

Food security in a turbulent world - the case of Finland

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March 27, 2023



Global food crisis

Same factors affect in three geographical levels

2022

Global



European



National

Delicate grain balance

Low stocks of exporters

Supply shock

Production & stocks



Food prices

Protectionism

Disrupted logistics

Inflation

Input costs

War

Stuck supply

Import dependency



Roaming prices - fertilisers, energy

Trade restrictions, sanctions

Food security - why is it important?

Source: <https://impact.economist.com/sustainability/project/food-security-index#introduction>



Structure

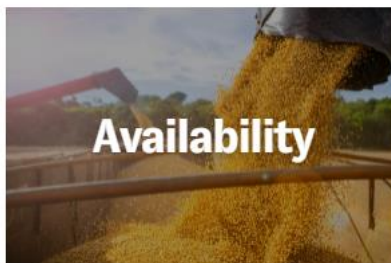


11th edition, 113 countries, 68 indicators in four groups



Affordability

Measures the **ability of consumers to purchase food**, their vulnerability to price shocks and the presence of programs and policies to support consumers when shocks occur.



Availability

Measures **agricultural production** and on-farm capabilities, the **risk of supply disruption**, national capacity to disseminate food and research efforts to expand agricultural output.



Quality and Safety

Measures the **variety and nutritional quality** of average diets, as well as the **safety of food**.



Sustainability and Adaptation

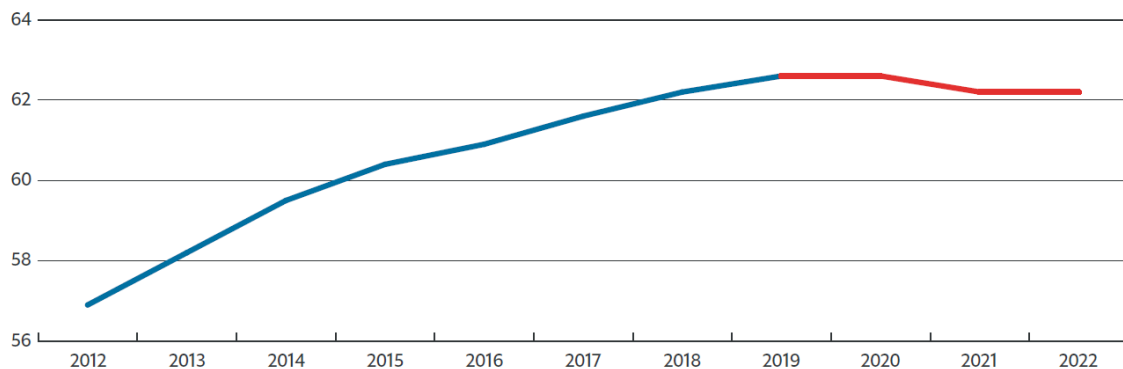
Assesses a country's **exposure to the impacts of climate change**; its susceptibility to natural resource risks; and how the country is adapting to these risks.



Major findings

GFSI average overall score, global 2012-22

After climbing year on year between 2012 to 2018, the overall food security score has not improved since 2019.



Source: Global Food Security Index 2022.

- After six years of growth, since 2019 the trend of GFSI has reversed and the global food environment has been deteriorating, making it vulnerable to shocks.
- The index in 2022 was dragged down by affordability and quality and safety. Affordability, usually the top scoring pillar, was dragged down by sharp rises in food prices, declining trade freedom and decreased funding for food safety nets.
- The food security gap has been widening between the top performers and countries in the bottom of the ranking list since 2019.
- Access to agricultural inputs, and financial products, public investments in R&D and innovative technology and strong supply chain infrastructure contributed to the top performers' high indices.

Global food security index - a dive into details



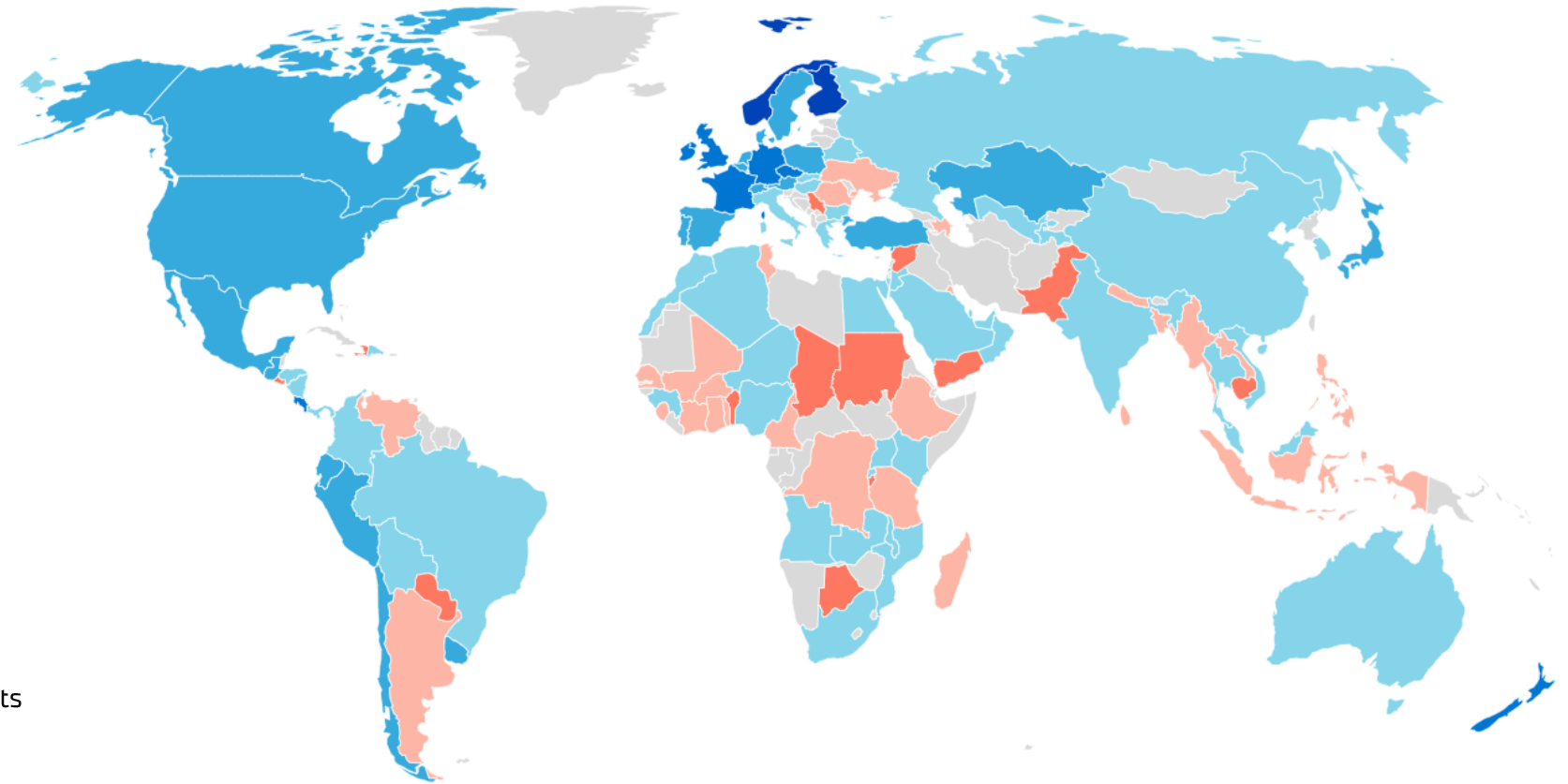
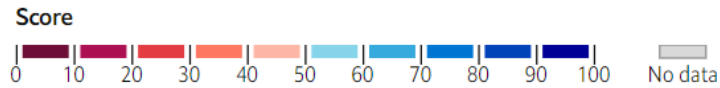
Overall score

Affordability

Availability

Quality and Safety

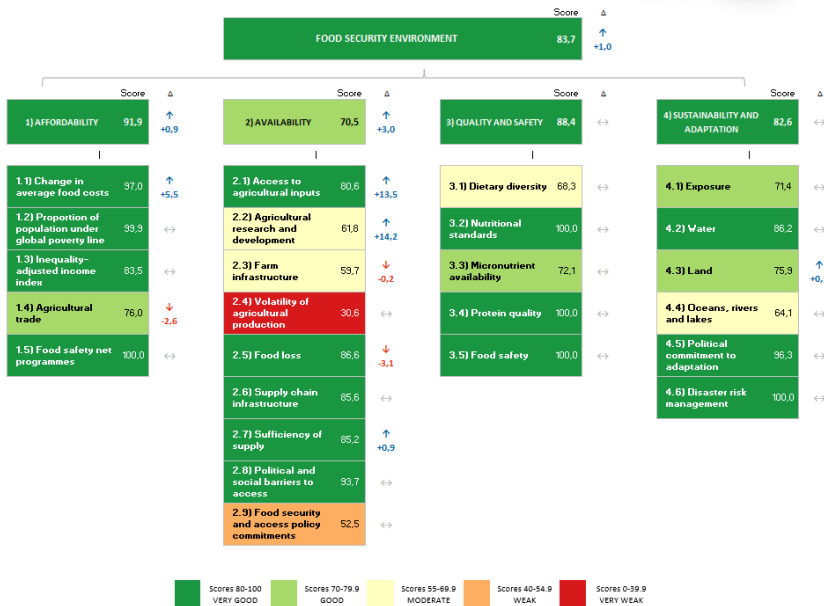
Sustainability and Adaptation



Global map by sub-index groups

- A distinct inequality among countries is observable in **affordability**.
- Availability** is a major challenge in Africa, but also weakened in Eastern Europe, Ukraine and Serbia.
- Food quality and safety** issues occur mainly in the African countries,
- Countries of Africa, South-Eastern Asia and Latin America are most exposed to the effects of **climate change and natural disasters**, but the status of some Eastern and Southern European countries are also weakened.

