

# Kes teeb, kus teeb, mida teeb? – meretehnoloogia ja katsealad lähiriikides

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## KES TEGI & MIDA TEGI?

## KES TEEB & MIDA TEEB?

2025

- Sinimajanduse publikatsioonide statistika & dünaamika (2000-2025) Läänemere piirkonnas
- **Milline on BSR riikide kompetentsid, fookused & T&A „kihi paksus“ sektorite lõikes**

- Eesti ja Läti 4-heeliksi sinimajanduse tehnoloogiate, vajaduste ja valmisolekute kaardistus
- **Mis on need tehnoloogiad, mida meil on vaja, ja milline on meie valmisolek selleks?**

## Marine Living Resources

- Fish farms
- Fisheries
- Sustainable aquaculture
- Marine biotechnology
- Aquaculture systems
- Fisheries management
- Integrated multi-trophic aquaculture
- Bycatch reduction
- Marine biomass valorization
- Algae cultivation
- Ocean pollution management
- Seafood processing
- Fish stock assessment
- Selective breeding aquaculture
- Fishmeal alternatives
- Sustainable seafood

## Marine Renewable Energy

- Offshore energy
- Blue renewable energy
- Offshore wind turbines
- Floating wind platforms
- Wave energy converters
- Underwater infrastructure
- Tidal stream generators
- offshore thermal energy
- Offshore hydrogen electrolysis
- Power-to-X offshore
- Hybrid marine energy systems
- Digital twin wind farms
- Predictive maintenance offshore
- Smart grid integration offshore
- Multi-use offshore platforms
- Energy storage offshore

## Maritime Transport

- Container shipping
- Green maritime shipping
- LNG bunkering
- Autonomous vessels
- Autonomous navigation systems
- Ship routing optimization
- Ballast water management
- Green shipping corridors
- Vessel traffic services
- Ship emissions monitoring
- Arctic shipping routes
- Short-sea shipping
- Digital shipping platforms
- Maritime cybersecurity
- Ship fuel efficiency
- Decarbonized shipping

## Port Activities

- Port automation
- Port digitalization
- Shore power systems
- Cargo handling automation
- Port logistics optimization
- Smart port technologies
- Cold chain logistics
- Port energy efficiency
- Port dredging operations
- Port resilience planning
- Port waste management
- Port digital twins
- Port emissions monitoring
- Port security systems
- Port-based hydrogen hubs
- Port multimodal integration

## Coastal Tourism

- Cruise tourism
- Coastal resilience
- Beach resort development
- Coastal ecotourism
- Marine recreational boating
- Diving tourism
- Coastal heritage tourism
- Blue flag beaches
- Sustainable coastal tourism
- Cruise port infrastructure
- Marine wildlife tourism
- Coastal destination branding
- Coastal tourism resilience
- Cruise ship emissions
- Coastal tourism digital platforms
- Underwater heritage tourism

## Shipbuilding and Repair

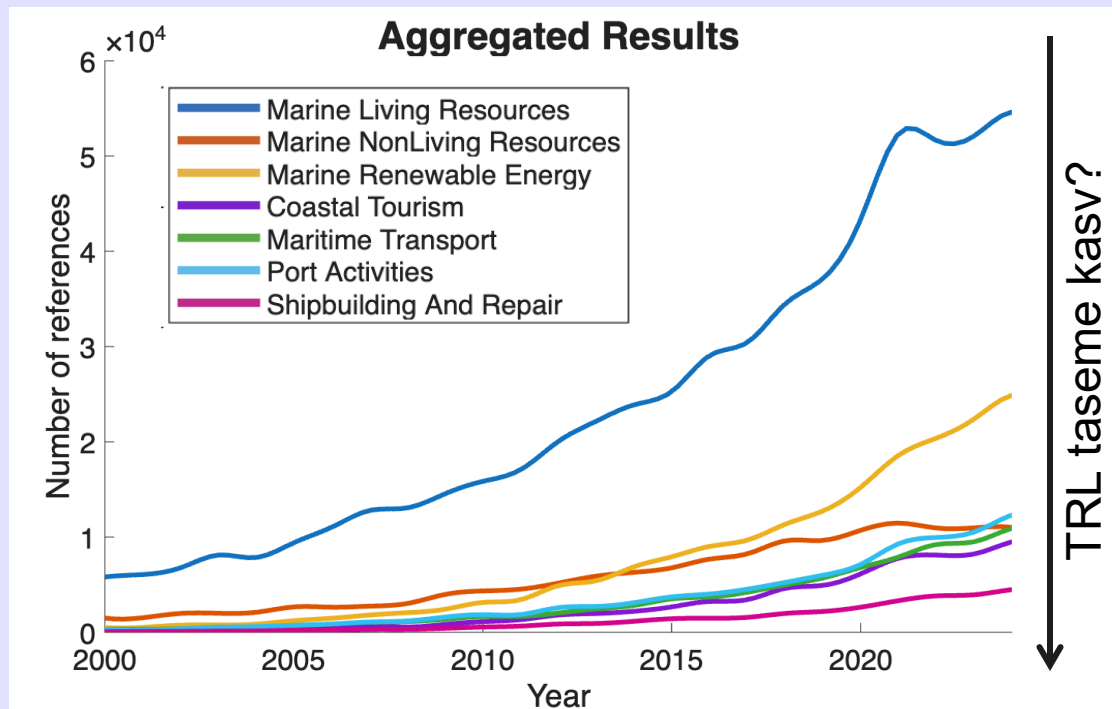
- Modular ship design
- Advanced shipbuilding materials
- Digitalization and Automation of ships
- zero-emission ship
- Alternative fuels in shipbuilding
- Hybrid propulsion systems
- Ship retrofitting technologies
- Hull coating innovations
- Ship hull optimization
- Ship recycling techniques
- Digital shipyard technologies
- Additive manufacturing in shipbuilding
- Ship structural health monitoring
- AI-aided ship design
- Ship noise reduction
- Ship lifecycle assessment

