



The Energy Trilemma Index as a tool to support national security of energy system towards climate neutrality

Authors: Karlis Gicevskis, Edgars Groza, Inese Karpovica, Edgars Smiltans



Table of contents

01

Background

The Energy Trilemma
Index as a tool

02

Aim and methods

A look on how to upgrade
the energy sector

03

Analysis

Statistical records and
energy experts

04

Conclusion

Improvements still are
required

Background

“The Energy Security Score”

Country	Score
1.Canada	77.5
2.Finland	75.3
3.Romania	74.1
4.Latvia	74.9
5.Sweden	74.5

“The Energy Equity Score”

Country	Score
1.Qatar	99.9
1.Kuwait	99.8
1.UAE	99.8
2.Oman	96.6
2.Bahrain	99.6

44.Latvia

78.1

“The Environmental Sustainability Score”

Country	Score
1.Switzerland	88.2
2.Sweden	86.3
3.Uruguay	85.4
4.Norway	84.4
5.Panama	83.7

34.Latvia

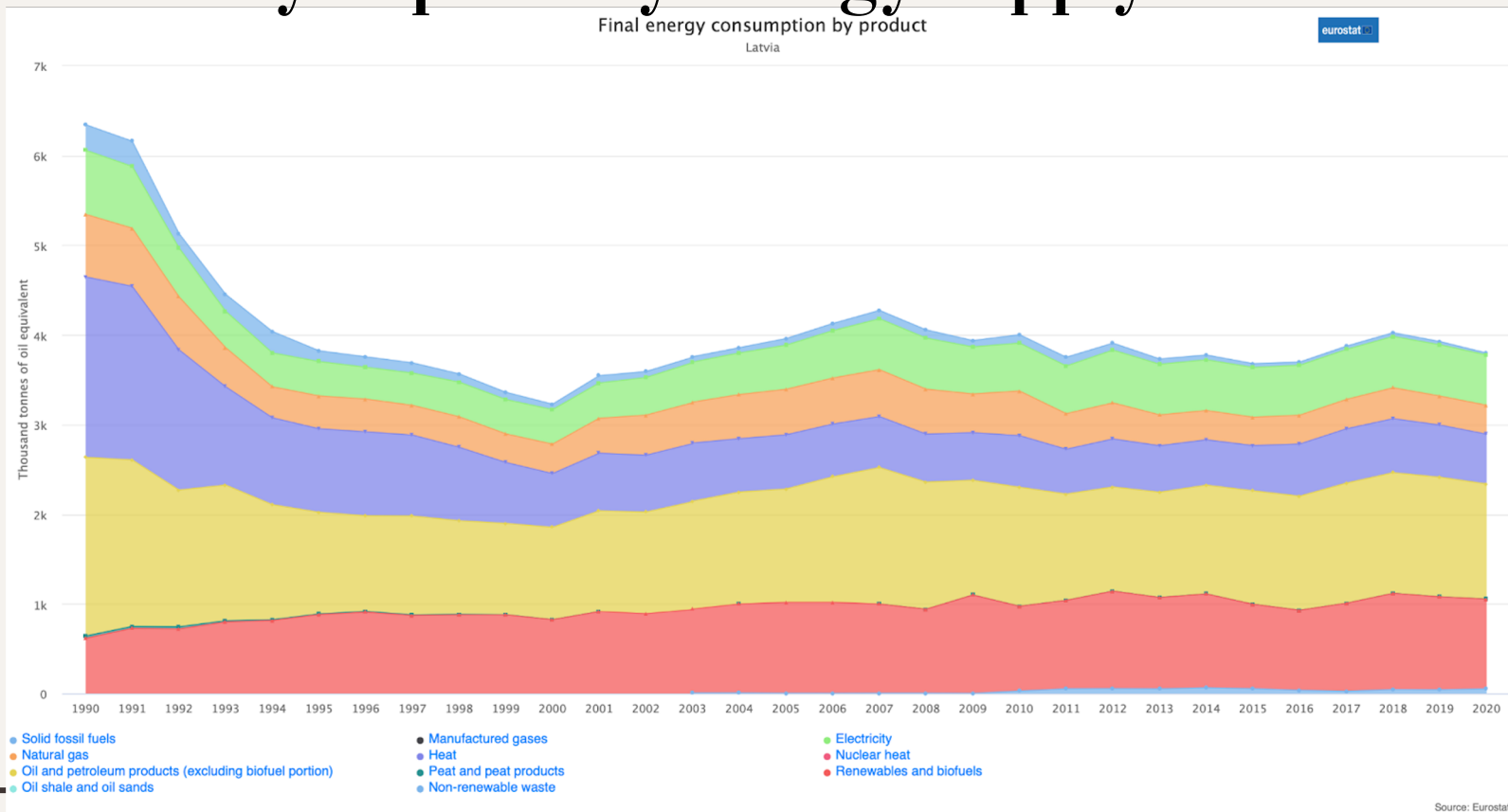
70.9

The aim and methods

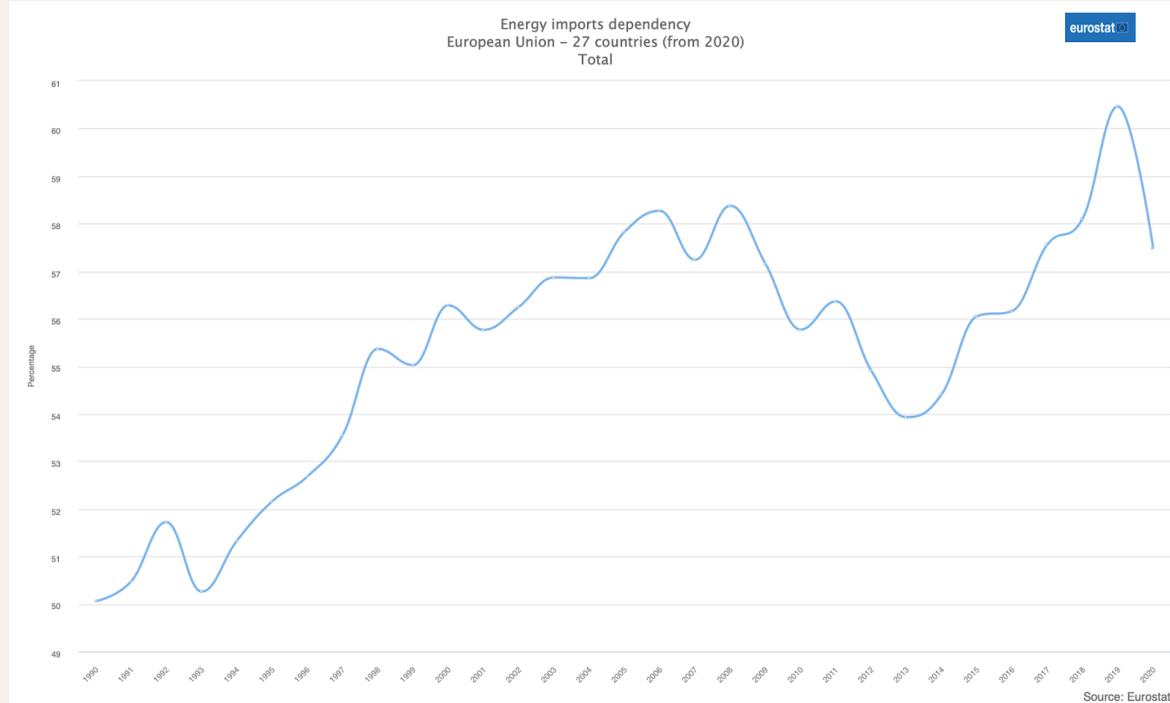
Aim. The aim of this study is to investigate Latvian energy security dimension to assist decision makers describing the key points that can move the energy sector onto safer ground.

Methods. The dimension of energy security considers various sub-indicators that covers the effectiveness of management of domestic and external energy sources, along with the reliability and resilience of energy infrastructure. Up to ten-year period retrospective analysis of statistical records of those indicators as well as Latvian and foreign scientific and professional research studies was revised by authors and discussed with another 12 experts from a programme “The Future Energy Leaders Latvia” organized by the Latvian WEC committee.

