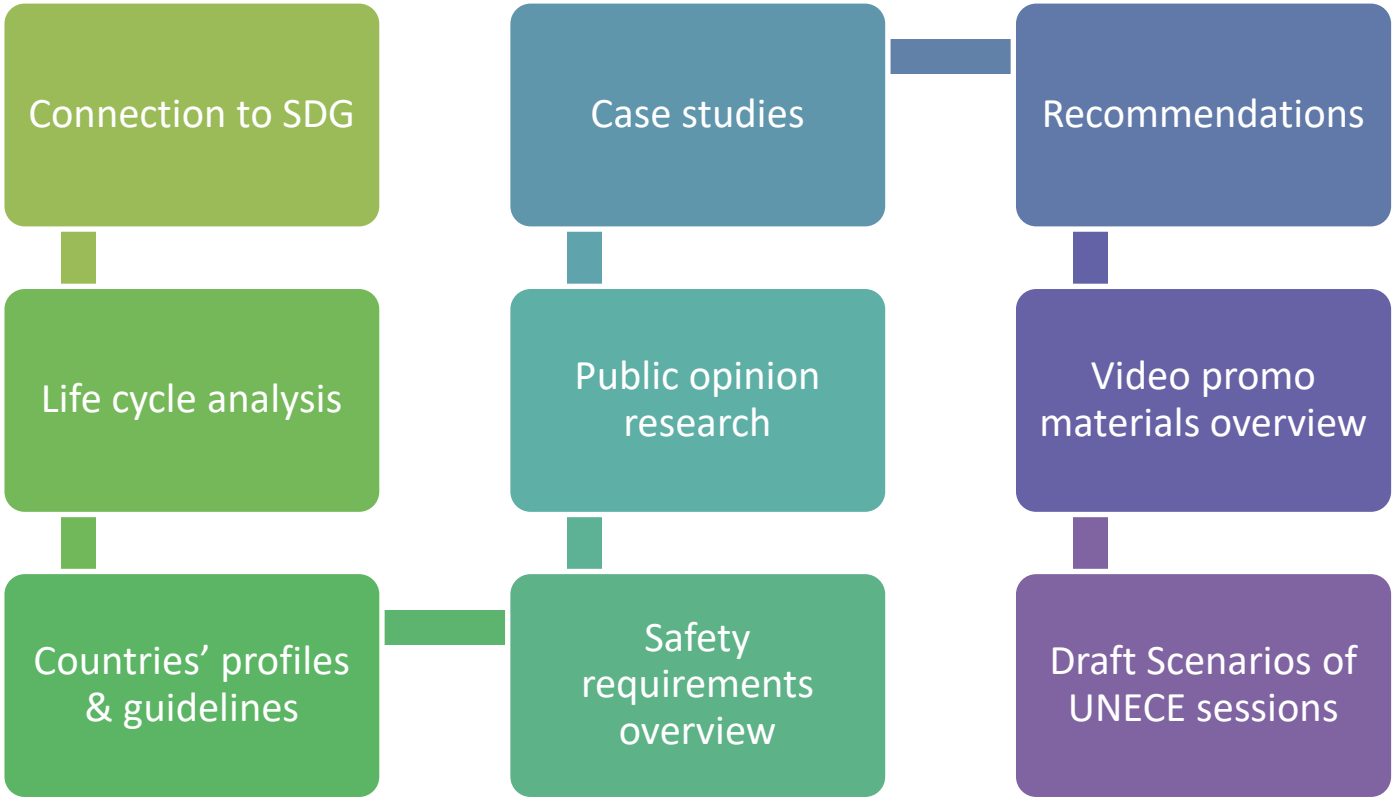
Decarbonization of the transport sector in UNECE member states: Kazakhstan

