Advancing Russia’s Coal Transition to Keep 1.5°C in Sight

Tuesday, 12 October, at 10am BST
The Russian Coal Sector: Challenges and Transition Opportunities
Russian coal sector: key findings about reforms
Outline

- Overview of the main stages of the Russian coal industry transformation
- Coal production in the Soviet Union
- The structure of the Soviet coal sector and its main problems
- Reforms and their results
The level of coal domestic consumption began to decline gradually from 54% in 1960 to 25.2% by 1980. In 1983, the «Energy Program of the USSR for the Long Term» was adopted, an intensive increase in coal production began. High production indicators were achieved due to opencast coal mining.

In 1989, the crisis began in the coal industry. It provoked a massive strike movement of miners.

A general decline in industrial production. The Russian economy began restructuring to a market system.

The final stage of the industry privatization. The Russian coal industry emerged from crisis.

The World Bank allocated more than US $ 1.1 billion to fix unprofitable mines.

Another economic crisis

Russia ratified the Paris Climate Agreement.

1960s

1970s

1980s

1991

The collapse of the USSR

1992-1998

1998-2006

2008

2014-2016

2019
From 1928 to 1955 the share of coal in the domestic market increased from 29% to 59%, while oil and gas shares were only from 15% to 28% of the domestic market.

Then, in the early 1960s, significant reserves of oil and natural gas were explored in Western Siberia.
5. The Soviet Union reached its peak

By 1988, the overall level of mechanized mining in comparison with 1965 increased from 41.6% to 84.1%.

At the same time, there was no reduction in the number of employees in the industry.

By 1988, the Soviet Union reached its peak in total volume of coal production of 771.8 million tons.

At the same time, the core of coal mining was Russia (RSFSR) with a share of 55.1%, and the main coal basin was Kuzbass (West Siberia), with an output of 159.2 million tons of coal.

### Table 1. The USSR's coal production distribution by 1988

<table>
<thead>
<tr>
<th>Regions</th>
<th>Coal production, Mt</th>
<th>Proportion, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian SFSR</td>
<td>425.4</td>
<td>55.1</td>
</tr>
<tr>
<td>Ukrainian SSR</td>
<td>191.7</td>
<td>24.9</td>
</tr>
<tr>
<td>Kazakh SSR</td>
<td>143.1</td>
<td>18.5</td>
</tr>
<tr>
<td>Uzbekskaya SSR</td>
<td>5.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Kirghiz SSR</td>
<td>4.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Georgian SSR</td>
<td>1.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Tajik SSR</td>
<td>0.7</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>771.8</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
6. The Soviet coal industry main problems: old infrastructure and lack of funding

- In 1990, about 380 million tons of coal were produced by underground coal mines (54% of the total), while more than half of them were commissioned before 1960 and had never been upgraded since then.
- About 210 mines throughout the USSR operated for more than 35 years, 64 of which were put into operation before the Second World War and 73 were commissioned during the next five years after it began;
- **The external economic environment for the Soviet Union also did not contribute to the development of the country's coal industry** (the growth of the balance-of-payments deficit, external debt, shortage of food and consumer goods, beginning of the disintegration of the USSR);
- Coal miners’ strike movement

![Figure 3. Capital productivity of the Soviet coal industry](image-url)
There was a need for structural changes aimed at creating competitive enterprises. To solve this problem, a mechanism of creating JSC was formed.

The presidential decree "On transformation into joint-stock companies and privatization of coal industry associations, enterprises and organizations“ No. 1702 of December 30, 1992.

Beginning of mass privatization of state-owned enterprises of the industry supported by the WB
1998 - turning point (cheap; easy to reform)
1999 – coal sector became profitable

Figure 4. Privatization of the Russian Coal Industry
In the new economic realities, Russia was no longer able to support the functioning of inefficient enterprises and, starting in 1995, the volume of state support to the coal sector began to decrease ($1.63 billion against $3.25 billion in 1994).