## Marine Non-Living Resources

- Marine rare earth minerals
- Offshore drilling
- Subsea mining
- Gas hydrate extraction
- Marine geophysics
- Seabed mineral nodules
- Offshore oil platforms
- Subsea pipeline engineering
- Salt evaporation ponds
- Marine seismic surveys
- Deep-sea dredging
- Offshore decommissioning
- Subsea well intervention
- Marine georesources
- Offshore exploration rigs
- Subsea production

systems

# ÜLDINE TREND SEKTORITE LÕIKES 2000-2024



**Mere elusressursid:** Ühtlaselt kasvav teadusuuringute fookus.

**Mere taastuenergia:** Järsk kasv alates 2015. aastast, kiireim kõigist sektoritest.

**Meretransport:** Kiirenemine pärast 2010. aastat tänu digitaliseerimisele ja süsinikujalajälje vähendamisele.

**Sadamategevus ja rannikuturism:** Mõõdukas, kuid stabiilne kasv.

**Laevaehitus ja -remont:** Aeglane kasvutrend, mida veavad rohetehnoloogiad ja automatiseerimine.

**Mere mitteelusressursid:** Aeglustumine, kuna fossiilkütuste kaevandamine kaotab prioriteedi.

# RIIKIDE AKTIIVSUS SINIMAJANDUSE SEKTORITES

## ❖ KO Selged liidrid domineerivad enamikke sektoreid

- *tugevad riiklikud investeeringud, väljakujunenud teadustaristule sinimajanduse valdkonnas*

## Sektoriaalne spetsialiseerumine

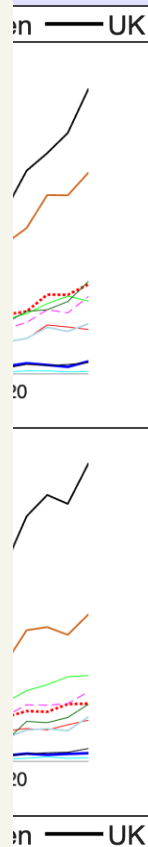
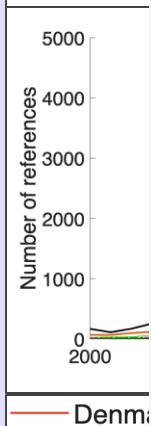
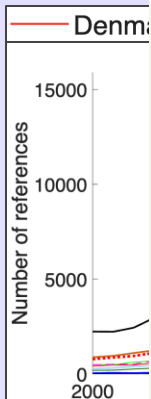
- *riigid näitavad suurt aktiivsust teatud sektorites (nt taastuvenergia või meretransport), kuid madalamat teistes, mis viitab spetsialiseerumisele vastavalt prioriteetidele või eelistele*

## Potentsiaal rahvusvaheliseks koostööks

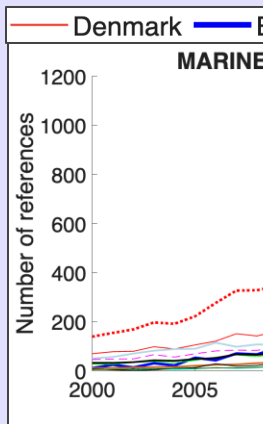
- *Teadustöö ebavõrdne jaotus viitab võimalustele teadmiste jagamiseks ja ühiste projektide elluviimiseks kõrge ja madala publikatsioonimahuga riikide vahel, et tasakaalustada ekspertiisi globaalselt.*