Global food security index - Finland and Sweden



Rank (113 countries)	Country	Overall score	Affordability	Availability	Quality and Safety	Sustainability and Adaptation
1 st	Finland	83.7	91.9	70.5	88.4	82.6
2 nd	Ireland	81.7	92.6	70.5	86.1	75.1
3 rd	Norway	80.5	87.2	60.4	86.8	87.4
4 th	France	80.2	91.3	69.0	87.7	70.3
5 th	Netherlands	80.1	92.7	70.7	84.7	69.2
6 th	Japan	79.5	89.8	81.2	77.4	66.1
7 th	Sweden	79.1	91.9	68.3	85.0	68.3
8 th	Canada	79.1	88.3	75.7	89.5	60.1
9 th	United Kingdom	78.8	91.5	71.6	77.6	71.1
10 th	Portugal	78.7	90.0	77.0	79.8	64.5
11 th	Switzerland	78.2	89.2	76.8	73.5	69.5
12 th	Austria	78.1	91.3	67.1	81.2	69.7
13 th	United States	78.0	87.1	65.1	88.8	69.4
14 th	Denmark	77.8	92.1	63.2	89.1	63.8
15 th	New Zealand	77.8	91.6	67.7	73.1	75.1
16 th	Czech Republic	77.7	91.3	69.4	76.3	70.3
17 th	Belgium	77.5	92.6	64.6	88.4	61.0
18 th	Costa Rica	77.4	83.0	79.2	79.2	73.3
19 th	Germany	77.0	87.9	67.0	79.9	70.8
20 th	Spain	75.7	89.0	63.1	81.2	66.4
21 st	Poland	75.5	87.4	63.8	81.5	66.7
22 nd	Australia	75.4	93.3	61.1	84.0	58.8
23 rd	United Arab Emirates	75.2	86.7	73.8	81.3	55.2
24 th	Israel	74.8	88.6	67.2	87.4	52.2
25 th	Chile	74.2	82.4	68.8	77.0	66.6
26 th	China	74.2	86.4	79.2	72.0	54.5
27 th	Italy	74.0	89.5	68.7	75.9	57.3
28 th	Singapore	73.1	93.2	77.8	69.7	44.3
29 th	Bulgaria	73.0	85.8	66.5	79.5	56.6
30 th	Qatar	72.4	88.6	72.9	71.7	51.0
31 st	Greece	72.2	88.5	58.3	80.8	57.3
32 nd	Kazakhstan	72.1	78.0	67.2	76.3	65.4
33 rd	Uruguay	71.8	80.0	65.6	73.8	65.8
34 th	Hungary	71.4	86.7	63.3	74.4	57.0
35 th	Oman	71.2	88.6	64.3	73.2	53.6
36 th	Slovakia	71.1	89.1	55.3	77.9	57.6
37 th	Peru	70.8	79.7	58.6	75.2	68.1
38 th	Bahrain	70.3	91.3	60.1	76.3	47.3
39 th	South Korea	70.2	76.8	71.5	71.5	58.5
40 th	Panama	70.0	84.4	63.3	69.7	58.3
41 st	Saudi Arabia	69.9	83.2	67.2	71.6	53.7
42 nd	Malaysia	69.9	87.0	59.5	74.7	53.7
43 rd	Russia	69.1	77.8	61.4	78.7	56.6
44 th	Mexico	69.1	76.0	60.0	78.9	60.2
45 th	Romania	68.8	85.1	60.6	77.9	47.1
46 th	Vietnam	67.9	84.0	60.7	70.2	52.2
47 th	Jordan	66.2	85.3	59.8	55.4	58.9
48 th	Ecuador	65.6	70.8	59.3	69.4	62.0
49 th	Turkey	65.3	58.4	65.3	78.5	61.2
50 th	Kuwait	65.2	80.0	62.9	67.8	45.5

Detailed results by country

- Top scores for both countries, 1st and 7th ranks.
- Some of the methodology and the use of certain indicators raises questions. Due to the deficiencies, the results shall be used for limited conclusions only.
- For both Finland and Sweden volatility of agricultural production is the weakest link, which appears to be a relevant finding.
- Weaknesses related to agricultural research, food security policies, farm infrastructure, dietary diversity and water surfaces raise suspicion.



Note: The diagram below shows country performance in 2022 (latest available data). Scores are normalized 0-100, where 100=best conditions. Δ = change in score, 2022 compared with 2021. ↑ = Score improved ↓ = Score deteriorated - = no change in score.

History of food security in Finland

Determining factors



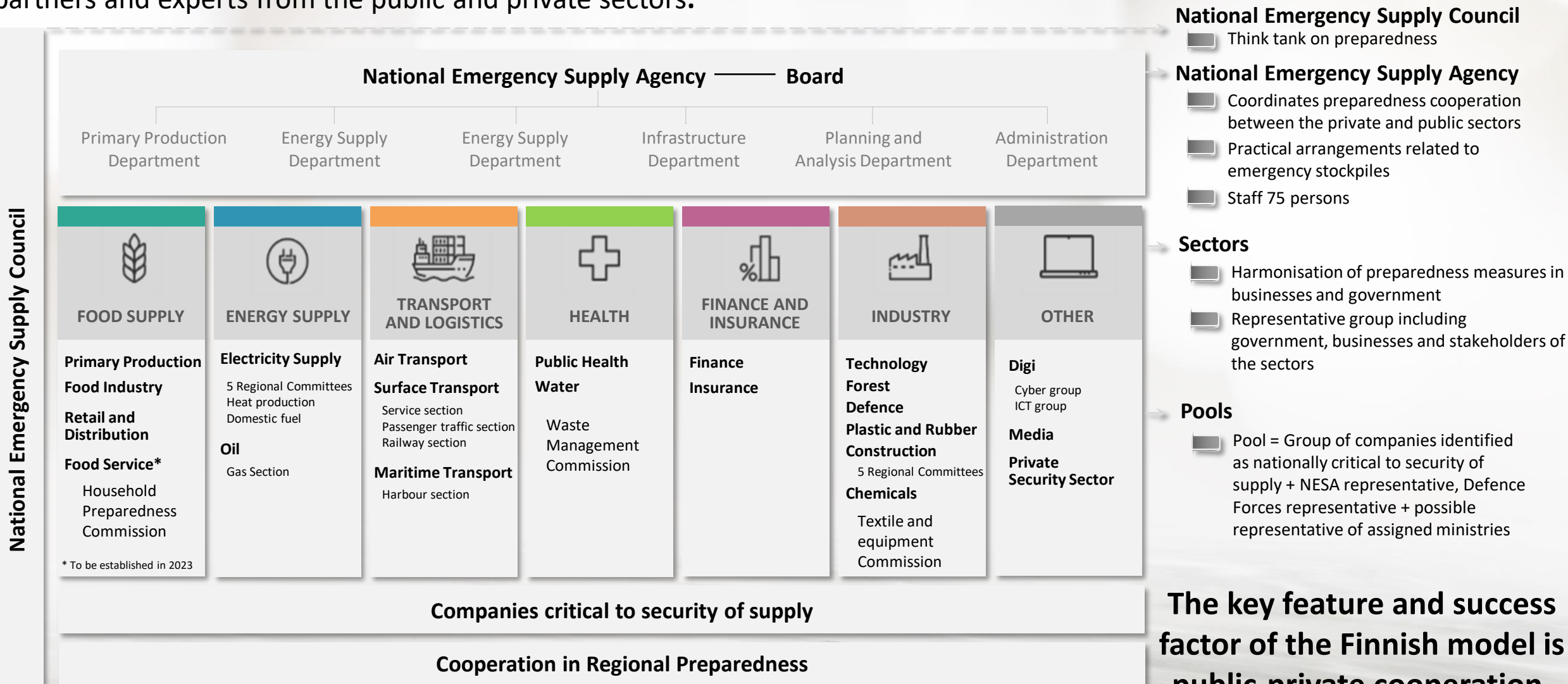
Milestones, turning points and stages of development



Given the determining factors in the background, it's not hard to understand the Finnish people's sensitivity to food security...

