

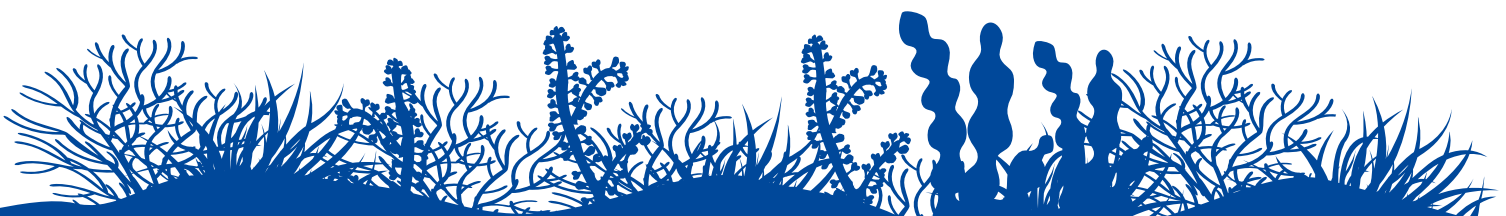
STRATEGIC PLAN

2021



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Context

The opportunities to grow the blue economy are vast.

Consumers are increasingly focused on food and energy security, sustainability, and provenance. Already, we are seeing strong international demand for offshore renewable energy and for sustainably farmed offshore aquaculture. With the increasing populations and increasing prosperity and the pressures of climate change, we are confident that this demand will increase into the future.

Taken together, Australia and New Zealand have an Exclusive Economic Zone of over 14 million square kilometres of well managed clean oceans that provide enormous potential to increase seafood and renewable energy production sustainably.

Realising this potential requires moving aquaculture and renewable energy systems offshore into high quality but remote and more exposed high-energy operating environments. This requires the development of new more robust structures, technologies and production systems that require less maintenance with increased automation.

They will need to withstand both regular and extreme weather events while being safely and economically managed. The Blue Economy industries of the future will require a new and highly skilled workforce.

Governments are strongly motivated to support industries that will lead to growth in the economy and particularly employment. However, Australia's regulatory frameworks for offshore renewable energy and aquaculture are relatively immature. Moving offshore requires new planning, regulatory and monitoring systems to provide industry confidence to make long-term investments and community confidence that the operations will be environmentally sustainable and socially responsible. In addition, the management and use of Sea country is an emerging area of interest for indigenous people.

The Blue Economy CRC has been established to address these challenges and to facilitate a step change in the economic value of Australia's new Blue Economy industries.



Who are we

Established in 2019, Blue Economy CRC is an independent not-for-profit company limited by guarantee and is a Cooperative Research Centre under the Australian Government's CRC Program.

With a ten-year life and budget of more than \$300 million, the Blue Economy CRC brings together 40 industry, government, and research partners from ten countries with expertise in aquaculture, marine renewable energy, and maritime engineering.

Through targeted and industry focussed research and training, the Blue Economy CRC paves the way for innovative, commercially viable and sustainable offshore developments and new capabilities that will see significant increases in renewable energy output, seafood production and jobs that will transform the future of Australia's traditional blue economy industries.

Our Partners are:



Purpose

“ To perform world class, collaborative, industry focused research and training that underpins the growth of the Blue Economy through increased offshore sustainable aquaculture and renewable energy production. ”

Vision

“ Australia’s Blue Economy industries in offshore sustainable seafood and collocated renewable energy are globally competitive, at the forefront of innovation and are underpinned by a robust environmental planning and management framework which consumers trust and value. ”

Values



Innovative

We are industry focussed, flexible and take measured risks and are prepared to think outside of the ‘box’



Integrity

Responsive to our Participants’ needs, we are open, transparent, honest, and reliable



Collaborative

Understanding and respecting our Partners’ needs, we work together to generate knowledge relevant to our industry and the broader community



Excellence

We aim to be world class and we focus on those things we can genuinely add value to, and we celebrate our achievements



Supportive

We are diverse, respectful, encouraging and maintain an enjoyable workplace

Approach

Strategies have been developed for the following five themes (*Appendix 1*).

Research

Our research is industry led, world-class, internationally connected, focussed on growing Australia's Blue Economy, and is trusted by our stakeholders. Our approach is collaborative, agile, and innovative.

Adoption and Commercialisation

We deliver new and useful knowledge with commercial impact for our industry partners, end-users and Governments using multiple platforms and formats. We create industry relevant intellectual property and facilitate its commercialisation by our partners.

Corporate

We will pursue the highest standards of governance and management, including the development of capacity and capability, embracing diversity and equal opportunity. Our management systems will be fit for purpose, efficient and focussed on supporting the Blue Economy CRC's goals.

Engagement

Our Partners are engaged. We deliver on our commitments. We have a focus on growing our contribution base.

Capability and Capacity Building

Our education and training program is developing a skilled workforce designed to support the Blue Economy and increasing industry and Government's capacity to realise the potential opportunities provided by the Blue Economy.



Research Portfolio

Our Research is focussed on our Partners' needs, is environmentally and socially responsible, and will have a demonstrable commercial impact.

Our Research portfolio is structured into five integrated programs: Offshore Engineering and Technology, Seafood and Marine Products, Offshore Renewable Energy Systems, Environment and Ecosystems, and Sustainable Offshore Developments (*Appendix 2*).

Combined, these programs will deliver the knowledge to enable current and new industries to increase seafood and renewable energy production. This includes developing technologies and production systems that can withstand both regular and extreme weather events, while being safely and economically managed. It will deliver the knowledge to underpin new planning, regulatory and monitoring systems that encourage and support sustainable capital-intensive operations while giving community confidence that the operations will be environmentally sustainable and socially responsible.

Through the completion of 19 Scoping Study Projects across the five programs, the Blue Economy CRC has developed an overarching research and development (R&D) plan will make a significant contribution to delivering the blue economy. This R&D plan captures the short-, medium and long- term R&D opportunities which are described in more detail in the five research program plans in Appendix 2.

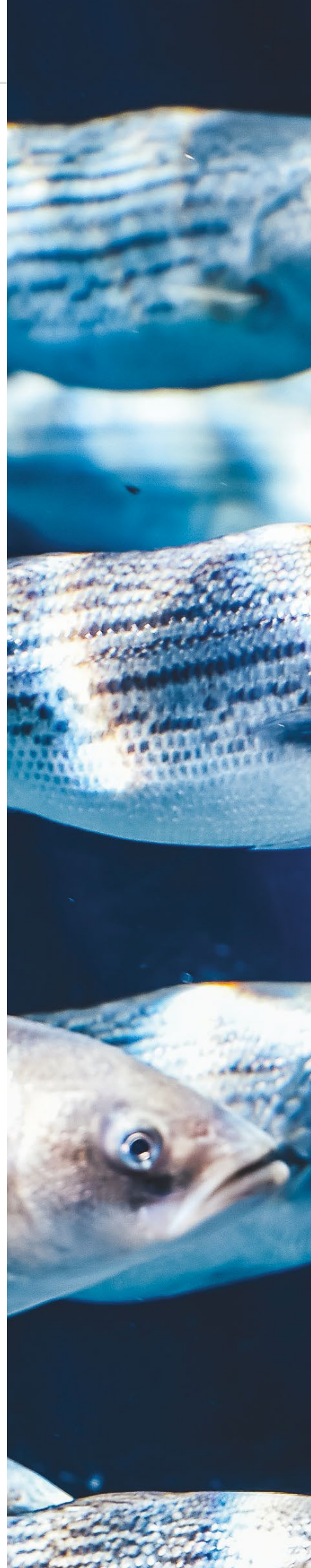
Success

Our Partners and the community will be demonstrably better off because of the application and utilisation of the results of the Blue Economy CRC and its activities.

