

Joint research seminar on Vessel Performance
Management & IT and impact on energy efficiency,
emissions and operational cost for shipping
companies

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Maritime energy efficiency @ Chalmers

- Dep. of Shipping and Marine Technology
 - Marine technology; Maritime Environment and Energy Systems; Human Factors and Navigation; Cargo and Maritime Management
- Technical/natural science areas
 - “Traditional” hydrodynamics (e.g. added resistance in waves, air cavity hulls, hull-propeller interaction)
 - Structural models and routing (for wind propulsion)
 - Thermodynamic models (energy/exergy analysis, WHR etc.)
 - Hull fouling (marine biology/hydrodynamics)
 - Whole system models
- Social science areas
 - Energy management practice (performance management, energy audits, EMS implementation etc.)
 - Crew motivation, education and competence (Stena Line field studies)
 - Knowledge management (industrial PhD student w. Swe Shipowners Association)
 - Energy efficiency in ship design and procurement (NEW from 2016)

*Since
2010!*

My research history

- 2009: 1-year project on energy management system standards in energy intense industry & lessons for shipping
 - “Plan for test implementation in two-three shipping companies...”
- 2010-2013: Implementing energy management systems in shipping
 - Laurin Maritime/Transatlantic/DNV
 - Action research, part of project groups in each shipping company
- 2013-2015: Cont. project
 - Teaching, courses, research ... PhD thesis due February
- 2016-2018: Procurement of energy efficient ships
 - 3,8 MSEK, “Strategic energy systems research”, Swe Energy Agency
 - Field studies starting at Stena, Wallenius + 1 more
 - Moving to Gothenburg Research Institute, School of Business, Economics and Law @ Gothenburg University
 - Interdisciplinary institute, externally funded research, management and organisation studies
 - Post doc period at Graduate School of Public Policy, Tokyo University
- 2016-?? collaboration w. Aalborg University

Agenda

- Need for qualitative social science aspects in maritime energy research
- Need for close connections w. industry partners as well as policy makers
- Need for academic independence

Need for qualitative perspectives...

The energy efficiency gap

- MAC curves and assessments show large potential for energy efficiency in design and operations of ships
- = this is not (only) a technical/engineering problem
- Dominant research framework heavily influenced by neo-classical economics (e.g. Sorrell et al., 2004)
 - find evidence of market barriers/failures to rationalize policy intervention)
- “Barriers” and “drivers” to energy efficiency
- Most often large-N studies: surveys and interviews
- Recently more focus on energy management practice in organisations (e.g. Schultze et al., 2015)

“Implementing energy management systems in shipping”

- 2008/2009: no ISO 50001, no SEEMP, no performance management industry...
- Lessons from energy intense industry in Sweden – implement energy management system according to SS 62 77 50
- Joint project Chalmers-Österströms-Laurin Maritime-DNV
- Researcher part of project teams
- Meetings bi-annually
- **50% success rate!**