National Emergency Supply Organisation

The **National Emergency Supply Organisation** consists of a network of about 1000 partners and experts from the public and private sectors.



The key feature and success factor of the Finnish model is public-private cooperation.

Source: National Emergency Supply Agency

Stockpiling critical products and inputs

Stock piles of critical agricultural products and inputs



* Incl. raw materials,
ammonium, kalium

Food grains - wheat and rye - are stored for the equivalent of 6 months consumption.

Emergency reserves of grain, fertilisers or their raw materials, protein feed or pesticides have never released during the existence of NESA since 1993.

Seeds have been released to resolve availability several times, such as 1999, 2005, 2013, 2017, 2021.

Research and development related to food security

Import dependency, availability risks, preparedness for crisis in agricultural input supply

Survey of over 50 businesses and experts in seven ag-input sectors, synthetic report

Ag-inputs



Improving the food manufacturers' risk management and preparedness for crisis

Survey of over 100 SMEs, guidelines, communication and seminars

Agricultural production



Food and drink industries



Preparedness for crisis in wholesale, retail, food service, logistics and distribution

Survey of about 20 businesses and experts, synthetic report

Food retail



Food service



Food consumption



**IMPORT I, II, III
Full import dependency of the food supply chains**

Input-output analysis

Wholesale and retail sector



Retail companies estimate that 80% of their food merchandise is of domestic origin.

Import dependency of the food supply chain



Elintarvikeketjun tuontiriippuvuus

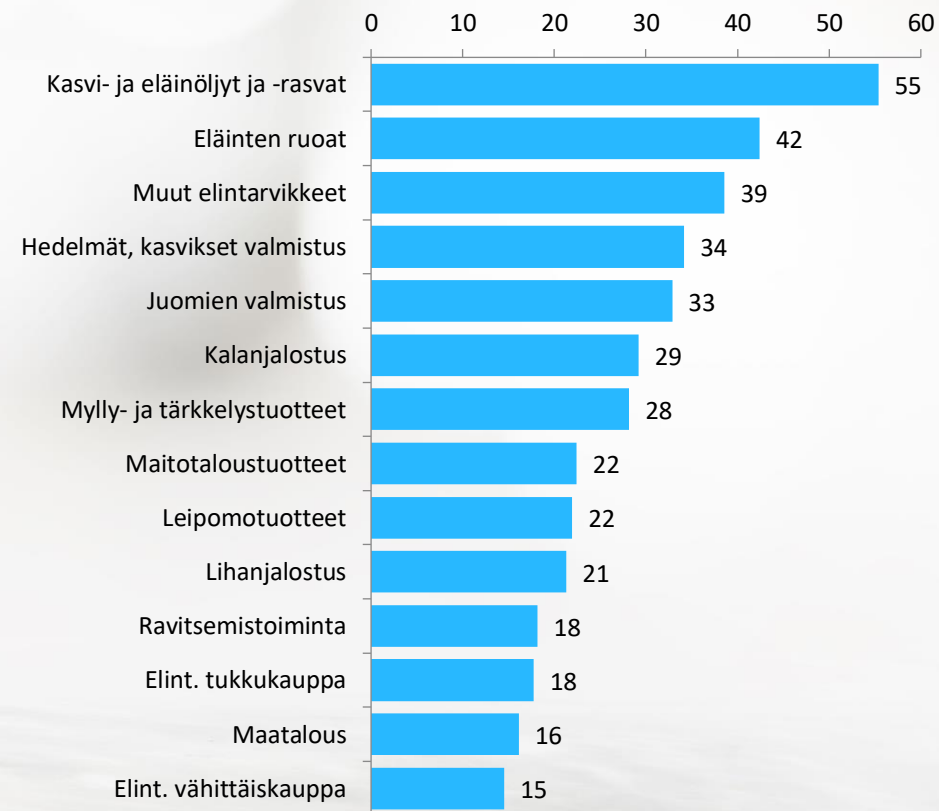
Paljonko tuontia tavaroina ja palveluina kaiken kaikkiaan on tarvittu elintarviketuotantoon kotimaassa nyky muodossaan?

Maatalouden tuotannossa käytettyjä tuontitavaroita ja -palveluja vuonna 2016, (milj. euroa)



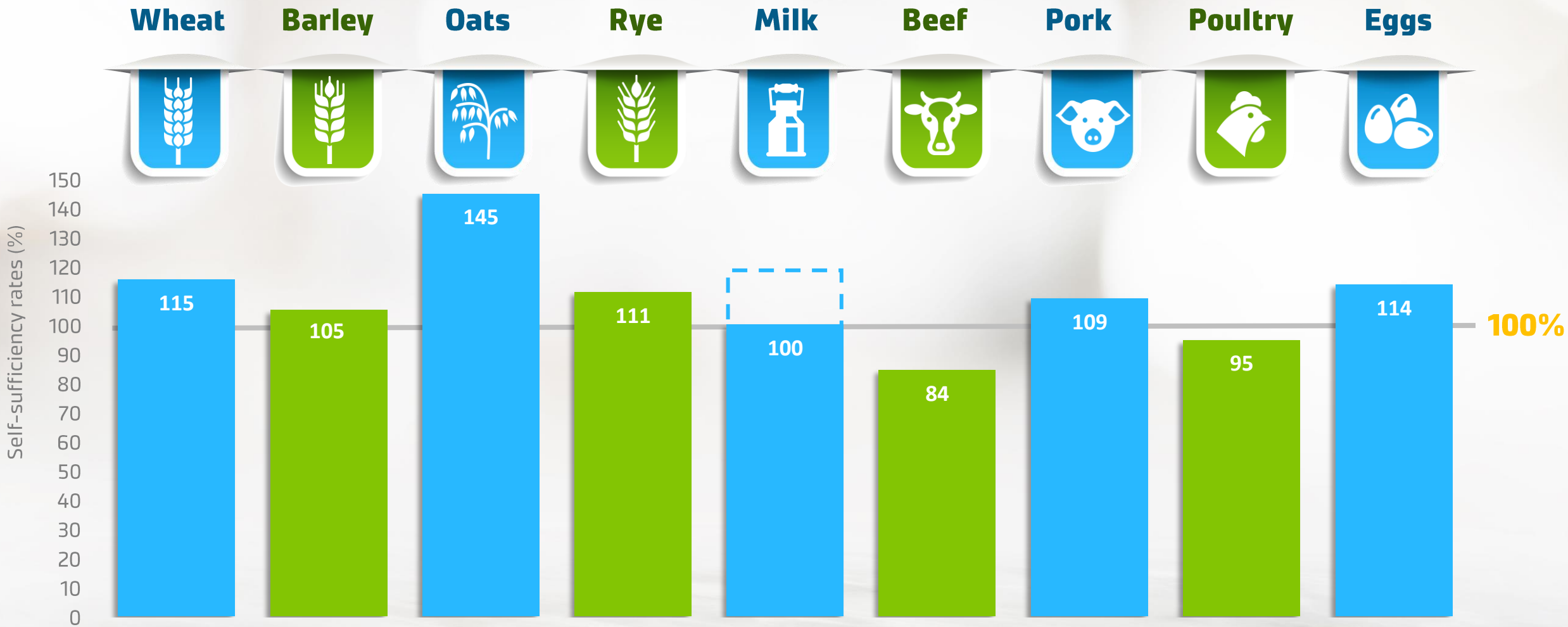
Lähde: [Knuuttila & Vatanen, 2021](#). Elintarvikemarkkinoiden tuontiriippuvuus 2003-2016. Luonnonvara- ja biotalouden tutkimus 44/2021.

Tuontipanosten osuuden tuotannon arvosta elintarviketoimialoittain vuonna 2016 (%)



Lähde: [Knuuttila & Vatanen, 2021](#). Huom. Luvut eivät sisällä investointien edellyttämää tuontia, ainoastaan tuotannossa käytettyjä kertaluonteisia tuotteita.

Self-sufficiency of agricultural products in Finland



Source: own calculations from data of Natural Resources Research Finland (Luke) and Kantar TNS Agri. Note: calculation formula of SSR = production/(production + imports - exports). Rates indicate the average of recent three years available. The self-sufficiency rate (SSR) of milk varies between 100-115% depending on the method of milk equivalent calculations.