BECRC's success measures are to:

- △ demonstrate a significant return on investment to our partners;
- △ provide the knowledge to create a step-change in the economic value of the Blue Economy; and
- △ become a globally trusted source of Blue Economy knowledge, capability and expertise

Impact measures are being developed to measure our performance (*Appendix 3*).





SHORT TERM ————— **MEDIUM TERM** ————— **LONG TERM**

Delivering offshore engineering solutions

- » Design of improved and novel offshore production systems, moorings, & support vessels
- » Development of autonomous marine systems
- » Biofouling reduction & reuse

- » Multi-use platforms
- » Validation, & prototyping
- » Codes of practice

- » Evaluating performance (sea trials)
- » Demonstrations and applying of actual systems

Delivering seafood and marine products

- » Seaweeds, salmon, oysters & by-products: Products, policy and social licence
- » Maintain and enhance production
- » Species selection & production assessment

- » Monitor, manage & mitigate risk
- » Integration & closed system aquaculture
- » Tropical aquaculture production

Delivering offshore renewable energy systems

- » Offshore electricity & hydrogen market opportunities & demand
- » DC Microgrids

- » Energy system model integration ORES design & assessment
- » Offshore electricity

- » Phased demonstration
- » Offshore electricity & hydrogen production

Delivering sustainable ecosystems & environments

- » Marine spatial planning & site selection
- » MetOcean prototyping
- » Risk & opportunity - hazard analysis
- » Sediment footprint & Biosecurity

- » Decision criteria & assessment tools
- » Life cycle & integrated assessments
- » Biosecurity
- » Adaptive Management

- » Offshore production systems: energy and aquaculture

Delivering sustainable offshore developments

- » Policy & regulation mapping
- » Environmental management accounting
- » Economic options
- » First Nations & Cultural values
- » Ethics, values & Social licence

- » Policy and regulatory scenarios
- » Environmental management accounting
- » Supply chain analysis and Non-Market valuations
- » Integrity systems: certification and assessment
- » Blue economy reporting

DELIVERING TO THE BLUE ECONOMY

Blue Economy Zones

Autonomous data collection systems

Portal & data Infrastructure

Offshore production systems: energy and aquaculture

Integrated Multi-Trophic Aquaculture

Guidelines for certification & standards



APPENDIX 1

Strategies

Research

Our research is industry led, world-class, internationally connected, focussed on growing Australia's Blue Economy, and is trusted by our stakeholders. Our approach is collaborative, agile, and innovative.

Objectives

- △ Ensure research is relevant to industry needs, practical, applicable, timely, and readily available
- △ Ensure research excellence
- △ Embrace measured risk in the development of our research portfolio
- △ Encourages 'Out of the box' ideas for furthering the Blue Economy CRC's purpose
- △ Collaborate with industry participants in all aspects of our research to ensure practical solutions with a pathway to commercialisation and adoption
- △ Ensure intellectual property is appropriately captured, protected and managed
- △ Grow the value of our research investment
- △ Complete all Commonwealth Funding Agreement research outputs and milestones

Outcomes

- △ Our research has underpinned the move of new aquaculture and renewable energy systems offshore
- △ We have produced internationally recognised high-quality research and are regarded as a highly credible source of Blue Economy expertise
- △ We are internationally recognised for our innovation and new thinking
- △ Our end-users have co-developed and adopted new regulatory approaches, production systems and technologies
- △ Our commercially-valuable intellectual property is identified and, where appropriate, protected and commercialised
- △ The value of our research investment significantly exceeds Participant's current contributions.
- △ We have excelled in the delivery of the Commonwealth Funding Agreement

Actions

- △ Implement research investment process based on industry needs, assessment of current investments, and Commonwealth Funding Agreement commitments
- △ Require industry or government participation in all research projects across the Blue Economy CRC
- △ Ensure projects pursue high quality research through sound project design, rigorous implementation and accountability and reputable scientific publication
- △ Consider, manage, and embrace risk in the selection and delivery of projects
- △ Involve end-users in design and implementation of delivery plans through existing and new pathways
- △ Establish a Strategic Investment Fund to allow for rapid opportunistic funding of small projects, particularly with SMEs
- △ Ensure active intellectual property management and engage expertise to assist with commercialisation

Adoption and Commercialisation

We deliver new and useful knowledge with commercial impact for our industry partners, end-users and Governments using multiple platforms and formats. We create industry relevant intellectual property and facilitate its commercialisation by our partners.

Objectives

- △ Ensure new knowledge is co-developed with industry partners and shared with end-users through existing and innovative pathways
- △ With our partners use intellectual property to maximise impact by developing and managing commercial opportunities
- △ Improve the regulatory environment to one that provides industry confidence to make long-term investments and community confidence that the operations will be environmentally sustainable and socially responsible
- △ Facilitate relevant knowledge being adopted and used effectively by next and end-users

Outcomes

- △ Our industry and government partners value and apply the knowledge produced by the Blue Economy CRC.
- △ We have made available intellectual property to our partners (or third parties) which has been commercialised
- △ The regulatory pathway for offshore aquaculture and co-located renewable energy is clear, fit for purpose, and trusted by industry, government, and the community
- △ We have improved the capacity of the Australian and New Zealand Blue Economy sector, including our partners, to move activities further offshore profitably and sustainably

Actions

- △ Formalise research investment process to ensure active input from our industry partners in the inception, design and delivery of projects
- △ Identify and document potential intellectual property in the development and delivery phases of all projects
- △ Develop Innovation Roadmaps for Blue Economy priorities (e.g. key infrastructure?)
- △ Regularly review and assess project intellectual property for commercial potential, and develop plans accordingly
- △ Engage expertise to assist with commercialisation, and where appropriate, seek third party Participants to assist commercialisation of IP
- △ Deliver Blue Economy CRC information face-to-face, through conferences, webinars, through websites, newsletters, social media, fact sheets and through other communication products

Capability and Capacity Building

Our education and training program is developing a skilled workforce designed to support the Blue Economy and increasing industry and Government's capacity to realise the potential opportunities provided by the Blue Economy.

