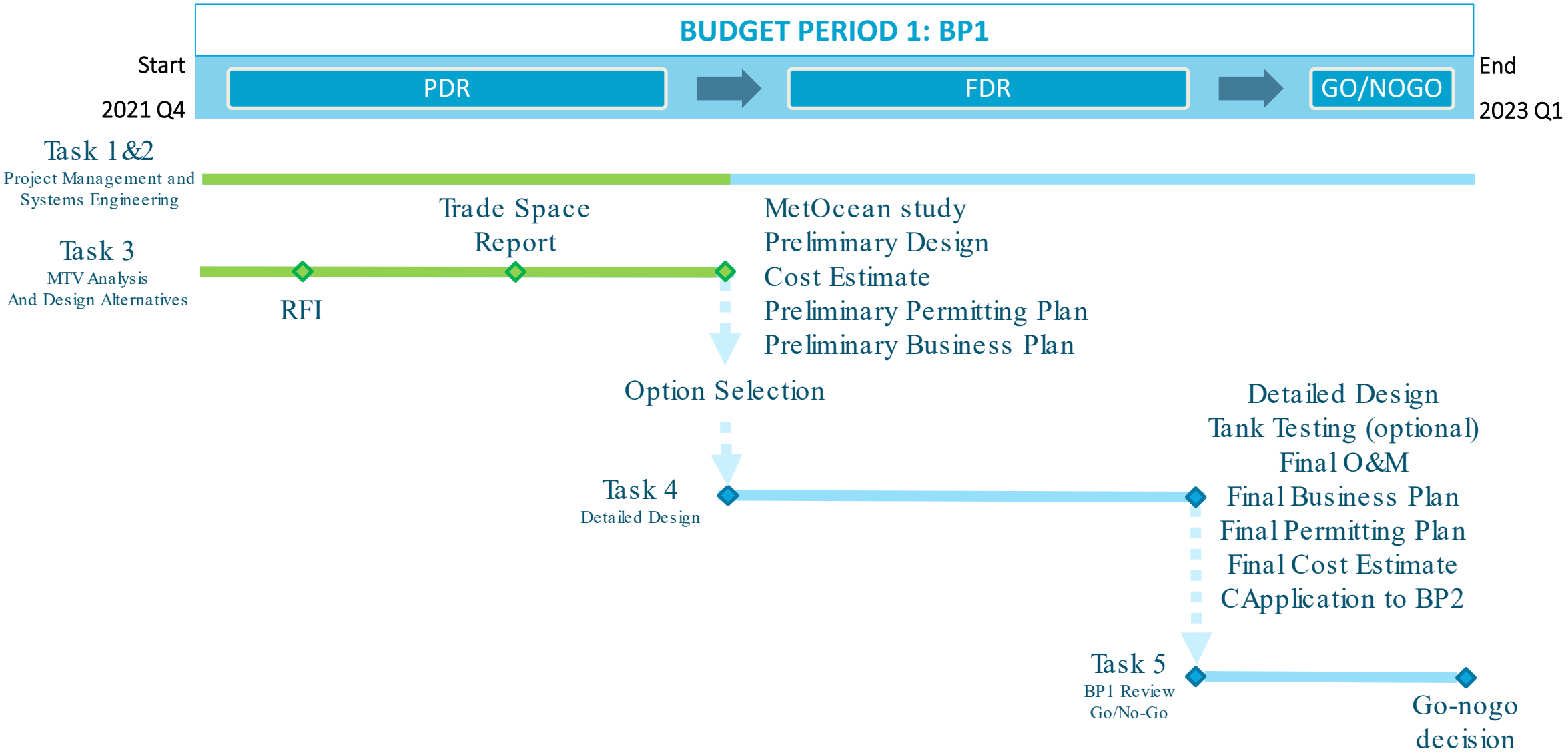
Performance: Accomplishments and Progress

