



Low Carbon Ukraine

Policy advice on low-carbon policies for Ukraine

Policy Briefing #13

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Promoting structural change in Ukrainian coal regions

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Executive Summary

While the Ukrainian coal industry in overall is in decline, it still plays a salient role as an employer in some regions. Its contribution to the economy, however, is low and even though the sector is highly subsidised, coal is losing its competitiveness as an energy source against renewable alternatives.

In the long-term, a further decline of the coal industry seems inevitable. It is crucial to initiate the process for supporting a smooth structural change in the coal regions as soon as possible in order to avoid a sudden structural break. According to international experience this process should be authorized from the highest political level and supported with political commitment as well as extensive funding. While being initiated from the top, the structural change needs to be developed bottom-up at the same time. Hence, regional development agencies should be founded and complemented with a structural change fund to promote economic development and social stability in the regions.

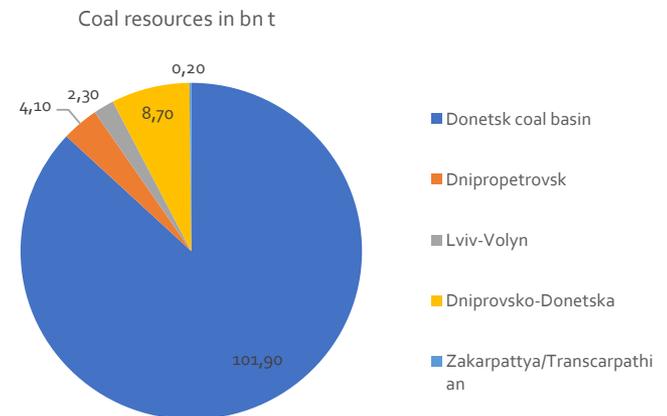
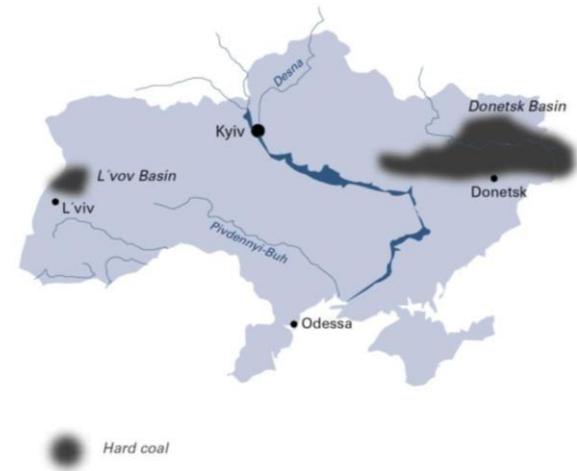
Our analysis shows that with adequate support through training of younger miners, transitional decommissioning work and fair retirement schemes, a negative impact on the labour market is avoidable. In the contrary, a successful structural change in coal regions has the potential to trigger an economic shift towards a more future-oriented industry and to overcome the socio-economic challenges these regions are facing today.

Structure

1. Assessing the current socio-economic situation in Ukrainian coal regions
2. The future of the Ukrainian coal industry
3. Learning from the experience of the structural change in the German Ruhr Area after the decline of its coal industry
4. Recommendations on how to ensure a socio-economically fair transition of coal regions in Ukraine

Current socio-economic situation in Ukrainian coal regions

- Ukraine has significant reserves of coal being the sixth largest worldwide with a total of 56 billion tonnes of coal
- The deposits are characterised by their great depth – operations take place at 500 to 1 000 metres – and by thin seams of 0.8 to 1.0 metre.
- According to the Secretariat of the Cabinet of Ministers of Ukraine (2018):
 - 102 state-owned coal mines exist, but most of them are located in the territory that is not controlled by the government.
 - Only 33 state-owned coal mines are controlled by the government and only 4 of them are profitable



Historical view on the development of coal regions in Ukraine

- In the early 1990s, industrial production in Ukraine collapsed and average wages fell by 80% within few years. Due to a lack of economic diversification in the Donbass region, the economic decline caused social deterioration, high unemployment rates and poverty. Small towns with a high dependence on the coal industry were affected most.
- In the regions of Lviv and Volyn, employment in coal mining also decreased significantly, but the populations' higher mobility and the relatively small share of the mining sector in the local economies mean that the impact of its breakdown in the 1990s was not as severe as in Donbass.

The coal industry still plays an important role in some regions

	Ukraine overall	Donetsk region	Lugansk region	Lviv region	Volyn region	Dnipropetrovsk
GDP per Person in USD	2187.8	1264.9	557.8	1773.7	1342.86	2913.3
Share of coal industry of regional Gross Value Added	0.78%	3.95%	0.30%	0.77%	0.25%	5.00%
Share of total labour force working in coal industry	125.000 (0.78%)	55.100 (7.4%)	25.100 (8.4%)	12.700 (1.2%)	2100 (0.5%)	30.000 (0.21%)
Unemployment rate	9.3%	14.1%	16.0%	7.7%	11.5%	8.1%

Source: State Statistics Service Ukraine, 2016 data only including government controlled territories

→ Despite a declining share of value added, the coal industry remains an important employer in Donetsk and Lugansk region

Coal mining is the most dangerous industry in Ukraine

- Coal mines in Ukraine, in particular in Donbass, are some of the most dangerous in the world (1 mln ton of extracted coal were paid off by 2.5 of miners' lives):
 - Complicated mining conditions and very deep operations (~ 900 m in average)
 - Frequent methane explosions, coal dust explosions and rock bursts (~ 75% of Ukrainian coal mines belongs to 1st high risk group with an increased danger of methane explosion, 35% - endangered by coal dust explosions)
 - Outdated infrastructure and equipment as well as generally poor labour safety
- This leads to a large number of accidents and deaths:
 - Since independence ~ 4000 Ukrainian miners died in ~ 40 major accidents
 - In 2018 about 18% of accidents in the country occurred in extractive industry, mainly at coal mines (according to Social Insurance Fund of Ukraine)
 - In 2016-2017 about 1600 miners were injured and 45 died, the majority of accidents occurred underground (according to the State Service for Labor)

Labour safety conditions on state coal mines are critical

- Critically outdated equipment (as of 01-Jan-2018):
 - ~70% of lifting machines service life had expired, 35% had not passed technical inspections and adjustments;
 - 62% of main ventilators service life had expired, 60% had not passed technical inspections and adjustments;
 - 56% of aggregates service life had expired, 21% had not passed technical inspections;
 - ~50% of stationary compressors service life had expired, 38% had not passed required adjustments;
 - ~40% of main pumps service life had expired, 8% had not passed technical inspections and required adjustments;
- Insufficient number of personal & group protection equipment for miners at state coal mines (for individual equipment ~ 70% are available from required amount in average; for group equipment – 68%)
- Amount of labour protection inspectors is staffed only by 46% from required amount