Objectives

- △ Develop the next generation of researchers in areas relevant to the Blue Economy
- △ Ensure Blue Economy CRC postgraduate students are strongly linked to end-users and industry
- △ Develop and provide opportunities for Blue Economy CRC's partners to collaborate and innovate
- △ Provide opportunities for our partners to influence the development and direction of the Blue Economy

Outcomes

- △ A trained cohort of specialist scientists and engineers with detailed cross-discipline knowledge to work in Australia's future blue economy industries.
- △ Creation of new knowledge, technologies and future leaders that underpin the growth and productivity of participating sectors across Australia and internationally
- △ We have made significant progress to our end target of 50 PhD student enrolments
- △ Students understand the Blue Economy CRC and all its research programs
- △ Students have undertaken placements with industry or government during their candidature
- △ Blue Economy CRC Participants (researchers, industry, government) demonstrate enhanced collaboration and innovation abilities
- △ Through the Blue Economy partners interests are advocated for

Actions

- △ Provide a value proposition and opportunities to attract the best students
- △ Develop an PhD Scholars Program that identify industry focussed PhD topics that align with our purpose and require industry advisors on all PhD projects
- △ An active program of events for our Partners to provide opportunities for professional development, networking, public outreach and knowledge exchange
- △ Demonstrate capacity building for industry participants, researchers and students through industry experience, field experience and other training activities

Engagement

Our Partners are engaged. We deliver on our commitments. We have a focus on growing our contribution base.

Objectives

- △ Ensure all partners are engaged and active
- △ Develop and enhance national and international collaboration and opportunities for research and impact
- △ Attract additional resources for research
- △ Advocate for the importance of Blue Economy industries for growing the economy and creating new high value jobs
- △ Instil a culture of a collaborative community and a sense of belonging

Outcomes

- △ Our partners are active and vocal supporters of the Blue Economy CRC
- △ Enduring partnerships and collaborations have arisen from the Blue Economy CRC
- △ We are widely known and recognised as an international leader in the Blue Economy and innovation
- △ We have significantly made up the shortfall in resources
- △ Government and community recognise and value and contribution of the Blue Economy to our economy
- △ Our partners are engaged, supportive and committed to the CRC and future collaborations

Actions

- △ Engage and communicate consistently and regularly with partners through multiple platforms, including through face to face, direct contact by Directors, newsletters, webinars, Connect, the website and annual Participants meetings
- △ Undertake strategic business development activities to seek new partnership and collaboration opportunities
- △ Actively engage in promotion of the value the Blue Economy and the Blue Economy CRC at multiple fora, including through government submissions and networks
- △ Create the culture of community and inclusiveness, with regular opportunities for engagement by Blue Economy CRC partners

Corporate

We will pursue the highest standards of governance and management, including the development of capacity and capability, embracing diversity and equal opportunity. Our management systems will be fit for purpose, efficient and focussed on supporting the Blue Economy CRC's goals.

Objectives

- △ Employ best practice governance standards, including Board and committee review, diversity and professional development
- △ Ensure active participation of the Board sub-Committees in the governance of the Blue Economy CRC
- △ Ensure best management practices are employed in the Blue Economy CRC, including risk management, professional development, a strong culture, diversity and equal opportunity, succession planning and demonstration of values
- △ Ensure rigorous fiscal accountability
- △ Collate and evaluate evidence to demonstrate the value of Blue Economy CRC investment to partners, stakeholders and funders
- △ Ensure the strategic direction of the Blue Economy CRC is reviewed and revised as appropriate
- △ That the Blue Economy is recognised as a fun, innovative and rewarding organisation to partner with

Outcomes

- △ The Board was actively engaged in setting the strategic directions and monitoring performance of the organisation
- △ The advice of Board sub Committees has directly improved the performance of the Blue Economy CRC
- △ Risks, including financial, were clearly identified and actively managed and minimised
- △ Resources were used efficiently, effectively, and appropriately to maximise the impact of the Blue Economy CRC
- △ Monitoring and evaluations efforts provided clear evidence of the value of the Blue Economy CRC and the value to partners
- △ Over the life of the Blue Economy CRC independent reviews informed the development of strategies to maximise impact and shift directions as needed
- △ Partners and staff valued and enjoyed their participation in the Blue Economy CRC

Actions

- △ Undertake bi-annual reviews of Board and committee performance
- △ The Board undertake a strategic risk assessment and actively manage risk through the Finance, Audit and Risk Management Committee
- △ Develop an annual Board-approved budget
- △ Continue to develop and implement the Connect platform to manage Blue Economy reporting
- △ Develop a monitoring and evaluation plan to provide evidence of the Blue Economy CRC's value
- △ Annually review the Strategic Plan and undertake an independent external review of the Blue Economy CRC in Year 5
- △ Ensure diversity is a key consideration in the planning and execution of all Blue Economy CRC events
- △ Ensure Participant Meetings are high quality (facilities, venue Etc), well run and have time for networking



APPENDIX 2

Research Programs

Our Programs are focussed on our Partners' needs, are environmentally and socially responsible, and have a demonstrable commercial impact.

Research Program 1



OFFSHORE ENGINEERING AND TECHNOLOGY

The Offshore Engineering and Technology program will generate the infrastructure that supports the development of offshore systems. It brings together industrial engineering expertise to collaborate with the aquaculture and offshore renewable energy sectors to build the required infrastructure for integrated offshore operations. Intellectual Property will emerge in the design of sea-pen infrastructure, support systems for operating (e.g. anchoring devices), innovative maintenance technologies (e.g. anti-corrosive or antifouling devices), and monitoring (e.g. advanced materials for longevity and structural reliability; inbuilt sensors in composite materials to detect fatigue in offshore platforms). Commercial prototypes will be developed for monitoring and maintenance using robotics, artificial intelligence, integrated sensors and real-time visualisation.

Milestone Output 1

Commercialised designs and sub-systems for high-energy offshore aquaculture cages.

Outputs include proprietary IP for materials, pen design, mooring systems and manufacturing methods, as well as in-depth performance data from deployment tests. This output also includes the designated design and operation framework covering engineering principles, economic models and operation guidelines, as well as dynamic risk models for lifecycle assessment of offshore structures.

Milestone Output 2

First standardised modular multi-use platform system ready for commercialisation, including IP covering the design, fabrication, deployment, and decommission of the entire system.

This output includes the business case for the system, validated performance data from field tests, and design and operation guidelines. Other outputs include new mooring and station keeping systems, design and simulation tools, and guidelines and standards applicable to a broad range floating offshore platforms.

Milestone Output 3

A demonstrator multi-use offshore platform will be deployed as part of this activity. For the first time, this will allow the realistic investigation of system integration aspects of multi-use platforms, and the quantification of synergistic benefits of multi-use platform operation. For the last 5 years of the Blue Economy CRC, the platform will serve as live testbed for the real-world testing and co-location of the participants' systems and CRC outputs.

Milestone Output 4

Development of remote sensors and an autonomous platform that uses aerial, surface, and underwater systems to reduce the operational risks for aquaculture and renewable energy.

