

Targeting health and environmental improvement.

The main aim of the SECA regulation is to decrease the negative health and environmental effects originating from ship exhaust gas emissions. Health impacts such as respiratory and cardiovascular problems are caused by particles comprising mainly of sulphur. In addition to the health effects, sulphur emissions cause acidification which damage ecosystems, buildings and cultural heritage.

## Sulphur Emission Control Area (SECA) Regulation's Benefits Exceed the Costs. Both are Distributed Unevenly.

### POLICY BRIEF

October 2017

## Highlights

- The economic effects of SECA concerning the rise of fuel costs and modal shift from sea to land did not occur as was predicted.
- The impacts of emissions and compliance costs are distributed unevenly.
  - Children, the elderly and people with respiratory or cardiovascular disease will suffer more than the healthy adult population.
  - People living in port cities and in coastal areas are affected most.
  - The compliance costs are probably higher in the peripheral northern industries that have long sea routes to the markets. Especially the paper and the metal industry are concerned.
- The health, environmental and economic benefits of SECA outweigh the costs.
  - Decreased mortality, less sickness days and lower public healthcare costs are the economic benefits from effective environmental regulation.
- Tight environmental regulation can encourage innovation. Reduction of emissions can create business benefits to maritime cluster.

*This policy brief is based on results from EnviSuM project – Environmental Impacts of Low Emission Shipping: Measurements and Modelling Strategies. The project results will provide policy makers and authorities with tools and recommendations for the development of future environmental regulations, and the shipping sector with guidance to support future investment decisions.*

### *Further reading:*

*Jonson, J-E., Jalkanen, J-P., Johansson, L., Gauss, M. and Denier van der Gon, H.A.C. 2015. Model calculations of the effects of present and future emissions of air pollutants from shipping in the Baltic Sea and the North Sea.*

*Lähteenmäki-Uutela, A., Repka, S., Haukioja, T. and Pohjola, T. 2017. How to recognize and measure the economic impacts of environmental regulation: The Sulphur Emission Control Area case. Journal of Cleaner Production 154, 553-565*

The Sulphur Emission Control Area (SECA) of the Baltic Sea, the North Sea and the English Channel can be used as a case example to indicate how the environmental regulation influences the region and its people. In order to gain environmental and health benefits, the maximum allowable sulphur content in marine fuels in the SECA was lowered from 1% to 0.1% in the beginning of 2015. The decision to establish SECA was made in October 2008 by International Maritime Organization (IMO).

#### Assessing the impacts of SECA regulation

Impact assessments can be divided to two categories, if the effective date of regulation is taken into consideration: impacts of potential regulation (ex-ante) or impacts of existing or past regulation (ex-post). In case of SECA the effective date is 1.1.2015. Results of ex-post impact assessment showing the realized effects of the regulation should be used as a guidance when comparable regulation is planned. The performance of the SECA rules can be compared to the evaluations and to the political claims made before the SECA was effective.

Many assessment studies were completed before the SECA came into effect in order to find out what are the potential impacts of the regulation. Some of the studies were rather simple calculations based on the price differences between the different fuel oils, but also studies with broader view were made. They concentrated on for example cost benefit analyses or impacts on short sea shipping and to its competitiveness in relation to other transport modes (rail and road). In general, most of the studies examined the impacts of the regulation from the economic point of view. Emission scenarios were used when the health improvements were assessed.

The SECA regulation causes compliance costs. The most obvious short-term effect of SECA was an increased fuel costs due to the more expensive low sulphur fuel. Low sulphur fuel is generally more expensive than heavy fuel oil, because it is a distillate product and the process costs

more. According to ex-ante impact studies that assess the impacts of potential regulation, the transport costs were forecast to rise by 20-40%. The calculations based on the price difference between heavy fuel oil and low sulphur fuel. The rise did not happen as had been forecasted, because the absolute fuel costs did not rise due to the general development of the fuel prices. Similarly, a modal shift was expected to happen because of the regulation. The modal shift can increase the external costs, i.e. harm human health, increase congestion and accidents. However, the effects of the regulation to the modal shift have been insignificant.