Self sufficiency of agricultural inputs

under 20%

nitrogen 0%,
kalium below 15%,
fosphorus over 100%



Fertilisers

35%
of primary energy



Energy



Seed

0-99%

Vegetables 0%; grass 60-65%; special crops 92%, grains 99%



Plant protection agents

0%

Self-sufficiency rates of agricultural inputs

20%-110%

Complementary protein feed 20%,
feed grain ~110%



Feed



Equipment and spare parts



Labour

45%-98%




Field vegetable farms 45%;
greenhouse farms 65%; pig farms 85%;
poultry farms 93%; milk farms 97%;
grain farms 98%

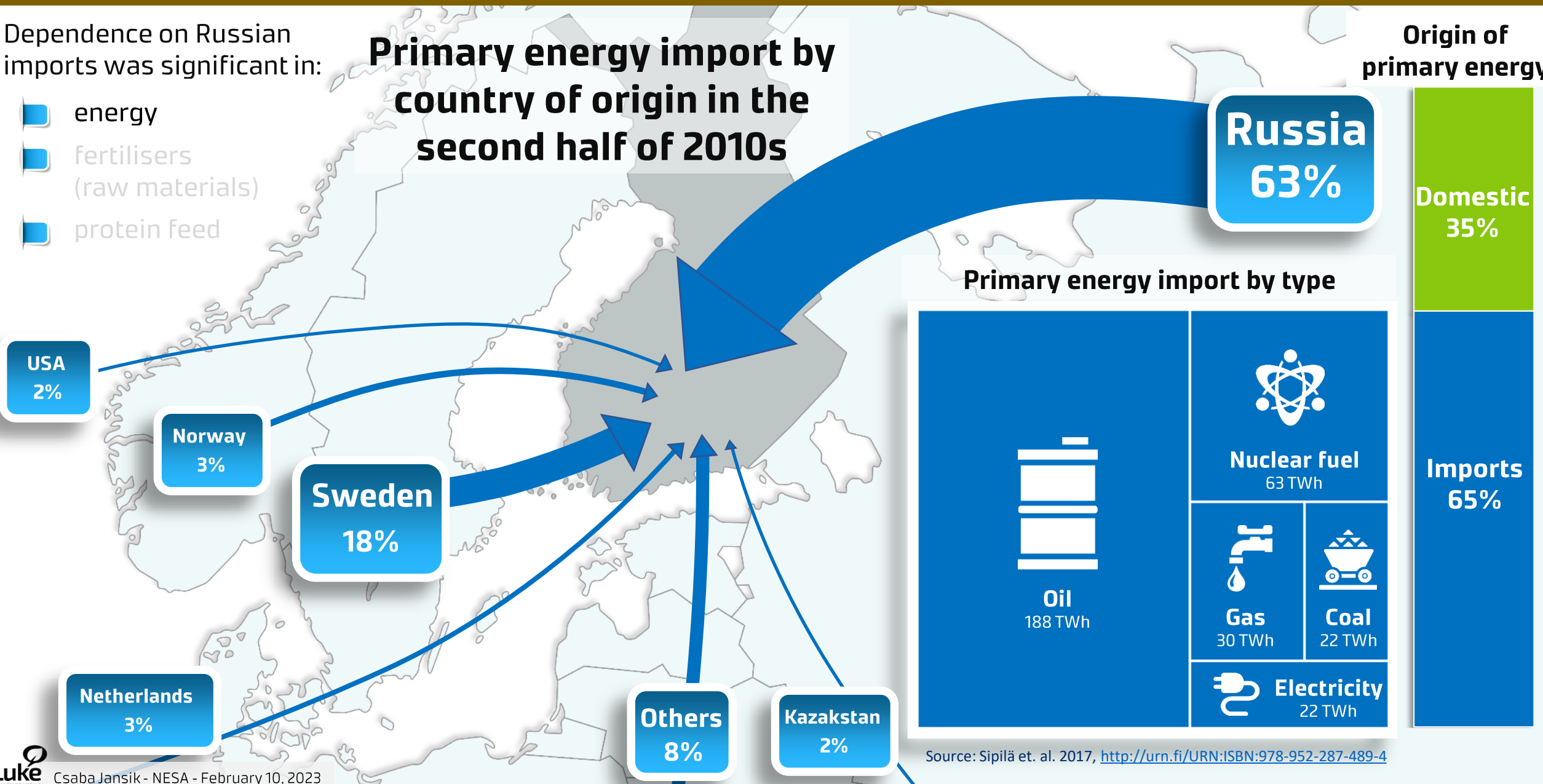
Restructuring the sourcing channels of agricultural inputs

Dependence on Russian imports was significant in:

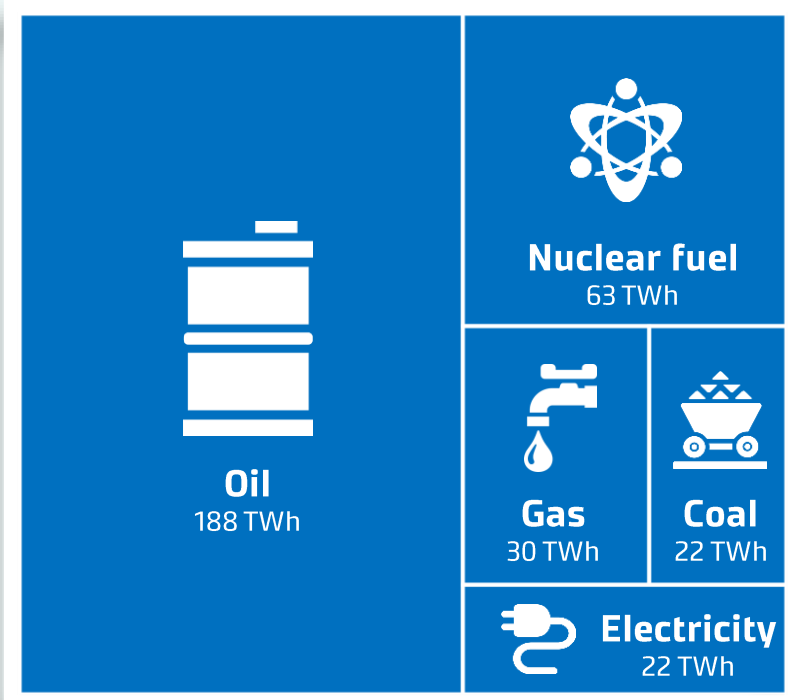
Primary energy import by country of origin in the second half of 2010s

Origin of primary energy

-  energy
-  fertilisers (raw materials)
-  protein feed



Primary energy import by type



Source: Sipilä et. al. 2017, <http://urn.fi/URN:ISBN:978-952-287-489-4>

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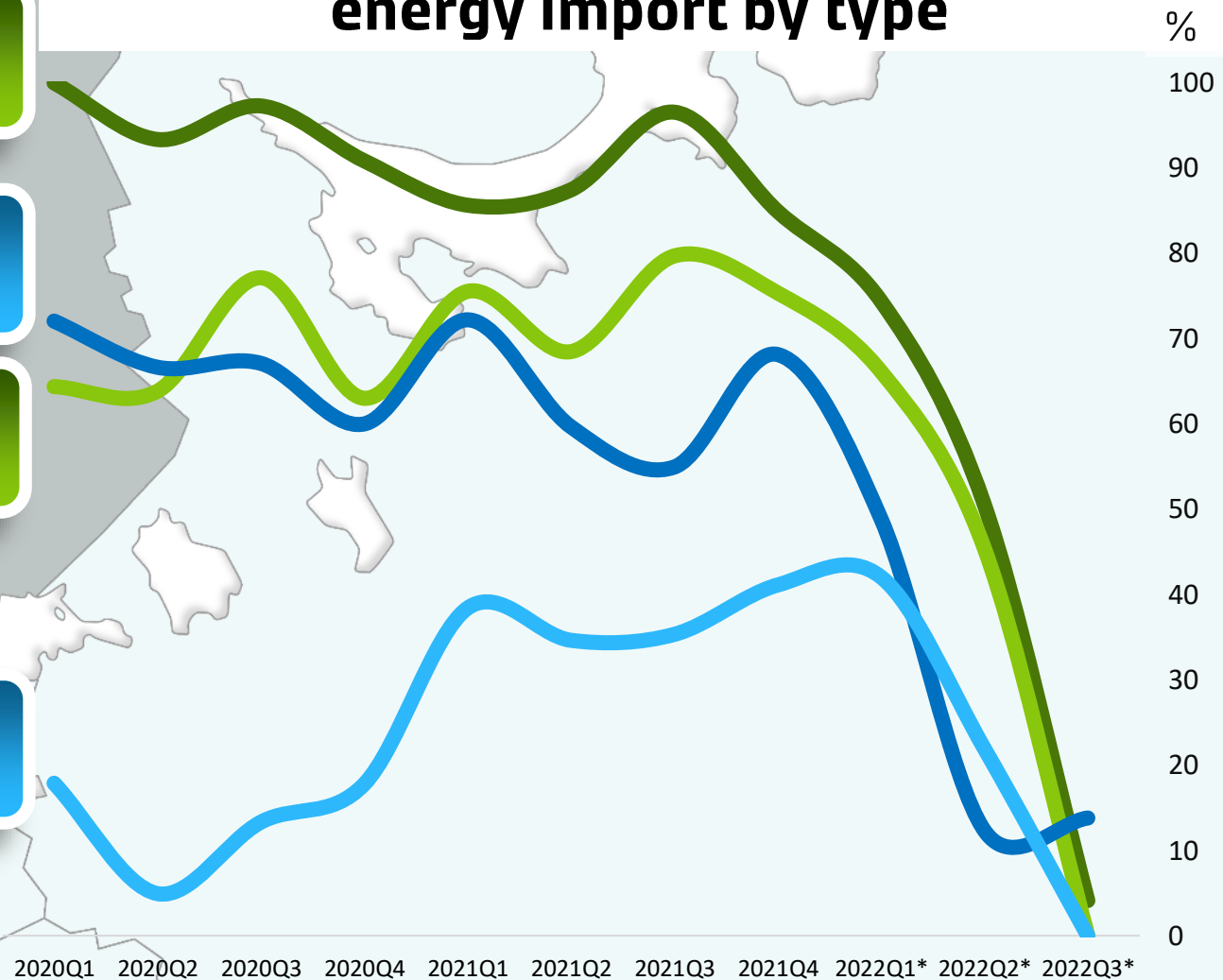
Coal 