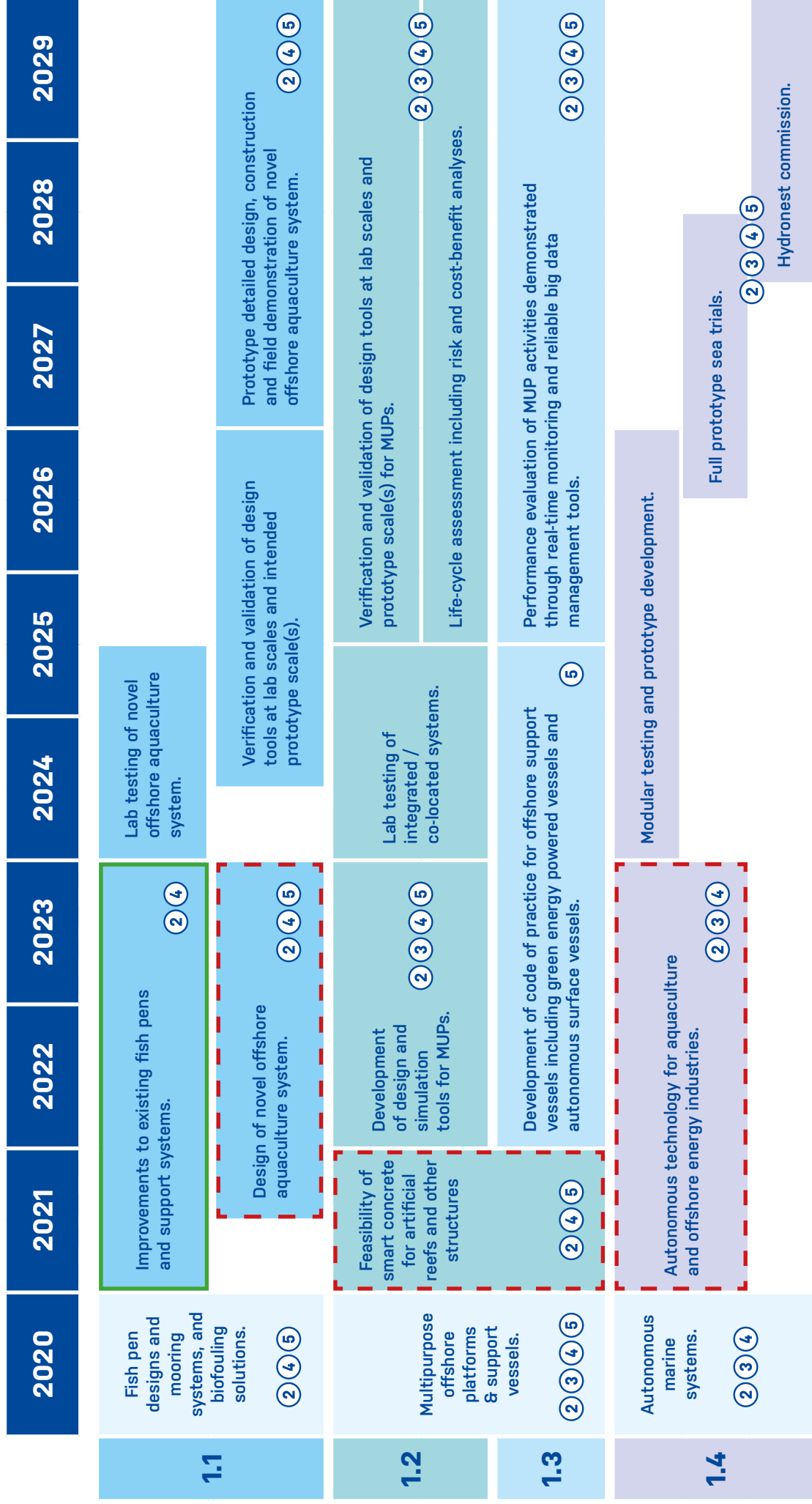
Strong emphasis will be on sensor integration and cross-platform communication to allow predictive decision making.

Legacy

- △ *Commercial-ready aquaculture pen designs and mooring systems for high-energy offshore sites.*
- △ *Successful deployment of large-scale multi-use offshore platforms for co-locating aquaculture and renewable energy production and storage facilities.*
- △ *Development of remote sensors and an autonomous platform that uses aerial, surface, and underwater systems to reduce the operational risks for aquaculture and renewable energy.*

RP1 ROADMAP

Started
 Priority to get started in 2021
 X RP Connections



Research Program 2



SEAFOOD AND MARINE PRODUCTS

The Seafood and Marine Products program will develop offshore aquaculture systems that provide viable and sustainable growth opportunities for this sector.

Commercialisation opportunities include novel aquaculture system designs for emerging species in collaboration with offshore engineering program, and new seafood products, as well as the development of supply chain aquaculture activities (e.g. platform-based hatcheries and processing). Identification and development of premium export products and new export markets will ensure the expectations of consumers are met.

Milestone Output 1

1

Advanced understanding of, and industry-ready knowledge to improve production biology in offshore environments. This will include operational guidelines and protocols, tools (models) to compare production, policy recommendations, environment and food safety across multiple species and tailored to offshore sites. This knowledge will be translated in the form of an online tool that lists suitable species and the likely production benefits from the adoption of advanced production approaches.

Milestone Output 2

2

A framework for integrating production and engineering technologies that advances overall productivity of seafood marine products. This will be in the form of a matrix that trades off the complexity of physical platforms and maximises the recovery of nutrients and nutritional material. It will also include the development of operational guidelines and protocols, policy recommendations, and a suite of information material.

Milestone Output 3

3

Platform to underpin the value and promotion of seafood from new aquaculture systems. This will be based on providing evidence to support operational arrangements. New species will achieve high value in the marketplace, based on attributes such as sustainability, animal welfare improvements, and nutritional value. Consumer confidence will be enhanced through certification schemes.