Natural Gas Vehicles Association of Russia

Vasiliy Zinin

Structure of the Report

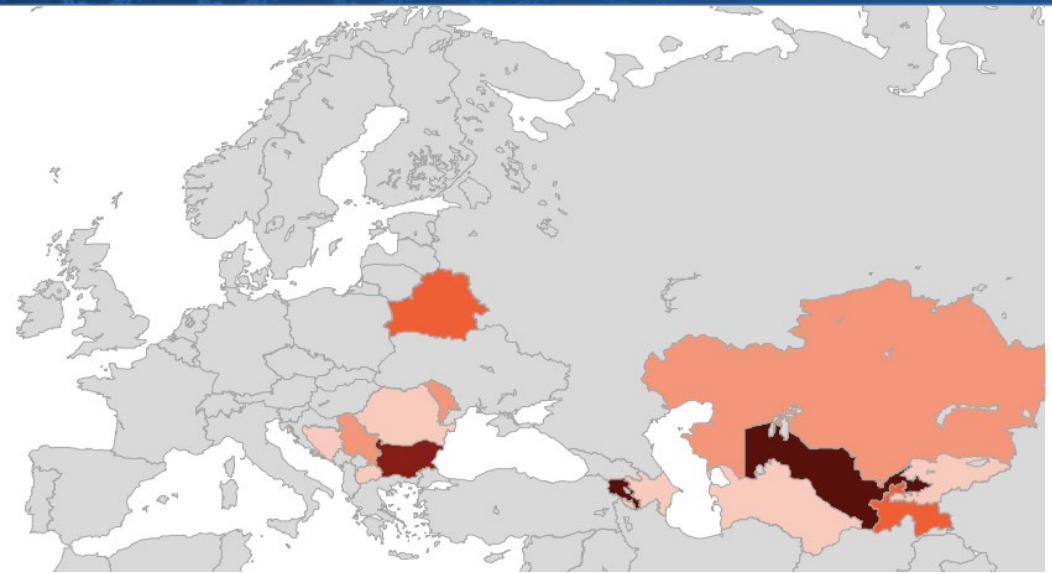


- 8 SDG;
- 4 LCA studies;
- 14 countries;
- 5 regional cases;
- 15 promo-materials

Life cycle analysis

1. According to the life cycle analysis natural gas allows to decrease GHG emissions and to get rid of the most harmful substances absorbed by particulate matter.
2. The use of biogas from municipal and agricultural waste allows implement a comprehensive approach to solving environmental problems.
3. Retrofitting of old vehicles to CNG is the most fast and cheap way to decrease harmful emissions.
4. The transition to e-mobility implies a mandatory change in the power mix, while the transition to NGV does not require huge investments in the power generation.
5. It is worth conducting a detailed analysis of the transport transition opportunities in each country, taking into account the prospects for energy development (including power mix forecasting)

Number of existing CNG stations



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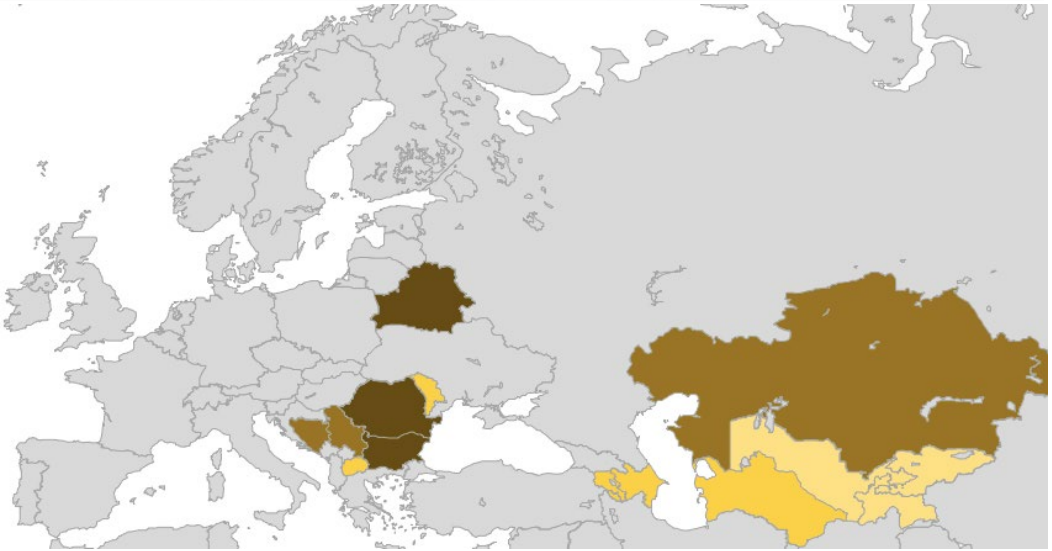
- Armenia - 400
- Azerbaijan - 6
- Belarus - 42
- Bosnia & Herzegovina - 2
- Bulgaria - 121
- Kazakhstan - 21
- Kyrgyzstan - 6
- Moldova - 14
- North Macedonia - 6
- Romania - 3
- Serbia - 24
- Tajikistan - 53
- Turkmenistan - 0
- Uzbekistan - 1,070

Motorization level (per 1000 inhabitants)