Oil and oil products 

Natural gas 

Electricity 

Share of Russia in Finland's energy import by type



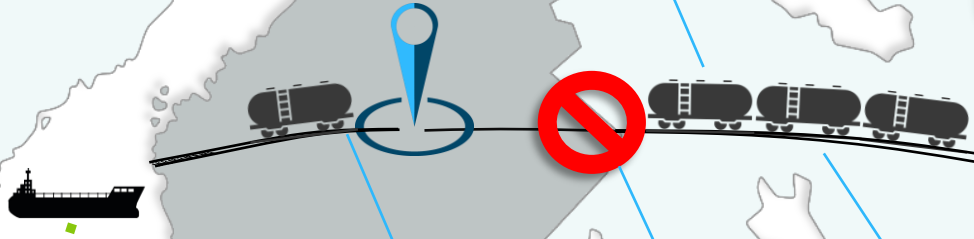
Source: Statistics Finland, https://pxdata.stat.fi/PxWeb/pxweb/en/StatFin/StatFin_ehk/statfin_ehk_pxt_13gn.px/

Restructuring the sourcing channels of agricultural inputs

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About 2/3 of the ammonium imports for manufacturing nitrogen fertiliser used to be originated from Russia.






Ammonium import from Russia continued throughout 2022.

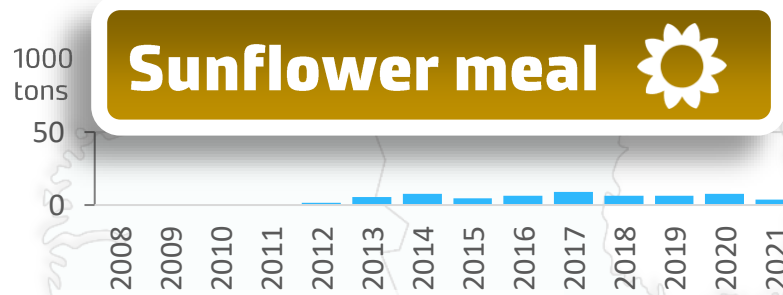
The Finnish Railroad company (VR) ceased the shipments as of January 1, 2023.

The solution is to reinforce the other import channel: tankers to harbours, from which train transport to the fertiliser factory.

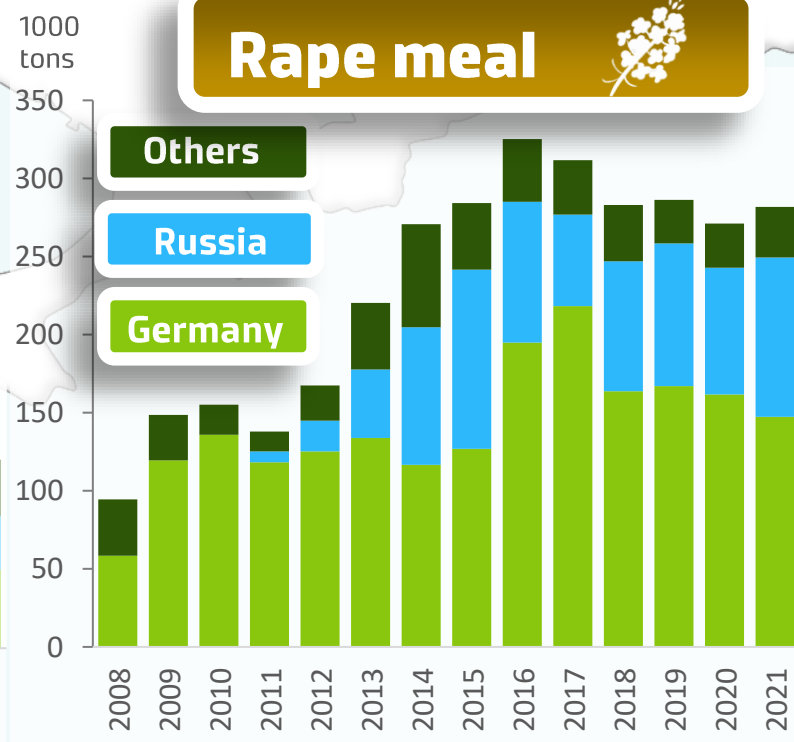
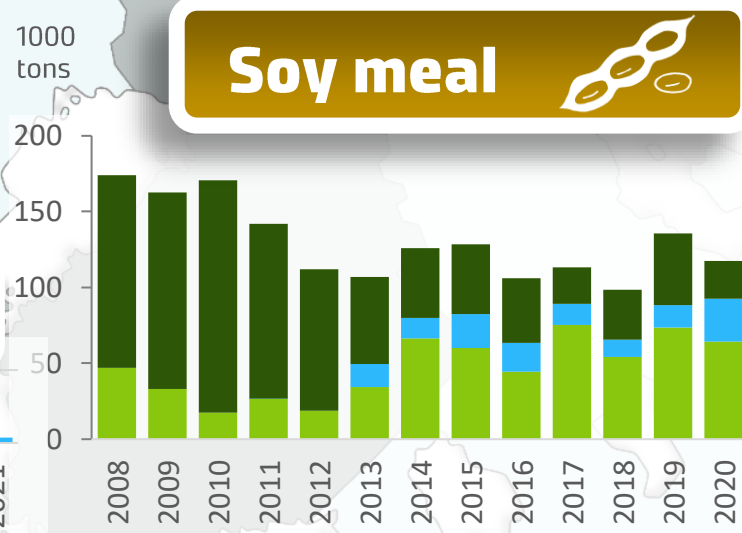
Restructuring the sourcing channels of agricultural inputs

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-  energy
-  fertilisers (raw materials)
-  protein feed