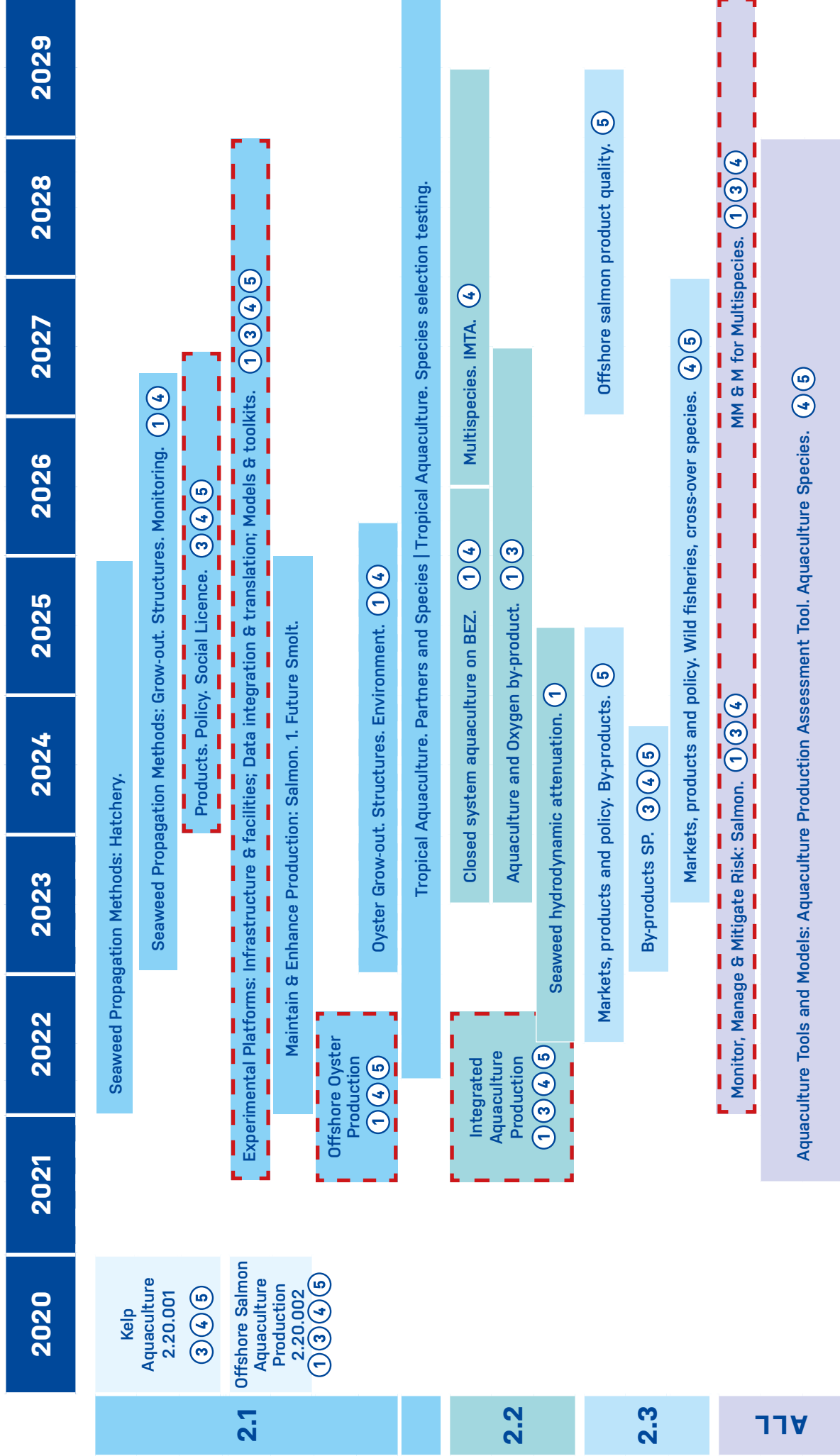
Legacy

- △ *Salmon aquaculture in offshore / high energy sites that is sustainable and allows industry a choice about where to farm salmon and a pathway for industry expansion and diversification.*
- △ *Sustainable and integrated seafood and marine products that come from multiple species and maximise the efficient capture, use and recycling of energy and key nutrients.*



RP2 ROADMAP

Started
 Priority to get started in 2021
 X RP Connections



Research Program 3



OFFSHORE RENEWABLE ENERGY SYSTEMS

The Offshore Renewable Energy Systems (ORES) program will support offshore aquaculture through supplies of lower cost energy and ancillary products (oxygen and freshwater) and through the development of exportable energy carriers (e.g. hydrogen). Commercialisation opportunities include the design and development of renewable energy conversion devices; optimal offshore storage solutions and export products; and micro-grid architecture solutions and control systems for intelligent management of integrated end-user demands. The ORES program will also focus on the production of essential resources such as freshwater (via desalination) and oxygen (for hatchery and fish culture).

Milestone Output 1

An energy demand and optimisation model for offshore industry operations (for proposed co-located aquaculture platform, and other future scenarios).

Milestone Output 2

Offshore Renewable Energy Converter (OREC) designs, patents, and improvement in existing technologies with increased survivability and decreased environmental impact, capital, and operating costs.

Milestone Output 3

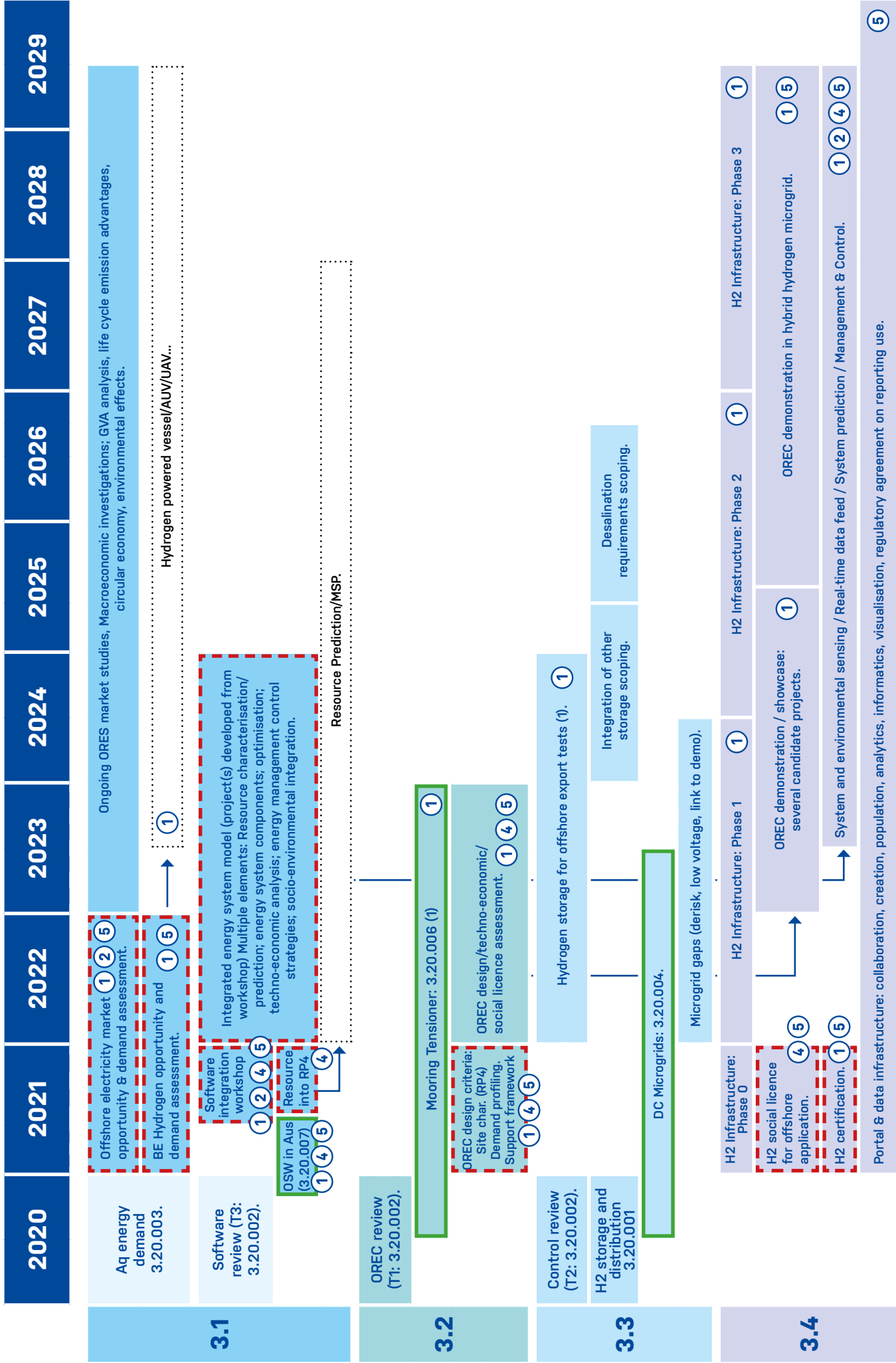
Designs, patents, energy management strategies, new and integrated technologies, suitable for the offshore environment, leading to a bench-scale test system and products such as micro-grid architecture, desalination, oxygen, hydrogen, ammonia, and other storage solutions, derived from Offshore Renewable Energy Systems (ORES).