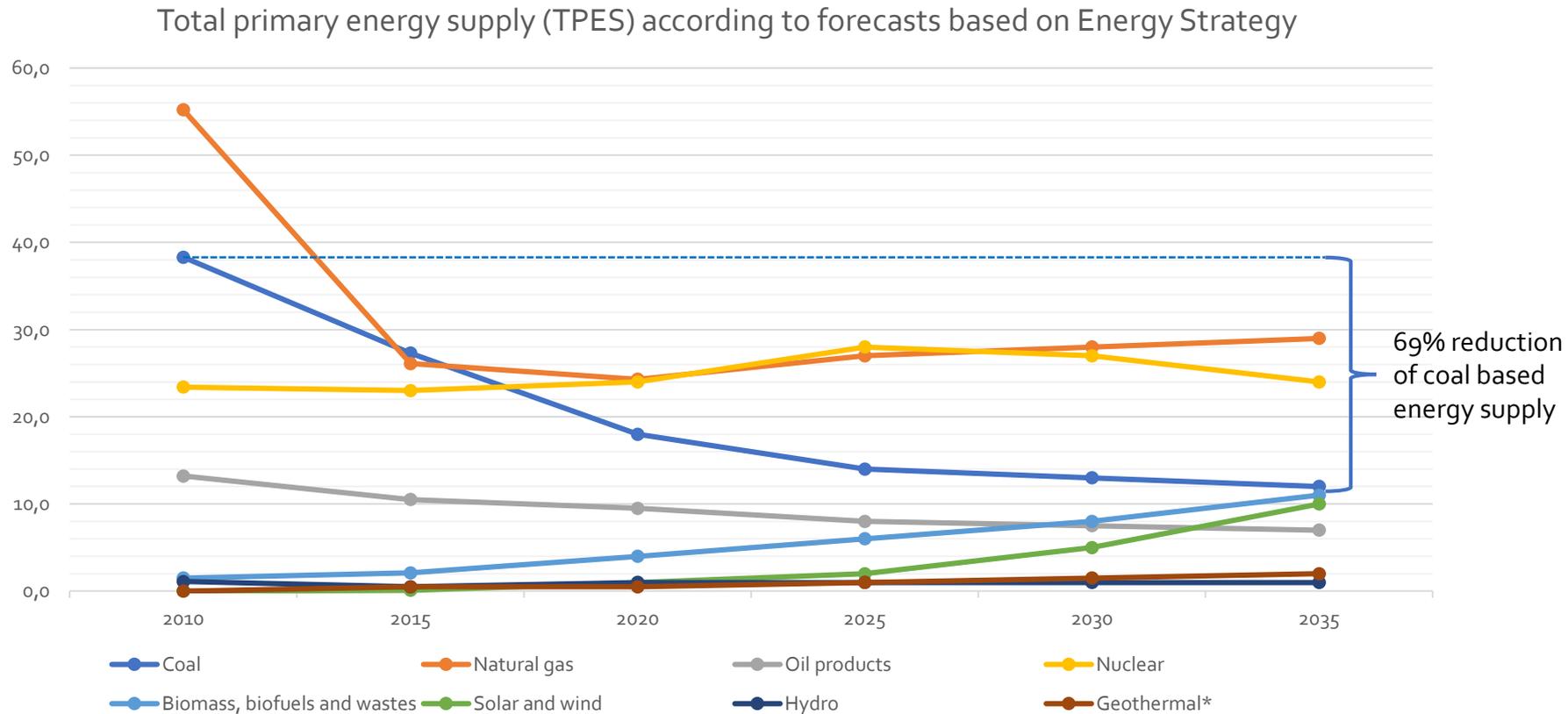
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International and national obligations to reduce coal power

- Ukraine ratified the Paris Agreement and committed to **reduce its greenhouse gas emissions by at least 40%** below 1990 levels until 2050.
- The 2050 Low Emission Development Strategy aims at a **69% emission reduction** of 1990 level until 2050.
- **National Emission Reduction Plan** sets emissions reduction targets for each large combustion plant and different pollutant types compared to 2018:
 - SO₂ emissions has to be reduced by 95% till 2028;
 - NO_x emissions has to be reduced by 48% till 2028 and by 72% till 2033;
 - Dust emissions has to be reduced by 97% till 2028;

Forecasts by Ukrenergo based on Energy Strategy 2035

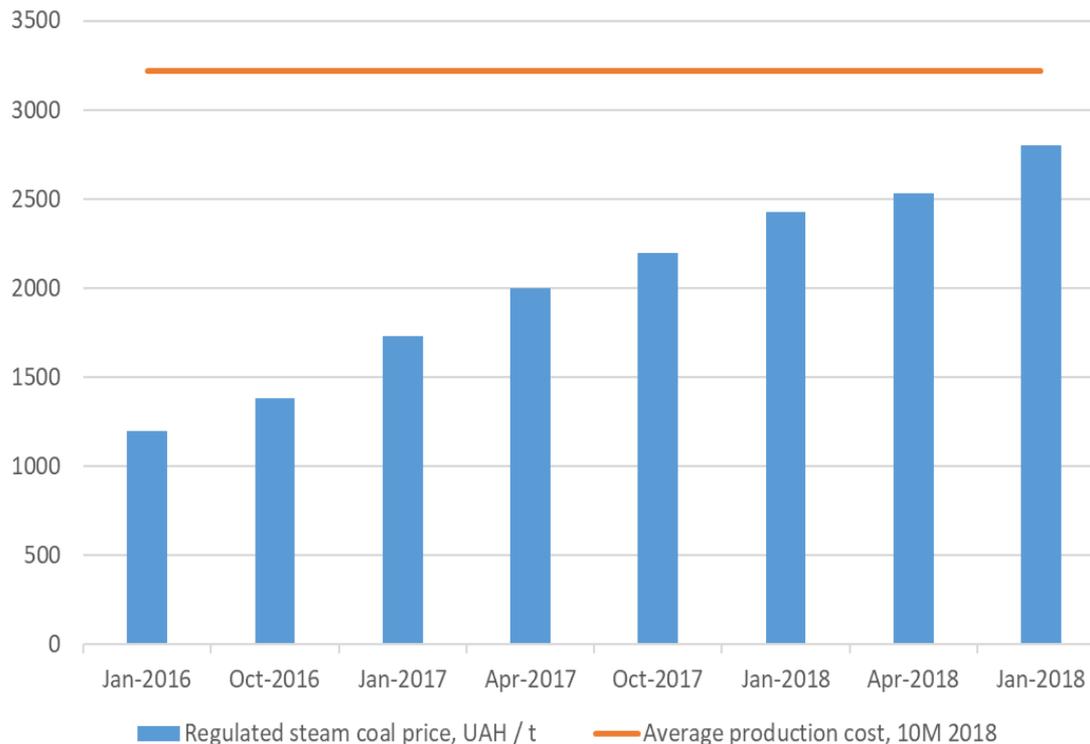


Source: Ukrenergo (<https://bit.ly/2V1uWRC>)

