FLxDeep

ROUNDTABLE ON SUSTAINABILITY DEVELOPMENT IN THE MARITIME COMMUNITY OF THE TURKU REGION

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Climate-KIC

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UNIVERSITY OF TURKU

FINLAND FUTURES RESEARCH CENTRE

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This roundtable was a program of the **FLxDeep Consortium**, co-funded by EIT Climate KIC and six EIT Climate KIC partner organizations.

What happened?

The goal of bringing together this group of experts was to create a space for an informal discussion about practical approaches to making our community more sustainable, in light of the local needs and possibilities of the Turku region and especially through exploring what new directions might be taken in the maritime sector.

As the beginning of a conversation on new initiatives and projects, it was emphasized that ideas in very initial stages were also valuable. The hope was to bring out thoughts about what could be interesting and productive to work on together in the future.

Our host **Leena Jokinen** (University of Turku - Finland Futures Research Centre) opened this event, explaining its connection to two ongoing projects happening at Finland Futures Research Centre at the University of Turku in collaboration with multiple partners: **FLxDeep** (Futures Literacy across the Deep Demonstrations) & **SusCon** (Sustainable Shipbuilding Concept Creation).

Leena began by asking all of the participants “Have you spotted something recently that surprised you or was novel to you in your organization?” Taking the many fascinating answers to this question as starting points, discussion continued with a round of short introductions by the participants, who each highlighted how sustainability concerns are being taken up in their work.

What kinds of topics were discussed?

All of the participants agreed that sustainability is an important and worthwhile goal that shows up in their everyday decision-making in different forms. The topics they chose to raise included:

Sustainability Concerns

DECARBONIZATION GOALS

It is surprising that even as much of the world is standing still and travel has declined precipitously, there has not been much impact on greenhouse gases (GHGs). We are still consuming too much. Goals for 2030 and 2050 will take hard work, as we are eventually aiming for a 50-70 percent reduction of greenhouse gas emissions. At the European level, air quality and climate change have been top priorities since 2019 for European ports (see ESPO study).

The City of Turku is aiming to be Carbon Neutral by 2029 (one reason for choosing that year in particular is that it will be Turku's 800th anniversary). This is an ambitious goal whose end date will arrive before we know it. Beyond this goal, Turku intends to continue work to produce no emissions and no waste by 2040, which will require widespread changes across entire systems.

Decarbonization is at the heart of discussion right now in shipyard operations and in the workings of ships themselves. Low-sulfur fuels, digital twins, and energy efficiency measures are some of the approaches already on the table.

ECOLOGY OF THE ARCHIPELAGO SEA

Eutrophication has been a long-time issue in the marine environment of the archipelago, where the Finnish government is spending millions to use gypsum to absorb excess phosphorus. Other sustainability concerns include plastic waste thrown overboard from ships, the risk of oil spills, underwater noise, and ship scrubbers that wash emissions into the sea instead of releasing them into the air.

One project aimed at improving the state of the archipelago sea is the Åland Sea Map. This project maps marine area habitats and performs analyses to select sites for protection based on a better understanding of both nature values and human pressures.

ESTABLISHING PROTECTED MARINE AREAS

By 2030, the EU's goal is to extend protections to 30% of its marine area. This will require efforts from all sectors, and will be a major undertaking for authorities in Finland because a lot of water areas here are privately owned.

SOCIAL AND ECONOMIC SUSTAINABILITY

There is also the human side of sustainability to consider. For example, Meyer Turku's operations in Perno involve 5,000 daily workers, 3,000 of which are employed by suppliers.

Possible Leverage Points and Solutions

TURKU AS A "LIGHTHOUSE CITY"

Turku has been very effective at securing funds through EU projects. Its proposal was one of the few Horizon 2020 lighthouse projects that were funded. As one of the participants remarked: "All eyes are on us at the moment." This was seen as making for a good opportunity to stretch for difficult aspirations and pilot new solutions.

However, some participants felt that better use could be made of Turku's good reputation as a "climate city" than has happened so far. It was suggested that this be taken up in companies' internal discussions.

COMMUNITY-LED INITIATIVES

Community-led initiatives are coming gradually to be more central to discussions of how to achieve zero-carbon transitions. Until a few years ago, these types of projects were on the fringes. Now, important solutions are being developed by local communities, and some of them are ready to be replicated elsewhere (see e.g. ECOLISE).

Citizen eco-villages are coming to the forefront as developers of solutions for circular economies and around conflict and ecological management. Last

year, the Port of Valencia connected with a local citizen initiative that uses open-source machines to break down plastic waste and 3-D print new urban infrastructure such as benches and small wind turbines.

SUSTAINABILITY STRATEGIES WITHIN SHIPBUILDING COMPANIES

Sustainability has been identified as one of the more important aspects for shipbuilding businesses. Companies that have not previously had cohesive sustainability strategies are starting work to develop them, hoping to include many types of stakeholders into their processes and anchor them in the larger sustainability issues faced by the Turku region.

