

SMART STRATEGIES FOR THE TRANSITION IN COAL INTENSIVE REGIONS



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COAL REGIONS IN TRANSITION: THE CHALLENGE

Coal is currently mined in 41 regions across 12 EU countries, making it the most abundant fossil fuel in the EU and a significant source of economic activity.

Transition towards a low carbon economy implies significant technological, economic and social challenges, in particular for coal-intensive regions that have to adapt from fossil-based energy production to new clean energy sources.

These regions need an effective roadmap to make the necessary transition to a more diversified economic base and a more sustainable energy system. This transition process should ensure social cohesion and justice for communities and regions dependent on coal production.

BENEFITS OF THE TRACER PROJECT

TRACER supports nine coal-intensive regions, which are at different stages of their energy transition, to shape (or fine-tune) their Research and Innovation (R&I) strategies and exchange previous experiences in order to facilitate transition towards sustainable energy systems.

Core activities include:

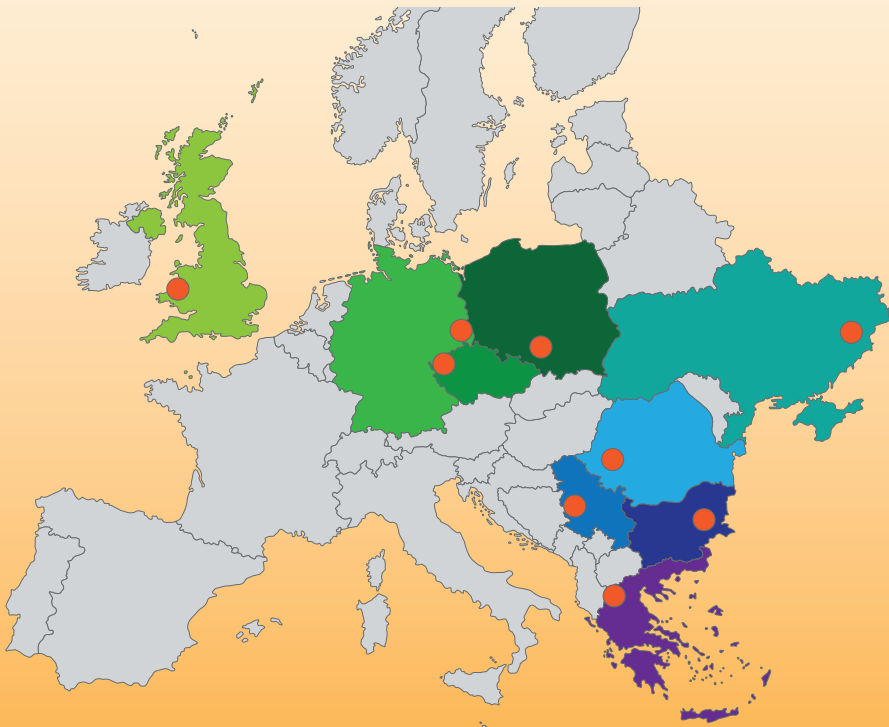
- Mobilisation of a wide range of stakeholders in nine European regions to discuss and agree on a shared vision and priorities for coal transition
- Joint development of R&I strategies, industrial roadmaps and decision support tools
- Identification and analysis of best practice examples of successful and ambitious transition processes in coal intensive regions
- Investigation of the current role of coal mining and use in TRACER target regions and assessment of social, environmental and technological challenges
- Elaboration of guidelines on how to mobilise investments
- Fostering R&I cooperation among coal intensive regions in Europe and beyond



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Project activities focus on nine European regions with a long history in coal mining and use of coal as fuel for power generation.