→ Assuming a workforce reduction proportionate to the coal energy supply would imply that by 2035 the coal sector would employ 86.000 workers less

State-owned mines in Ukraine are highly unprofitable

Average regulated prices for steam coal of state coal mines and average production costs for 10 months 2018



- Average mine production costs in state-owned mines are much higher than import costs.
- Coal mining productivity in Ukraine is much lower than the global average. For example, average labor efficiency is twice as high in Poland, five times as high in Western Europe and even 20 times as high in the USA²
- Almost half of people employed by the Ukrainian coal industry (51 000) work at highly unprofitable state-owned mines.

Sources:

¹ Euroacoal - <https://euracoal.eu/2018/09/21/euracoal-gives-its-opinion-on-ukrainian-coal-pricing-methodology/>

² Heinrich Böll Foudnation - https://ua.boell.org/sites/default/files/a5_web_layout_kiev_boell.pdf

Graphic: Ministry of Energy

Coal power is losing its competitiveness against renewable energies – further government subsidies are questionable

- At a Rotterdam+ coal price of about 100 USD/t[5200 kcal] and a plant efficiency of 33% the pure fuel cost of a coal plant [$100 \text{ USD} / (6 \text{ MWh} * 33\%) = 50 \text{ USD/MWh}$] for now are lower than the levelized cost of a utility scale solar PV installations (130 USD/MWh)¹ but this **difference is expected to decrease further due to decreasing CAPEX and cost of capital for PV projects in Ukraine**².
- The obligations under the National Emissions Reduction Plan will require **comprehensive investments in modernisation** of thermal power plants. In 2018, Energy Minister Ihor Nasalyk insisted on a programme of budget support worth (UAH 5Bn) for state owned mines' modernization.²
- **Up to 30% of coal subsidies are spent ineffectively**, for other than initially specified purposes or simply stolen, according to Ihor Yaremchuk, Deputy Head of Audit Chamber³

Sources:

¹ Average LCOE for ground and rooftop PV installations according to the report "LCOE Renewable Energy Sources in Ukraine", 2018

² Potentially it may reach the European range at 39-63 €/MWh as indicated by "Frauenhofer (2018). Levelized Cost of Electricity Renewable Energy Technologies"

³ Meeting Minutes on Rada Fuel and Energy Committee (FEC) hearings called "State coal industry sector: Strategic vision and budgetary process" on 19th October 2018.

Energy Community reports that subsidies to state coal mines are much higher than stated by the Ministry of Energy

- According to Energy Community calculations¹ the average amount of **subsidies to state coal mines for 2015 – 2017 were UAH 7103 m** while MinEnergo only reported about UAH 2374 m.
- MinEnergo only counts fiscal type of subsidies while EnC also includes (1) budget loan guarantee payments for loans taken by Lisichanskvugillya PJSC (UAH 445,6 m) and (2) taxes and contributions in arrears (UAH 4283 m)

Energy Community uses WTO definition of subsidies that classifies subsidies into 3 main categories:

- fiscal support-type subsidies (direct budget transfers, deferred or reduced budget revenues or write-offs of arrears to the budget);
- public finance support subsidies (state guarantees, loans and grants provided by institutions under control of government);
- State Owned Enterprises (SOE) investment support subsidies (equity investment, loans, advances, or forgiveness of arrears)

Source:

¹https://www.energy-community.org/dam/jcr:ae19ba53-5066-4705-a274-obe106486d73/Draft_Miljevic_Coal_subsidies_032019.pdf

²https://www.ecologic.eu/sites/files/publication/2018/3537-kohlereader_final.pdf

Subsidies to state coal mines / Developments in 2015 - 2018

UAH m	2015	2016	2017	2018
<u>(1) Fiscal support-type subsidies</u>	<u>1 997.95</u>	<u>2 292.67</u>	<u>2 833.02</u>	<u>3 431.56</u>
Restructuring of coal and peat industry (2015-17) / Liquidation of non-profitable coal enterprises (after 2018)	205.71	106.70	244.12	281.13
Rescue measures at coal mining enterprises	234.41	263.21	287.65	289.99
State support for coal mining enterprises on partial compensation of production costs of finished marketable coal	1 212.00	1 372.76	2 121.77	1 072.25
Measures to improve safety measures at mining enterprises	-	-	99.40	-
Replenishment of current capital or increase the statutory funds of coal mines to settle the arrears of wages to employees as of 01-01-2015	200.00	500.00	-	-
State support for construction of mine №10 "Novovolynska"	145.83	50.00	70.25	34.65
Implementation of measures to ensure domestic coal production and further reform of the state sector of the coal industry	-	-	-	1 671.15
Prevention of the emergency situation due to flooding of the mines of Pervomaysko-Stakhaniv coal mining region	-	-	9.83	82.39
<u>(2) Public finance support subsidies</u>				
Loan guarantee payment from budget for Loan between Lisichanskvugillya PJSC and the State Development Bank of the PRC	419.50	461.69	455.60	432.84
<u>(3) SOE investment support subsidies</u>				
Taxes and contributions in arrears - state coal mines	3 342.20	4 213.97	5 293.10	8 000.00
Total subsidies to state coal enterprises	<u>5 759.65</u>	<u>6 968.33</u>	<u>8 581.72</u>	<u>11 864.40</u>

Source: State Treasury reports, EnC, Business Censor

Interim conclusion on the future of the coal industry in Ukraine

- 1 The coal industry's contribution to the respective regions affluence has dramatically declined over the last 20 years.
- 2 The state-owned coal mines are highly inefficient and dangerous for their workers. They only persist due to extensive yearly state subsidies of around 56,000 UAH per miner (~ 1900€)
- 3 Coal as a source of energy is losing its competitiveness against renewable energies – this trend is expected to intensify in the future.
- 4 According to various forecasts and the wider international trend towards decarbonisation, the coal industry is expected to decline either way. Further investments in the coal industry are therefore likely to result in stranded assets.

