Environmental impacts of low emission shipping: measurements and modelling strategies (EnviSUM)

Project results and future perspectives

November, 2018

Interreg Baltic Sea Region

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The big picture of EnviSum

Environmental Impacts
Benefits of clean nature and biodiversity as valued by citizens and society

Macroeconomic Impacts
The macroeconomic perspective: e.g. national competitiveness

Health Impacts
Benefits of reduced mortality and ilness for citizens and society

Administrative Impacts
Costs of administration, including direct and indirect administration costs

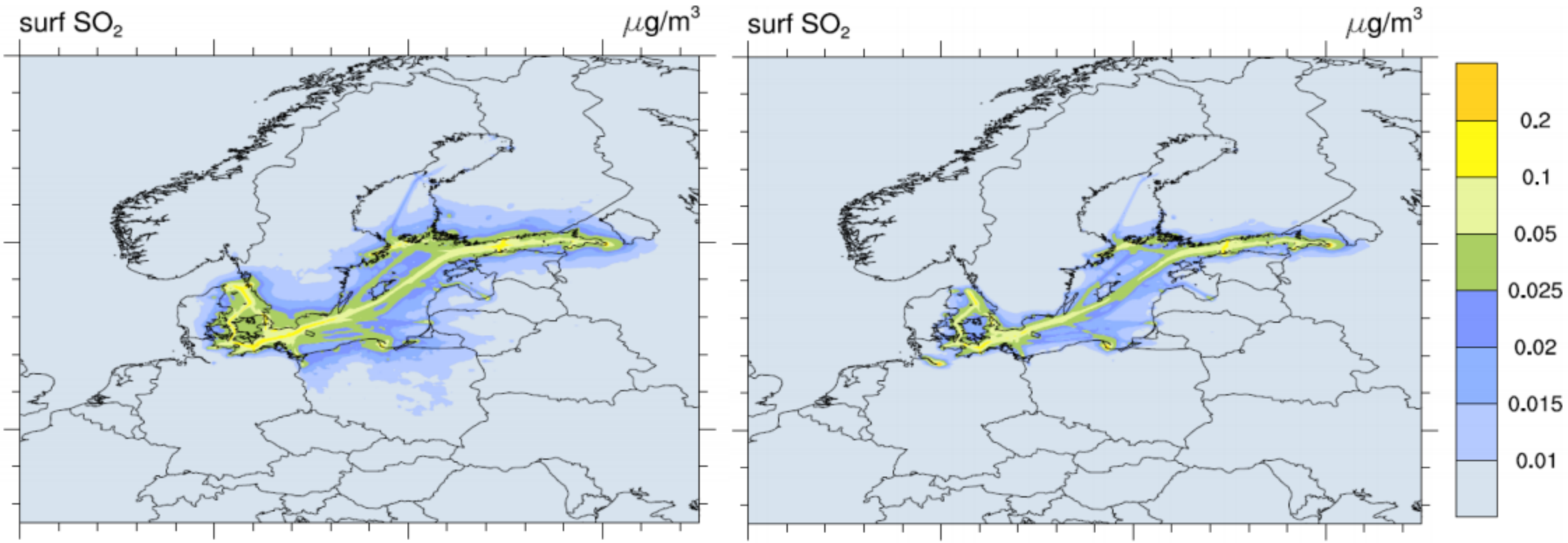
Business Impacts: Ecological Goods
Benefits of enhanced commercial ecological resources (fish, crops, forest) for business and society

Business Impacts: Innovation
Benefits for cleantech industries and on innovation inducement in cleaner shipping

Business Impacts: Compliance
Costs of compliance for the maritime industry, its costumers and society

Lähteenmäki-Uutela A., Repka S., Haukioja, T., Pohjola T. 2017. How to recognize and measure the economic impacts of an environmental regulation: case SECA. Journal of Cleaner 154:553-565.