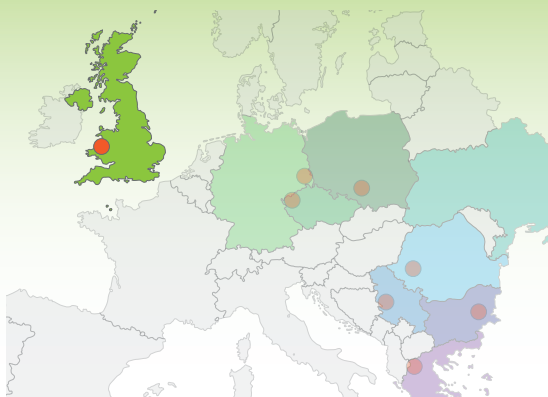
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TARGET REGION WALES (UKL1, UKL2)

QUICK DATA & FACTS



MINING & GENERATION (2017/2018)

Category	Wales (UKL1, UKL2)
Type of mining	Anthracite (steel production, not power station fuel)
Landscape area / mining district	2 counties
Coal production	500,000 mtpa
Employees	500
Added value	Wholesale price mt €100 mln
Coal phase out	Coal energy mineral 2025

SOCIO-ECONOMIC BASELINE (2017/2018)

Category	Wales (UKL1, UKL2)
GDP per capita	€ 22,600 (2016)
Employees	1,458,600 (2018)
Unemployment rate	4.3% (2019)

SMART SPECIALISATION STRATEGIES

Fields of action

- Research centres of excellence with clear comparative strength and market opportunity

Examples:

- The „SPECIFIC Innovation Centre“ aims to commercialise technologies by which buildings generate their own energy using functional, conductive steel. It builds on local industrial strengths in the steel industry and academic expertise in coating technologies.
- Semiconductors: based on a vision from within the industry, Wales aims to be the leader in compound semiconductors, which will drive technological advances from wireless devices to transport and healthcare.

Broad areas of activity:

- Life sciences and health
 - Low carbon, energy and environment
 - Advanced engineering and materials
 - The digital economy
- <http://s3platform.jrc.ec.europa.eu/regions/UKL/tags/UKL>



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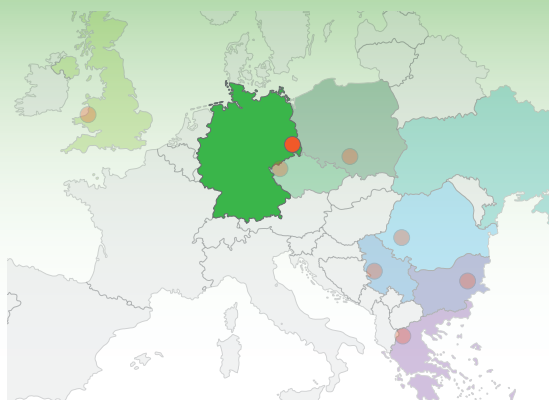


Llywodraeth Cymru
Welsh Government



TARGET REGION BRANDENBURG DE40 & DRESDEN DE02

LUSATIAN LIGNITE DISTRICT ECONOMIC REGION LUSATIA QUICK DATA & FACTS



MINING & GENERATION (2017/2018)

Category	Economic Region Lusatia
Type of mining	Lignite surface mining 4 mines in operation: Jänschwalde, Welzow-Süd, Nochten, Reichwalde, LEAG company
Landscape area / mining district	11,582 km² (6 counties + 1 independent town)
Land taken by mining & reclaimed	879 km² / 557 km² (63 %), in reclamation: 69 km²
Coal production	61.2 mln tons per year, 1/3 of the German production
Employees	7,000 + 12,000 related jobs
Added value of lignite processing	1.3 bln EUR
Coal phase out	2038

Data sources: LEAG (2018), DEBRIV (2019), Statistik der Kohlenwirtschaft e.V. (2019)

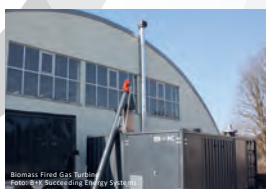
SOCIO-ECONOMIC BASELINE (2017/2018)

