



Viru Keemia Grupp AS is the largest oil shale processing company in Estonia. It is an important actor in the growth and prosperity of Estonia, thus a heavy distortion of this industry will have consequences on the national economy. Since the fall of the oil prices in the second half of 2014 and the implementation of the SECA regulation since 2015, the Estonian shale oil has been under economic pressure. The Estonian maritime bunker fuel challenge is further aggravated because the shale oil sulphur content will no longer meet the global sulphur requirement of 0.5 % from 2020. Realistically, VKG could choose from five different management investment portfolios in order to meet the future demands.

Economic effects of SECA regulation on regional development. Viru Keemia Grupp as an example.

POLICY BRIEF
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Highlights

- The SECA regulation compliance entails investment decisions for the maritime stakeholders who must comply with the strict regulation that competitors in other parts of the world are not subject to.
- Low bunker prices have alleviated economic costs of SECA, but the economic effects are spread unevenly.
- The effect is slightly negative on regional growth and cohesion in smaller regions where some of the maritime companies are linked to the economic well-being of the regions.
- The case company is a small refinery, however, its contribution to the economic situation of its country makes it a special case within the refining industry.

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:

Olaniyi, E. O., Viirmäe, M. (2016). The Economic impact of environmental regulations on a maritime fuel company. Research in Economics and Business: Central and Eastern Europe, 8(2). ISSN 1736-9126.

Prause, G. & Olaniyi E.O. (2017). The impact of environmental regulations on the regional development in Eastern Estonia. New Challenges of Economic and Business Development - 2017: Ed. Muravska, T. Riga: Latvian State University.

Viru Keemia Grupp as a shale oil producer

Viru Keemia Grupp AS is the largest oil shale processing company in Estonia. It is situated in Ida-Viru County, an approximately 150,000 populated area with the highest unemployment rate (13.2 %) in Estonia (6.2 %), a high labour pressure, a low average regional income (approx. 81 % of Estonian average) and the highest concentration of the national majority of Russian-speaking Estonians (approx. 77 %). Shale oil, VKG's main product is produced from oil shale, a sedimentary rock that contains a solid combustible organic matter called "kerogen" in its mineral state. As a solid material, the oil shale undergoes thermal treatment to produce shale oil and other products like coke and phenols. Shale oil is commonly used as a quality-improving supplement to HFO in maritime bunkering fuel and also as diesel supplement in industrial boilers and furnaces. It is increasingly becoming important as an alternative to petroleum derivatives globally.



Underground loader, VKG Ojamaa mine. *Picture: Kaupo Kikkas, 2011*

Shale oil covers about 65 % of Estonia's need for primary energy, which has guaranteed the energy independence of country making it the least energy importation dependent country in Europe due to shale oil produced electricity. Most European countries import over half of their total consumed energy but Estonia reliance on energy import is approximately 12 %. The country predominantly uses about 78 % of solid fuels to produce its energy requirement from oil shale.

Oil shale contribution to the economic growth

Both VKG as a company and the oil shale industry are important actors in the growth and prosperity of Estonia, thus a heavy distortion of this industry will have consequences on the national economy. Approximately half of Ida-Viru workforce is directly or indirectly employed in this industry, so changes in oil shale business will have direct socio-economic consequences on this region. For example, in the past ten years, VKG has invested close to €900 Million into the economy of Estonia and its contribution to the state budget of Estonia in 2015 from its turnover of €167 Million was up to €35 Million. The company has been responsible for over 2,100 jobs in Ida-Viru County.

Furthermore, the totality of the oil shale industry contributes about 4-5 % to Estonia's GDP and about € 300 Million to the state budget (including employment taxes, environmental taxes) and the oil shale industry is responsible for over 6,600 direct and about 13,400 indirect employees in Ida-Viru region.

VKG realities and challenges for VKG

The oil shale industry is a subject of several controversial discussions in Estonia due to the high ecological impacts comprising of high emission of CO₂, mining and groundwater issues. Consequently, VKG as an oil production company is subjected to diverse environmental

laws and regulations. Since the fall of the oil prices in the second half of 2014 and the implementation of the SECA regulation since 2015, the Estonian shale oil has been under economic pressure. The sulphur content of shale oil is around 0.8 % w/w, which means that the Estonian maritime bunker fuel challenge is further aggravated because the shale oil sulphur content will no longer meet even the global sulphur requirement of 0.5 % from 2020. Although VKG sells its fuel directly to the oil traders and not to the end-users, considering the harsh realities of the SECA and global limit, VKG must critically assess the impact of sulphur regulations on the marketability of their oil products post-2020.

The sulphur emission regulation's effects for VKG

Since the introduction of SECA, different changes have occurred with the vessels that operate in the Baltic Sea and most vessels use compliant fuel or abatement devices in order to clean their exhausts. However, despite the seemingly positive changes witnessed, the sulphur regulation have created some economic disadvantages for maritime stakeholders who must comply with a strict regulation that other counterparts around the world are not subject to. The oil refining industry is in a state of flux due to the emergence of new, renewable energy sources (used in transport and energy production) and the need to cut greenhouse gas emissions globally. Thus, fuel producers are under immense pressure to find economical ways to remove sulphur from their fuel and many refineries have started to adjust their production and made investments to these complex and expensive changes that require high materials usage.¹ It was speculated that the SECA implementation would cost the maritime sector between €2.6 billion and €11 billion by 2020. Maritime fuel

producers are affected by downward price fluctuations in recent times and that is why since the inception of the sulphur regulations, have been researching on cost-effective techniques to produce sulphur-free fuel that would comply with the stipulated air quality standards. These activities need the injection of intense funding that can only come from credit financing, which carries significant operational risks and typically difficult to secure.