Contribution of Baltic Shipping – SOx

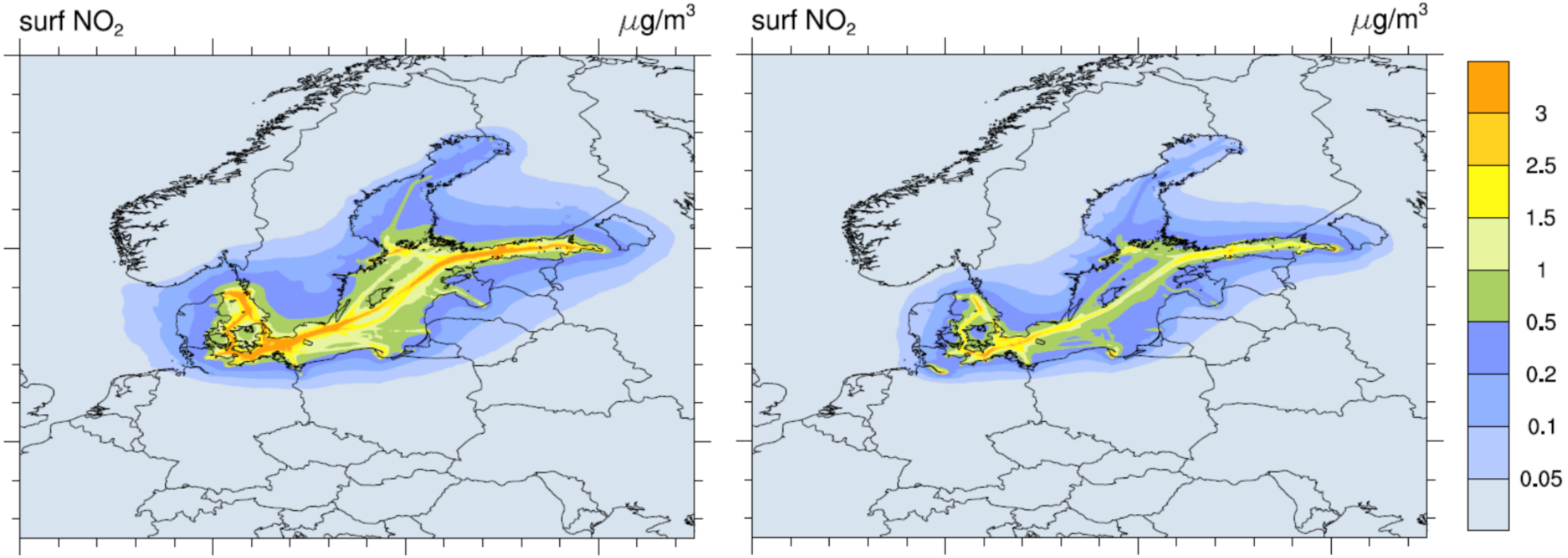


2015

2030

+ SECA (2015)