Category	Economic Region Lusatia	Germany
Population	1,162,703	81,198,000
GDP per capita	26,307 EUR	36,211 EUR
Share of industry on GDP	30 %	26 %
Employees	413,666	44,716,583
Unemployment rate	10.1 % (20.0 % in 2004)	3.4 %
Business start-ups at county level	58.5 - 95.8	100 (index)
Patents per 100,000 inhabitants at county level	5.2 - 75.2 (134.1)	111.4

Data sources: Markwardt & Zundel (2017), Prognos AG (2017), Wehnert et al. (2018), Federal Statistical Office (2019)

SMART SPECIALISATION STRATEGIES

Fields of Action



- Infrastructure Development
- Innovation - Research - Science
- Business and Economic Development



- Education of Specialists
- Marketing - Cultural Heritage - Tourism



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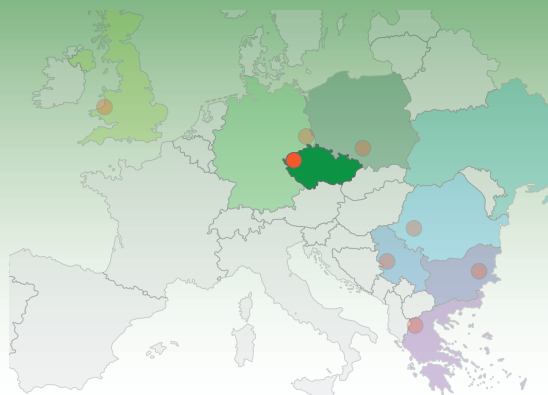
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TARGET REGION NORTH WEST BOHEMIA (CZ04)

ÚSTÍ COAL REGION & SOKOLOV COAL REGION

QUICK DATA & FACTS



MINING & GENERATION (2017/2018)

Category	Economic region Lusatia
Type of mining	Lignite surface mining Ústí Coal Region – 4 mines in operation (Vršany, Bílina, Doly Nástup Tušimice, Československá armáda) Sokolov Coal Region – 2 mines in operation (Jiří, Družba)
Landscape area/mining descript	8,649 km ²
Land taken by mining & reclaimed	270 km ² /130 km ² (48 %), in reclamation - 52 km ²
Coal production	38.18 mln tons per year (100 % of Czech production)
Employees	6,037 (mining companies)
Coal phase out	2053

Data sources:

- Analyses of economy development of the Czech Republic in 2017, Ministry of Industry and Trade, 2018
- Czech Statistical Office, www.csu.cz
- Environmental report of Ministry of Environment, 2017

SOCIO-ECONOMIC BASELINE (2017/2018)

Category	Coal Regions	Czech Republic
Population	1,115,685	10,649,800
GDP per capita	12,991 EUR	12,142 EUR
Share of industry on GDP	38.6 %	31.6 %
Employees		5,326,300
Unemployment rate	5.3 %	2.4 %
Business start-ups at county level	1,490 (4.6 % of national)	
Patents per 100,000 inhabitants at county level	101.28	34.92



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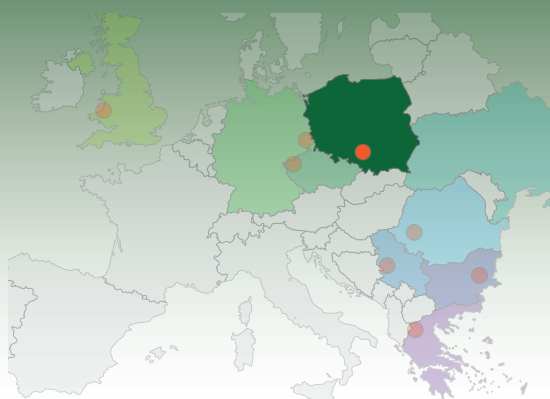


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UNIVERZITA V PRAZE

TARGET REGION UPPER SILESIA (PL22)

UPPER SILESIA REGION

QUICK DATA & FACTS



MINING & GENERATION (2017/2018)