Diversity of primary energy supply



Import dependence

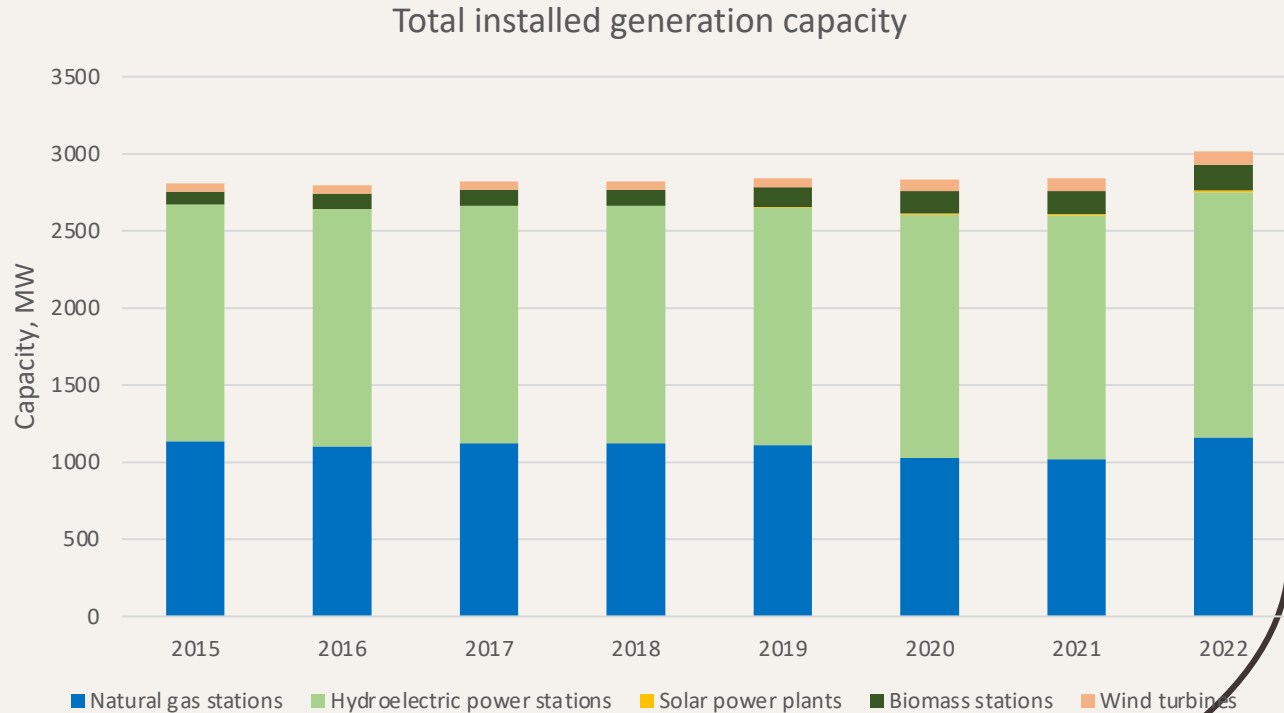


Diversity of suppliers

43 / 11

Increasing numbers of electricity and natural gas traders

Diversity of electricity generation

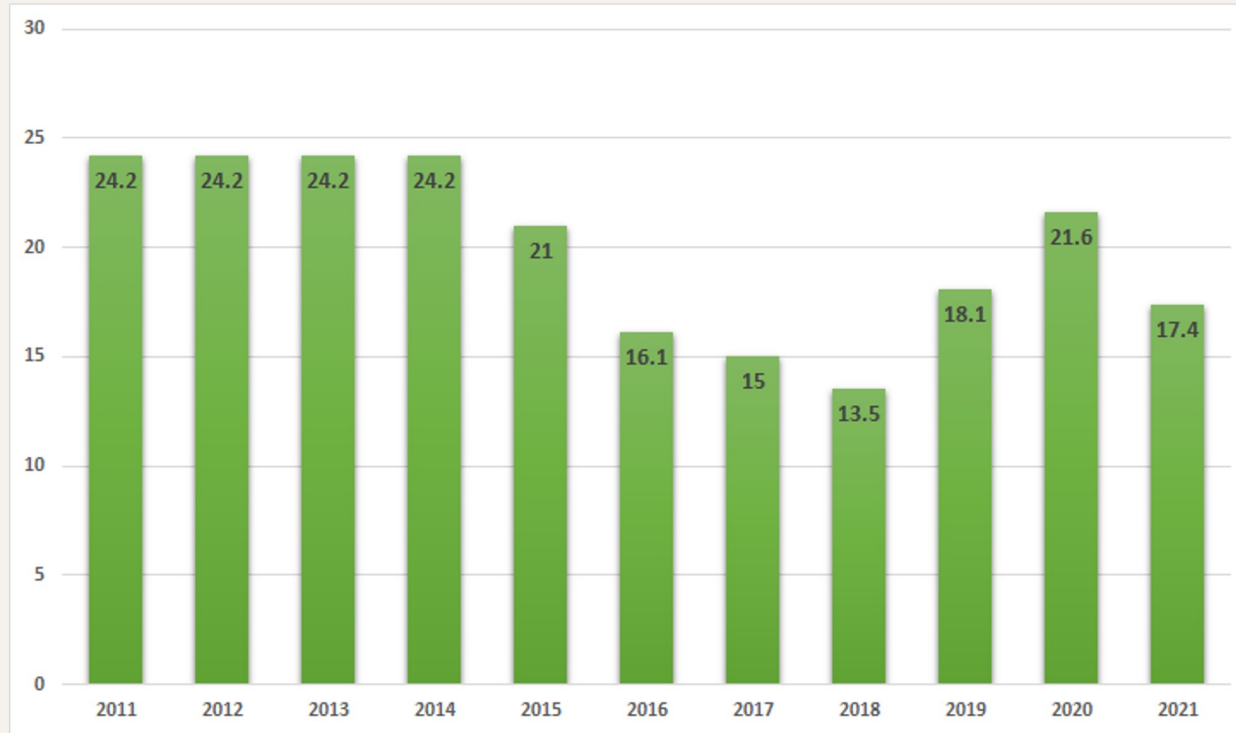


Energy storage for oil

304 400 t storage of oil products

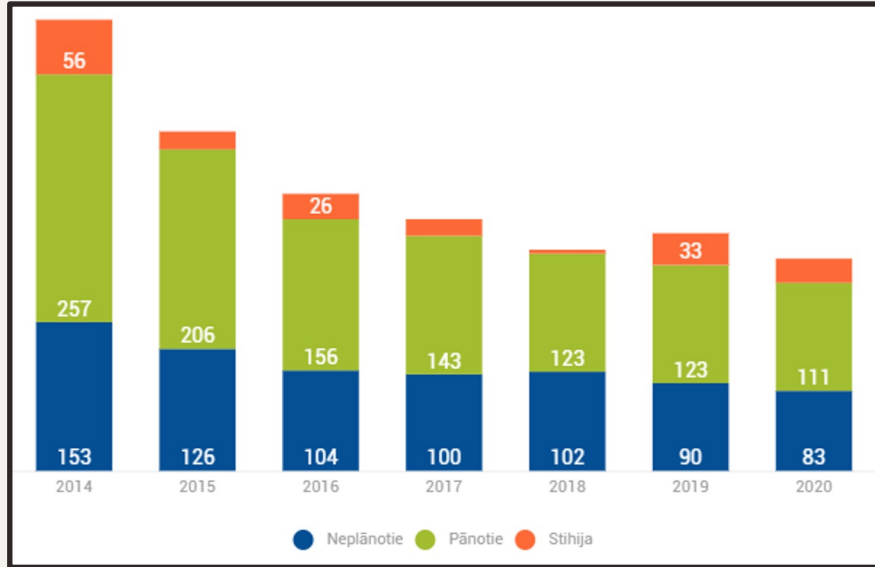


Energy storage for gas

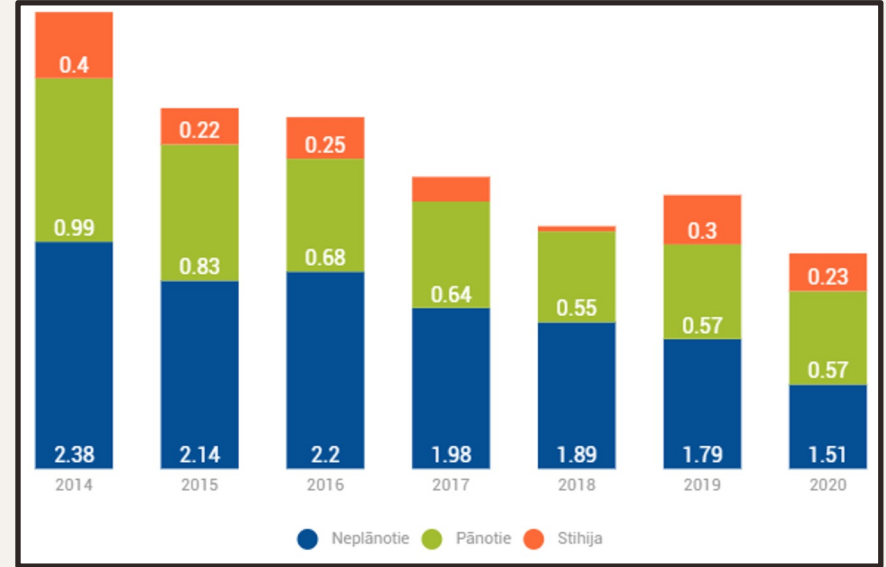


Amount of active natural gas at Inčukalns UGS after natural gas injection at the end of the season (TWh)

SAIDI and SAIFI



SAIDI: Average duration of power outages (min) per customer per year



SAIFI: Average number of power outages per customer per year

- decreasing slowly

Results

Indicators	Ratings in last years	Opportunities and risks for Latvia
Diversity of primary energy supply	not changing	-more solar, wind capacities, new energy carriers (like hydrogen, synthetic fuels, etc.) -greater energy dependence and new high price disruptions