Figure 5. Financing of the Russian coal industry in 1993-2002 (mln $US)
9. Reform outcomes: growth of productivity

Figure 7. Russia's coal industry changes in productivity of workforce

After the reforms:
- The reduction in budget funding from 1994 to 2001 and participation of the World Bank ($1,350bln) led to the elimination of inefficient mines and the reduction in their number from 229 to 103 units;
- Despite economic crisis of 1998, the coal industry became profitable already in 1999;
- By 2002-2003, the main stage of the coal industry restructuration was almost finished. The market had been shaped by highly efficient companies;
- The increase in coal consumption in the East of the country and the demand from partners in the Asia-Pacific region led to the development of railway infrastructure.
10. Export, profits and wages

Figure 8. Russian coal industry aggregate Profit Before Tax indicator, bln $US

Figure 9. Russia's coal industry workforce and average wages in $US

Figure 10. Russian coal industry aggregate Profit Before Tax indicator, bln $US

Figure 11. Russia's coal exports in 2003-2019
11. Coal in the fuel and energy balance of modern Russia
Summing Up About Reforms in Coal Sector

- It became private: largely market-based; smaller in size; technologically advanced (IT, mechanization)
- Export-oriented though very important for Russia’s Energy Security model (key role in Far East and Eastern Siberia)
- Competitive to other businesses in coal regions
- Management: shift from the so-called ‘Red directors’ towards CEOs with MBAs

∑ Russian coal sector still gets support from the state but it is ready to meet new challenges
THE RUSSIAN COAL SECTOR IN A LOW-CARBON WORLD: Prospects for a Coal Transition?

Anna Korppoo, FNI
12 October 2021
Focus of project

- Coal in the domestic energy sector
- Domestic debate: coal vs. decarbonizing world
- No coal phase-out discourse in Russia – instead growing exports to Asia anticipated: is this expectation correct?
- How could Russia’s coal regions diversify their economies to avoid adverse effects of the global coal phase-out?
- What could a Russian coal phase-out look like? Previous lessons.
But contributes only about 1% of GDP - indirect subsidies
Domestic debate: coal vs low-carbon

**Keep coal**
- Dominates policymaking
- Export optimism and redirection to Asia
- Climate policy threatens coal companies
- Technology solutions
- Russia will achieve PA targets

**Low-carbon trend**
- No active coal transition
- CBAM unwelcome
- Climate concern not motivation
- A novel, growing discourse
- Competitiveness of the Russian economy tied to low-carbon policies
- Carbon-intensive exports are a risk
- Russia should adopt a carbon tax
No official low-carbon scenario so far

### Box 2.1: Policy options to reduce domestic coal use in Russia

**Energy efficiency and capacity renewal policies: power and heat sectors**

Energy efficiency could be improved both by retrofitting existing installations and replacing them with new. That the Russian coal fleet is ageing provides a natural push for closure of the least efficient capacity, but has less retrofitting potential.

**Fuel switching: power and heat sectors**

Because of the ageing infrastructure of Russia’s coal sector and the national gasification ‘project’, switching from coal to gas, which cuts emissions, is already underway. IEF RAS has calculated that a coal phase-out in the power sector would cut emissions by 306 MtCO₂e by 2050 (Shirov & Kolpakov, 2021).

**Carbon taxes, regulation and domestic emissions trading schemes**

These target the coal sector by increasing costs. ERIRAS/Skolkovo⁷⁸ (2019) has estimated that, in the absence of climate policies, global energy transitions will reduce Russia’s GDP by ca. 0.6% per annum, whereas climate policies (carbon price of 20 USD per tonne, competitive domestic gas price and reducing cost of capital to 6–7%) could yield 2.7% annual GDP growth.

**No new coal-fired generation capacity**

A ban on building new coal-generation capacity is recognized as an option in the draft low-carbon strategy until 2050. A domestic carbon tax may have a disincentivizing effect, also without an explicit ban.