Contribution of Baltic Shipping – NOx

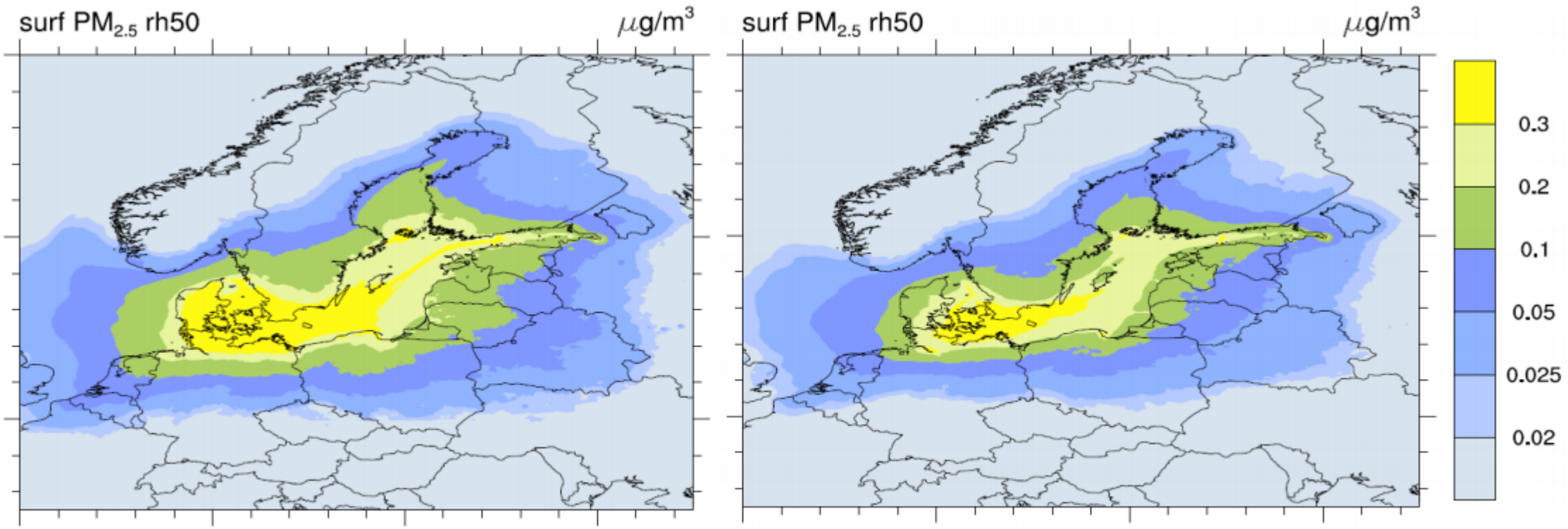


2015

2030

+ NECA (2021)

Contribution of Baltic Shipping – PM2.5



2015

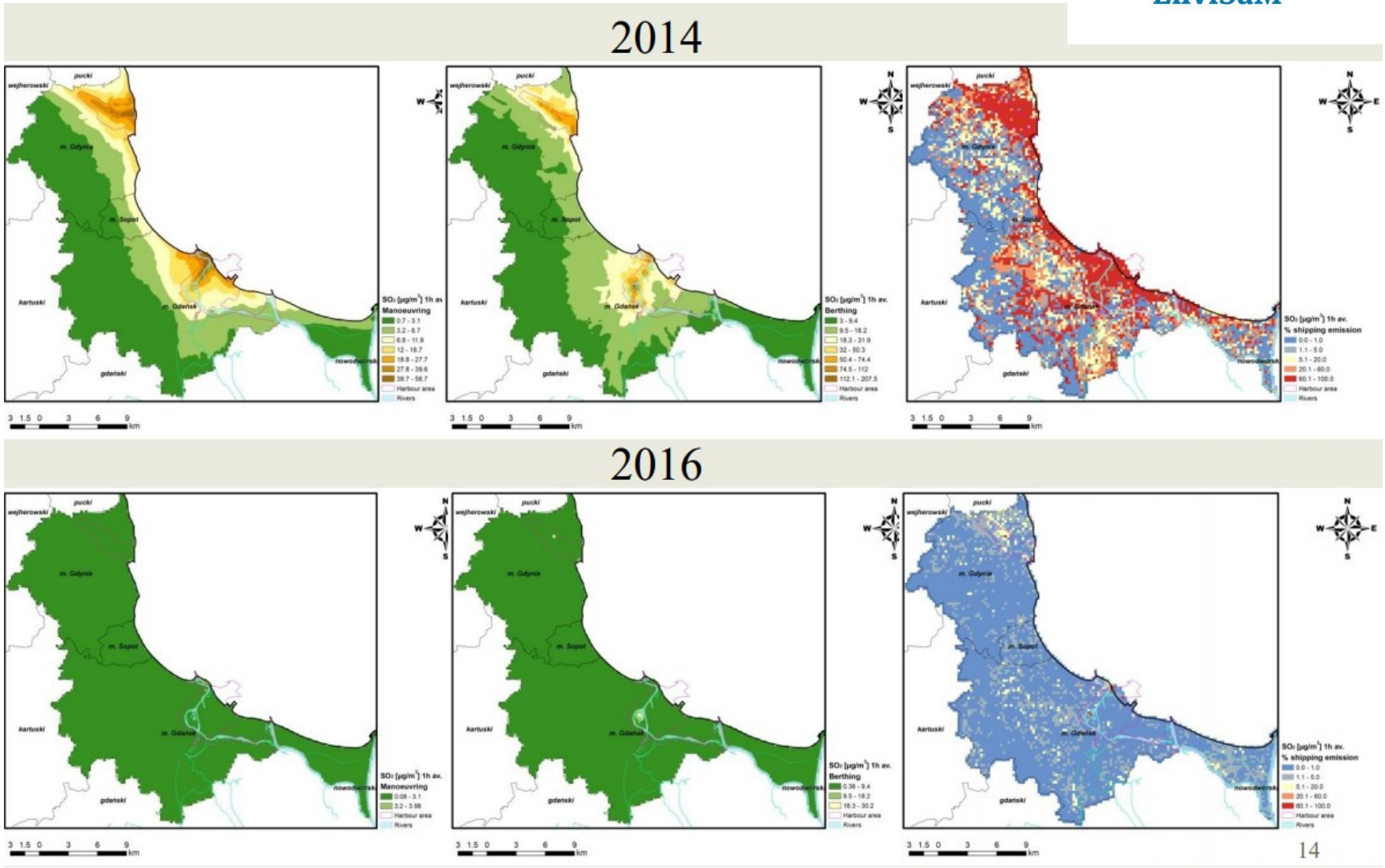
+ SECA (2015)
&
NECA (2021)