Import dependence	increasing	-stronger focus on energy efficiency, use of biofuels -system would further heavily relay on energy imports
Diversity of suppliers	increasing	-close energy integration with neighboring countries (new markets and platforms) -unsecure and not trustful suppliers who uses dominant state
Diversity of electricity generation	not changing	-access to market for demand response, electricity storage, virtual power plants -not flexible and modern generation underlies weak performance
Energy storage for oil	not changing	-diversity of supply and stocks / storage levels -unsecure and not trustful suppliers may use dominant state
Energy storage for gas	not changing	-infrastructure sharing and integration with neighbours -operational costs may lay mainly to local consumers
System stability as SAIFI (interruptions) and SAIDI (outage duration)	increasing slowly	-digitalisation of infrastructure, new data centres and data policy -not improved ratings, inefficient and costly system operation

Opportunities

1. Reinforce auxiliary service provision
2. Develop national storage strategy
3. Diversify primary energy sources – independency
4. Develop clear plan for decarbonization of its energy system

Conclusions

**Table 3: Top 10 Rank Performers
in Energy Security**



TOP 10 RANK PERFORMERS		
1	Canada	77.5
2	Finland	75.3
3	Romania	75.1
4	Latvia	74.9
5	Sweden	74.5
6	Brazil	73.5
7	United States	73.3
8	Bulgaria	73.1
9	Czech Republic	72.8
10	Germany	71.9

Rank Score

Source: World Energy Council

Improvements are required

New energy security issues

Clear plan for energy system development is needed

New indicators for security index assessment

Thanks

Do you have any questions?



<https://www.facebook.com/NELLatvija>



Acknowledgements. The authors would like to express their gratitude to an executive committee of program “Future Energy Leaders in Latvia”. This research was also supported by Riga Technical University's Doctoral Grant programme.