Source: Finnish Customs, ULJAS dataset



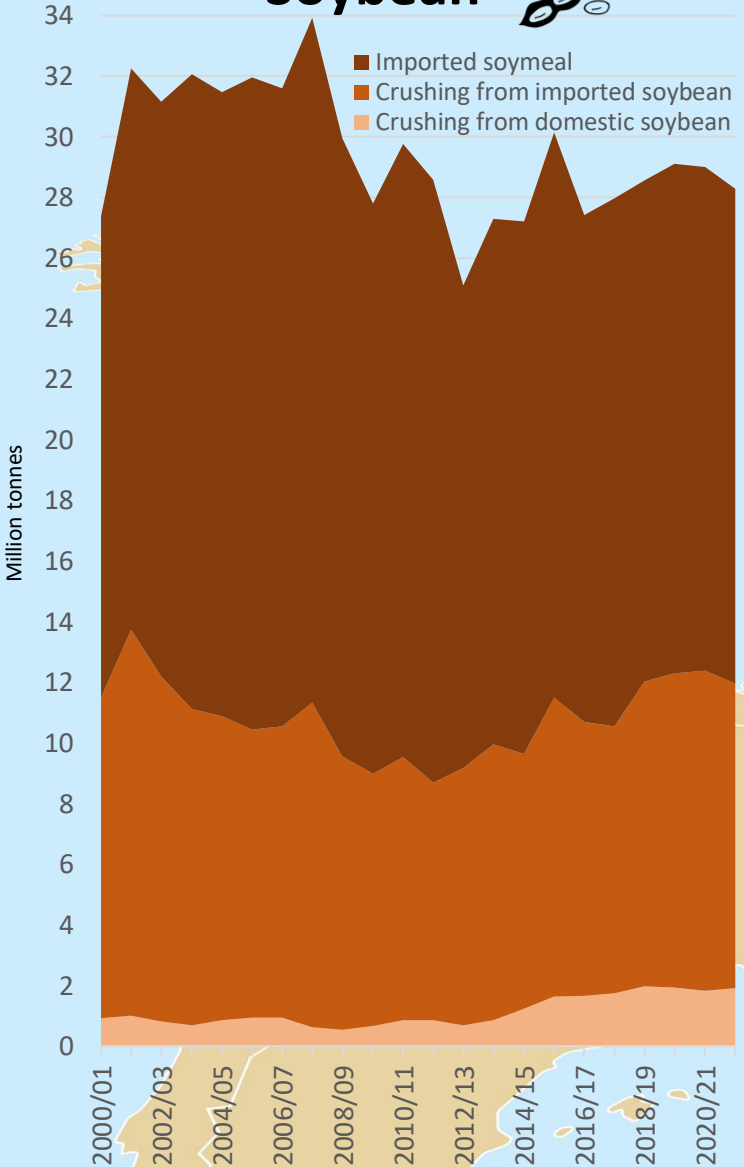
Russia had an increasing role in Finland's protein feed import over the past ten years, reaching 35% by 2021.

Soy and rapeseed meal shipments from e.g. Kaliningrad region to Finland continued to the autumn of 2022.

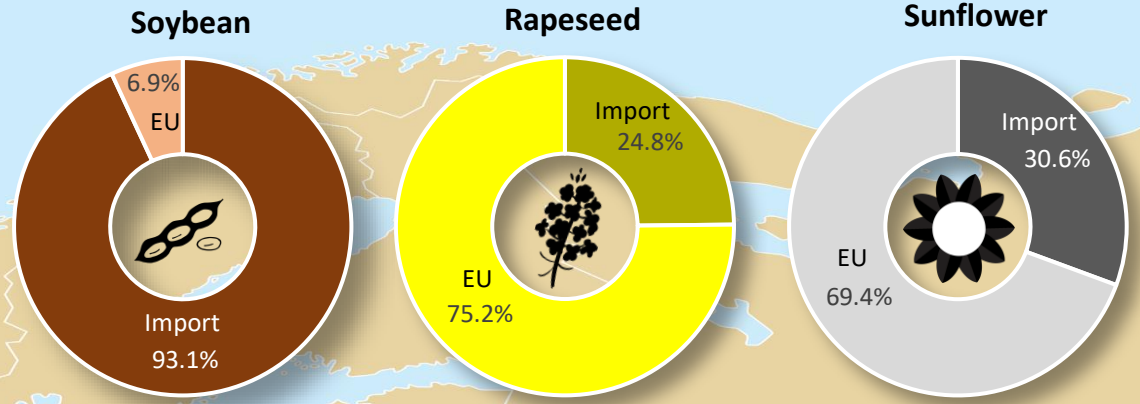
Oilseed meal import is mainly restructured to Germany, the second largest country of origin.

EU's production and import of oilseed meals

Soybean

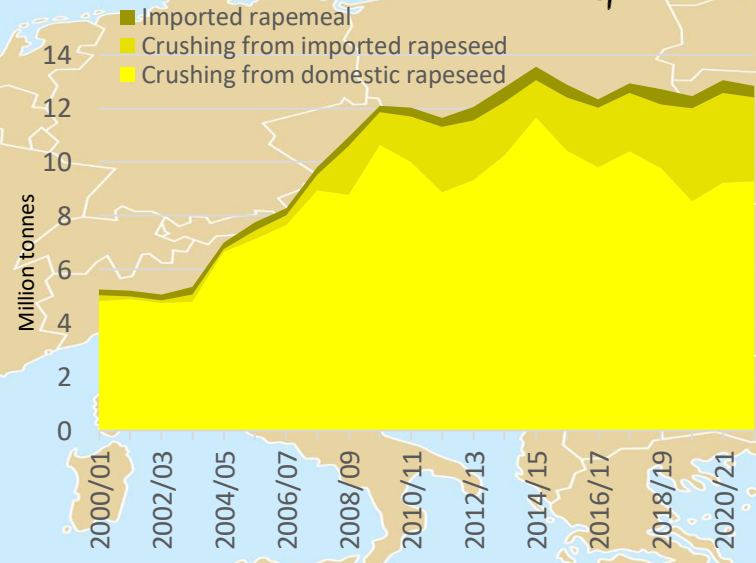


Supply of oilseed meals by origin, 2021/22e



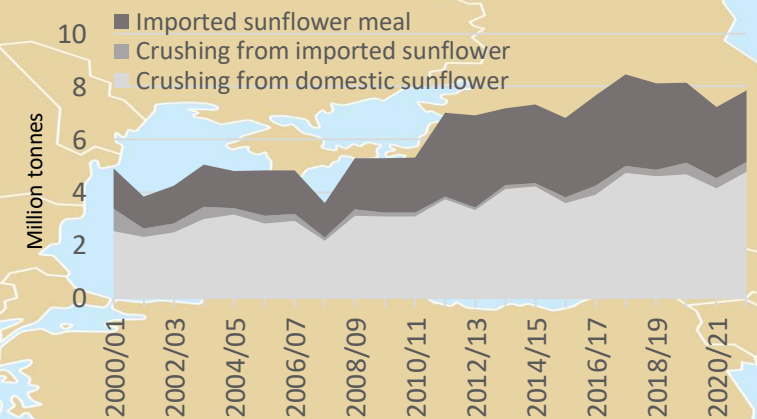
Source: own calculations based on EU DG-Agri's dataset

