



KYSTVERKET



ITS  
NORWAY

ocean  
industries  
concept  
lab



Arkitektur- og designhøgskolen i Oslo  
The Oslo School of Architecture and Design



*Color Line*

# MARITIM INNOVASJON FOR FREM TIDENS REDERI

*INNOVASJONSKONFERANSEN e-nav.no 2018*

*Oslo, 12.9.2018.*

*Konserndirektør Marine, Jan Helge Pile.*

## Maritim innovasjon for fremtidens rederi.

### Agenda,

- **About Color Line and the environment.**
- Digitalization of marine operations. What is it? Why digitalize?
- What is Color Line doing?

## Color Line 2018. A short presentation.



6 ships  
7 harbors  
4 routes  
18 daily departures

Providing short –sea services;

- Norway to Sweden
- Norway to Denmark (2 links)
- Norway to Germany

# Color Line 2018. A short presentation.

2018 Route network

100 % SECA operations  
in the North Sea  
and Baltic Sea  
SECA's



6 ships  
7 harbors  
4 routes  
18 daily  
departures

2020; Battery  
hybridization

2019; New Ro-  
Ro operation  
(cargo-only)

Providing short –sea services;

- Norway to Sweden
- Norway to Denmark (2 links)
- Norway to Germany

# Color Line 2018. A short presentation.

6 ships in operation. Average 18 daily departures (6100dep/year).

## Mini cruises and overnight services



M/S Color Fantasy  
2004

M/S Color Magic  
2007



Worlds largest cruise-ferries;  
75.000 GRT / 2700 pax.

2 vessels provide mini-cruises and overnight  
service on the Oslo – Kiel route.

Celebrated 55 years service on this route in 2016.

## Day-pax services



M/S SuperSpeed 1  
2008/2011 (34.000 GRT)



M/S Color Viking  
1985 (20.000 GRT)



M/S SuperSpeed 2  
2008 (33.000 GRT)



M/S Bohus  
1971 (10.000 GRT)

4 vessels provide day-pax  
services on 3 itineraries

Coming in June 2019 (2020 concession); NB 311 / “Color Hybrid”

# GREEN, SMART, INNOVATIVE

In cooperation with shipbuilder Ulstein Verft, Color Line is in the process of building the world's largest plug-in hybrid ship, with delivery scheduled for the high season 2019. These are the main features:

- Plug-in hybrid technology. Designed to be highly energy efficient and with low environmental impact
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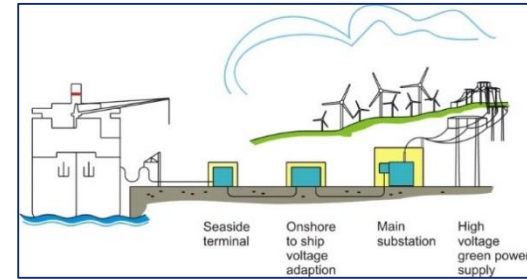
Battery-Hybrid; Capabilities for 0-emission operations for up to 60 min.



## ENVIRONMENTAL INITIATIVES TAKEN IN COLOR LINE

1. 2011-2017; Shore power in all Norwegian ports. Started with the first port in 2011 (Oslo) and last in 2017 (Sandefjord). (Kiel 2019?)
2. 2014-2015; Installed Scrubbers on high (energy) consumption routes, MGO operation on shortest routes.
3. 2016-2017; Sandefjord – Strømstad; tender process leading to developing and constructing battery-hybrid newbuilding “Color Hybrid”.

In order to be a good citizen in the ports we operate, and to be able to continue operate from the city centers over time, we see the need to be a front runner when it comes to environmental impacts (noise, particles, CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>.....)



Li-ion



# INNOVASJONSKONFERANSEN e-nav.no 2018

## ENVIRONMENTAL INITIATIVES TO BE TAKEN IN THE NEAR FUTURE;

### Initial IMO Strategy on Reduction of GHG Emissions from Ships



*Adopted on 13 April 2018 (key extracts)*

#### Vision

IMO remains committed to reducing GHG emissions from international shipping and, as a matter of urgency, aims to phase them out as soon as possible in this century.

#### Levels of Ambition

- Carbon intensity of the ship to decline through implementation of further phases of the energy efficiency design index (EEDI) for new ships**  
To review with the aim to strengthen the energy efficiency design requirements for ships with the percentage improvement for each phase to be determined for each ship type, as appropriate;
- Carbon intensity of international shipping to decline**  
To reduce CO<sub>2</sub> emissions per transport work, as an average across international shipping, by at least 40% by 2030, pursuing efforts towards 70% by 2050, compared to 2008; and
- GHG emissions from international shipping to peak and decline**  
To peak GHG emissions from international shipping as soon as possible and to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008 whilst pursuing efforts towards phasing them out as called for in the Vision as a point on a pathway of CO<sub>2</sub> emissions reduction consistent with the Paris Agreement temperature goals.