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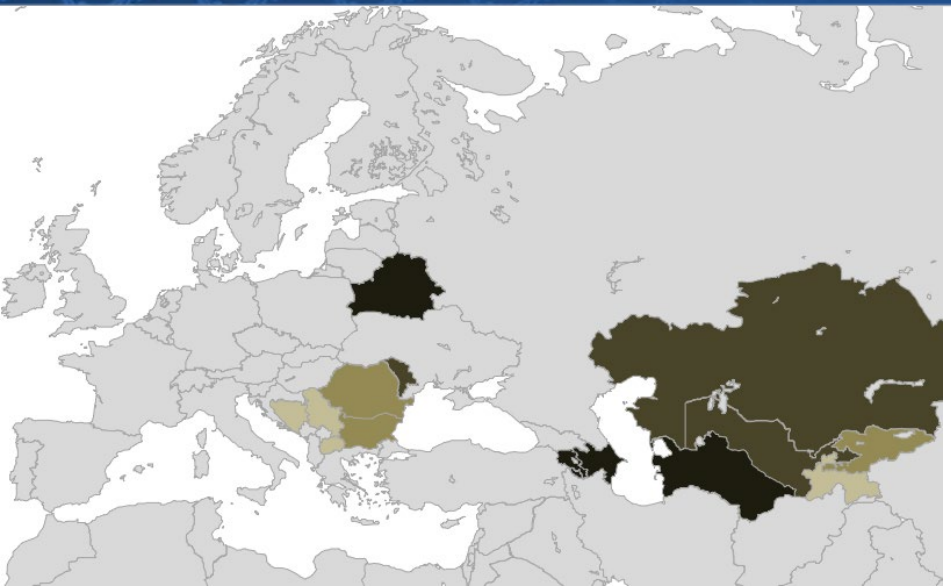
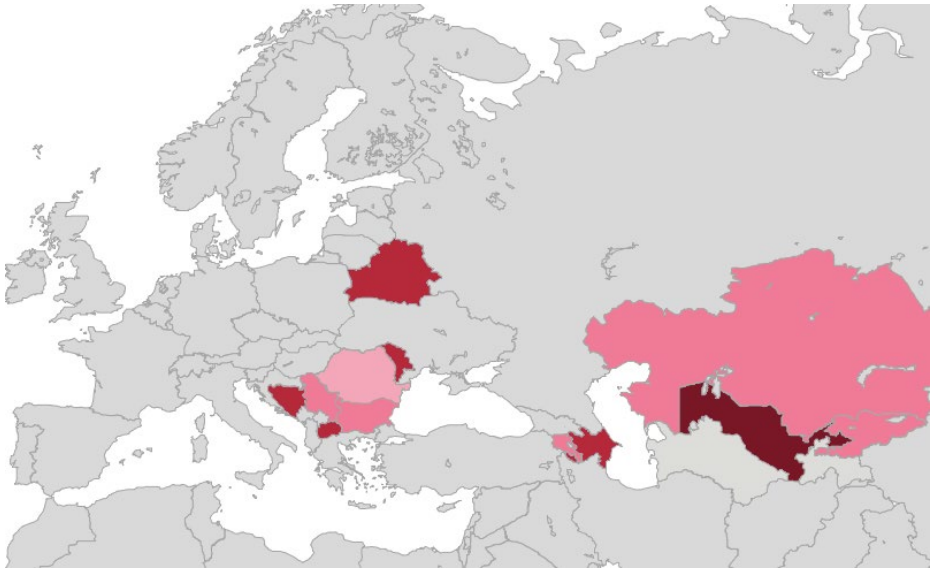
- Armenia - 110
- Azerbaijan - 119
- Belarus - 334
- Bosnia & Herzegovina - 263
- Bulgaria - 393
- Kazakhstan - 209
- Kyrgyzstan - n/a
- Moldova - 173
- North Macedonia - 194
- Romania - 330
- Serbia - 252
- Tajikistan - 37
- Turkmenistan - 107
- Uzbekistan - 70