## Tõusvad panustajad

- *riigid, mille publikatsioonide arv on mõõdukas, kuid kasvav, võivad kujutada endast uusi tegijaid sinise majanduse teaduses, mis annab märku koostöövõimalustest tulevikus.*  
**Sellest annab parema ülevaate, kui vaatame suhtelist publitseerimist.**



# SUHTELINE AKTIIVSUS BE SEKTORITES



## Põhjamaad juhivad suhtelises arvestuses

- *Norra ja Taani paistavad silma peaaegu kõigis sektorites, kui arvestada elanike arvu, mis näitab tugevat T&A fookust elaniku kohta.*

## Eesti paistab silma oma väiksuse juures

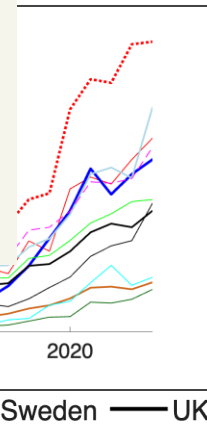
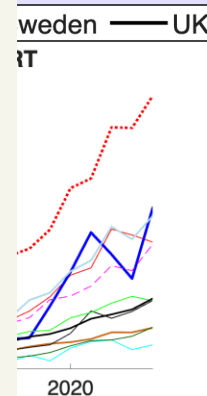
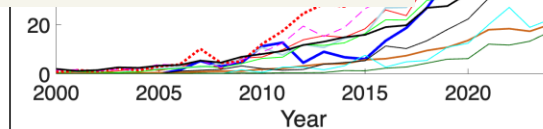
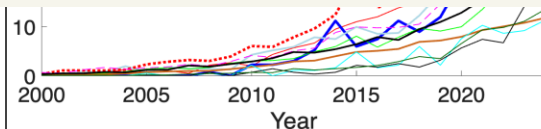
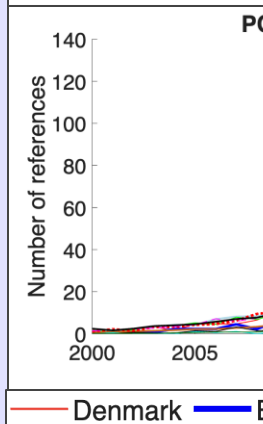
- *Vaatamata väikesele rahvaarvule näitab Eesti aktiivsust mitmes sektoris (nt sadamategevused ja laevaehitus)*

## Väiksemad riigid suudavad konkureerida

- *väiksemad riigid (nt Eesti, Läti) võivad saavutada tugeva suhtelise positsiooni niššides, mis võib pakkuda strateegilisi spetsialiseerumisvõimalusi.*

## Poliitika ja investeringute mõju

- *Kõrge suhteline aktiivsus korreleerub sageli sihipäraste riiklike poliitikate ja rahastusega sinimajanduse innovatsiooni jaoks*



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# TEHNOLOOGILISTE VAJADUSTE JA VALMISOLEKUTE KAARDISTUS? 2025+

## ❖ Tehnoloogiad BE sektorite lõikes:

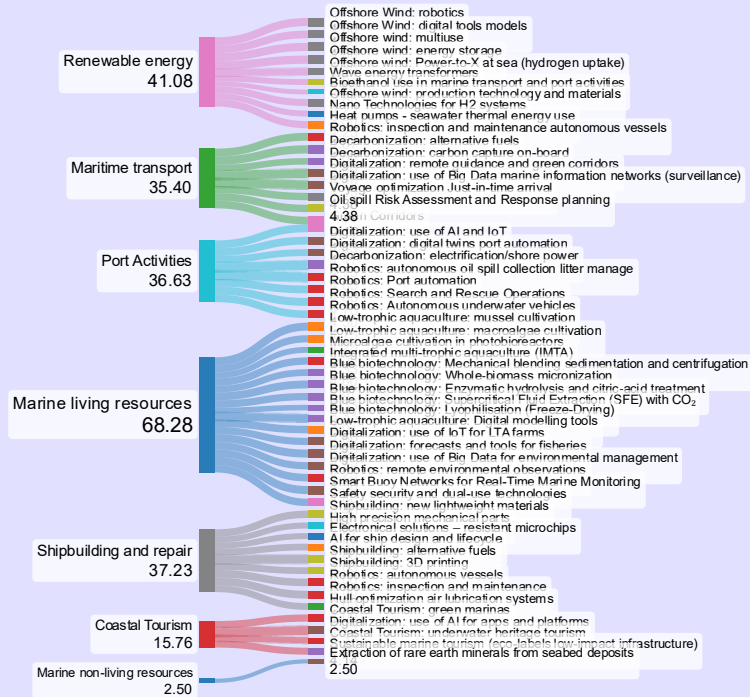
- *Marine Renewable Energy*
- *Maritime Transport*
- *Coastal Tourism*
- *Port Activities*
- *Shipbuilding and Repair*
- *Marine Living Resources*
- *Marine Non-Living Resources*