**CCS technologies**

The use of CCS could retain some coal capacity by capturing the GHG emissions generated; this possibility is included in many mitigation scenarios. However, the current costs of CCS remain much higher than those of other policy options.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Years</th>
<th>Greenest scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Natural Resources and Ecology: Reporting to the United Nations Framework Convention on Climate Change (UNFCCC)²³³</td>
<td>1990–2030</td>
<td>With LULUCF and additional measures −49%</td>
</tr>
</tbody>
</table>
Coal exports

• Increased six-fold since 2000 – 60% of coal exported
• Third largest coal exporter in the world
• Market shifting from Europe to Asia
• Official strategies expect significant increase of demand in Asia
Foreign climate policies reduce demand for Russian coal

- EU’s CBAM reduces the competitiveness of many carbon-intensive export products
- Renewable energy is gaining competitiveness over coal in Russia and abroad
- Divestment cuts the Russian coal sector’s access to international credit markets
Graph 4.1 Russia’s coal export’s structure, Mt
International demand for Russian coal

- There’s no long-term future for coal exports to the EU
- Coal demand in China and India is peaking and declining
- Regardless of carbon neutrality commitments, Korea and Japan continue to import some coal
- Turkey replaces Russian coal imports for political reasons
- Southeast Asia is cancelling new coal capacity
<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>India</th>
<th>Japan</th>
<th>Korea</th>
<th>Turkey</th>
<th>EU</th>
</tr>
</thead>
<tbody>
<tr>
<td>TES trend</td>
<td>Growth</td>
<td>Growth</td>
<td>Decline</td>
<td>Flat</td>
<td>Growth</td>
<td>Flat</td>
</tr>
<tr>
<td>Total coal consumption, of global total</td>
<td>Large</td>
<td>Large</td>
<td>Small</td>
<td>Small</td>
<td>Small</td>
<td>Mid</td>
</tr>
<tr>
<td>Share of own coal production 2018</td>
<td>Large</td>
<td>Large</td>
<td>Small</td>
<td>Small</td>
<td>Mid</td>
<td>Large</td>
</tr>
<tr>
<td>Share of coal import in 2019/2020, of global flows*</td>
<td>Large</td>
<td>Large</td>
<td>Large</td>
<td>Mid</td>
<td>Small</td>
<td>Mid</td>
</tr>
<tr>
<td>Share of coal import from Russia 2019**</td>
<td>Mid</td>
<td>Small</td>
<td>Mid</td>
<td>Mid</td>
<td>Large</td>
<td>Large</td>
</tr>
<tr>
<td>Coal consumption (supply) trend 2015-2019, % of 2015</td>
<td>Flat</td>
<td>Growing</td>
<td>Flat</td>
<td>Flat</td>
<td>Growing</td>
<td>Declining</td>
</tr>
<tr>
<td>Coal import trend 2015–2019, % of 2015</td>
<td>Growing</td>
<td>Growing</td>
<td>Flat</td>
<td>Flat</td>
<td>Growing</td>
<td>Declining</td>
</tr>
<tr>
<td>Share of coal of power production, 2018/9</td>
<td>High</td>
<td>High</td>
<td>Mid</td>
<td>Mid</td>
<td>Mid</td>
<td>Low</td>
</tr>
<tr>
<td>Share of coal of TES 2018/9</td>
<td>High</td>
<td>Mid</td>
<td>Mid</td>
<td>Mid</td>
<td>Mid</td>
<td>Low</td>
</tr>
<tr>
<td>Net coal capacity increase***</td>
<td>Yes</td>
<td>Unclear</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Carbon neutrality plan</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Share: RES of TES</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Coal transition in coal producing regions

- Local environmental and health impacts
- Local protests emerging
- Coal regions have several diversification options but their environmental impacts vary
  - RES
  - Coal-bed methane
  - Coal chemistry
Previous coal transitions

- **1990s/2000s transition in Russia**
  - There is previous experience of coal transitions
  - Previous one was socially much more significant (form 900,000 to 130,000 employees)
  - Policy programmes tested

- **More recent foreign low-carbon transitions, lessons:**
  - Plan proactively rather than reactively
  - Re-training and early retirement of workers
  - No action: stranding of assets and additional energy generation costs
Conservative view dominates policy-making...