Category	Upper Silesia Region
Type of mining	Coal mining (19 coal mines operating at the moment)
Landscape area / mining district	12,333 km ² (Śląskie Voivodship) 5,600 km ² – surface area of the Upper Silesian Coal basin
Land taken by mining & reclaimed	45 exploited deposits of hard coal, 46 87 mln Mg geological resources in Upper Silesia region Land requiring reclamation: 52.59 km ² Reclaimed 0.42 km ²
Employees	133,100 mining of coal and lignite in Poland 84,662 mining and quarrying in Upper Silesia
Added value of coal processing	31.5 bill PLN (Mining and quarrying, Poland) 3.9 bill PLN (Śląskie Voivodship)

Data sources: Statistical Yearbook of the Republic of Poland (2018), Polish Geological Institute – National Research Institute (2018)

SOCIO-ECONOMIC BASELINE (2017/2018)

Category	Upper Silesia Region	Poland
Population	4.5 mln	38.4 mln
GDP per capita	50,184 PLN (2016)	In total: 51,760 PLN 821 PLN (mining and quarrying)
Share of industry on GDP	35.3% (2016)	In total: 18.9%, 375,768 PLN 0.2%, 4,602 PLN (mining and quarrying)
Employees	In total: 1.7 mln In industry: 0.4 mln Mining and quarrying: 84,662	In total: 15.7 mln Mining of coal and lignite: 82,600
Unemployment rate	5.1%	4.9%
Patents per 100,000 inhabitants at county level	In total: 14 patent applications, 11 patents granted	In total: 3,924 patent applications, 2,795 patents granted Building and mining: 252 patent applications, 223 patents granted

Data sources: Statistical Yearbook of the Republic of Poland (2018), Statistical Yearbook of Industry – Poland, <https://katowice.stat.gov.pl>, https://www.uprp.pl/uprp/_gALLERY/91/93/91930/raport_roczny_2017.pdf

SMART SPECIALISATION STRATEGIES

Fields of action

- Infrastructure development
- Business and economic development - Haldex S.A.; The shopping gallery was built on the areas of the former coal mine „Kleofas”, changing the abandoned post-industrial area to the meeting place of the local community. Currently, the Silesia City Center consists of a shopping mall, entertainment part (cinemas, bowling, fitness club, restaurants), an underground car park and a parking lot located on the roof. The investment is considered one of the most important land reclamation projects in Silesia
- Cultural heritage - Katowicka Strefa Kultury - designated cultural and entertainment area located in Katowice
- Tourism – forest reclamation

City – industry – forest relationships on Katowice Forest District area



CONTACT

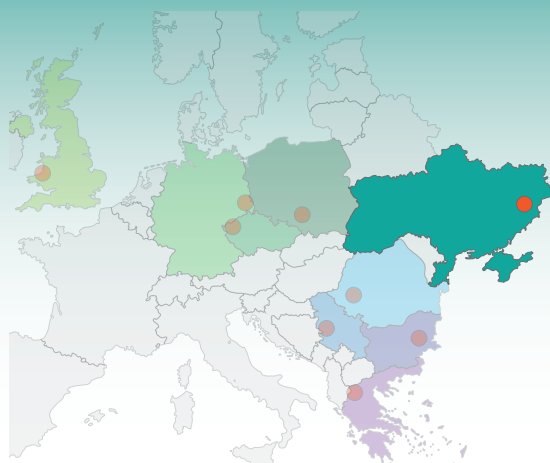
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TARGET REGION DONETSK REGION

QUICK DATA & FACTS



MINING & GENERATION (2018)

Category	Donetsk region *
Type of mining	Deep mines Bituminous coal, anthracite, coking coal
Landscape area / mining district	26 517 km ² (18 districts, 1301 settlements)
Coal production	11.1 mln tons of raw coal per year, 33% of Ukrainian production
Employees	50,000 employees and members of their families
Electricity production by coal TPPs	14.3 GWh (30% Ukrainian coal TPPs generation)
TPPs installed capacity	5 TPPs with 6.4 GW installed capacity (21% of the Ukrainian TPPs installed capacity)

*excluding the temporarily occupied territory.