2030

Tricity, Poland (SO2 - 1h)

Before SECA

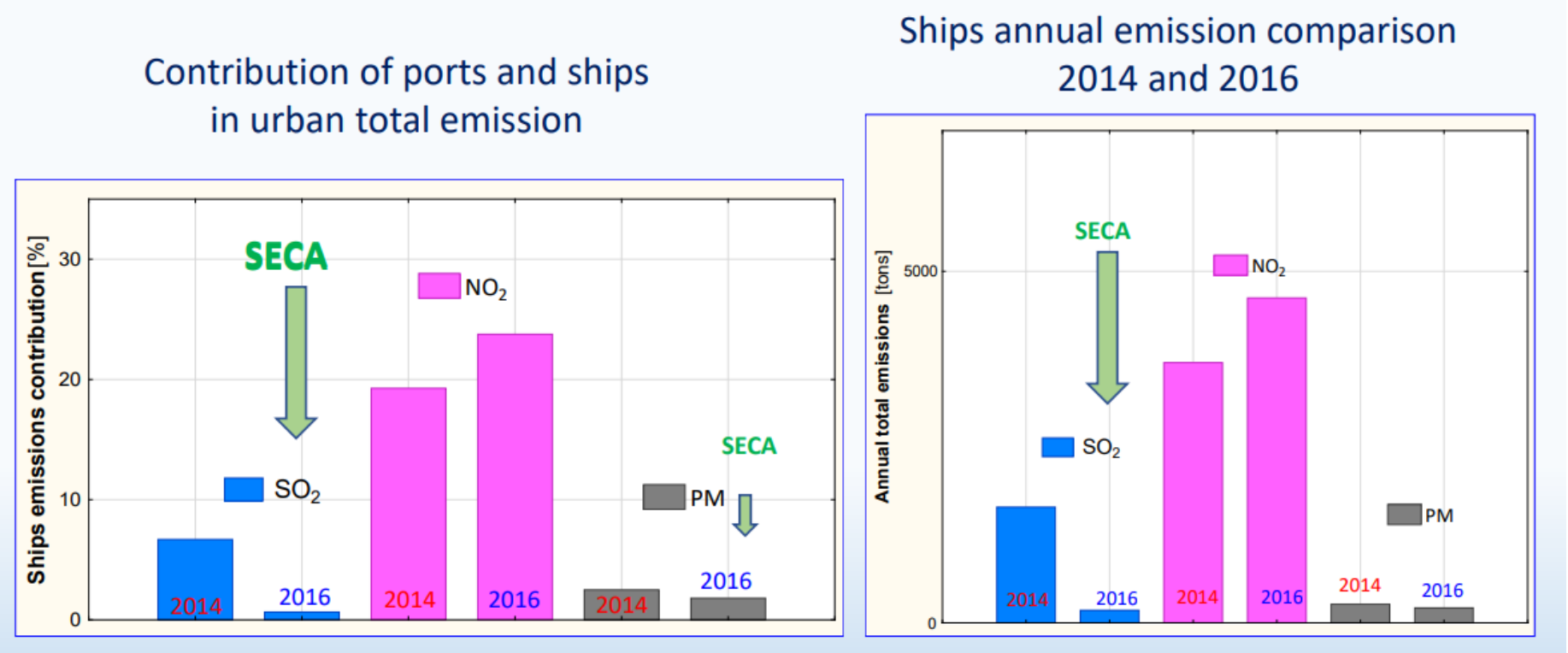
After SECA



Case study - Tricity, Poland

	2014	2016
SO2 (%)	6.7	0.65
PM (%)	2.5	1.8
NO2 (%)	19.3	23.8

Table 1: Emissions discharge comparison
Estimative of ship emissions based on ship calls.



Monitoring Compliance

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The sniffer method is fully operational, for fixed sites and airborne measurements.

Campaign TriCity Oct 2017

Göteborg and Great Belt , fixed measurements 2016-2018

- Highest non compliance in western English Channel and middle Baltic Sea
- In general good compliance rate, 96 % at great Belt bridge, 94 % from airborne. Good compliance near the ports Gothenburg and Gdansk (99%), Saint Petersburg (95% compliant, but 2% were gross emitters)
- Some specific ship owners/lines are often encountered with high emissions (flag less important)
- Several ferry lines have been operating with malfunctioning scrubbers
- Some cruiser lines makes long term tests with permission from non SECA flagtest

Airborne campaign midell of of Baltic sea Sep 2017

Campaign Sankt Petersburg Sep 2018

Scrubbers efficiency

- No dramatic increase in scrubber installations after SECA

  - Low fuel prices and high investments cost of EGCS (exhaust gas cleaning system) on ships has pushed owners to low sulfur fuel oil option

- Global SOx emissions reductions in 2020 may contribute to the increased interest and cost-effectiveness of EGCS

- Black carbon not decreased with scrubbers

- The results of the surveys conducted on ships equipped with EGCS indicate a number of technical aspects requiring modification and improvement

Innovation

- On a short term increase in incremental innovations:

- cleaner fuels that can be used on existing vessels
- emission abatement technology already in use in other industries

- SECA has created markets for emission abatement technologies and motivated investments

- SECA increased sales, R&D efforts