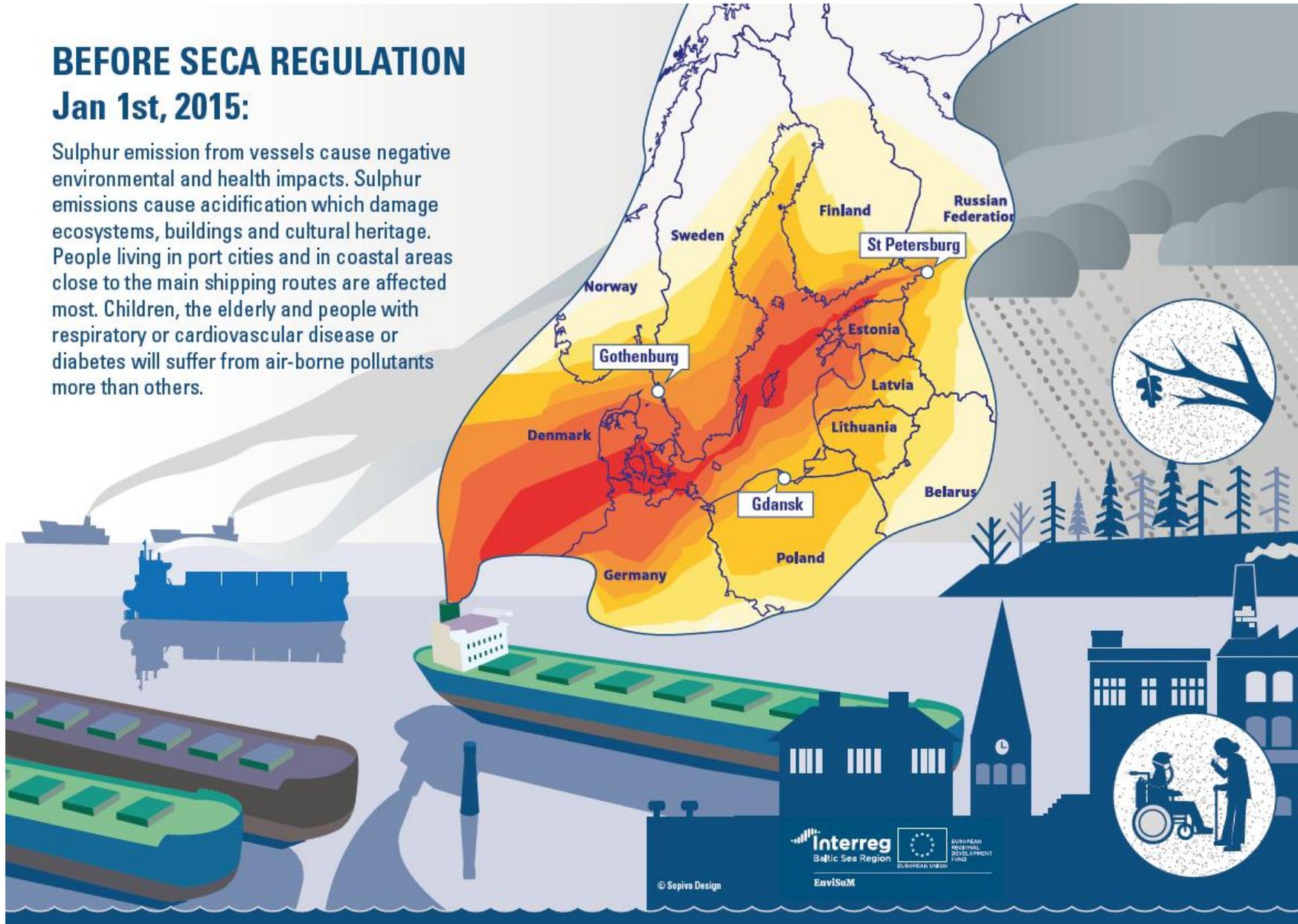
#### Uneven distribution of cost and benefits

The results on impact studies of SECA show that lowering the sulphur content of ship fuel have positive effects both on air quality and health. Positive impacts especially at a local scale are significant. Results of cost benefit analysis indicate that the benefits according to different scenarios are much higher than the costs, even though only benefits related to human health are included.