Data source: Ministry of Energy and Coal Industry of Ukraine (2018)

SOCIO-ECONOMIC BASELINE (2018)

Category	Donetsk Region *	Ukraine
Population	2,100,000	42,386,400
GDP per capita	1,334 EUR	2,348 EUR
Share of industry on GDP	52.7%	14%
Employees	782,900	15,069,400
Unemployment rate	15%	10%

*excluding the temporarily occupied territory.

Data sources: State Statistics Service of Ukraine (2018), Ministry of the Temporarily Occupied Territories and Internally Displaced Persons of Ukraine (2018)

SMART SPECIALISATION STRATEGIES

Fields of action



- Explosives clearing
- Infrastructure renovation and development
- Innovation – Research – Science

- Green energetics development
- Business and economic development
- Education of specialists



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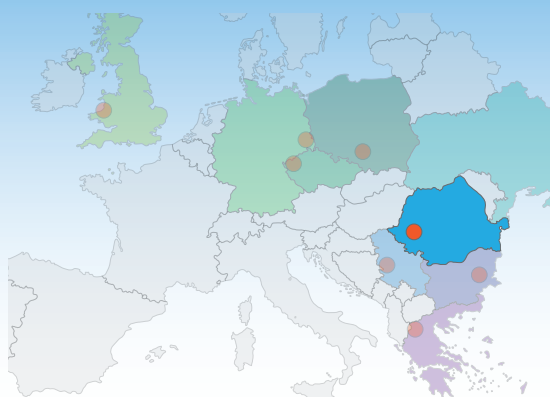
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TARGET REGION JIU VALLEY / WEST REGION (R042)

VALEA JIULUI (WEST REGION)

QUICK DATA & FACTS



MINING & GENERATION (2017/2018)

Category	Jiu Valley	West Region (R042)
Type of mining	Hard coal underground mining (Petroșani basin) 4 underground mines in operation ¹ Lonea, Lupeni, Vulcan and Livezeni	
Landscape area / mining district	1,032.5 km ² (3 municipalities and 3 cities) ²	32,034 km ² (4 counties, 12 municipalities and 30 cities) ³
Land taken by mining & reclaimed	89.915 km ² of which 17.983 km ² covered by mine lakes and reclaimed mining tailings dumps	N/A
Hard coal production	0.8 mln tons/year (2017) covering around 3% of the total domestic energy production from coal ⁴ <i>Jiu Valley is the only coal production source in R042 region</i>	
Employees	55,000 (1990) ⁵ ; 29,000 (2007) ⁶ ; 4,797 (2018) ⁷	
Hard coal phase out data source: in footnote	2015 + 104 = 2119 <i>Hard coal resources are 232 mil. tons, concentrated in Jiu Valley, of which 83 mln tons are leaseable permits⁸.</i>	

SOCIO-ECONOMIC BASELINE (2017/2018)

Category	West Region (R042)	Romania
Population	1,784,522 (2018) ⁹	19,530,631 (2018)
GDP per capita	9,194 EUR (2016)	8,647 EUR (2016)
Share of industry on GDP	30% (2016)	24% (2016)
Employees	525,900 (2017)	4,945,900 (2017) ¹⁰
Unemployment rate	2.2% (2017); 3.73% Hunedoara County (2018) <i>major differences between statistics data and real situation</i>	4% (2017)
Business start-ups	730 new SMEs (start-up nation program 2017) 3,227 SRL-D (working LLC for young entrepreneurs' in 2017)	8,653 new SMEs (start-up nation program 2017) ¹¹ 41,531 SRL-D (working LLC for young entrepreneurs' in 2017) ¹²
Patents	75 submitted applications (2017)	410 granted applications ¹³ (2017)

data source: in footnote

SMART SPECIALISATION STRATEGIES

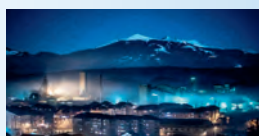
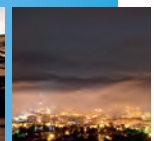
Fields of action