Milestone Output 4

Successful proof of concept through field demonstration of the operation of novel ORES, and reporting findings and learnings (e.g. performance, system-scaling, installation, monitoring systems, licensing, risk management and mitigation, maintenance, end-user demands, and CAPEX and OPEX reductions).

Legacy

- Δ *Demonstration of ORE powering offshore industry (aquaculture or otherwise) – providing power to support growth of a diverse sustainable blue economy.*
- Δ *Maritime sector hydrogen demand established and being delivered to.*



Research Program 4



ENVIRONMENT AND ECOSYSTEMS

The Environment and Ecosystems program will evaluate the environmental footprint of the infrastructure, culture systems and energy generating devices used by offshore industries. The program connects with the Sustainable Offshore Developments program to develop management systems to monitor environmental impact and interactions with other sectors, and with Offshore Engineering, Seafood and Renewable Energy programs to monitor the impacts of the offshore environment on the health, maintenance and performance of species, infrastructure and devices respectively. Novel monitoring systems will be developed, including models and user interfaces to deliver real time data and information for use by government, industry, and the public.

Milestone Output 1

Multi-criteria regional marine spatial planning tool for the identification of regional areas that would support technical and economically feasible areas for integrated multiple-use platforms. This is including consideration for other users (and associated trade-offs), identification of desired environmental conditions, and a suite of potential indicators and reference points to be used to track operational performance and predicted impacts.

Milestone Output 2

Framework for assessing proposed offshore activities and supporting specific site selection. Constituent products include: systematic risk assessment process (hazard analysis, risk assessment, contingency and response identification); indicator identification and benchmarking; characterisation of site properties; and creation of reference cases and requirements for subsequent developments and assessments.

Milestone Output 3

Smart monitoring and information platforms, maximising probability of correctly attributing the cause of observed changes and enabling responsive operations. Automated data workflows feeding forecasting systems will result in model and data products, coordinated in centralised information platforms featuring in-built visualisation and processing, and a design focus on easing access and interoperability. This underlies a risk alert system and incident response platform.

Milestone Output 4

New understanding and prioritisation of environmental interactions with production in the novel offshore environment. This will include biosecurity (exposure and treatments) with regard to emerging and extant disease and parasite vectors, as well as interactions with wild flora and fauna – how they influence and are influenced by offshore production. New biosecurity protocols will leverage off the new understanding and new data types (accessed via RP4.3) to prioritise risk responses and operational procedures for stocks on production sites and in the immediate vicinity of platforms.

Milestone Output 5

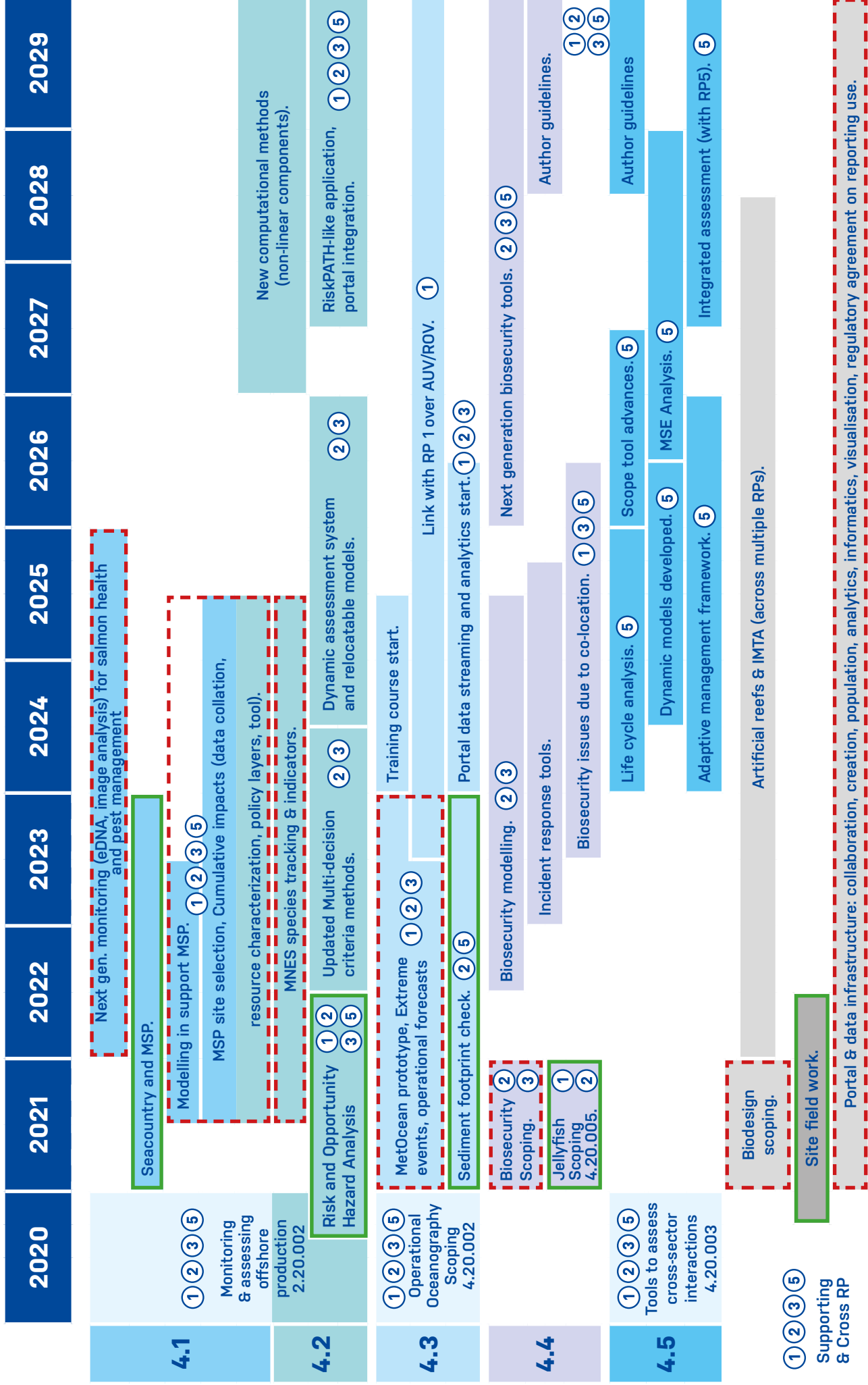
Understanding, tools, and guidelines pertaining to the benefits, drawbacks, and trade-offs associated with co-location of operations on multiple use platforms. This includes: social, economic, environmental footprint of platforms and their interaction with surrounding socio-ecological systems; life cycle, economic, and systems analysis procedures; reporting; and analyses of feasibility, returns on investment and public good comparison of offshore activities versus terrestrial or coastal industries.

