Risk Governance in Public Sector-led transitions:

The case of electrification of ferries in Norway

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Introduction - Climate challenges and necessary innovation for decarbonization
We have necessary knowledge of climate crisis. There is no need to argue for climate change actions. The UN IPCC report on Global Warming of 1.5 °C (IPCC, 2018), the report on ice melting and sea level rising (IPCC, 2019) and the UN Climate Action Summit September 2019 (UN, 2019) gives evidence.
Norway bad news1: Emission Goal for 2020 48.6 mill. T. Co2 will not be reached (51 mill. T.)

Brown color: Only CO2-emission
Grey color: All other gases
The reduction curve gives 68% probability to reach 1.5 temp. goal
Important research questions today are pathways to decarbonizing results.

One pathway is technological. This paper discuss lessons learned on risk-taking rising form one Norwegian green innovation case: The electrical revolution of the Norwegian ferry sector (Skauge et al., 2017, 2018).

Our goal is to propose concepts and a model to grasp future lessons on rewards and risk distribution in radical innovation processes.
From Niche to Regime – Risk identification in green innovation

Landscape
(Context)

Regime

Niche innovations
Electrical ferries
The two next innovation waves:

1) Fast- and local boat routes

Fast- and local boat routes are the worst transportation option for the climate.

No other means of public transport has higher emissions per passenger kilometer - not even domestic flights.

The high-speed passenger boats between Bergen and Sogn / Nordfjord alone use 6.6 million liters of diesel a year.

› New design for high speed boats with electric or hydrogen fuel for next tender periode 2021 -
Emissions from cruise ships are greatest when on board and not when docked. However, with 2,200 cruise calls in Norway in 2018 and expectations of traffic growth, the cuts achieved by switching to shore power will be significant.

One year ago, in May 2018, the Storting asked the government to introduce zero discharge requirements from tourist ships and ferries in the World Heritage fjords by 2026.

Bergen, which is Norway's largest cruise port with over 300 calls and 600,000 cruise tourists a year, is in the process of building Europe's largest onshore power plant, which will be able to supply three ships simultaneously.
Risks in green innovation

Typology
Four Risk Challenges
According to EU Commission Expert Group

Define and assess risks and reward for all partners involved at the various stages of the procurement process, including:

1. Nature (kinds of risks) of risks, which may change during the various procurement stages,
2. Causes and sources of risk,
3. Likelihood of risks to occur
4. Potential consequences of risk occurrence (additional costs, reduced reward),
Risk typology – Nature of risk

Technological risks

“are all those risks that lead to non-completion, under-performance or false performance of the procured good and service. Due to its more innovative nature, the risk lies in the technical characteristics of the service or product or in its production, and thus originates in the suppliers’ side. This risk appears of particular relevance in procurement of products in the fluid phase.

Organisational and societal risks

Organisational risks are all those risks of the procurement failing or under-delivering for reasons situated within the organisation that procures.

Societal risks

are those related to a lack of acceptance and uptake by the users of the new or changed service delivered within society.
Risk typology – Nature of risks

Market risks

are to be found on the demand and supply side. The former occur when innovations in public procurement are also intended to spill over to private markets and those private markets are not large or responsive enough or do not build up quickly enough to justify capacity investment. The latter are those that potentially disrupt or delay operations such as political instability and volatile labour market; potential threats that a competitor will take over a supplier and potentially lock out supplies, risks related to delays and insufficient quality.

The financial risks

in public procurement are related to uncertainty in meeting target costs and the ability to secure the funds needed.

Finally turbulence risks

– in fact turbulence uncertainties as they are hard to predict and measure – are associated with large scale-projects and emerge from a range of unforeseen events that lead various actors in the whole process to re-assess their priorities or change their expectations.”
Risk Matrix
(based on scoring of Applicable Threat Scenarios)

**Probability**
- Very Likely (1-4 per year)
- Probable (<1/yr. to 1 in 1-2.5 years)
- Possible (<1 in 2.5 yrs. and up to 1 in 5 years)
- Unlikely (<1 in 5 yrs. or up to 1 in 10 years)
- Improbable (<1 in 10 years)

**Consequences**
- Minor
- Moderate
- Serious
- Major
- Catastrophic

- **High Risk**: 9-11
- **Critical Risk**: 12-15
- **Low Risk**: 3-5
- **Moderate Risk**: 6-8
Stages in decision making and innovation – to search for risks

<table>
<thead>
<tr>
<th>Stages i decision making:</th>
<th>Stages in innovation circle:</th>
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<tbody>
<tr>
<td>▪ Initiative</td>
<td>▪ R&amp;D stage</td>
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<tr>
<td>▪ Assessment</td>
<td>▪ Adoption by public sector</td>
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<td>▪ Decision on Tender process</td>
<td>▪ Diffusion</td>
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<tr>
<td>▪ Tender process – Decision on contracts award</td>
<td>▪ Maintenance and updating</td>
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<td>▪ Implementation phase</td>
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<td>▪ Result - Learning</td>
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## Typology for mapping risks in green innovation

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<thead>
<tr>
<th>Source type</th>
<th>Institutional</th>
<th>Financial</th>
<th>Market</th>
<th>Technological</th>
<th>Other</th>
<th>Source type</th>
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<tbody>
<tr>
<td>Stages in decision making</td>
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<td>Initiative</td>
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<td>Implementation</td>
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Reward and Risk mapping
The Reward Vision for the ferry revolution

- Norwegian Technology to Reduce Emission
- Give new industry and jobs
- Be in front of global innovation
For climate reduction
Twelve billion tonnes of goods were shipped in 2018 over the worlds’ ocean on 60,000 ships. Norway is big in this industry. An industry that accounts for around 2.5 per cent of greenhouse gas emissions in the NCE Maritime CleanTech organize initiatives for zero-carbon fuel
Risk and Rewards

› **RISKS:** failing to achieve transition if fail to develop a fair risk-sharing model

› **PRIVATE risk:** if incentives do not allow reasonable return then will propose sub-optimal technologies (LNG, hybrid) or renegotiate.

› **GOVERNMENT:** if risk model not adequate then will subsidize innovations for private business with no rewards.

› **PUBLIC:** end up paying too much for reduced services with more pollution and undermining support for green transition policy instruments

› **REWARDS for all if successful transition made:**

› **PRIVATE COMPANIES**

› **Ferry companies:** concessions that reward the system integration work

› **Shipyards:** new product ranges developed and ready for wide launch

› **Subsystems developers:** creating demonstrator projects and electrification modules

› **GOVERNMENT**

› **Demonstrating competence** to voters

› **Reducing cost** of innovative service provision.

› **Providing Jobs**

› **PUBLIC Modernising** public services

› **Guaranteeing longer term decarbonisation**

› **Reducing local diesel pollution**
The Two Most Serious Risks for Public Sector

<table>
<thead>
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<th>Risk-sharing in funding:</th>
<th>Technology:</th>
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<tr>
<td>Are the State and Private Sector willing to share the economic risk taken by the Regional Municipality?</td>
<td>Can the battery and Grid system deliver expected service with necessary stability?</td>
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Empirical results from electric ferry revolution in Norway
Thank You
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