Rapeseed

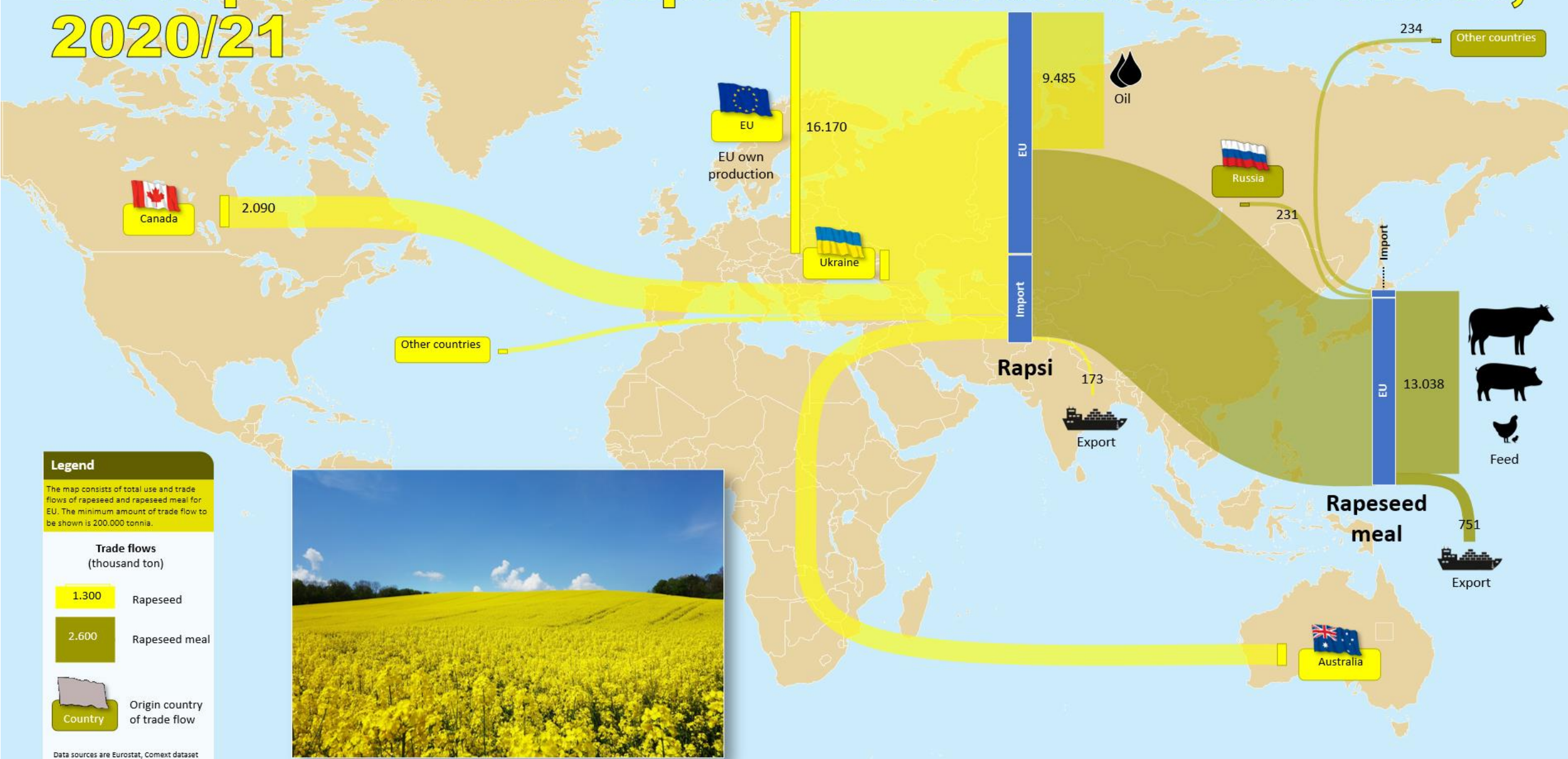


Source: own calculations based on EU DG-Agri's dataset

Sunflower



EU rapeseed and rapeseed meal balance sheet, 2020/21



Legend

The map consists of total use and trade flows of rapeseed and rapeseed meal for EU. The minimum amount of trade flow to be shown is 200,000 tonnia.

Trade flows (thousand ton)

- 1.300 Rapeseed
- 2.600 Rapeseed meal

Country

Origin country of trade flow

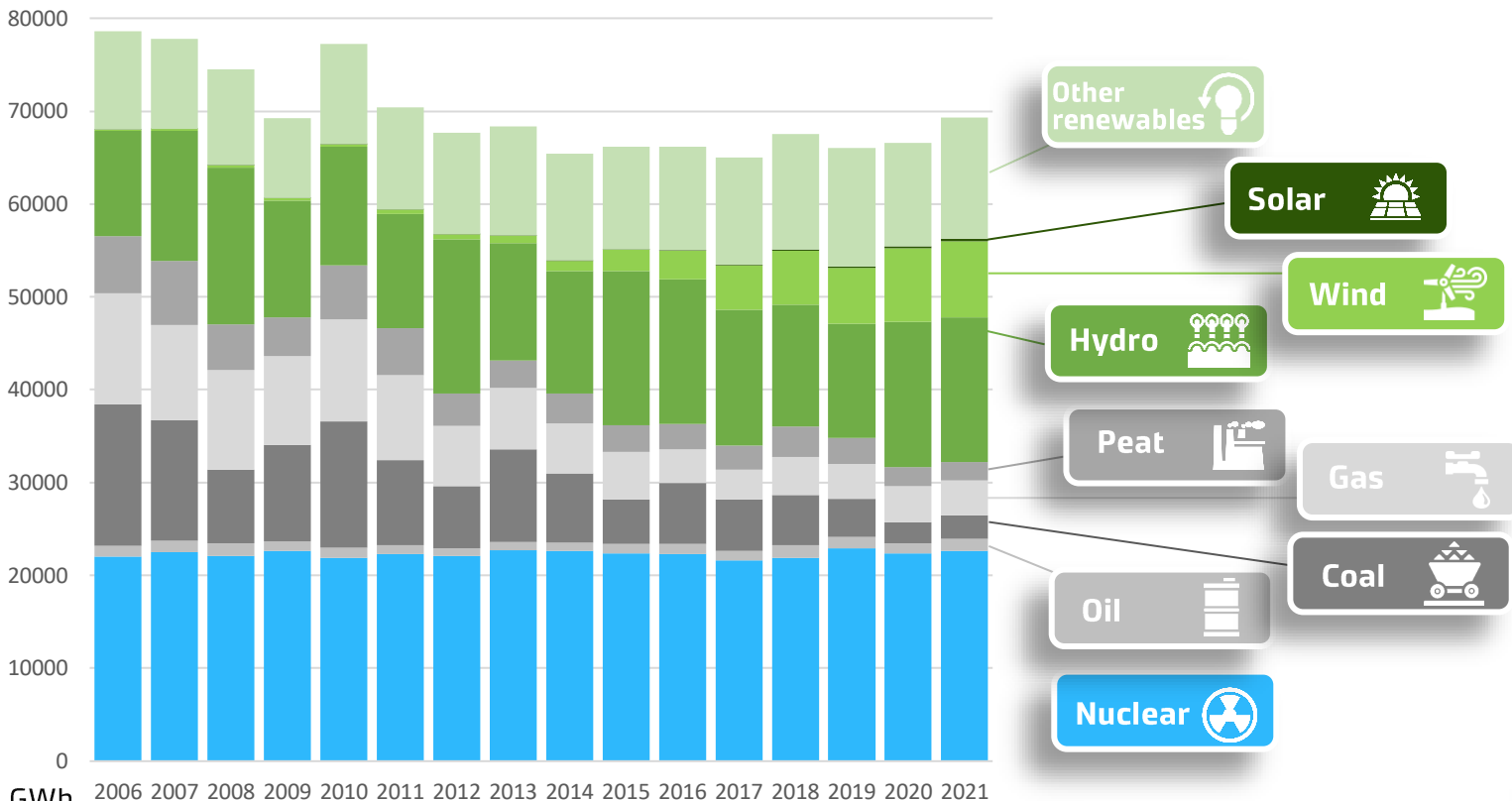
Data sources are Eurostat, Comext dataset and EU DG Agri. Own calculations.



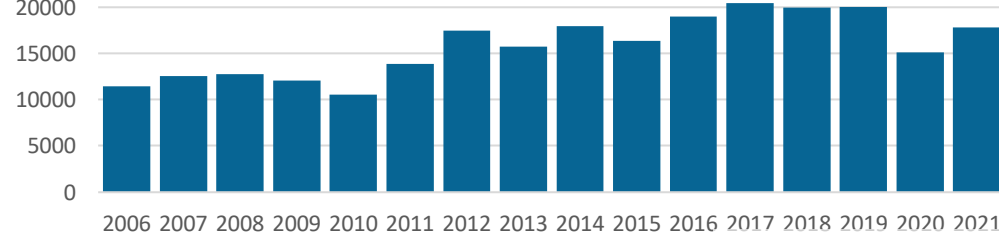
Slide layout: Csaba Jansik

Paths of increasing self-sufficiency in Finland

GWh **Electricity production by energy source**



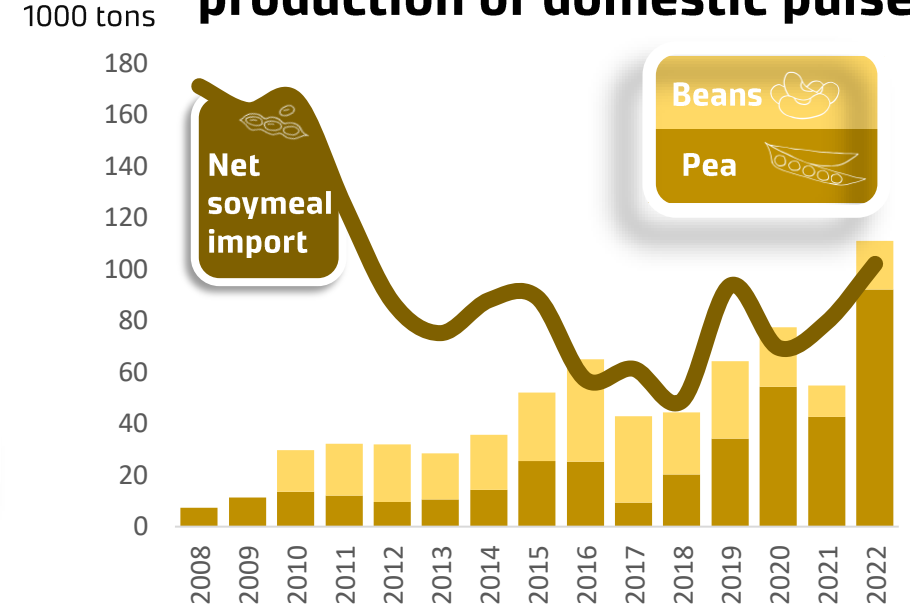
GWh **Net import of electricity**



Source: Statistics Finland

- Increasing own production of renewables.
- Saving, decreasing consumption and import.
- Shifting fossil energy use in transportation and some industries is a long term challenge.