*(The strategy also includes a list of candidate measures for further CO<sub>2</sub> reduction that will be considered by IMO, including measures that could be implemented before 2023.)*





# INNOVASJONSKONFERANSEN e-nav.no 2018

## ENVIRONMENTAL INITIATIVES TO BE TAKEN IN THE NEAR FUTURE;

CO2 reductions as pr IMO.

1. 2025; EEDI; 5-25 % New ships!
2. 2030 Average for all ships; 40 % by 2030/ 70 % 2050.
3. 2050; GHG from shipping industry 50 % down (including expected growth in volume.)

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How to comply?



Color Line

## Maritim innovasjon for fremtidens rederi.

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- **Digitalization of marine operations. What is it? Why digitalize?**
- What is Color Line doing?

# INNOVASJONSKONFERANSEN e-nav.no 2018

2018; Digitalization. A main topic of the industry.

- Big Data, IOT, AI, Digital Twin
- What is it?
- What can it do for us?
- What can we do with it?



# INNOVASJONSKONFERANSEN e-nav.no 2018



2018; A main topic of the industry.

- SMM (Hamburg Sept 4-7 2018)
- A digital conference every day.
- Shipping is slow! Or are we?
- Do we believe in the numbers?
- How great are the numbers?





## INNOVASJONSKONFERANSEN e-nav.no 2018

Many have started;

The big 4; ABB, Rolls Royce, Wartsila, and Kongsberg all have their solutions and possibilities.

Many smaller firms are in the market of digitalization as well.

They all want to 'digitalize' us and suggest great savings, rationalization, energy savings and enhanced safety.



# INNOVASJONSKONFERANSEN e-nav.no 2018

Larger shipping companies have started their company specific solutions while others (smaller?) subscribe to supplier services from remote monitoring & control (RMC) providers such as ABB in nearby Asker.



Monohakobi Technology Institute

NYK GROUP

## Digitalization - the next techno-economic great wave

1. Use assets more efficiently
  1. Automate ship operations & navigation
  2. Manage ship/shore personnel into a single more productive team
  3. Integrate fleet systems to improve asset performance
  4. Use big data to find ways to improve performance & reduce accidents
  5. Inform management on how the business is performing
2. Produce regulatory information digitally
3. Develop global through transport system

NYK presentation from 2015.

ABB operates Asker COC (Collaborative operations Center) monitoring and 5 other COC around the world monitoring 700+ vessels for shipowners around the world.



# INNOVASJONSKONFERANSEN e-nav.no 2018

Digitalization beneficial at many levels;

1. Remote reading & monitoring.
2. Remote diagnostics.
3. Remote correction and updates.
4. Remote control.
5. Remote operations.
6. Autonomous operations.
7. Autonomous ships.
8. Unmanned vessels.

Will give improvements;

1. Energy efficiency
2. Work efficiency
3. Better maintenance planning.
4. Enhanced safety levels.
5. Better work hour/rest hour scheduling for crew.
6. Better service levels for passengers.

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4. dates.
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The potential benefits and cost savings seem overwhelming. We hear talks about OPEX cost savings between 5 % and above 30 %. The upper end includes rationalizations yet to be identified.

Will give cost savings;

1. Fuel savings
2. Other operational savings
3. Maintenance savings
4. Vendor service costs
5. Downtime costs

.. and perhaps down the road....

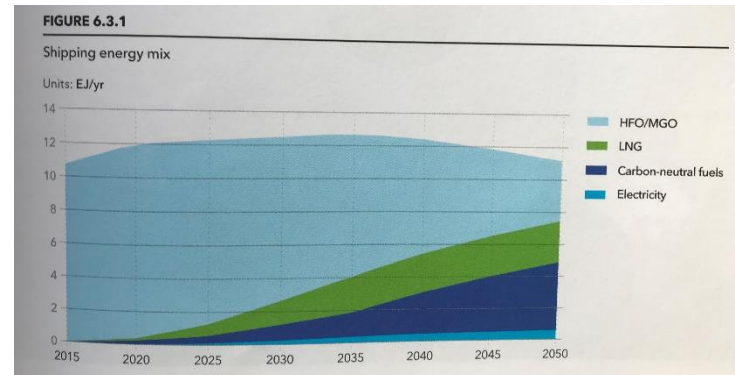
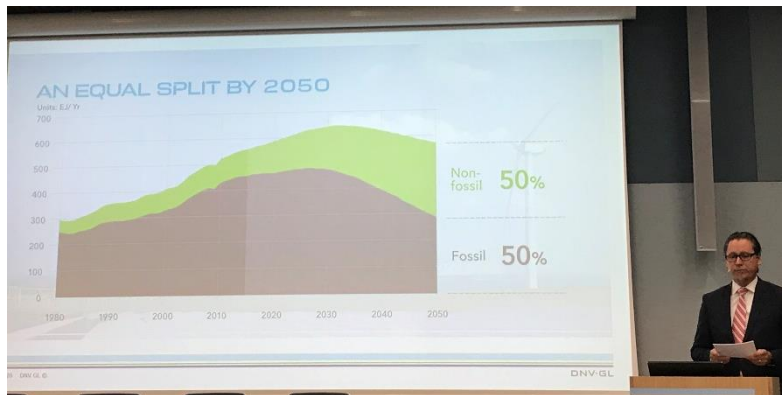
6. Manning costs savings
7. Building costs .....