## ❖ Ca 50+tehnoloogiat

## ❖ 5 hindamiskriteeriumit

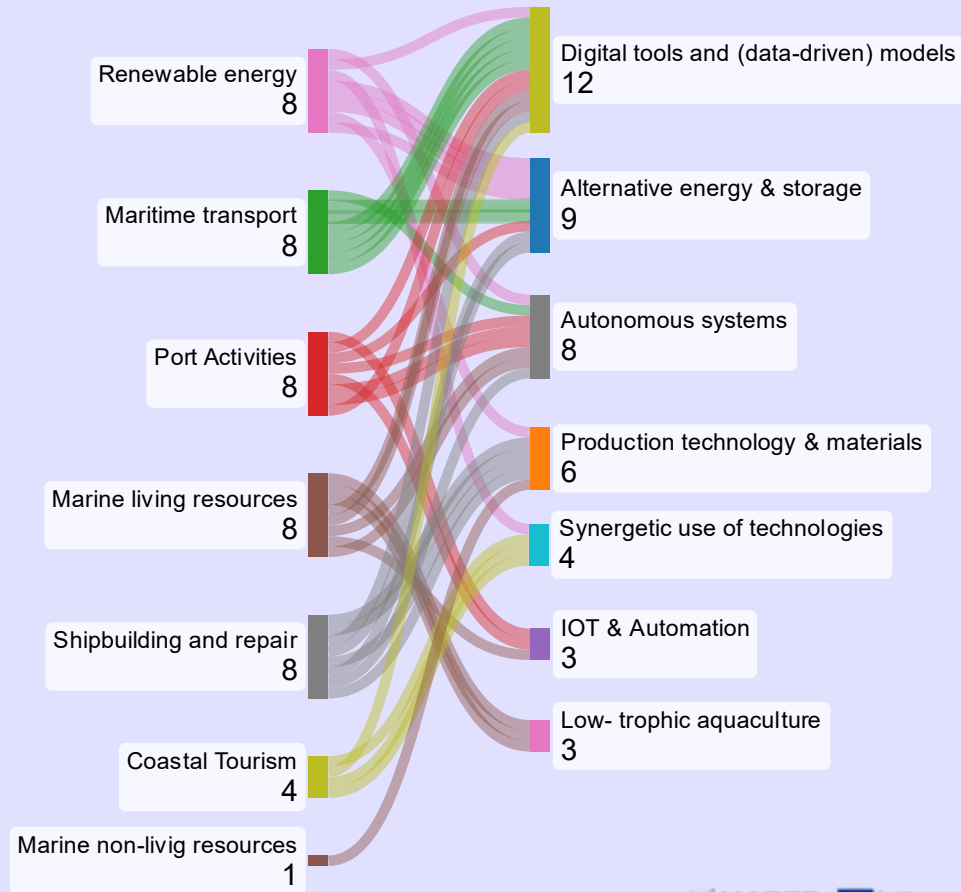
| ID | Technology                                             | Technology Group                  | Necessity for region | Infrastructure Compatibility | Environm. Benefit | Feasibility in Region | Local Innovation Ecosystem Readiness |
|----|--------------------------------------------------------|-----------------------------------|----------------------|------------------------------|-------------------|-----------------------|--------------------------------------|
| 1  | Renewable energy                                       |                                   |                      |                              |                   |                       |                                      |
| 1  | Offshore Wind: robotics                                | Autonomous systems                |                      |                              |                   |                       |                                      |
| 2  | Offshore Wind: digital tools, models                   | Digital tools and models          |                      |                              |                   |                       |                                      |
| 3  | Offshore wind: multiuse                                | Synergetic use of technologies    |                      |                              |                   |                       |                                      |
| 4  | Offshore wind: energy storage                          | Alternative energy & storage      |                      |                              |                   |                       |                                      |
| 5  | Offshore wind: Power-to-X at sea (hydrogen uptake)     | Alternative energy & storage      |                      |                              |                   |                       |                                      |
| 6  | Wave energy transformers                               | Alternative energy & storage      |                      |                              |                   |                       |                                      |
| 7  | Bioethanol use in marine transport and port activities | Alternative energy & storage      |                      |                              |                   |                       |                                      |
| 8  | Offshore wind: production technology and materials     | Production technology & materials |                      |                              |                   |                       |                                      |
| 9  | Nano Technologies for H2 systems                       | Alternative energy & storage      |                      |                              |                   |                       |                                      |
| 10 | Heat pumps - seawater thermal energy use               | Alternative energy & storage      |                      |                              |                   |                       |                                      |
| 2  | Maritime transport                                     |                                   |                      |                              |                   |                       |                                      |
| 1  | Robotics: inspection and maintenance - autonomous      | Autonomous systems                |                      |                              |                   |                       |                                      |
| 2  | Decarbonization: alternative fuels                     | Alternative energy & storage      |                      |                              |                   |                       |                                      |
| 3  | Decarbonization: carbon capture on-board               | Alternative energy & storage      |                      |                              |                   |                       |                                      |
| 4  | Digitalization: remote guidance and green              | Digital tools and models          |                      |                              |                   |                       |                                      |