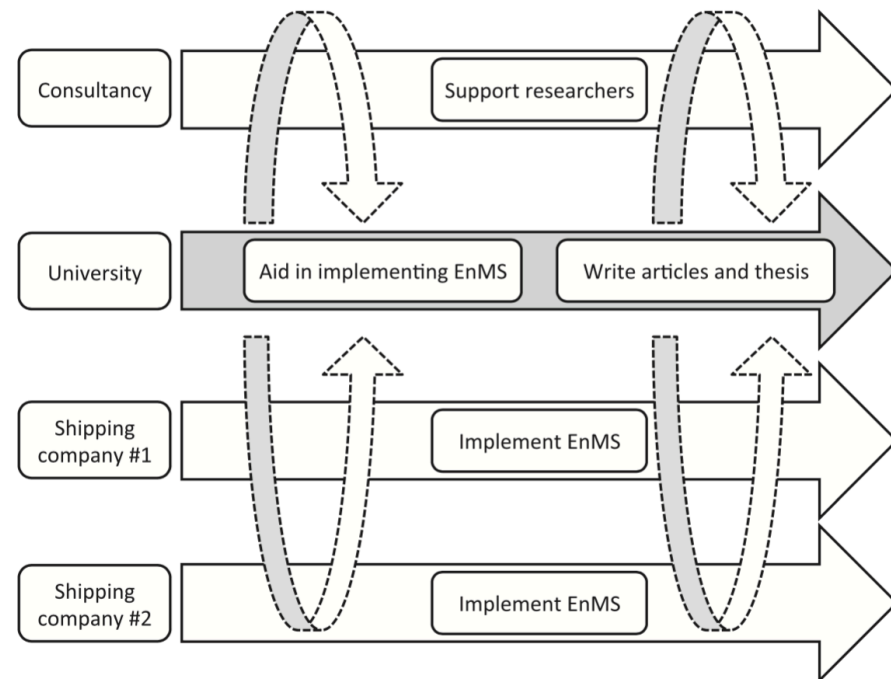
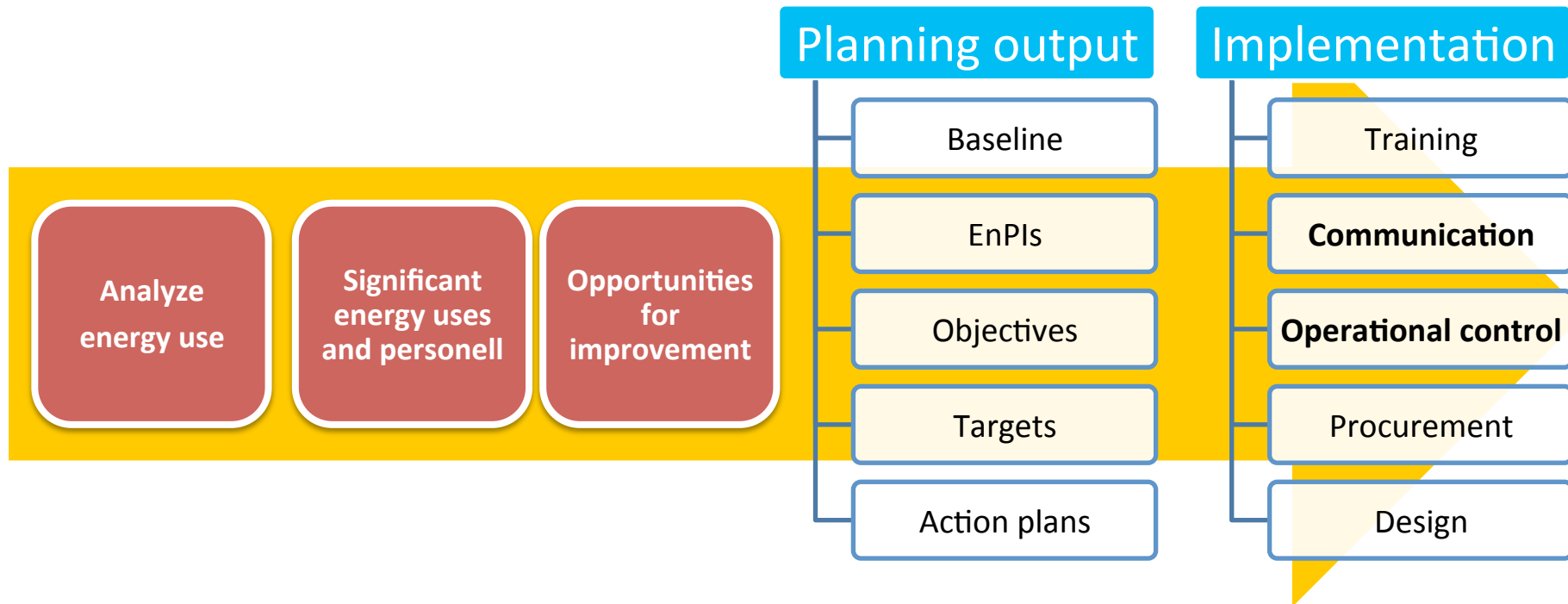


Fig. 1. Outline of the collaborative project to implement EnMS in two shipping companies.

ISO 50001 – an overview



Requires reliable infrastructure for measuring, analysing and follow-up on performance!

Need for qualitative perspectives...

Action research

- In-between consultancy and “normal” research
- Researcher takes active part in common process, but still grounded in academic discourse
- Data collection methods often borrowed from management & organisation studies, and in particular ethnographic studies
 - Interviews, observations, shadowing etc.