Of interest for Jiu Valley

- Infrastructure development
- Energy efficiency in industry and construction
- Specialists education and professional reconversion
- Urban and rural regeneration, including architecture aesthetic in buildings reconversion
- Cultural heritage – Tourism
- RDI (Energy, ICT, Environment)

Committed for West Region (R042)¹⁴

- Automotive (spare-parts) industry
- ICT industry
- Textile - leather - footwear industry
- Agro - food
- Construction - construction materials - energy



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¹ Hunedoara Energy Holding <http://www.cenh.ro/>

² Jiu Valley Zonal Territory Plan, 2003, UrbanProiect http://www.mdri.ro/_documente/dezvoltare_teritoriala/amenajarea_teritoriului/patz_valea_jiului/faza1/memoriu1.pdf

³ http://s3platform.jrc.ec.europa.eu/documents/20182/89941/Documentul-Cadru_Regiunea-Vest_s.pdf/92d5bdfc-0cd8-4119-bf62-725e71232acb

⁴ <http://www.inssse.ro/cms/en>

⁵ Hard coal mining industry in Petroșani basin - history and current challenges, p.11, Hunedoara Energy Holding http://coal2gas.eu/wp-content/uploads/CE-Hunedoara_COAL2GAS_Final-Workshop_2017.pdf

⁶ Mines-Energy National Federation, Modern mining in Romania - Local and Regional Sustainable Development in European Context, p.9 <http://www.cenh.ro/>

⁷ Hunedoara Energy Holding <http://www.cenh.ro/>

⁸ Energy Strategy of Romania 2019-2030, and 2050 perspective, Ministry of Energy <http://energie.gov.ro/transparenta-decizionala/strategia-energetica-a-romaniei-2019-2030-cu-perspectiva-anului-2050/>

⁹ <http://statistici.inssse.ro:8077/tempo-online/#/pages/tables/inssse-table-and-EUROSTAT> (tgs00096, tps00001)

¹⁰ <http://www.inssse.ro/cms/en>

¹¹ <https://www.startupcafe.ro/harta-start-up-nation.htm>

¹² https://www.onrc.ro/statistici/2017/decembrie/Raport_SRLD_31.12.2017.xls

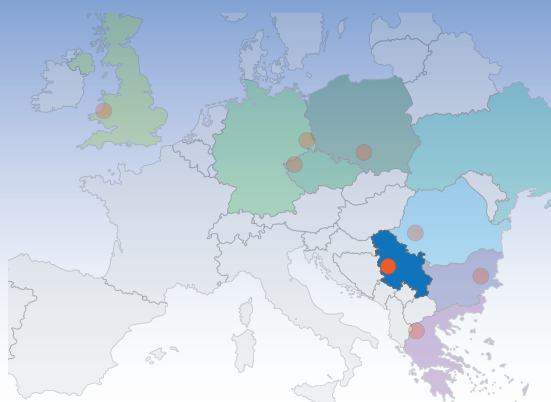
¹³ <https://osim.ro/wp-content/uploads/Publicatii-OSIM/Raport-Anual/Raportul-Anual-2017.pdf>

¹⁴ http://s3platform.jrc.ec.europa.eu/documents/20182/89941/Documentul-Cadru_Regiunea-Vest_s.pdf/92d5bdfc-0cd8-4119-bf62-725e71232acb

TARGET REGION KOLUBARA REGION (RS11, RS21)