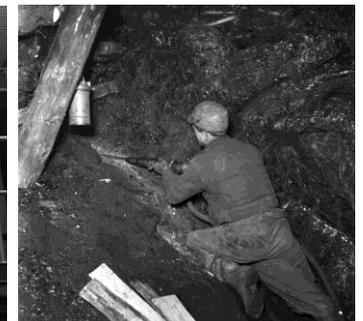
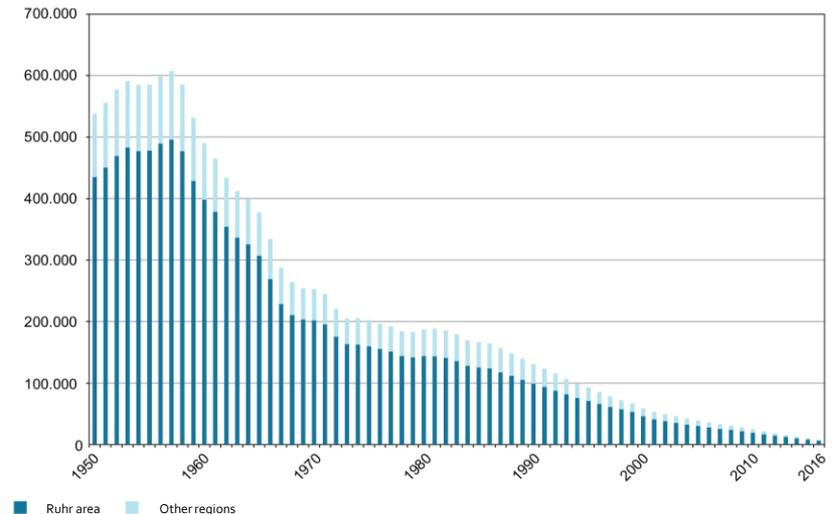
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Historical view on the economic development of the Ruhr Area

- The Ruhr area in western part of Germany used to be heavily dependent on its coal and steel industry with more than 500.000 people, **10% of its population, working in this sector.**
- Beginning in mid 1950s, the decreasing profitability of extracting hard coal caused a long-lasting and profound change to the social and economic structure of the region.
- Within 10 years the number of workers in the **coal sector was reduced by 50%** until 1968. The monostructural economy of the regions was heavily affected by this structural change.
- Just after this disruptive economic change, an ordered structural change process was initiated.

Development of the employment numbers in the coal mining sector in the Ruhr area between 1950-2016 (Source: Statistik der Kohlewirtschaft e.V.)



Source:

https://www.prognos.com/uploads/tx_atwpubdb/151111_Prognos_Endbericht_Lernen_aus_dem_Strukturwandel_1_.pdf

<https://www.iat.eu/aktuell/veroeff/2019/wwf-studie-deutsch.pdf>

Today the Ruhr Area is a prospering region

- **Overall economic development is thriving.** While the production industry continues to contribute, the service industry (e.g. Healthcare and Logistics) has become the major driver.
- **Highly specialised economic centres emerged** including the metal industry, the chemical industry, mechanical engineering and the energy sector.
- Business incubators and a good environment for entrepreneurs have contributed to new business development.
- **Population size is stabilising** after many years of decline– in some areas it is even increasing again.
- **The demand for higher skilled workers has increased.** The growing service sector and the increasing automation in the production sector changes job requirements profoundly.
- **Large-scale investments in universities and vocational training** resulted in a large supply of well qualified personnel.
- The growing research sector also plays an important role in the regional labour market.
- Today, the Ruhr area has a well-developed communication and transport infrastructure.

The share of working population in the production and service sector, Ruhr area and NRW, 1964-2014

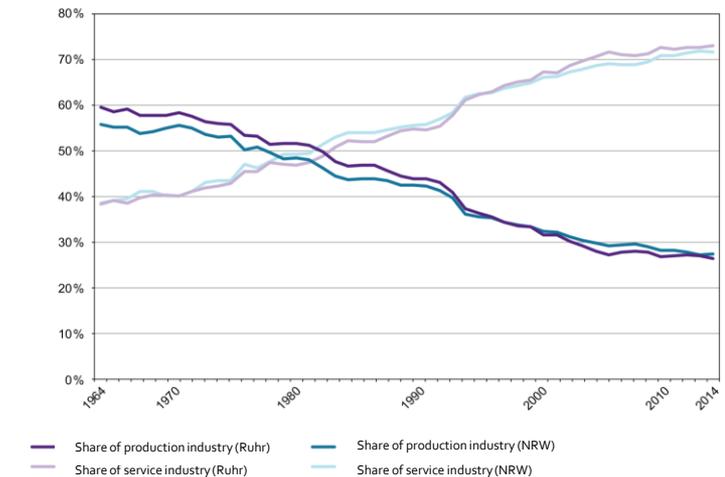


Foto: Getty Images / Stockphoto

Sources:

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Key principles that contributed to the Ruhr Area's success