Natural Gas Market

NG Network coverage



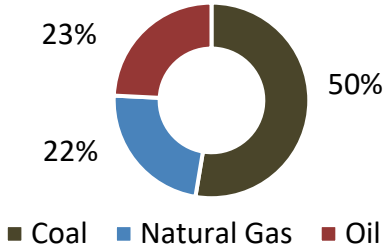
CNG/gasoline price difference



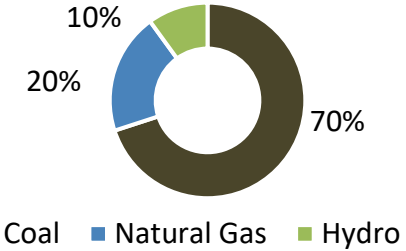
Kazakhstan Factsheet

18,513 Population, thousand people	**209** Motorization rate, vehicles per 1000 people	**11.7** Carbon intensity, tonnes CO_2-eqv per capita	**51** Human Development Index
3,847 Vehicles fleet, thousand	**0.4** Carbon intensity, CO_2 per GDP, kg/USD	**27,517** GDP per capita PPP, $	**0.04** Natural gas vehicles share, %
69 Carbon intensity of road transport energy consumption, gr/MJ	**52** NG network coverage, %	**17** NG fuel stations	**4** Share of CO2 emissions from transport in total CO_2 emissions, %

Energy Mix

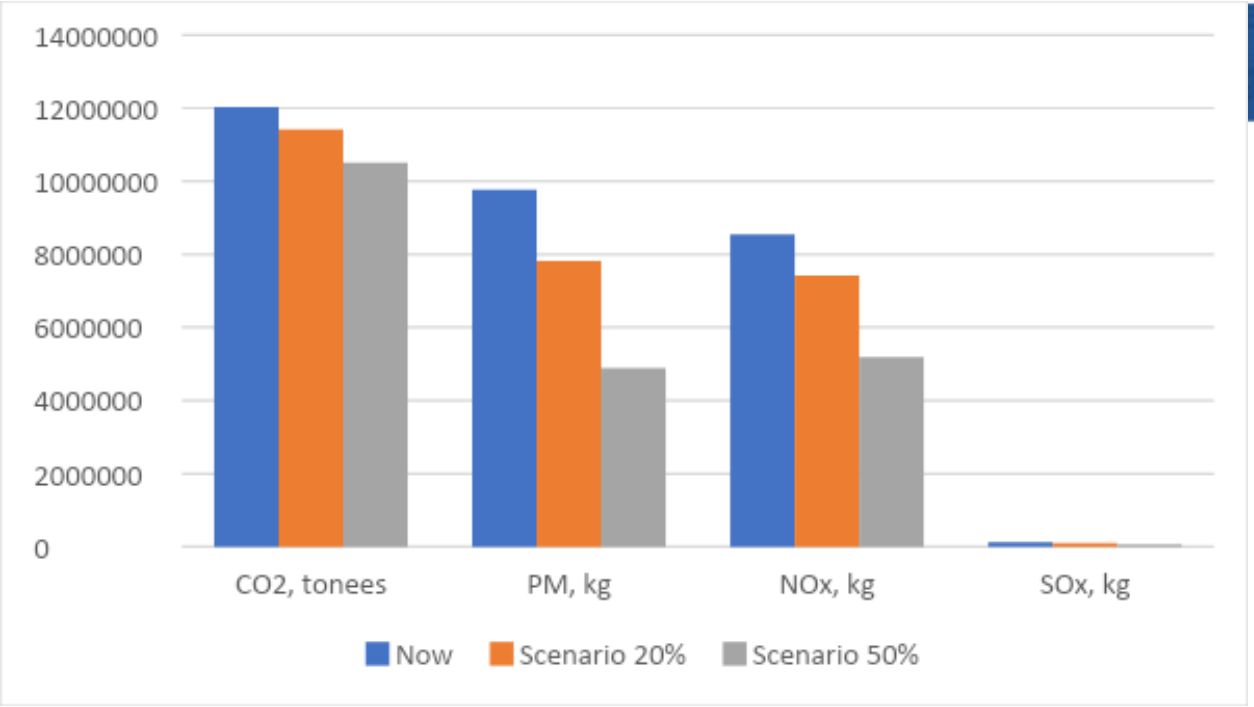


Power Mix



- According to the UN Human Development Index classification Kazakhstan ranks 51st and belongs to a group with a very high level of development
- As part of its obligations under the Paris Agreement, Kazakhstan announced its intention to reduce greenhouse gas emissions by 15% compared to 1990, or by 25%, subject to assistance from international funds
- Outdated vehicle fleets is the key reason behind high GHG intensity in the transport sector, especially in large cities