# INNOVASJONSKONFERANSEN e-nav.no 2018

This week; Launch of DNV GL Energy Transitions Outlook 2018;

Digitalization is part of the solution towards 2050 goals.



## Maritim innovasjon for fremtidens rederi.

### Agenda,

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- Digitalization of marine operations. What is it? Why digitalize?
- **What is Color Line doing?**

# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

### What is Color Line doing?

- We started digitalization of parts of the customer experience. Simplified online booking and reservations, mobile first approach, partly automated check-in, ANPR for cars, onboard app for f&b services, etc....
- We have NOT yet started any systematic digitalization of the maritime operations such as weather routing, engine plant configuration and usage, navigation optimization (incl trim and speed), etc on a fleetwide approach. (Albeit a few projects on stand-alone ships.)
- We have since 2015 observed the marketplace and developments in this field.

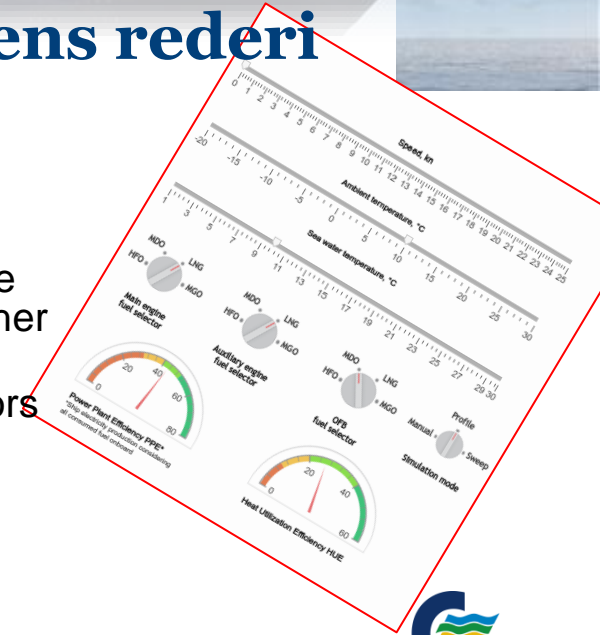


# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

### What is Color Line doing?

- We believe in identifying most promising areas to digitalize before we commit to a large scale digitalization process. (As opposed to the other way around; Digitalize first!)
- We are identifying existing onboard infrastructure, signals and sensors as well as IAS systems with thousands of i/o's already onboard our vessels. (In this process we also identify 'missing sensors' and tags that we might would want to install.)
- We are identifying business cases for **“What is useful”** to digitalize before we go for the **“What is possible”** to digitalize approach. I.e; Cost/benefit; Identifying 'low hanging fruits first'.



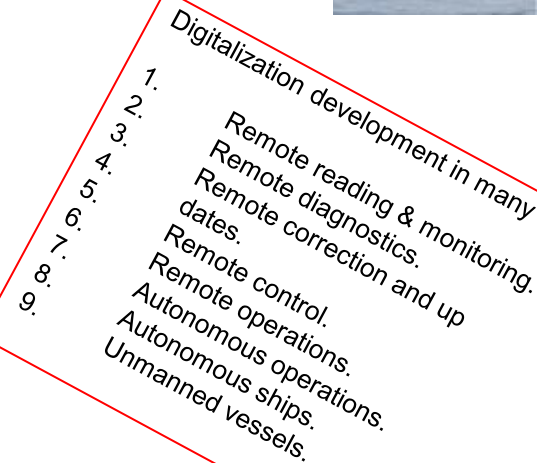


# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

### What is Color Line doing?

- We operate short-sea passenger vessels. We are concerned about digital and cyber safety. We always consider ‘safety-first’ for our passengers and crew. We are manned by highly qualified crew, and we are heavily regulated. We are visiting ports daily.
- On this background, for existing vessels, we would first utilize (step 1) remote reading & monitoring. [We believe this step alone could generate impressive savings.](#)
- We would be very caseous in allowing digital access back to the ship, but remote diagnostics and corrections would be a natural development when technology allows for it.
- For our NB 311 / “Color Hybrid” we might take this further, but as of now we do not have any autonomous operation projects in the fleet.