Shipbuilding companies have several kinds of sustainability concerns. Pollution from physical operations needs to be prevented wherever possible and collected quickly and thoroughly if it occurs, as it concerns all their neighbors. Wasteful energy usage and emissions need to be combated as well. While shipbuilding companies sometimes struggle to enforce all their own regulations within their extensive supplier network, they nevertheless feel the ultimate moral responsibility for what goes on in the shipyard.

EMISSIONS TRADING SYSTEMS

It is possible that developing a market-based emissions trading system for shipping might achieve faster emissions reduction results than IMO regulations, which are seen as very slow-moving and inflexible.

RESEARCH AND INNOVATION PLATFORMS

Key to developing new sustainability solutions and keeping local industry competitive on a global level will be innovation platforms such as Turku Science Park (a regional business development company owned by the City of Turku) and a proposed Blue Industry park focused on the maritime sector. Without these kinds of entities, projects remain fragmented and funding uncoordinated.

Maersk has established a center for zero-carbon shipping in Denmark. Participants asked whether Turku could do something similar, or find ways to collaborate with this institution, for instance by establishing a joint venture with their scientists and researchers to serve other Nordic cities.

CIRCULAR ECONOMY

The City of Turku is working on a circular economy roadmap that will be launched next year. Its view is that the idea of “resource wisdom” covers every field.

Some connection to circular economy can be seen in SSAB plans to change steel production methods to be fossil-free rather than using coking coal. This will have an effect on maritime logistics in the Baltic Sea as coal and iron ore shipping in the region decline. At the same time, new steel production methods would have a significant effect on the carbon footprint of ship construction.

So far no firm guidelines on circular economy in port contexts has come from the national level, and the Port of Turku has not yet incorporated major circular economy initiatives.

COOPERATION BETWEEN SHIPPING COMPANIES AND PORTS

Ports link sea and land operations (through warehousing, for example). At the moment, the focus is primarily on what changes can be made on land. Dredging is a key issue, as fairways have to be kept in good shape, but it is not obvious where dredging mass should be disposed of responsibly. Currently, it has been decided to locate dredged material somewhere on land, but a suitable site still needs to be found. Noise pollution from ports is another factor, especially where it occurs close to protected ecological areas on the island of Ruissalo.

Energy efficiency in warehouses and cranes could be improved, and plans are in the works to use solar power for these purposes. Onshore power supply for electric ships would be quite complicated and require new investment.

There is a clear need for cooperation between the shipping sector and ports. At the moment, ports seem to be waiting to see what changes shipping companies intend to make. Eventually, discounts on fee and charges could be offered for ships that reduce emissions.

NEW FUEL AND POWER TECHNOLOGIES

Power2X technology development is an interesting opportunity. It employs electrolysis to produce hydrogen fuels that can be used flexibly across differ-

ent sectors, complementing other energy storage strategies. There are beginning to be real development projects in this area, which compares favorably to battery systems in terms of sustainability, and suggests the possibility that fuel harvested from the sea could be used in a clean way on ships. By contrast, electrified systems would require a lot of new infrastructure from ports.

Viking Grace was the first liquified natural gas (LNG) powered passenger ship operating. At the moment, LNG is the main fuel intended for use by cruise ships currently on order.

Interestingly, some old technologies are resurfacing as possible alternative solutions in the area of energy production. Some of these solutions have been available for years.

USE OF INFORMATION SYSTEMS

Information system utilization is rather poor in processes surrounding new ship construction. There is too much warehousing, too much transportation, low material utilization, and long lead-times, all of which could potentially be improved through better information management. Networks of subcontractors do one-third to one-half of the construction work on ships and are not as sophisticated in their use of IT systems as the big shipbuilding companies. Production and material management could be streamlined, reducing structural waste in the supply chain. Refurbishment projects have much tighter schedules and shorter lead times already.

Improving performance through IT systems is one avenue through which cost reductions and sustainability improvements can possibly go hand in hand. This can also provide an edge in global competition, since Finland has more expensive costs in general for labor and heating than shipyards in Asia.

INVOLVING URBAN CITIZENS IN CLIMATE WORK

At the City of Turku right now, special emphasis is being put on having businesses and citizens involved in climate work, which is needed to reach its ambitious goals.

Presentations

After the initial round of opening up new topics and key issues, two presentations were given outlining tools that might be of use in developing the systems innovations needed to achieve sustainability transitions in the Turku region.

EIT Climate KIC and the Net Zero Emissions Maritime Hubs Deep Demonstration

The first presentation was given by **Maria Loloni** (European Institute for Technology - Climate Knowledge and Innovation Community), Program Director for the Maritime Hubs Deep Demonstration. Maria outlined EIT Climate KIC's approach to systems innovation.

EIT Climate KIC argues that systemic change requires a different order of innovation in shifting from an incremental to a transformational approach. By acting on a wide array of change levers at the same time, instead of focusing primarily on technology, EIT Climate KIC aims to achieve "Transformation in Time," envisioning a circular, inclusive, resilient, and net-zero carbon future. The Deep Demonstrations approach is guided by four systems innovation principles: learning by doing; a portfolio approach that tries to find a set of solutions that work well together; letting demand from actors in real-world contexts lead change processes; and searching for ways to intervene at many different kinds of systemic leverage points.