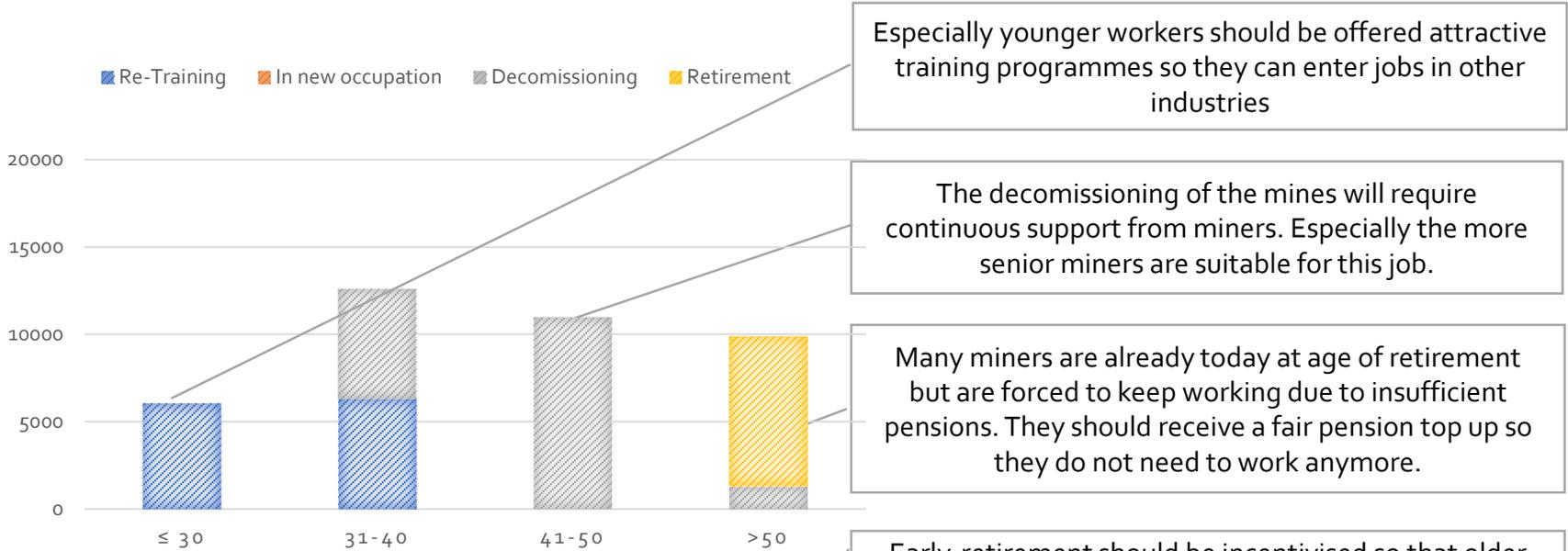
- **Bottom-Up approach for a demand-driven structural change**
 - Structural development policies were developed based on a dialogue between the relevant actors from civil society, business and politics.
 - This allowed for customised solutions corresponding to the varying needs of the different regions.
- **Extensive investments in universities and research institutions contributed to higher-skilled jobs**
 - The overall level of education increased significantly and could adjust to the changing demands of the labour market. Especially, the service sector benefited from that and experienced extensive growth.
 - The supply of highly-qualified labour allowed new enterprises to emerge.
 - The area developed an excellent research environment
- **Large-scale economic support programmes targeted at developing technology hubs and diversifying the economy**
 - The focus of these support programmes was to create new technology hubs in the Ruhr area. While some programmes unsuccessfully focused on revitalizing the old industries, others succeeded in diversifying the economic structure and focusing on smaller and mid-sized businesses in other sectors.
 - Within just 10 years, more than 180.000 new jobs were created between 1975-1985.
- **Investments in transport and digital infrastructure supported the economy to thrive**
- **Improving „soft“ locational factors (leisure, culture, sports etc.) improved quality of live in the region and attracted high-skilled workers.**

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Active government support avoids unemployment through a combination of training, decommissioning work and retirement

2020

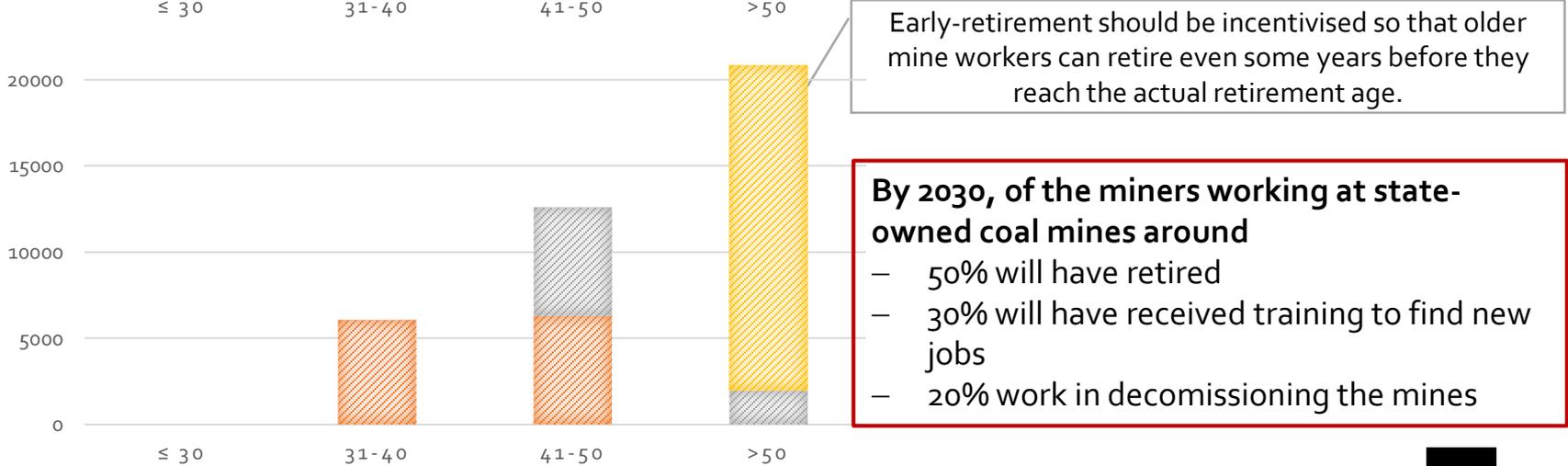


Especially younger workers should be offered attractive training programmes so they can enter jobs in other industries

The decommissioning of the mines will require continuous support from miners. Especially the more senior miners are suitable for this job.

Many miners are already today at age of retirement but are forced to keep working due to insufficient pensions. They should receive a fair pension top up so they do not need to work anymore.