- SECA has expanded business of established BSR companies
    - Companies serve global markets; BSR SECA area too small market area?

Economic impacts

- Impact on economic parameters like *costs, pricing, FDI, cargo flows* and *modal splits* are considered **negligible**
- Significant SECA impacts were attributed to **innovation** and **reputation** of BSR
- Regression analysis shows that blue growth and FDI and BSR branding are statistically significant, both with a positive leading sign
- Their ß-Coefficients percentage shows that blue growth, cargo flows and pricing accounted for about 56% of the overall economic impact of SECA

Some results are sector specific:

- the ports feel negative about possible *modal splits* while shipowners are positive

Responses are country specific:

- Danish are 6 times more positive about the *overall impact of SECA* regulations than the Estonians

SECA Investment tool

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Web-based tool: Prototype Interface.

- Risk management and times series
- Analysis for spread of different fuel types
- Portfolio management analysis
- Asset allocation management
- Creating a dashboard based on available and future possible solutions

Health Impacts – EnviSUM results

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~1000 extra deaths annually (2016) due to shipping in the Baltic

34% reduction in premature deaths -< 2014 – 2016 (SECA benefits)

Health assessment - Case study of Tricity, Poland

SECA regulation on ship emissions → **drop of health hazards in Tricity** (mainly: Respiratory mortality & Cardiovascular hospital admissions)

The impact of pollutants emitted by ships varies spatially:
Sopot – association with mortality (PM10, PM2.5, SO2, NOx) and hospitalizations (NOx)
Gdynia – association with mortality (SO2) and hospitalizations (PM10, PM2.5, SO2)
Gdansk – no significant influence (residential sector plays a key role)

Project Partnership

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