In general, it is agreed that the health, environmental and other benefits of SECA outweigh the costs. It is also agreed that the impacts of emissions are not distributed evenly. There seems to be specific effects on particular risk groups determined by age, gender, disability, social group etc. Children, the elderly and people with respiratory or cardiovascular disease or diabetes will suffer from air-borne pollutants more than the average adult population. In addition to uneven distribution between different population segments, there is also a regional bias: people living in port cities and in coastal areas close to the main shipping routes are affected most. On the other hand, those population segments and areas will benefit most of the positive effects of lowered emissions. In other words, the densely populated Central European countries will benefit more than sparsely populated and peripheral regions.

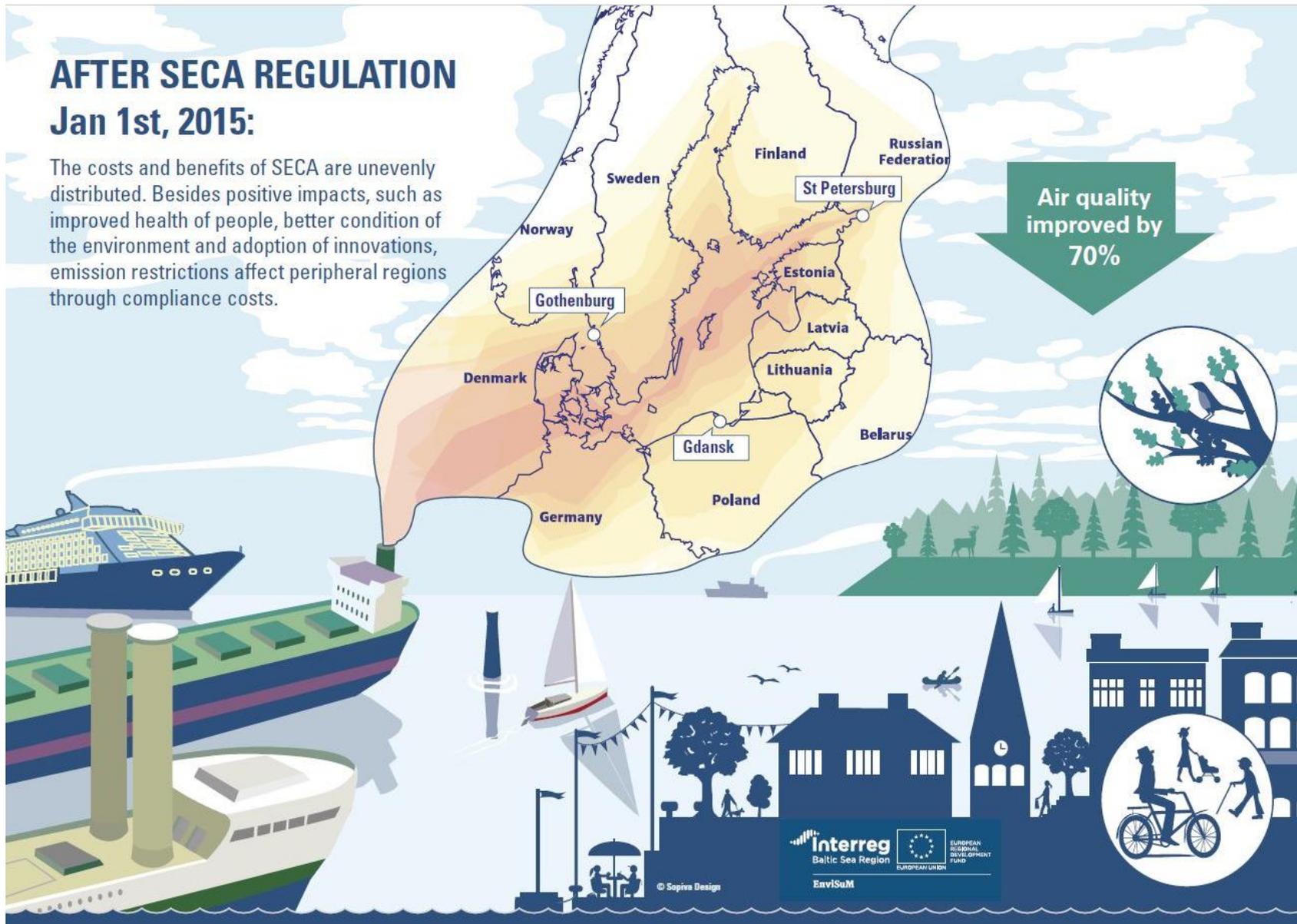
## BEFORE SECA REGULATION Jan 1st, 2015:

Sulphur emission from vessels cause negative environmental and health impacts. Sulphur emissions cause acidification which damage ecosystems, buildings and cultural heritage. People living in port cities and in coastal areas close to the main shipping routes are affected most. Children, the elderly and people with respiratory or cardiovascular disease or diabetes will suffer from air-borne pollutants more than others.



## AFTER SECA REGULATION Jan 1st, 2015:

The costs and benefits of SECA are unevenly distributed. Besides positive impacts, such as improved health of people, better condition of the environment and adoption of innovations, emission restrictions affect peripheral regions through compliance costs.



This graphic describes the effects of air pollution and effects of SECA regulation. The framework is based on Lähtenmäki-Uutela et al. 2017 and air pollution map is modified from the Jonson et al. 2015. The air pollution after SECA is based on still unpublished results.

Good quality of life is a value as such, but its economic benefits can also be calculated. Human health-related issues such as deaths, sickness days and hospital costs are figures which can be used when the results of the regulation in terms of monetary value are assessed. Decreased mortality, less sickness days and lower public healthcare costs are the economic benefits from effective environmental regulation.

When considering the economic costs, the Central European countries and more distant countries are affected differently. The compliance costs of the SECA are probably higher in the peripheral northern industries that have long sea routes to the markets. Especially the paper and the metal industries have been concerned of the increased cost of transport that may weaken their competitiveness. Doubts have been groundless in most cases, or at least the cost effects have been lower than expected.

#### Regulation accelerating innovation

Tight environmental regulation may encourage innovations, and reduction of emissions can bring business benefits to maritime cluster. In addition to the SECA regulation, a global regulation for sulphur emissions will take place in 2020. The maximum allowable sulphur content of fuel will be 0.5%. Sulphur regulations have already created worldwide markets for emission abatement technologies (e.g. scrubbers), stimulated the development of more energy-efficient vessel engines and related maintenance or lifecycle services. Many of the leading technology provider companies have improved existing and developed new technologies due to the SECA. Producers of 'cleaner' fuels, vessel designers, shipbuilding companies and repair yards have also benefitted as many ship owners operating in the SECA have decided to either retrofit their existing vessels or to invest in new vessels using cleaner fuels. Ports and their surrounding cities have made preparations and plans to be ready for rising demand of 'cleaner' fuels (LNG, methanol, biofuels). All the above mentioned

issues have also increased the demand for consultancy and planning services. In order to ensure the regulatory compliance a need for bunker sample testing services and emission measurement technologies have arisen in the course of regulation.

In regulatory impact assessment distributive effects should also be discussed. On the business side, some compensation mechanisms could be discussed to aid those businesses and regions that suffer most.



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