Environmental effects

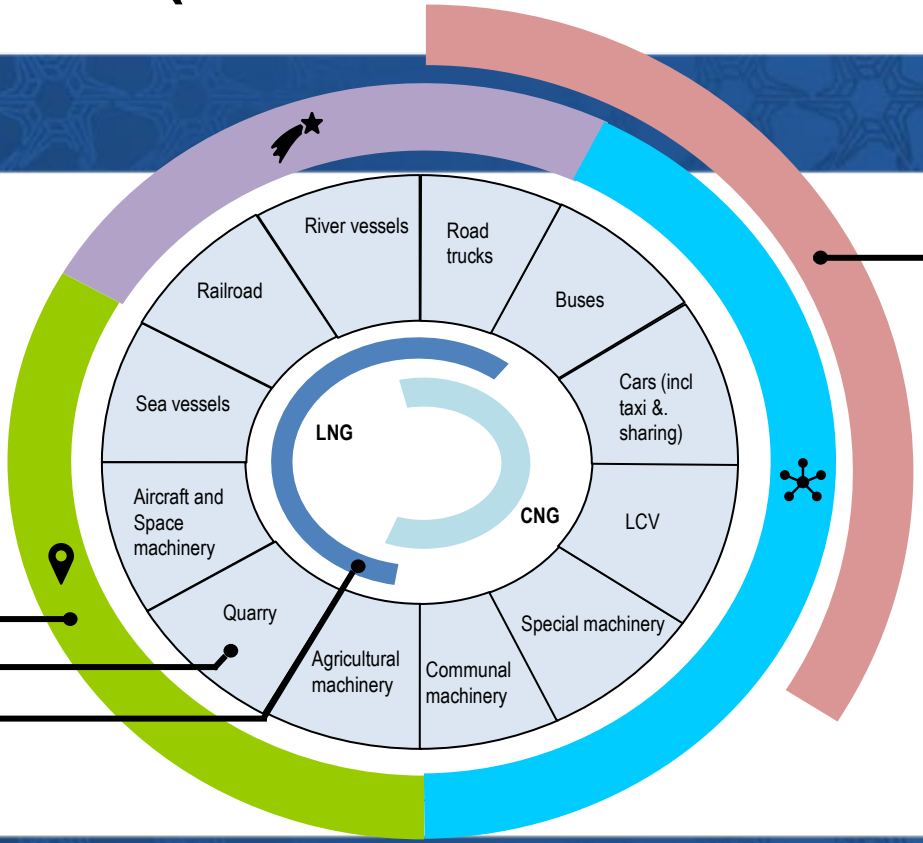


- 20%- and 50%-scenarios for **Kazakhstan**
- The additional gas consumption in 50% scenario is **11.4 bcm annually**
- Complex analysis requires specific LCA with power mix forecasting

Structure of the Transportation Sector (*incl off-road machinery*)

Types of infrastructure:

- Network covers the area for limited logistic routes
- Highway covers the main transportation routes between agglomerations
- Pointed covers closed logistic routes



Type of infrastructure

Segment

Type of fuel

Scope of Study

Water transport, Railroads and off-road machinery should be covered at the next stage of the research

Guideline for Kazakhstan

- Main obstacles are limited access to natural gas in some regions as well as insufficient financing and governmental support. The further development needs complex measures for NGV promotion.
- CNG is 40% cheaper than gasoline, so there is an economic incentive. Hazardous air urban quality is environmental incentive.
- In areas with low gas distribution network coverage it is worth to create an infrastructure for small-scale LNG and start the transition from commercial segments of transport sector, primarily long-distance heavy trucks and machinery.
- The construction of international Western Europe - China route provides great perspectives for LNG infrastructure development.

Comprehensive Development Program

1. Each country should have a comprehensive development program for the NGV market including different segments of the transport sector: private cars, buses, LCVs, heavy trucks, construction and communal machinery, agricultural and quarry machinery, railway transport, water transport etc.
2. A comprehensive development program should be based on the long-term scenario of power sector (including power mix forecasting). We recommend to organize a specific research of power mix for every target country within the framework of the project.
3. A comprehensive development program should include a layout for filling infrastructure (CNG and LNG) with pipeline connection and supporting infrastructure (cylinder inspection centers, service centers, retrofitting points etc). The layout should be based on the potential demand research for the different segments of the transport sector.
4. The meaningful result of the UNECE project would be the start of a pilot project to develop a comprehensive development program for one of the developing NGV markets in target UNECE countries

Recommendations

- To organize a specific research of power mix perspectives
- To initiate a pilot projects for implementation a comprehensive development program
- To support creation of a unified interstate register of cylinders to control their circulation and simplify procedures for the end user when crossing borders
- To initiate a project to create promo video-materials clarifying the specifics of NGV fuel in the UNECE countries involving industrial associations

Thank you for attention!

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