Legacy

- △ *Australia its neighbours have a rapidly developing Blue Economy providing driving economic growth in coastal communities and equitably creating new jobs and opportunities delivered in a way that protects the underlying marine environment, biodiversity and ecosystem services.*
- △ *Not only designing infrastructure and technology that underpins the Blue Economy, allowing it to work with nature not against it, but also shaping the workforce and new skills required for sustainable offshore production.*
- △ *An adaptive roadmap and the necessary supporting toolbox to move towards co-location and offshore production that minimises the footprint while maximising the realised potential production.*

RP4 ROADMAP

Started Priority to get started in 2021 X RP Connections



Research Program 5



SUSTAINABLE OFFSHORE DEVELOPMENTS

The Sustainable Offshore Developments program will profile, and advocate for, the regulatory frameworks that will provide confidence for aquaculture and renewable energy industry to invest, while also giving the public confidence that offshore developments operate to the highest environmental standards for sustainability and ecosystem integrity. Strong linkages with the Environment and Ecosystems program in the design of appropriate monitoring and evaluation performance metrics, will support ongoing environmental assessment and health monitoring. Collaboratively with the Seafood and Marine Products and Ocean Renewable Energy Systems programs, this program will evaluate the performance of different aquaculture and offshore renewable energy systems as well as the financial, environmental and societal benefits of co-location and integration of activities across different users and different sectors.

Milestone Output 1

Assessment of the fit of legislative and policy frameworks for blue economy activities, evaluation of mechanisms in relation to management of risks in the implementation of integrated management, and development and application of policy tools to assess the effectiveness in meeting policy objectives.

Milestone Output 2

An integrated and planned approach to managing supply chains that includes the identification of potential synergies between marine and offshore energy and aquaculture systems that results in cost effectiveness. Proposing integrated systems and processes for supporting marine and offshore energy and aquaculture supply chain operations, including the proposed co-located platform.

Milestone Output 3

State of the blue economy reporting framework and regular reports. Mapping, assessing, and making recommendations for improvement to the Blue Economy Integrity Systems.

Milestone Output 4

Establishment of cost effective and robust economic assessments, and environmental management accounting systems for blue economy activities.

Milestone Output 5

Establishment of internal CRC research engagement and extension process. Establishment of research user forums and industry workshop to enhance capacity.

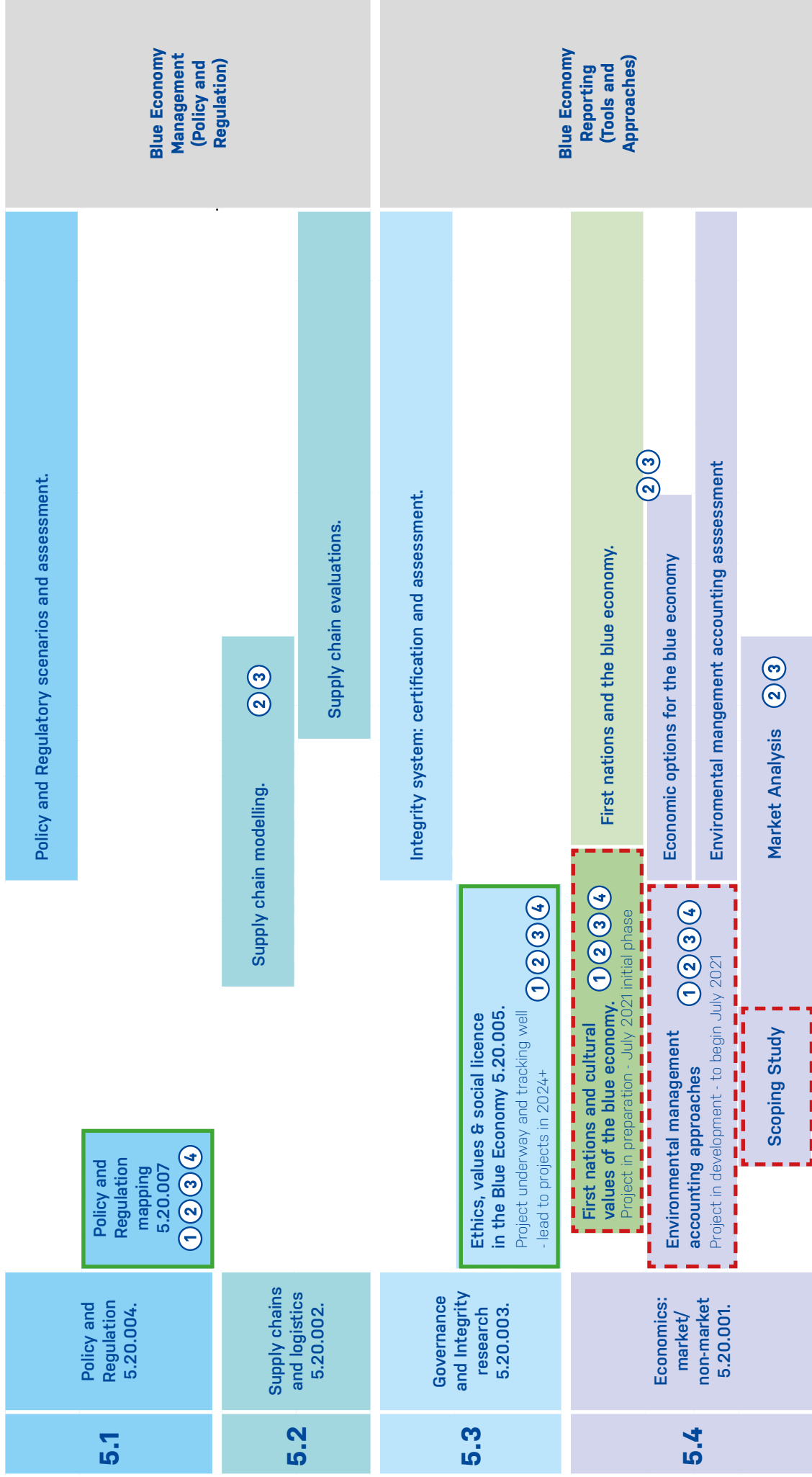
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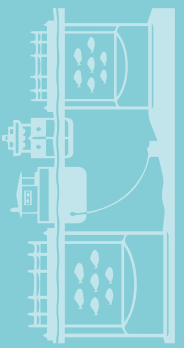