- Political leadership and the coal sector do not foresee an end to coal mining, encourages expanding coal exports
  - some likely to go on but to what extent and how long?
  - Infrastructure investment?
- Political support to the survival of the coal for social reasons
  - strikes in the coal sector contributed to the collapse of the Soviet Union in 1991
- Coal mining causes significant health risks for local populations
- The climate impacts of the coal sector are proportionally much greater than its contribution to the Russian economy
- Russia has no official decarbonization scenario
...but preparation for a coal transition would make sense

- Preparation for a coal transition socially and economically important
- Coal regions require proactive planning
  - diversify economies before the decline of coal demand affects socio-economic well-being
- Lessons learnt from the previous transitions, also domestic
- Recognizing CBAM as a tool for the inevitable low-carbon and coal transition
Elements of a Fair and Equitable Coal Transition

1) *social programmes* to subsidize and re-employ the redundant workers
2) national and regional programmes to plan and *support diversification of the regional economies*, especially Kuzbass
3) economic mechanisms to *reflect the real costs of coal* such as a domestic carbon price

The Russian government should launch *an objective national assessment to manage coal transition* and to maximize its benefits.
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Russia’s regional diversification vision

Georgy Safonov
The case study of Kuzbass region

- 693 billion tons of coal reserves
- 30% of industrial production
- 133 thousand jobs

- 250 kinds of hazardous substances
- 1.8 mln tons of pollutants per year
- 550 mln m³ of wastewater per year
- 16% higher mortality rate
- 7.4% high cancer diseases
Options for low carbon diversification

- Energy efficiency: 25 Mtoe/year
- Coal-bed methane: 20 trillion m³
- Renewables: over 30 Mtoe per year, including solar, wind, small hydro, biomass
- Coal chemistry: 130 types of semi-products and over 5000 products
- CCS technologies for cleaner energy generation
Diversification plans so far

- Governmental plan of Kuzbass diversification adopted in July 2021
- 78 projects in various sectors with the overall public and private investments of $6 billion by 2026
- 24-40 thousand new jobs in non-coal sectors
- However no renewables or other green projects
Thanks for your attention!
Green development of Russian coal-intensive regions: opportunities and innovations

Tatiana Lanshina, Ph.D., Senior Research Associate at RANEPA, CEO at Goal Number Seven
Vladimir Slivyak, Co-Chair at Ecodefense

12 October 2021
Major coal mining regions in Russia

<table>
<thead>
<tr>
<th>Region</th>
<th>Share of the region in the total coal production in Russia, 2018, %</th>
<th>Coal mining employment, employees, 2020</th>
<th>Share of coal mining employment in the total employment, 2020, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kemerovo Oblast (Kuzbass)</td>
<td>58.2%</td>
<td>88,085</td>
<td>11.6%</td>
</tr>
<tr>
<td>Krasnoyarsk Krai</td>
<td>9.4%</td>
<td>4,949</td>
<td>0.5%</td>
</tr>
<tr>
<td>Republic of Khakassia</td>
<td>5.6%</td>
<td>4,661</td>
<td>3.7%</td>
</tr>
<tr>
<td>Zabaykalsky Krai</td>
<td>5.3%</td>
<td>2,420</td>
<td>0.9%</td>
</tr>
<tr>
<td>Sakha Republic</td>
<td>4.1%</td>
<td>7,524</td>
<td>2.1%</td>
</tr>
<tr>
<td>Novosibirsk Oblast</td>
<td>3.3%</td>
<td>2,769</td>
<td>0.3%</td>
</tr>
<tr>
<td>Irkutsk Oblast</td>
<td>3.0%</td>
<td>4,222</td>
<td>0.6%</td>
</tr>
<tr>
<td>Sakhalin Oblast</td>
<td>2.5%</td>
<td>2,632</td>
<td>1.5%</td>
</tr>
<tr>
<td>Komi Republic</td>
<td>2.3%</td>
<td>4,691</td>
<td>1.5%</td>
</tr>
<tr>
<td>Primorsky Krai</td>
<td>2.0%</td>
<td>3,312</td>
<td>0.5%</td>
</tr>
<tr>
<td>Khabarovsk Krai</td>
<td>1.4%</td>
<td>2,560</td>
<td>0.5%</td>
</tr>
<tr>
<td>Rostov Oblast</td>
<td>1.2%</td>
<td>6,515</td>
<td>0.6%</td>
</tr>
<tr>
<td>Amur Oblast</td>
<td>0.8%</td>
<td>1,715</td>
<td>0.6%</td>
</tr>
<tr>
<td>Buryatia Republic</td>
<td>0.6%</td>
<td>1,351</td>
<td>0.6%</td>
</tr>
<tr>
<td>Tuva Republic</td>
<td>0.2%</td>
<td>632</td>
<td>0.9%</td>
</tr>
<tr>
<td>Chukotka Autonomous Okrug</td>
<td>0.2%</td>
<td>420</td>
<td>1.5%</td>
</tr>
<tr>
<td>Magadan Oblast</td>
<td>0.1%</td>
<td>127</td>
<td>0.2%</td>
</tr>
<tr>
<td>Kamchatka Krai</td>
<td>0.005%</td>
<td>33</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
Official plans for economic diversification for Kuzbass and Komi Republic
Ministry of economic development, July 2021