SPATIAL REGION KOLUBARA

QUICK DATA & FACTS



MINING & GENERATION

Category	Spatial Region Kolubara
Type of mining	Lignite surface mining 7 fields in operation or to be operated until closedown (fields „Tamnava-Zapad“, „C“, „D“, „E“, „Veliki Crljeni“, „G“, „Radljevo“, EPS company)
Landscape area / mining district	1,435 km ² (4 municipalities)
Land taken by mining & reclaimed	Within exploitation boundaries 130 km ² (~9%); reclaimed 12.6 km ²
Coal production (without overburden)	29 mln tons per year (>70% of Serbian production)
Employees	7,644 + 5,699 related jobs
Coal phase out	2050

Data sources:

1. EPS Technical Review, 2017.
2. Opencast mining center: Study on long-term development program of coal exploitation in Kolubara basin, 2015.
3. Spatial plan of Kolubara lignite basin exploitation area, Official Gazette of RS, no. 122/2008.

SOCIO-ECONOMIC BASELINE

Category	Spatial Region Kolubara	Serbia
Population (census 2011)	175,722	7,186,862
GDP per capita	N/A	4,112 EUR
Share of industry* on GDP (2017)	N/A	1.1%
Employees (census 2011)	62,610	2,304,628
Unemployment rate (of active population) (census 2011)	13.52%	22.43%

* Industry meaning coal mining

Data source:

1. Statistical Office of the Republic of Serbia: Municipalities and Regions of the Republic of Serbia, 2018.

SMART SPECIALISATION STRATEGIES

Fields of Action

Concept of smart specialization strategy in Serbia is presented in „Report on the qualitative analysis of preliminary priority areas in the smart specialization process in the Republic of Serbia“ issued in March 2019 (<http://s3platform.jrc.ec.europa.eu/-/report-on-the-qualitative-analysis-of-preliminary-priority-areas-in-the-smart-specialization-process-in-the-republic-of-serbia?inheritRedirect=true>). It contains general guidelines for further discussion.

The following issues should be covered:

- Infrastructure development
- Innovation – Research – Science
- Business and economic development
- Education of specialists



CONTACT

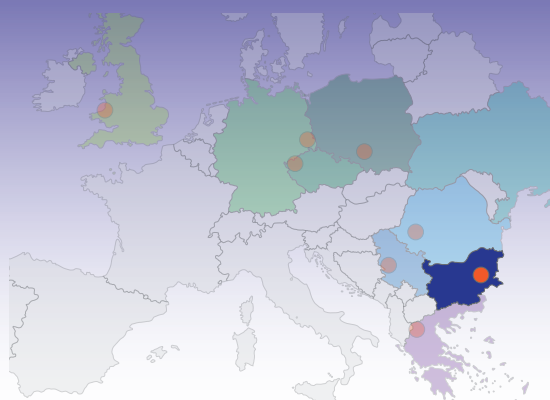
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TARGET REGION SOUTHEAST REGION (BG34)

YUGOIZTOCHEN REGION

QUICK DATA & FACTS



MINING & GENERATION

Category	Yugoiztochen region
Type of mining	Lignite open cast mining 3 open mines: Troyanovo 1, Troyanovo 3, Troyanovo-North 4 TPPs: "Maritza East 2", "Contour Global Maritza-East 3" AD, "AES Galabovo" EOOD, "Brikel" EAD
Landscape area / mining district	19,664.2 km ² (four regions)
Land taken by mining & reclaimed	240 km ²
Coal production	30,337,319 tons (2017)
Employees	11,150
Added value of lignite processing	N/A
Coal phase out	No phase-out under discussion

Data source: Mini Maritza Iztok EAD, National Statistical Institute (2018)

SOCIO-ECONOMIC BASELINE (2017)

Category	Yugoiztochen Region	Bulgaria
Population	1,039,549	7,050,034
GDP per capita	12,538 BGN (6 410,58 Euro)	14,280 BGN (7,301.25 Euro)
Share of industry on GDP	46%	28%
Employees	299,701	2,308,129
Unemployment rate	7 % (11.9 % in 2012)	6.2 % (12.3 % in 2012)
Business start-ups at county level	14 % of the total active enterprises are start-ups	10.7 % of the total active enterprises are start-ups
Patents per 100,000 inhabitants at county level	0.233 (2012)	4.172 (2012)