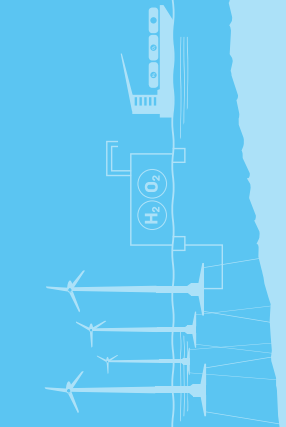


- △ *Achieve effective cross jurisdictional policy settings [and regulatory arrangements] that are coherent, cost effective, and support offshore blue economy activities.*
- △ *Development of state of the blue economy reporting, combining new and existing measures that includes social measures to support improved community understanding of the importance of blue economy activities.*

RP5 ROADMAP

Started
 Priority to get started in 2021
 X RP Connections

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
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RP1		RP1	<ul style="list-style-type: none"> » Seaweed hydrodynamics: attenuation benefits and resistance » Hydrodynamics of farm arrays » Optimising offshore growing infrastructure and farm arrays 	RP2		RP3	<ul style="list-style-type: none"> » Mooring design » Monitoring system loads, performance, reliability installation and commissioning » Operations and maintenance » Licensing and standards » Hazard identification, risk management » Integrated system design » Corrosion and biofouling 	RP4	<ul style="list-style-type: none"> » Environment site inputs » Environment design constraints » Site selection and zoning » Environment impact from structures » Structures enhancing ecosystems 	RP5	<ul style="list-style-type: none"> » Cost effective floating solutions » Supply chains » Logistics » Life cycle analysis » Policy and regulation on vessels, structures and operations » Social acceptability » First nations peoples
RP2	<ul style="list-style-type: none"> » Optimising aquaculture structure design » Environmental site condition inputs » Environmental design constraints » Fish behaviour in exposed sites » Feeding, bathing & harvesting » Environmental impact 	<ul style="list-style-type: none"> » Increase offshore energy and offset diesel consumption of offshore aquaculture operations » Oxygen application in aquaculture » Biomass for bioenergy generation » Co-location benefits / challenges » Desalination / freshwater needs 		<ul style="list-style-type: none"> » Environment site condition inputs » Environment design constraints » Site selection and zoning » Decision support tools for production and species selection » Minimising environment impact » Monitoring & biological risks offshore » Delivering IMTA 	<ul style="list-style-type: none"> » Policy and regulation on management of integrated aquaculture operations » Social acceptability » First nations peoples » Environmental and carbon accounting 						
RP3	<ul style="list-style-type: none"> » Scale, type, capacity of production / storage facilities » Energy demand estimation of farm infrastructure type (surface, subsea, fixed) » Operations and maintenance » Monitoring installation and commissioning » Novel materials 	<ul style="list-style-type: none"> » Seaweed hydrodynamic attenuation and renewable energy production » Wave-driven pump for seaweed production » Carbon sequestration » Oxygen for salmon aquaculture 	<ul style="list-style-type: none"> » Site characterisation » Marine Spatial Planning » Extreme events / survivability » Digital infrastructure » Resource assessment » Biofouling / antibiofouling coatings » Environmental impact (e.g. striking, noise) » Integrated system modelling » Integrated sensor networks » Decision support tools 	<ul style="list-style-type: none"> » Environment site inputs » Environment design constraints » Marine spatial planning and site selection » Energy resources map » Environment all impact assessment 	<ul style="list-style-type: none"> » Offshore electricity market assessments » Hydrogen utilisation market assessment » Value-Proposition » Market drivers for renewable energy transition » Supply chain and policy requirements » Social acceptability » First nations peoples 						
RP4	<ul style="list-style-type: none"> » Site characterisation » Marine Spatial Planning » Extreme events / survivability » Digital infrastructure » Autonomous systems » Biofouling / antibiofouling coatings 	<ul style="list-style-type: none"> » Site characterisation » Marine Spatial Planning » Digital Infrastructure » Decision support tools » Integrated system modelling » Integrated sensor networks » Environmental assessment » Biosecurity and incident response » Ecosystem services & IMTA Risk identification & mitigation 		<ul style="list-style-type: none"> » Decision support tools » Regulatory / legislative » Social acceptability » First nations peoples » Environmental and carbon accounting » Life cycle analysis 							
RP5	<ul style="list-style-type: none"> » AMSA rules and regulations for aquaculture marine vessels & AUVs » Economic assessment of biofouling mitigation » Emerging / drafted regulations for offshore activities » Social acceptability of emerging technologies 	<ul style="list-style-type: none"> » Emerging / drafted regulations for offshore energy activities » Permitting and Licensing » Social acceptability of emerging technologies » Market assessments » Supply chain development » Stakeholder engagement » Workforce profiling » Blue economy metrics 	<ul style="list-style-type: none"> » Decision support tools » Regulatory / legislative » Social acceptability » First nations peoples » Environmental and carbon accounting » Life cycle analysis 	<ul style="list-style-type: none"> » Decision support tools » Regulatory / legislative » Social acceptability » First nations peoples » Environmental and carbon accounting » Life cycle analysis 							



APPENDIX 3

Impact

Our Impact

Our Partners and the community will be demonstrably better off because of the application and utilisation of the results of the Blue Economy CRC and its activities.

Impact	Delivered through
Increase offshore aquaculture production and decrease production costs	<ul style="list-style-type: none"> △ Improved access to high energy and offshore sites through development and adoption of regulatory regimes △ Improvements in pen design △ Improvements in seafood production biology △ Improved biosecurity in offshore operations △ Reduced energy costs △ Cost savings from the use of autonomous systems
Increase offshore renewable energy generation and use (MWh)	<ul style="list-style-type: none"> △ Demonstration of renewable energy generation and storage collocated aquaculture △ Demonstration of a marinised hydrogen-based energy carrier △ Reduce diesel usage and emissions of offshore operations, including transportation
Increase sustainability and community trust in Blue Economy industries	<ul style="list-style-type: none"> △ Improved environmental management and incident response △ Efficient regulation and monitoring of offshore operations △ Social acceptance of Blue Economy industries △ Decarbonisation of seafood production
Increase regional economic growth	<ul style="list-style-type: none"> △ Opening up opportunities for new areas for offshore aquaculture and renewable energy production △ Facilitating new markets, supply chains and employment in renewables and aquaculture
Trained workforce for the future	<ul style="list-style-type: none"> △ Industry relevant job-ready PhD graduates △ Active industry participation in our knowledge sharing activities



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