Kuzbass is expected to develop
• Mining of metal ores and other minerals,
• Metallurgical production,
• Agriculture,
• Construction,
• Tourism (including the Sheregesh ski resort and other ski complexes),
• Food production,
• Wood processing and production of wood products,
• Production of paper and paper products,
• Coke and petroleum products,
• Chemical production,
• Rubber and plastic products,
• Machinery and equipment,
• Electrical equipment.

Komi Republic is expected to develop
• Mining of metal ores and other minerals,
• Finished metal products, except for machinery and equipment,
• Wood processing and production of other wood products,
• Production of paper and paper products,
• Agriculture,
• Construction.
Low-carbon coal mining alternatives for Russian regional economies

- New value added from abandoned coal mines
  - Heat pumps exploiting water from flooded coal mines (example: Novoshakhtinsk, Rostov Oblast)
  - Greenhouse and underground farming
  - Energy storage in abandoned coal mines
  - Uses of abandoned open pit mines
- Wind and solar PV power options
  - Power generation
  - Equipment manufacturing
- Solid biofuels
- Green special economic zones (GSEZ)
- Small businesses and entrepreneurship

Direct normal irradiation in the coal mining regions of Russia compared to Germany and the UK, kWh/m² per day

Mean wind speed for the 10% of windiest areas in the coal mining regions of Russia compared to Germany and the UK at height 150 m, m/s
Russian coal mining regions with competitive solar PV energy for small enterprises

- **Rostov Oblast**
  - Solar from 5.5 eurocents/kWh
  - Grid power 8.5 eurocents/kWh

- **Kemerovo Oblast (Kuzbass)**
  - Solar from 5.8 eurocents/kWh
  - Grid power 7.2 eurocents/kWh

- **Republic of Khakassia**
  - Solar from 5.4 eurocents/kWh
  - Grid power 6.7 eurocents/kWh

- **Tuva Republic**
  - Solar from 4.6 eurocents/kWh
  - Grid power 7.6 eurocents/kWh

- **Buryatia Republic**
  - Solar from 4.4 eurocents/kWh
  - Grid power 6.0 eurocents/kWh

- **Zabaykalsky Krai**
  - Solar from 4.2 eurocents/kWh
  - Grid power 6.2 eurocents/kWh

- **Southern part of Krasnoyarsk krai**
  - Solar from 5.3 eurocents/kWh
  - Grid power 7.8 eurocents/kWh
Establishing a Kuzbass green special economic zone (GSEZ)

A GSEZ could comprise the following:

1. renewable power and heating generation available for its residents and local population, mainly solar, wind, geothermal and biomass solutions with storage;

2. equipment manufacturing for renewable energy industries to supply both the regional market and the neighbour regions – Kuzbass should become a Siberian renewable energy equipment manufacturing hub with ambitions to supply its products for export markets;

3. a hub for creating value from abandoned underground coal mines and abandoned coal open pits, including geothermal heating, underground farming, energy crop farming, renewable energy storage, science laboratories, entertainment facilities, such as underground industrial museums, hotels and restaurants;

4. symbiotic relations and exchange of water, steam and materials (including waste materials) between the residents of the GSEZ;

5. modern services for sustainable tourism, especially at the Sheregesh ski resort (hotels, restaurants, rental services, infrastructure);

6. tax incentives and other benefits for the residents of the GSEZ that meet the requirements of GSEZ, i.e. manufacturing products for green industries, reducing GHG emissions, participating in symbiotic relations, etc.
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Thank you for attending and engaging!

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