# Tehnoloogiate gruppeerimine



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❖ Ülevaate saamiseks jagasime tehnoloogiad jagatud 7 tehnoloogilisse gruppi



# HINDAMISMAATRIKS

VAJALIKKUS

TEOSTATAVUS  
& VALMISOLEK

| BLUE ECONOMY SECTOR     | TECHNOLOGY GROUP                  | Necessity for region | Environmental benefit | Feasibility in Region | Infrastructure Compatibility | Local Innovation Ecosystem readiness |                                                         |
|-------------------------|-----------------------------------|----------------------|-----------------------|-----------------------|------------------------------|--------------------------------------|---------------------------------------------------------|
|                         |                                   |                      |                       |                       |                              |                                      | <b>Renewable energy</b>                                 |
| Renewable energy        | Autonomous systems                | 4.80                 | 4.30                  | 4.50                  | 3.00                         | 3.60                                 | Offshore Wind: robotics                                 |
| Renewable energy        | Digital tools and models          | 4.56                 | 4.22                  | 4.22                  | 3.56                         | 3.56                                 | Offshore Wind: digital tools/models                     |
| Renewable energy        | Synergistic use of technologies   | 4.80                 | 4.40                  | 4.30                  | 3.44                         | 3.30                                 | Offshore wind: multiuse                                 |
| Renewable energy        | Alternative energy & storage      | 4.90                 | 4.40                  | 3.80                  | 2.56                         | 3.10                                 | Offshore wind: energy storage                           |
| Renewable energy        | Alternative energy & storage      | 3.67                 | 3.89                  | 2.56                  | 1.78                         | 2.67                                 | Offshore wind: Power-to-X (hydrogen uptake)             |
| Renewable energy        | Alternative energy & storage      | 3.50                 | 4.00                  | 2.60                  | 2.60                         | 2.30                                 | Wave energy transformers                                |
| Renewable energy        | Alternative energy & storage      | 2.88                 | 4.00                  | 3.13                  | 2.13                         | 3.25                                 | Transportation: port activities                         |
| Renewable energy        | Production technology & materials | 4.22                 | 3.67                  | 3.33                  | 2.89                         | 3.11                                 | Offshore wind: production technology and materials      |
| Renewable energy        | Alternative energy & storage      | 3.50                 | 3.75                  | 2.13                  | 2.38                         | 2.63                                 | Nano Technologies for H2 systems                        |
| Renewable energy        | Alternative energy & storage      | 4.25                 | 3.63                  | 3.38                  | 3.29                         | 3.14                                 | Heat pumps - seawater thermal energy use                |
|                         |                                   |                      |                       |                       |                              |                                      | <b>Maritime transport</b>                               |
| Maritime transport      | Autonomous systems                | 4.67                 | 3.88                  | 4.25                  | 3.38                         | 3.50                                 | Robotics: inspection and maintenance autonomous systems |
| Maritime transport      | Alternative energy & storage      | 4.89                 | 4.88                  | 3.88                  | 2.38                         | 2.50                                 | Digitalisation: alternative fuels                       |
| Maritime transport      | Alternative energy & storage      | 3.89                 | 3.50                  | 2.88                  | 2.71                         | 3.25                                 | Digitalisation: carbon capture and storage              |
| Maritime transport      | Digital tools and models          | 4.38                 | 3.86                  | 3.86                  | 3.29                         | 4.14                                 | Synergistic use of technologies                         |
| Maritime transport      | Data-driven models                | 4.25                 | 3.71                  | 3.86                  | 3.86                         | 3.86                                 | Alternative energy & storage                            |
| Maritime transport      | Digital tools and models          | 4.56                 | 4.56                  | 4.44                  | 3.67                         | 3.67                                 | Production technology & materials                       |
| Maritime transport      | Data-driven models                | 4.38                 | 4.00                  | 4.57                  | 3.86                         | 4.00                                 | Alternative energy & storage                            |
| Maritime transport      | Digital tools and models          | 4.38                 | 4.88                  | 4.25                  | 3.63                         | 4.13                                 | Alternative energy & storage                            |
|                         |                                   |                      |                       |                       |                              |                                      | <b>Port Activities</b>                                  |
| Port Activities         | IoT & Automation                  | 4.63                 | 4.13                  | 4.75                  | 4.25                         | 4.00                                 | Digitalisation: use of AI and IoT                       |
| Port Activities         | Digital tools and models          | 4.11                 | 4.22                  | 4.67                  | 4.11                         | 3.86                                 | Digitalisation: digitalisation port activities          |
| Port Activities         | Alternative energy & storage      | 4.75                 | 4.75                  | 4.25                  | 3.00                         | 2.88                                 | Digitalisation: digitalisation port activities          |
| Port Activities         | Autonomous systems                | 4.63                 | 4.63                  | 4.38                  | 3.38                         | 3.63                                 | Robotics: inspection and maintenance autonomous systems |
| Port Activities         | IoT & Automation                  | 4.63                 | 4.00                  | 4.63                  | 3.86                         | 3.63                                 | Digitalisation: digitalisation port activities          |
| Port Activities         | Autonomous systems                | 4.75                 | 3.88                  | 4.13                  | 3.75                         | 3.25                                 | Robotics: Search and Rescue Operations                  |
| Port Activities         | Autonomous systems                | 4.50                 | 3.75                  | 4.13                  | 3.38                         | 3.13                                 | Robotics: Autonomous underwater vehicles                |
| Port Activities         | Digital tools and models          | 4.63                 | 4.75                  | 4.38                  | 3.75                         | 4.00                                 | Digitalisation: digitalisation port activities          |
|                         |                                   |                      |                       |                       |                              |                                      | <b>Marine living resources</b>                          |
| Marine living resources | Low trophic aquaculture           | 4.67                 | 4.67                  | 3.67                  | 4.00                         | 3.00                                 | Low trophic aquaculture: marine aquaculture             |
| Marine living resources | Low trophic aquaculture           | 4.00                 | 4.00                  | 2.67                  | 4.00                         | 2.00                                 | Low trophic aquaculture: marine aquaculture             |
| Marine living resources | Low trophic aquaculture           | 3.33                 | 3.00                  | 2.67                  | 3.00                         | 3.00                                 | Marine living resources: marine aquaculture             |
| Marine living resources | Low trophic aquaculture           | 4.00                 | 4.50                  | 3.00                  | 3.50                         | 2.00                                 | Marine living resources: marine aquaculture             |
| Marine living resources | Low trophic aquaculture           | 3.50                 | 3.50                  | 3.00                  | 3.00                         | 3.00                                 | Marine living resources: marine aquaculture             |