2030

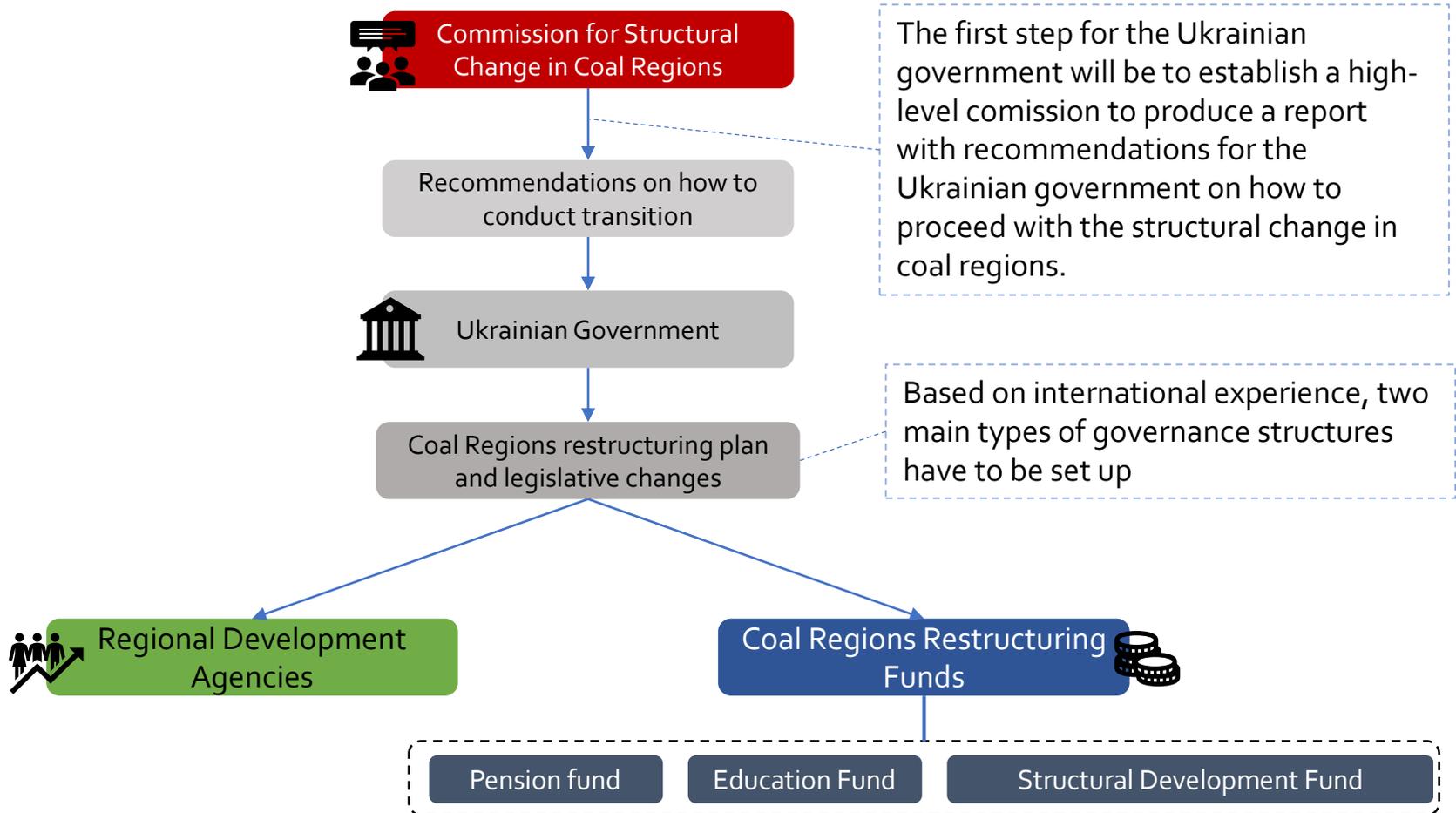


Early-retirement should be incentivised so that older mine workers can retire even some years before they reach the actual retirement age.

By 2030, of the miners working at state-owned coal mines around

- 50% will have retired
- 30% will have received training to find new jobs
- 20% work in decommissioning the mines

Governance of structural change in Ukrainian coal regions



First Step: The Ukrainian government should initiate a commission with the responsibility to develop a roadmap for the phase-out of coal



Commission for Structural Change in Coal Regions

- The commission for Structural Change in Coal Regions shall prepare a roadmap for the phase-out of coal extraction in Ukraine. It should be initiated by the Cabinet of Ministers with a clear mandate for its action.
- The roadmap should fulfil the following goals:
 - Ensure social and financial protection for workers who are currently employed in the coal industry.
 - Establish a long-term strategy for the affected coal regions that promotes economic growth and employment.
 - Align the process with the targets of international climate agreements as well as the Ukrainian Energy Strategy.
 - Design a mix of instruments for combining climate action with economic development, structural change, social cohesion and social compatibility (see following pages).
- The final report shall be presented to the Ukrainian Government at the end of 2019. The report, however, is not binding and it is up to the government to decide on how to implement it into binding action.
- The Commission should have up to 30 members comprising representatives of:
 - National and regional political level (incl. municipalities)
 - Business and energy associations
 - Trade unions
 - Environmental associations
 - Research- and academic institutions
 - Donor community

→ It is important that the commission will be initiated by the highest level of the Ukrainian government to begin with the long-lasting process of structural change and to allow for a decisive and inclusive bottom-up approach.

Second Step: Initiate *Regional Development Agencies* that ensures an inclusive process for the economic and social development