FY21 → Initial conceptual stage

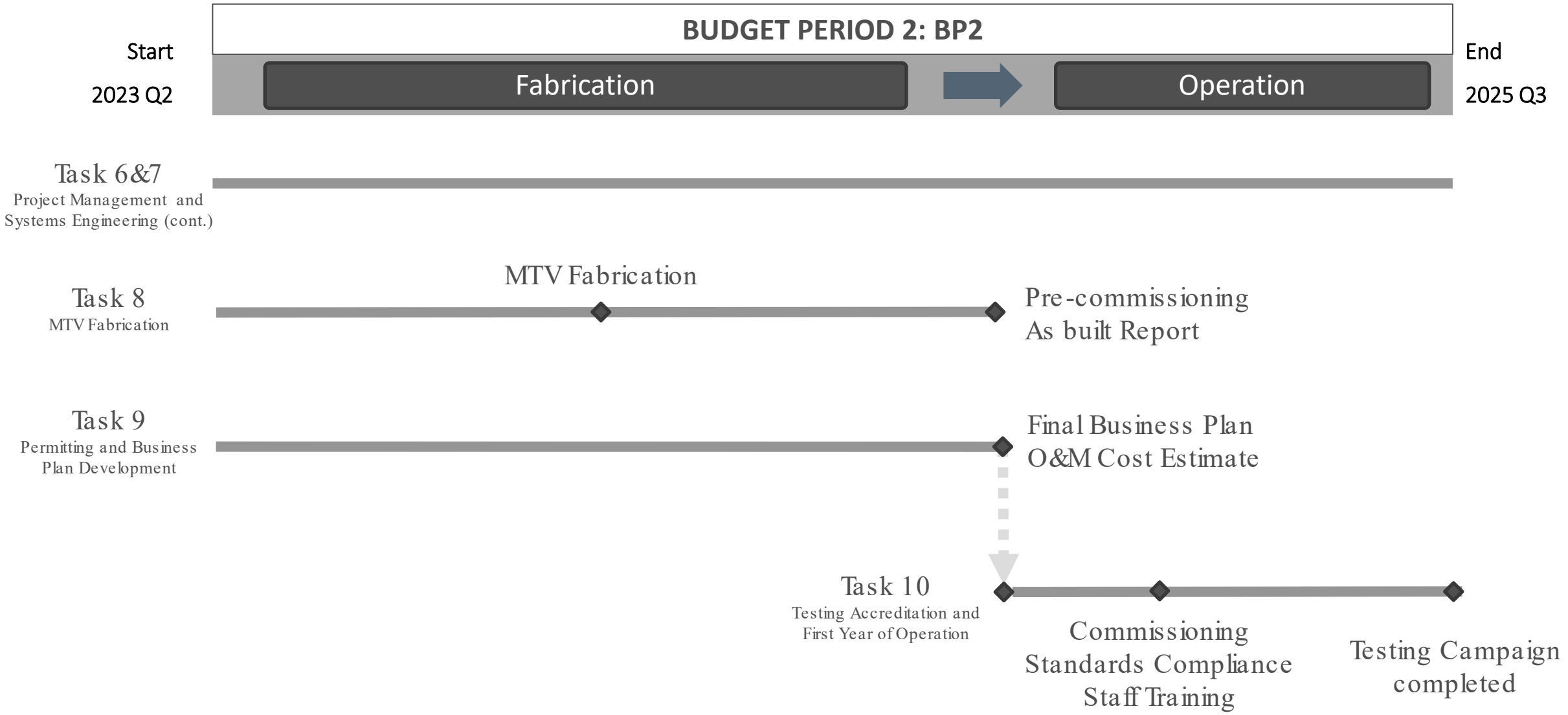
Up-to-date accomplishments:

- Request for Information to CEC industry
  - Assessment of the responses
  - Identification of testing needs and interfaces
- MTV Trade Space Report
  - Description of Current Energy Converter typologies, loads and interfaces
  - Identification of trade space parameters in diverse potential sites
  - Definition of testing capabilities
  - Description of MTV sub-systems
  - Operation & Maintenance
  - Identification of applicable standards and permitting and regulatory requirements

Future work


BUDGET PERIOD 1: BP1
Start
2021 Q4
PDR
FDR
GO/NOGO
End
2023 Q1
Task 1&2
Project Management and Systems Engineering
Task 3
MTV Analysis
And Design Alternatives
RFI
Trade Space Report
MetOcean study
Preliminary Design
Cost Estimate
Preliminary Permitting Plan
Preliminary Business Plan
Option Selection
Task 4
Detailed Design
Detailed Design
Tank Testing (optional)
Final O&M
Final Business Plan
Final Permitting Plan
Final Cost Estimate
CApplication to BP2
Task 5
BP1 Review
Go/No-Go
Go-nogo decision

Future work


BUDGET PERIOD 2: BP2
Start
2023 Q2
Fabrication
Operation
End
2025 Q3
Task 6&7
Project Management and Systems Engineering (cont.)
Task 8
MTV Fabrication
MTV Fabrication
Pre-commissioning
As built Report
Task 9
Permitting and Business Plan Development
Final Business Plan
O&M Cost Estimate
Task 10
Testing Accreditation and First Year of Operation
Commissioning
Standards Compliance
Staff Training
Testing Campaign completed

Q&A