Net soymeal import vs production of domestic pulses



Source: Finnish Customs, ULJAS dataset; Natural Resources Research Institute, Luke, production statistics

Protein feed

Fertilisers

Electricity

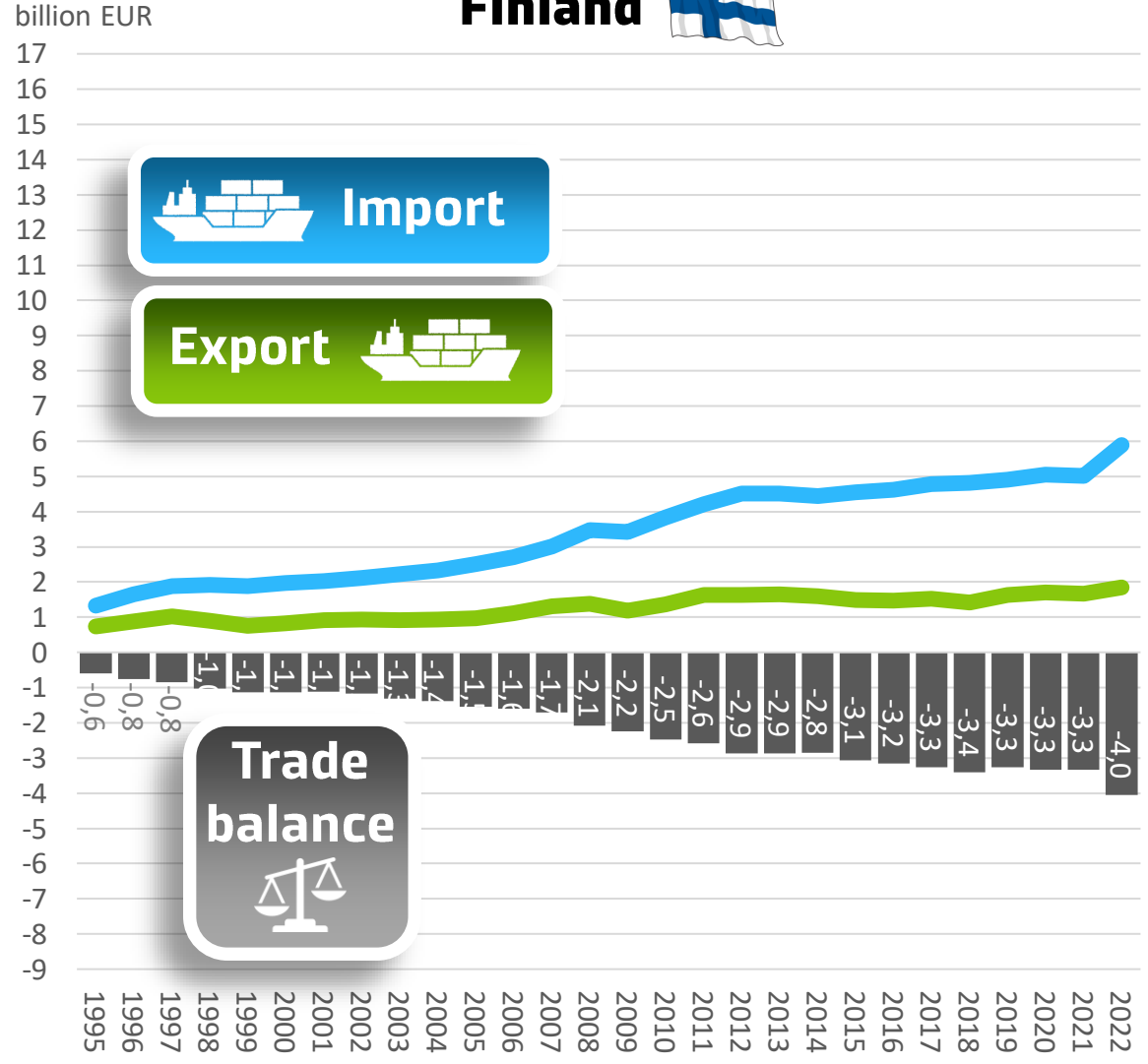
Fertiliser production may become feasible in the long run with hydrogen production.

BUT:

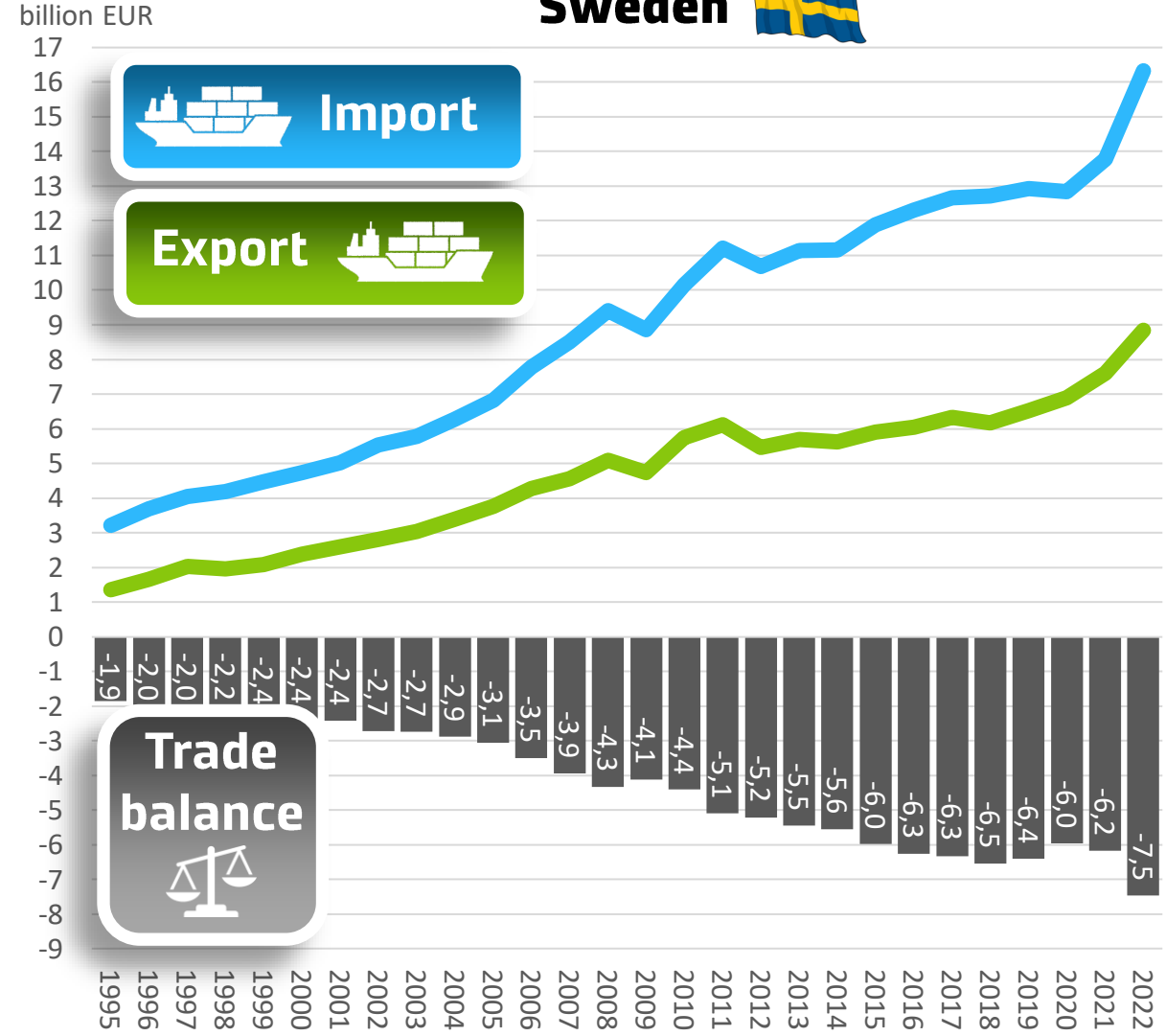
It may not be economically reasonable to pursue self-sufficiency in all inputs and products.

Agri-food export, import and trade balance

Finland



Sweden



Source: Eurostat, Comext dataset. Note: Export and import figures include the following groups CN01-04, CN07-12 and CN15-24. Figures for 2022 are estimates calculated on the basis of January-October trade figures. Both Finnish and Swedish exports and imports were corrected for the re-export of Norwegian salmon since 2012. Imports were corrected for non-edible vegetable oil for both countries since 1995.

Factors prompting to higher awareness of food security

- Global population and food demand growth
- Risks of regional or global supply shocks rises in climate change
- Food insecurity, malnutrition and famine may raise the chance of mass migration
- Geopolitical uncertainty, political polarisation
- Unpredictability and vulnerability in global trade
 - The notion of national food security will gain stronger recognition
 - Protectionism, trade wars
 - Disruptions in the global logistic chains
 - Pandemics, animal diseases
- The role Baltic Sea as precondition of smooth trade and food security - especially for Finland - but also for Sweden
- Cooperation is essential in national preparedness for crises - among public-private and institutional and individual actors