| BLUE ECONOMY SECTOR | TECHNOLOGY GROUP                       | Necessity for region | Environm. Benefit | Feasibility in Region | Infrastructure Compatibility | Local Innovation Ecosystem Readiness | Necessity/Innov.Ecosys | Env.benefit/Innov. v. Ecosys | Technology name                                         |
|---------------------|----------------------------------------|----------------------|-------------------|-----------------------|------------------------------|--------------------------------------|------------------------|------------------------------|---------------------------------------------------------|
|                     |                                        |                      |                   |                       |                              |                                      |                        |                              | <b>Renewable energy</b>                                 |
| Renewable energy    | Autonomous systems                     | 4.80                 | 4.30              | 4.50                  | 3.00                         | 3.60                                 | 1.33                   | 1.19                         | Offshore Wind: robotics                                 |
| Renewable energy    | Digital tools and (data-driven) models | 4.56                 | 4.22              | 4.22                  | 3.56                         | 3.56                                 | 1.28                   | 1.19                         | Offshore Wind: digital tools, models                    |
| Renewable energy    | Synergistic use of technologies        | 4.80                 | 4.40              | 4.30                  | 3.44                         | 3.30                                 | 1.45                   | 1.33                         | Offshore wind: multiuse                                 |
| Renewable energy    | Alternative energy & storage           | 4.90                 | 4.40              | 3.80                  | 2.56                         | 3.10                                 | 1.58                   | 1.42                         | Offshore wind: energy storage                           |
| Renewable energy    | Alternative energy & storage           | 3.67                 | 3.89              | 2.56                  | 1.78                         | 2.67                                 | 1.38                   | 1.46                         | Offshore wind: Power-to-X at sea (hydrogen uptake)      |
| Renewable energy    | Alternative energy & storage           | 3.50                 | 4.00              | 2.60                  | 2.60                         | 2.30                                 | 1.52                   | 1.74                         | Wave energy transformers                                |
| Renewable energy    | Alternative energy & storage           | 2.88                 | 4.00              | 3.13                  | 2.13                         | 3.25                                 | 0.88                   | 1.23                         | Bioethanol use in marine transport and port activities  |
| Renewable energy    | Production technology & materials      | 4.22                 | 3.67              | 3.33                  | 2.89                         | 3.11                                 | 1.36                   | 1.18                         | Offshore wind: production technology and materials      |
| Renewable energy    | Alternative energy & storage           | 3.50                 | 3.75              | 2.13                  | 2.38                         | 2.63                                 | 1.33                   | 1.43                         | Nano Technologies for H2 systems                        |
| Renewable energy    | Alternative energy & storage           | 4.25                 | 3.63              | 3.38                  | 3.29                         | 3.14                                 | 1.35                   | 1.15                         | Heat pumps - seawater thermal energy use                |
|                     |                                        |                      |                   |                       |                              |                                      |                        |                              | <b>Maritime transport</b>                               |
| Maritime transport  | Autonomous                             | 4.67                 | 3.88              | 4.25                  | 3.38                         | 3.50                                 | 1.33                   | 1.19                         | Robotics: inspection and maintenance autonomous systems |