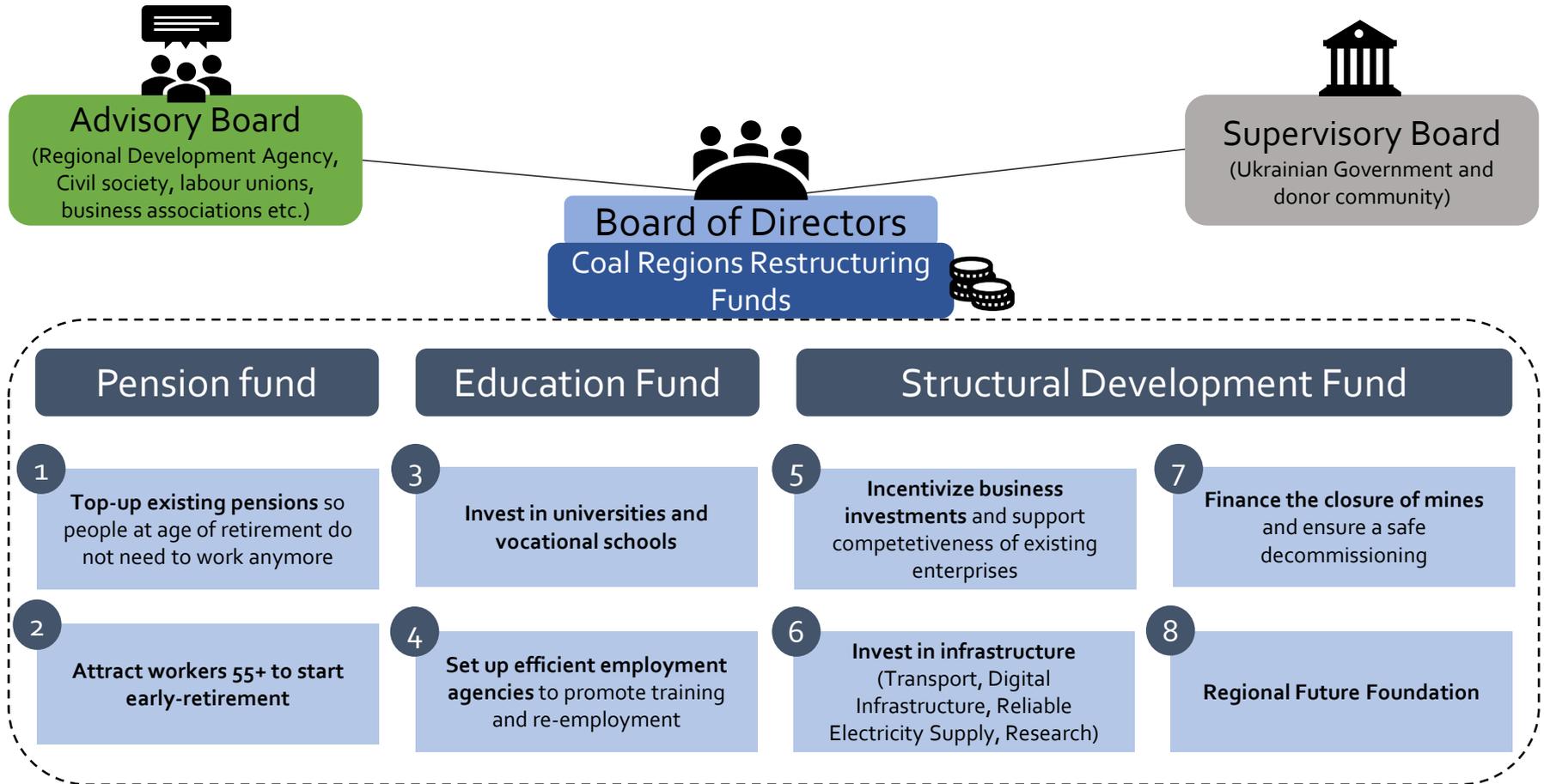


Regional Development Agencies

- Responsibilities:
 - Inform the public about the impact of the structural change in their region
 - Organise bottom up initiatives to support a just transition
 - Organise events and stakeholder workshops. Prioritise local demands and communicate them to decision makers.
 - Advise the Coal Region Restructuring Fund (CRRF)
 - Develop and implement projects funded through its own budget as well as through the CRRF.
- Stakeholders
 - Chambers of commerce and business associations
 - Universities
 - Municipalities and national government
 - Civil society organisations (incl. NGOs, labour unions, the church)
- Examples from Germany:
 - [Transforming Lusatia](#)
 - [Development Agency: Rheinisches Revier](#)

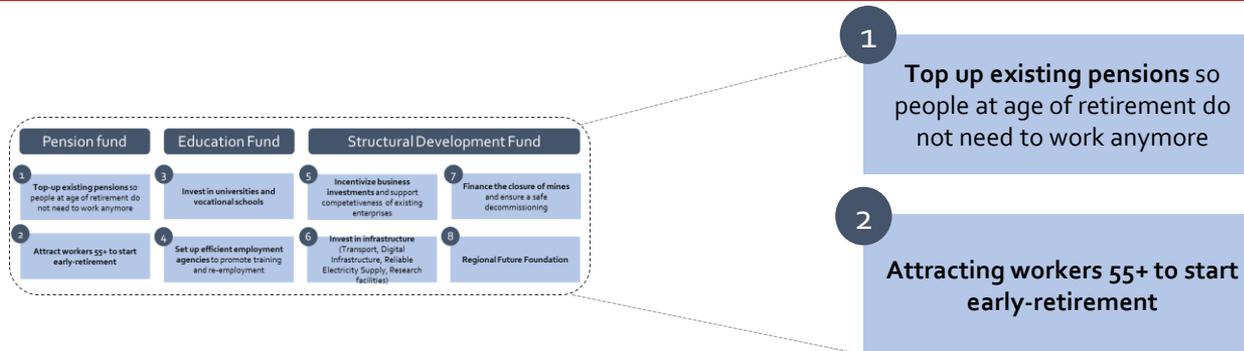
→ The regional development agency allows for a bottom-up approach that gives a voice to the people who are affected from the structural change and creates a constructive dialogue for the regions future development.

Third Step: Set up Coal Regions Restructuring Funds for each coal region



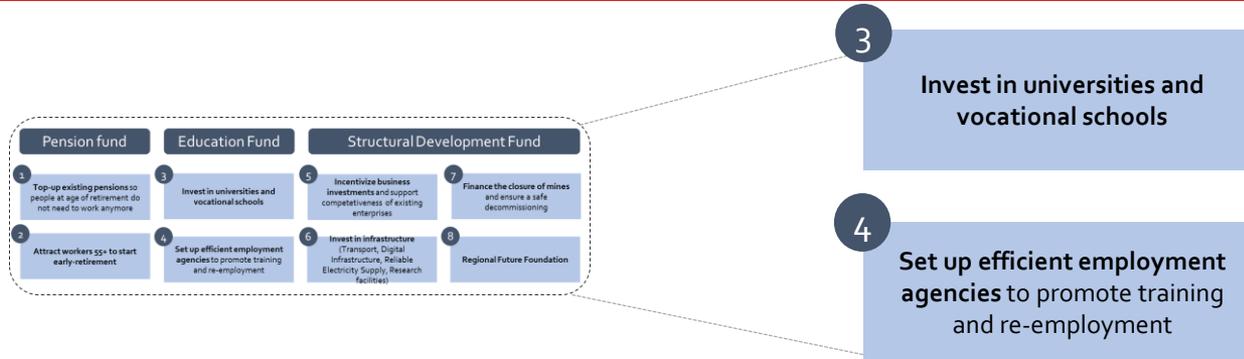
- The fund should be funded mainly by re-purposing the extensive coal-mining subsidies
- Additional funds should be requested from the Donor Community in exchange for a role in the governance process

Set up a Pension Fund to help older workers to retire earlier



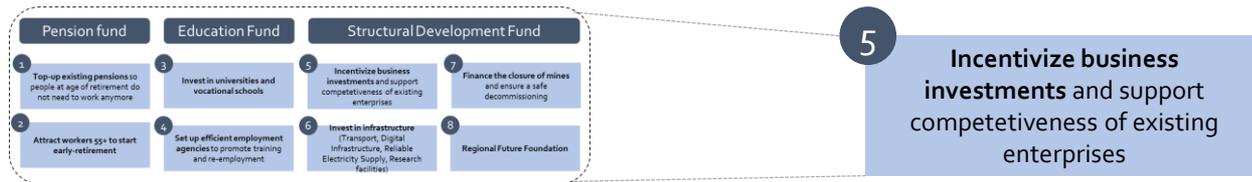
- 1 According to recent data 22% of workers in Ukrainian coal mines are already at the age of retirement. Unfortunately, their pensions are too low, so they have to continue working in the mines. A programme to top up their existing pensions would not only be socially fair but also economically reasonable as it would cushion the impact on the labour market.
- 2 Workers with an age of up to 5 years before they would normally retire, should be incentivised to retire early by specially targeted early-retirement schemes.