- 
1. Digitalization development in many
  2. Remote reading & monitoring.
  3. Remote diagnostics.
  4. Remote correction and up dates.
  5. Remote control.
  6. Remote operations.
  7. Autonomous operations.
  8. Autonomous ships.
  9. Unmanned vessels.



# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

### What is Color Line doing?

- We have completed energy efficiency studies for the vessels. This enables us to see how far off the design points we operate the vessels and their systems. This gives us an idea of how much energy may be saved in existing operation patterns/profiles.



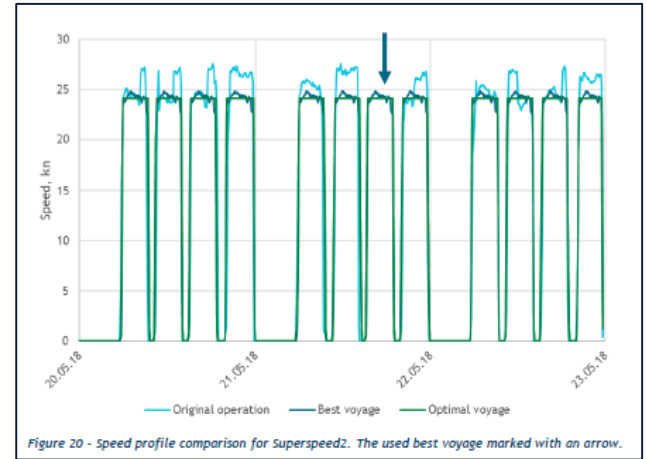
# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

### What is Color Line doing?

Example from the studies;

- Speed optimization; Best practice becomes normal practice; could lead to fuel savings of more than 7 %.
- The studies also evaluates a number of possible technical improvements, and operational changes. Some of which we need a digitalization process (big data gathering and algorithms) to utilize.



# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

**What is Color Line doing?** We are writing our MDS specification.

**Extracts;** A MDS (Marine Digitalisation System) shall enable us to gather information for remote monitoring and surveillance and possibly also control for the purpose of continuous improvement of on-board and shore-side processes in order to improve energy efficiency, work efficiency and rationalisation, increase safety, passenger and crew satisfaction, and maintenance management and routines. A MDS may of course include both hardware and software equipment, and may also include services.





# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

### What is Color Line doing?

April 13<sup>th</sup> 2018; IMO (MEPC) DECEIDED THAT SHIPPING AS AN INDUSTRY SHOULD WORK ALONG THE PARIS AGREEMENT PATHWAY TOWARDS 50 % REDUCTION OF CLIMATE GAS EMISSIONS IN 2050. FOR INDIVIDUAL SHIPS THE TARGET IS 70 % IN 2050.

Color Line welcomes this as we have also previously joined and accepted the NSA (Norw. Shipowner Association) similar pathway.



# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

What is Color Line doing to meet IMO targets?

Electrification

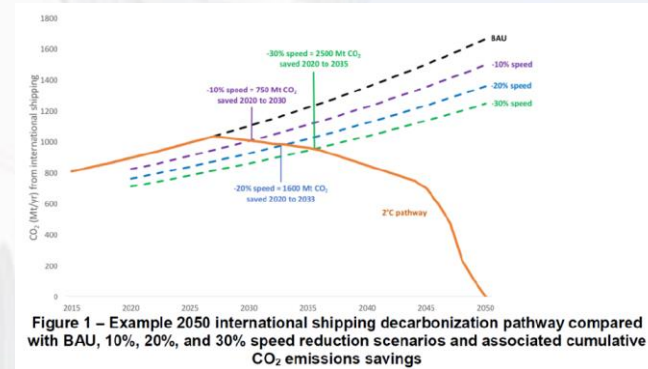
Waste Heat Recovery

Digitalization

(Speed reduction)

Research projects (EO-NAV and TEQMARIN)

... but eventually a “zero-”, or “close-to-zero-emission” fuel will be required....



Speed reduction is difficult for pax vessels as there are only 24h/day.

# INNOVASJONSKONFERANSEN e-nav.no 2018

## Maritim innovasjon for fremtidens rederi

Abt 27.000 GRT,  
2000 pax, 500 cars,  
4,7 MWh battery  
capacity



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Thank you for your attention!