# TEHNOLOOGIAD: VAJADUS JA VALMISOLEK

## SEKTOR

## VAJADUS

## VALMISOLEK

Renewable energy  
4.69

IOT & Automation  
4.68

Digital tools and (data-driven) models  
3.65



Kõrge vajadus + madal valmisolek = arendada, koostööd teha või sisse osta

Maritime transport  
3.36

- *Low-trophic aquaculture*
- *Alternative energy & storage*
- *Autonomous systems*

Port Activities  
6.07

Kõrge vajadus + keskmine valmisolek = rakendamine ja tootestamine

- *Digital tools*
- *IoT & Automation*

Marine living resources  
8.07

Alternative energy & storage  
4.32

Shipbuilding and repair  
4.57

Synergetic use of technologies  
4.05

Production technology & materials  
3.77

Coastal Tourism  
3.21

Marine non-livig resources  
0.42

KASVA  
VALMIS

Alternative energy & storage  
2.97

Production technology & materials  
2.92

Low- trophic aquaculture  
2.59

# TEHNOLOOGIAD: SUUR VAJADUS

## CRITERIA 1

**Necessity for  
region**

### MARINE LIVING RESOURCES

| Technology Group         | Technology Name                                     | Score |
|--------------------------|-----------------------------------------------------|-------|
| IOT & Automation         | Smart Buoy Networks for Real-Time Marine Monitoring | 4.80  |
| Low- trophic aquaculture | Low-trophic aquaculture: mussel cultivation         | 4.75  |
| Digital tools and models | Digitalization: forecasts and tools for fisheries   | 4.75  |
| Low- trophic aquaculture | Blue biotechnology for valorisation of blue biomass | 4.67  |
| Digital tools and models | Low-trophic aquaculture: Digital modelling tools    | 4.50  |

### MARITIME TRANSPORT

| Technology Group             | Technology Name                                         | Score |
|------------------------------|---------------------------------------------------------|-------|
| Alternative energy & storage | Decarbonization: alternative fuels                      | 4.89  |
| Autonomous systems           | Robotics: inspection and maintenance autonomous vessels | 4.67  |
| Digital tools and models     | Green Corridors                                         | 4.56  |
| Digital tools and models     | Digitalization: remote guidance and green corridors     | 4.38  |
| Data-driven models           | Voyage optimization, Just-in-time arrival               | 4.38  |

### PORT ACTIVITIES

| Technology Group             | Technology Name                                          | Score |
|------------------------------|----------------------------------------------------------|-------|
| Alternative energy & storage | Decarbonization: electrification/shore power             | 4.75  |
| Autonomous systems           | Robotics: Search and Rescue Operations                   | 4.75  |
| IOT & Automation             | Digitalization: use of AI and IoT                        | 4.63  |
| Autonomous systems           | Robotics: autonomous oil spill collection, litter manage | 4.63  |
| IOT & Automation             | Robotics: Port automation                                | 4.63  |

# TEHNOLOOGIAD: SUUR VAJADUS

## CRITERIA 1

**Necessity for  
region**

### RENEWABLE ENERGY

| Technology Group               | Technology Name                          | Score |
|--------------------------------|------------------------------------------|-------|
| Alternative energy & storage   | Offshore wind: energy storage            | 4.90  |
| Autonomous systems             | Offshore Wind: robotics                  | 4.80  |
| Synergetic use of technologies | Offshore wind: multiuse                  | 4.80  |
| Digital tools and models       | Offshore Wind: digital tools, models     | 4.56  |
| Alternative energy & storage   | Heat pumps - seawater thermal energy use | 4.25  |

### SHIPBUILDING AND REPAIR

| Technology Group                  | Technology Name                          | Score |
|-----------------------------------|------------------------------------------|-------|
| Alternative energy & storage      | Shipbuilding: alternative fuels          | 4.63  |
| Autonomous systems                | Robotics: inspection and maintenance     | 4.63  |
| Alternative energy & storage      | Automation, robotics, autonomous vessels | 4.50  |
| Production technology & materials | Lightweight materials                    | 4.33  |
| Digital tools and models          | AI for ship design and lifecycle         | 4.00  |