When asked about the value that those who participate in the Deep Demonstrations get out of it, Maria suggested that it helps partners to: think outside the box; consider the whole system, not just respond to regulations; and pursue multiple sustainability goals

simultaneously, including reducing emissions, improving social cohesion and supporting environmental regeneration. The Deep Demonstrations program looks for ways to complement what is already happening on the ground, connecting a variety of entities by offering tools to translate different languages of practice so that businesses, decision-makers, and academia can communicate effectively.

Maria pointed out that work never stops with the Deep Demonstration, and there are multiple programs running now, including circular economy training for ports, a maritime start-up accelerator, and the LOOP-PORTS final conference at the World Circular Economy Forum (WCEF2020) in December (see Resources section for more information). EIT Climate KIC will continue this multi-year program and hopes to work with more and more ports in the future.

Futures Literacy

The second presentation came from FLxDeep consortium leader **Nick Balcolm-Raleigh** (University of Turku/Finland Futures Research Centre), who asked "How can the skill of futures literacy be used to support business innovation?"

Like other literacies, futures literacy is a skillset. A key premise of futures literacy is that all people and organizations "use futures," but often unconsciously and through a limited number of approaches. Which future or futures we have in mind when we look at the world around us narrows what we notice and pay attention to. When innovators and stakeholders consider the futures they are using, they may see new pathways for systems transformation.

Our ability to see today's options for innovation is enhanced by viewing transformation through a wider variety of futures. We can work to expand the variety of our methods and techniques for using futures, as well as the purposes we use them for, such as exploring options, making choices, or noticing novelty.

Maria offered an example of how Futures Literacy has helped her to think this year about where to innovate. During a Futures Literacy Laboratory last year in Turku, Maria worked with the idea of a future where international trade was not as important because of local circularity. At the time, other participants of the workshop were skeptical and told her it could never happen. Then COVID changed the port landscape, and some of the new ideas that she had considered during the workshop resurfaced. New ideas that she was able to draw on included community gardens within the port, diversifying port revenue streams, and different energy models including installing solar capacity in the surrounding local community.

Nick is looking for new opportunities to introduce futures literacy in Turku. He will be organizing a Futures Literacy Lab for the Turku maritime sector via the SUSCON project next year.

What potentials do we see emerging from this event?

Key areas for further discussions by Turku actors could include management of the sea area near the island of Ruissalo, the future role of Baltic sea ports, and a holistic perspective and transparency in sustainability communications.

Connecting to the EIT Climate KIC Deep Demonstration on Resilient, Net-Zero Emissions Maritime Hubs could prove beneficial. In particular, the shipbuilding expertise of the Turku maritime hub would connect well with the interests of the Deep Demonstration's activities in Cyprus, which concern shipowners, ship registries, and maritime innovation. The maritime biodiversity and maritime spatial planning expertise represented in this roundtable could also prove beneficial in experiments with creating long-lasting living carbon sinks intended to offset maritime emissions from ports and ships.

Artificial Intelligence solutions and the Automatic Identification System (AIS) carry potential for inter-organizational collaborations in the near future. Overall, maritime safety and efficiency of navigation and piloting, safety of life at sea, and the protection of the maritime environment are interconnected themes around which local actors could take action with international partners.

Ship concepts and shipbuilding offer several entry points for forward-looking development including collaborative ideation of ship concepts that focus on introducing sustainability innovations. One of the current development areas are virtual solutions for mock-ups that make real-time performance data analysis available to both land-based staff and onboard crews.

Resources

PROJECT WEBSITES

Futures Literacy across the Deep Demonstrations (FLxDeep):
https://www.utu.fi/en/university/turku-school-of-economics/finland-futures-research-centre/research/FLxDeep

Sustainable Shipbuilding Concepts (SusCon):
https://tt.utu.fi/embedded/research/suscon/

EIT Climate KIC Net-Zero Emissions Maritime Hubs Deep Demonstration:
https://www.climate-kic.org/programmes/deep-demonstrations/resilient-net-zero-emissions-maritime-hubs/publications/

Åland Sea Map:
https://baltcf.org/project/aland-islands/

European Network for Community-Led Initiatives on Climate Change and Sustainability (ECOLISE):
https://www.ecolise.eu/

EVENTS

LOOP-PORTS final conference at the World Circular Economy Forum (WCEF2020) on 16.12.2020:
https://www.loop-ports.eu/2020/11/loop-ports-final-conference/

REPORTS

City of Turku's Voluntary Local Review of 2030 Agenda SDGs:
https://www.turku.fi/sites/default/files/atoms/files/turku_voluntary_local_review_2020_0.pdf

Priorities of European Ports for 2019-2024:
https://www.espo.be/media/Memorandum%20ESPO%20FINAL%20Digital%20version.pdf

SSAB Plans to Change Steel Production Methods:
https://www.ssab.com/company/sustainability/sustainable-operations/hybrit

***Seeds for Growing Futures Literacy in the Net-Zero Emissions Maritime Hubs Deep Demonstration* Report:**
https://www.utu.fi/sites/default/files/public%3A//media/file/Seeds-for-Growing-Futures-Literacy-v1.2.pdf