Energy efficiency as a problem of organising

- “Have you compared energy efficiency in shipping with aviation/trains/trucks/buildings...”
 - Energy efficiency not that different from other organising matters!
- Johnson, H., and Andersson, K. (2014) Barriers to energy efficiency in shipping. WMU Journal of Maritime Affairs.
 - **Role of contract monitoring and standardized best practices**
- Johnson, H., Johansson, M. and Andersson, K. (2013) Barriers to improving energy efficiency in short sea shipping: an action research case study. Journal of Cleaner Production
 - **Energy efficiency as a problem of project management, measurement capabilities, fragmentation of responsibilities, internal communication, knowledge/competence**
- Johnson, H. and Styhre, L. (2015) Increased energy efficiency in short sea shipping through decreased time in port. Transportation Research Part A – Policy and Practice.
 - **Energy efficiency as a problem of incentives between organisations, poor market conditions and little space/time for planning, poor communication between ship-shore-port, perceived risk of coming in late**

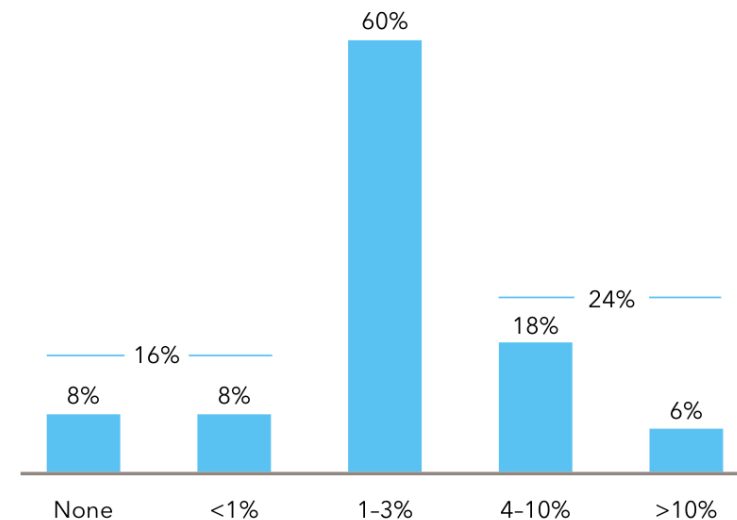
Energy efficiency as a problem of organising

- Conclusions for (my) way forward
 - Study *how* energy efficiency *is achieved (or not)*
 - Be modest, stay clear of reductionist explanations – study how (not why or why not)
 - Study practice, accounts of practice (e.g. Mol, 2002)
- I.e. need for energy efficiency research(ers) to learn from social scientists
 - STS & actor-network theory (Law, Latour etc.), organising in action nets (Czarniawska etc.)

Difference vs. other approaches

- Kühnbaum (2014): survey study, 20% response rate (85 companies)
- Many companies have started energy management activities, but only few have realized above 10%
 - Most only 1-3%
- Slow steaming, weather routing common
- More “challenging” measures not implemented
 - Especially not those requiring many stakeholders
- **“Change management”, training, awareness etc. not prioritised.**
- **Poor performance data collection and management**

How much fuel reduction did you experience (estimate) since your company implemented the SEEMP / energy management?



Challenges, “barriers”?

What challenges have you encountered when implementing energy management / SEEMP?*



We don't know what to do
+1

Need for studies that “clutch with” practice

- Contribute to forwarding knowledge in academia as well as in industry
- Contribute to policy-making processes
- Studies need to be interdisciplinary, using both engineering/technical and social science competence
 - Risk that engineering research is carried out with naïve social science methods/theories, or social science research is carried out on problems that are not technologically advanced/interesting

Need for researchers independence

- Researcher as slow and poor consultant
 - Focus on consulting part, losing research focus
- Researcher as “harmless idiot” or “un-informed but well-intentioned” (e.g. Czarniawska, 1993)
 - Focus on research, loose contribution to practice
- What is the sweet spot?
 - Easy to do the project and forget about the research
 - Matter of time management and setting up infrastructure for collecting data
- How to frame “poor” results?

Plan for next project

- Three year funding from Swedish Energy Agency
- Case studies of design/procurement processes starting at two shipping companies
 - “Follow the process” across organisational boundaries
 - Ship yard, banks, class, consultants, etc.
 - Interdisciplinary – social inquiry informed by in-depth technical understanding
 - Source of inspiration: “Aramis, or the Love of Technology” by Bruno Latour
 - Some likely knowledge fields: naval architecture, ship finance, contract law etc.
- How are more innovative ships designed, procured and built?
 - Discuss challenges for industry in achieving radical changes in ship design due to (needed) regulation
 - E.g. what forms of collaboration are important?