### COASTAL TOURISM

| Technology Group               | Technology Name                                                    | Score |
|--------------------------------|--------------------------------------------------------------------|-------|
| Digital tools and models       | Digitalization: use of AI for apps and platforms                   | 4.33  |
| Synergetic use of technologies | Coastal Tourism: green marinas                                     | 4.29  |
| Synergetic use of technologies | Sustainable marine tourism (eco-labels, low-impact infrastructure) | 4.14  |
| Synergetic use of technologies | Coastal Tourism: underwater heritage tourism                       | 3.00  |
| Digital tools and models       | Digitalization: use of AI for apps and platforms                   | 4.33  |

# TEHNOLOGIAD: NÖRK VALMISOLEK

## CRITERIA 6

### Necessity/ Innov.Ecosys

#### MARINE LIVING RESOURCES

| Technology Group         | Technology Name                                 | Score |
|--------------------------|-------------------------------------------------|-------|
| Low- trophic aquaculture | Integrated multi-trophic aquaculture (IMTA)     | 2.17  |
| Low- trophic aquaculture | Low-trophic aquaculture: macroalgae cultivation | 2.13  |
| IOT & Automation         | Digitalization: use of IoT for LTA farms        | 1.89  |
| Autonomous systems       | Robotics: remote environmental observations     | 1.80  |
| Low- trophic aquaculture | Low-trophic aquaculture: mussel cultivation     | 1.73  |

#### MARITIME TRANSPORT

| Technology Group             | Technology Name                                              | Score |
|------------------------------|--------------------------------------------------------------|-------|
| Alternative energy & storage | Decarbonization: alternative fuels                           | 1.96  |
| Autonomous systems           | Robotics: inspection and maintenance autonomous vessels      | 1.33  |
| Digital tools and models     | Green Corridors                                              | 1.24  |
| Alternative energy & storage | Decarbonization: carbon capture on-board                     | 1.20  |
| Data-driven models           | Digitalization: use of Big Data, marine information networks | 1.10  |

#### PORT ACTIVITIES

| Technology Group             | Technology Name                                          | Score |
|------------------------------|----------------------------------------------------------|-------|
| Alternative energy & storage | Decarbonization: electrification/shore power             | 1.65  |
| Autonomous systems           | Robotics: Search and Rescue Operations                   | 1.46  |
| Autonomous systems           | Robotics: Autonomous underwater vehicles                 | 1.44  |
| Autonomous systems           | Robotics: autonomous oil spill collection, litter manage | 1.28  |
| IOT & Automation             | Robotics: Port automation                                | 1.28  |

# TEHNOLOOGIAD: NÕRK VALMISOLEK

CRITERIA 6

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## RENEWABLE ENERGY

| Technology Group                  | Technology Name                                    | Score |
|-----------------------------------|----------------------------------------------------|-------|
| Alternative energy & storage      | Offshore wind: energy storage                      | 1.58  |
| Alternative energy & storage      | Wave energy transformers                           | 1.52  |
| Synergetic use of technologies    | Offshore wind: multiuse                            | 1.45  |
| Alternative energy & storage      | Offshore wind: Power-to-X at sea (hydrogen uptake) | 1.38  |
| Production technology & materials | Offshore wind: production technology and materials | 1.36  |

## SHIPBUILDING AND REPAIR

| Technology Group                  | Technology Name                            | Score |
|-----------------------------------|--------------------------------------------|-------|
| Digital tools and models          | AI for ship design and lifecycle           | 1.56  |
| Alternative energy & storage      | Shipbuilding: alternative fuels            | 1.54  |
| Autonomous systems                | Robotics: inspection and maintenance       | 1.42  |
| Production technology & materials | Hull optimization, air lubrication systems | 1.33  |
| Production technology & materials | Shipbuilding: new lightweight materials    | 1.30  |

## COASTAL TOURISM

| Technology Group             | Technology Name                                          | Score |
|------------------------------|----------------------------------------------------------|-------|
| Alternative energy & storage | Decarbonization: electrification/shore power             | 1.65  |
| Autonomous systems           | Robotics: Search and Rescue Operations                   | 1.46  |
| Autonomous systems           | Robotics: Autonomous underwater vehicles                 | 1.44  |
| Autonomous systems           | Robotics: autonomous oil spill collection, litter manage | 1.28  |
| IOT & Automation             | Robotics: Port automation                                | 1.28  |

# Kes teeb, kus teeb, mida teeb? – meretehnoloogia ja katsealad lähiriikides

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