Set up an Education Fund to promote training and employment



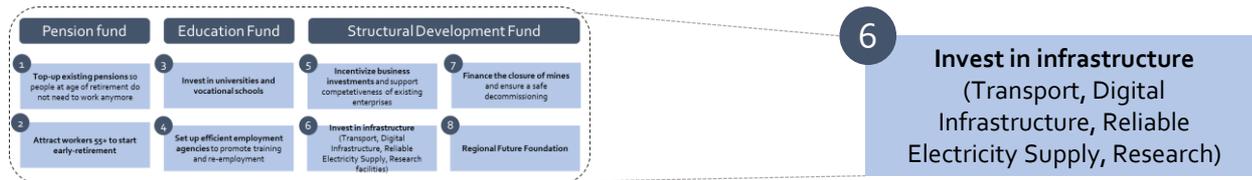
- 3 Increasing the capacities of educational institutions like universities and vocational schools will be essential for a longer-term structural change within the regions and a shift towards higher-skilled and better paid jobs.
- 4 Efficient employment agencies should be set up to support mine workers from early on with finding alternative job opportunities and with identifying potential for skill-development.

Set up a Structural Development Fund to promote economic and social prosperity - 5



- Develop targeted concepts for the economic transition and future development.
E.g: Fund a special advisory service to support businesses that are deeply intertwined with the coal sector like its suppliers and subcontractors. Potential revenue losses due to the decline of the coal sector shall be compensated by helping these companies with identifying new business opportunities. New products might need to be developed and new markets, also abroad, should be targeted.
- Support a close interconnection between business and scientific research. Ensure frequent exchange of knowledge and promote cooperations between research institutions, universities and companies in order to develop high-tech clusters.
- Promote the founding of new companies.
E.g. provide early-stage seed capital for start-ups
- Ensure that these measures are closely aligned with the programmes of the education fund.

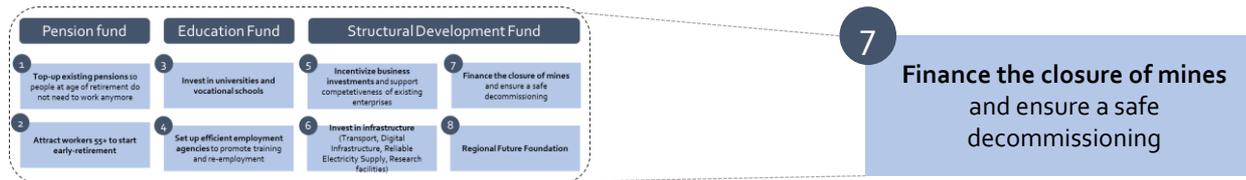
Set up a Structural Development Fund to promote economic and social prosperity – 6



- Improve the transport infrastructure.
 - It will allow people to commute to work places that are further away, especially in urban centres.
 - Better logistics will also help business operations.
- Set up new and relocate existing research and innovation facilities.
- Ensure a reliable and sustainable electricity supply. It will be crucial to replace the closing coal-fired power plants with renewable energies while ensuring the stability of electricity supply.
- With a longer-term shift towards a larger share of the service industry, a well developed digital infrastructure, in particular high-speed internet access and telecommunication services, will play an ever more important role.
- Improve the legal and operational environment for business investments – [link](#)

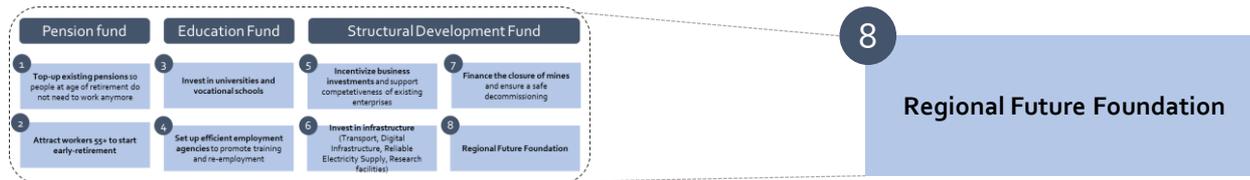


Set up a Structural Development Fund to promote economic and social prosperity - 7



- The closure of mines requires a diligent and safe decommissioning in order to **prevent the repetition of previous mistakes**. Poor governance has led to progressive deterioration of the local environment, resulting in chronic problems such as water supply disruptions, increased salinity of groundwater, accumulation of enormous amounts of solid waste, resulting land degradation, air pollution with dust particles and mudslides from spoil tips.
- The threat of flooding the abandoned mines, could have unpredictable outcomes. The Donetsk coal basin is an enormous interconnected geological system that was significantly transformed by mining activities. Its **flooding poses a serious threat to groundwater and nearby rivers** by leaking toxic compounds and chemical waste.
- Hence, **a comprehensive program for financing a safe closure of these mines is crucial**. As the decommissioning activities will last for many years, it is also a suitable way for ensuring the employment of many of the more senior workers who might reject changing jobs before their retirement.

Set up a Structural Development Fund to promote economic and social prosperity - 8



- The goal of the foundation is to **fund cultural, social and educational initiatives** in order to improve the quality of life and attractiveness of the regions affected by the coal phase-out.
- This way of funding shall complement the other pillars of the structural development fund with a more socially focused, **quick and unbureaucratic instrument**. It will be important in order to **prevent further emigration („brain drain“)**.
- The construct of a foundation has the **benefits that there is no time pressure to invest** into project ideas too quickly, if they are not ready. Budget that is not spent in one year will be saved for the following years. This will allow for a more sustainable structural change process whenever good project ideas arise. Potential projects funded by the foundation could comprise:
 - Promoting culture and art in the region through festivals, of film, theatre and music.
 - Supporting initiatives of settlements that are particularly affected by the ongoing war.
 - Funding social enterprises and small local businesses that are deeply intertwined with society.

Conclusion on how Ukraine can succeed with the structural change process of its coal regions

- 1 Start as soon as possible with initiating a commission for structural change in order allow for a smooth transition and avoid a sudden structural break in the coal regions.
- 2 Design a bottom-up process with clear and binding targets as well as extensive funding for the structural development.
- 3 Focus on education and employment services as well as a larger range of instruments for promoting economic development in the regions.



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