Portfolio of VKG for SECA compliance

The cost for sulphur emissions regulations compliance for companies like VKG could be excessively risky and expensive. In their case, cost of compliance will unavoidably consume resources that could have been effectively distributed for needed development. It can also generate social costs like loss of jobs for the region.

Realistically, VKG could strategically choose from five conventional management investment portfolios.

1. To blend shale oil with the 0.1 % MGO or other low-sulphur content fuel - an upward vertical integration in its supply chain process -> Upward vertical Integration
2. To build a new refinery to change its marketable products portfolio to V-Diesel, 0.1 % sulphur marine fuel oil and stabilised naphtha -> Products Upgrade
3. To use partial hydrogenation of shale oil for sulphur removal -> Hydrodesulphurisation

¹ See OECD/ITF (2016). Reducing Sulphur Emissions from Ships: The Impact of International Regulation. <http://www.itf-oecd.org/reducing-sulphur-emissions-ships-impact-international-regulation>.

4. To market the existing product with a discount -> Product Discount
5. To improve its production method to increase and improve efficiency -> Process innovation

However, when the investment portfolios were empirically assessed, only two options showed positive investment return. These were **hydrodesulphurisation** and **product upgrade**, both with relatively high risk and costs of initial investment. When both options were compared, hydrodesulphurisation showed a higher investment return with a lower associated risk. Even at that, from interviews with industry experts, a typical refinery will have to spend \$50–150 million for this sulphur remover process. This cost depends on the type of technology already in place and for them have to spend only \$50 then they must have already invested some money beforehand for removal process. Hydrodesulphurisation challenge is also linked to VKG oil shale resource allocation, which is smaller than the company's processing capacity so that they are unable to meet up to 100 % of shale oil production capacity. In a report from the U.S Department of energy², a major challenge to hydrodesulphurisation is that the complicated process, which can only be done on a high scale and in a multi-step process, is capital intensive and too expensive for small-scale refinery with the capacity to remove less than 20 tons of sulphur per day. Even at that, the sulphur, which is removed at a so-called low operational cost, usually cost between \$300 and \$600 per ton for the materials – a process too expensive for many small fuel-processing plants. Even the MEPC agrees that the compliance options are

² See: More Economical Sulfur Removal for Fuel Processing Plants
https://www1.eere.energy.gov/office_eere/pdfs/tda_sbir_case_study_2010.pdf

somewhat expensive³, unfortunately, most efforts are concentrated on abatement technologies for ship owners and the port monitoring activities.

In terms of workforce, global presence and net worth, VKG cannot be compared to other, often mainly greater players in the maritime fuel market. In spite of this, the importance of VKG to the economic development of Estonia cannot be downplayed because a collapse of this sector could generate massive social and political problems in Eastern Estonia. Already, the unemployment rate in the region is double and higher than the Estonian average and might increase to 25 – 30 % in the coming years. Unfortunately, other regional economic activities are too weakly developed to mitigate some of the consequences.

Opportunities for regional development

SECA regulation has been able to yield health benefits for the people living in the Baltic Sea region, however, the underlining fact is that regulatory compliance is always related to significant investment decisions for maritime stakeholders like the shipowners, the ports and maritime fuel producers, and large uncertainties will always encompass each regulation. More so, the low cost of fuel has minimised the overall economic impact of SECA regulation and as a result, the ship owners are not forced for example to invest in abatement technologies. This way, fuel producers are expected to supply compliant fuel.

³ Unctad. 2015. Chapter 5: legal issues and regulatory developments. In Legal Issues and Regulatory Developments Ship-source pollution and protection of the environment
unctad.org/en/PublicationChapters/rmt2015ch5_en.pdf



Panorama of VKG production territory. Picture Kristian Kruuser, 2016

Viru Keemia may be a small refinery, however, its contribution to the economic situation of its country makes it a special case within the refining industry. The case has confirmed that not all regulations are created equal in terms of their costs or their benefits and that companies like VKG could sometimes lack the capacity to handle the needed compliance changes that come with regulatory decisions. Since the shipping industry incurs such a significant cost, for sulphur emission regulations like SECA to be rational, there has to be an allowance for level playing among related stakeholders. Stiffening out smaller companies by allowing the bigger companies to maintain dominance may not be very beneficial to consumer interest or any economy, which is why economic regulations are intended to counter the abuse of monopoly power to reduce inefficiencies, price manipulations and entry barriers.

Stimulating innovation in the maritime sector for a cleaner environment is crucial and technology development such as the abatement technologies can solve some persistent environmental problems. Conversely, since the shipping industry has to comply with

significant expenses from SECA regulatory investment there should be an allowance for a level playing among the related stakeholders. To facilitate structural changes, authorities can use the Estonian oil shale industry's annual contribution to the public budget. Furthermore, the oil shale industry can be integrated into Estonian smart specialisation strategy since smart specialisation encourages regions to develop their innovation around existing schemes and interconnected diversification to improve local cohesion. This resolution can be extended to other regions threatened by similar consequences in the BSR. The need for cooperation among various stakeholders is important. In situations characterised by a high investments risk where the major priority is to minimise costs to obtain greater operational efficiency such as this, a strategic partnership can be used for implementation. In short, active support of the oil shale industry could bring advantages on a regional and national level. However, globally environmentalists may welcome changes in refining industry that increase its sustainability.

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