Data source: National Statistical Institute (2018), Eurostat

SMART SPECIALISATION STRATEGIES

Fields of action

- New technologies in creative and recreation industries
- Mechatronics and clean technologies
- Industry for a healthy life and bio-technology



Data source: Ministry of Economy (2018)

Photos are taken from the websites of the Maritza East complex entities

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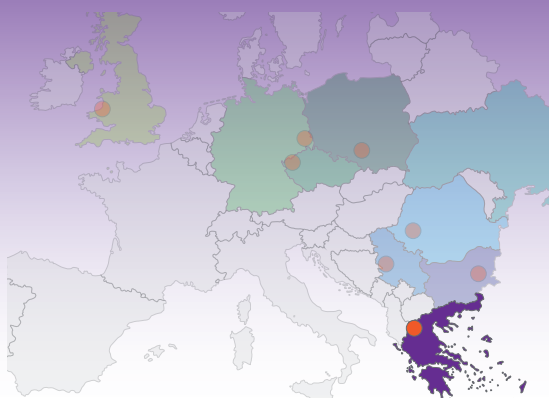
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TARGET REGION WEST MACEDONIA (EL53)

WESTERN MACEDONIA REGION (WEST MACEDONIA LIGNITE CENTRE)

QUICK DATA & FACTS



MINING & GENERATION

Category	Economic region WMR
Type of mining	Lignite found in horizontal or slightly inclined multiple layers (surface mining) In the wider area of the West Macedonia Lignite Centre, there are 4 lignite mines operating: South Field Mine, Main Field Mine, Amyntaio Mine (the Florina Mine also included) and Kardia Mine.
Landscape area / mining district	9,451 km ² (4 Regional Units: Kozani, Grevena, Kastoria and Florina)
Land taken by mining & reclaimed	160 km ² / 30 km ² already reclaimed (16 km ² reforested, 10.5 km ² agricultural land, 3 km ² parks, lakes, etc.)
Coal production	35.7 mln tons extracted by the PPC + 2.2 mln tons extracted by a few privately operated mines (2015)
Employees	5,522 employees of PPC (4,199 permanently employed) (2014)
Added value of lignite processing	1,450 mln EUR (2013) (mines, processing, electricity supply, sewage treatment, etc.)
Coal phase out	2050

Data sources:
 • Public Power Corporation SA (PPC) (2017),
 • "Overview: National coal phase-out announcements in Europe - Status March 2019",
 • Smart Specialisation Strategies in Greece – expert team review for DG REGIO: "RIS3 Regional Assessment: Dytiki Makedonia (December 2012)",
 • https://www.enterprisegreece.gov.gr/images/public/Synergasia-2018-Western_Macedonia.pdf

SOCIO-ECONOMIC BASELINE

Category	Economic region WMR	Greece
Population	278,706 (in 2014)	10,741,165 (2018)
GDP per capita	15,642 EUR (2015)	20,157.41 EUR (2015) (20,494.40 EUR in 2017)
Share of industry on GDP	45% (mines, quarries, industry, electricity supply, etc.) (2013)	14.79% (industry) (2017)
Employees	86,200 (2018)	3,883,000 (2018)
Unemployment rate	31.3% (2016)	18% (2018)
Business start-ups at county level	N/A	562 (2018)
Patents per 100,000 inhabitants at county level	N/A	498 (2017) (4.4 per 100,000 inhabitants)

Data sources:
 • <https://www.statista.com/statistics/276399/distribution-of-gross-domestic-product-gdp-across-economic-sectors-in-greece/>,
 • ROADMAP FOR THE TRANSITION OF THE WESTERN MACEDONIA REGION TO A POST-LIGNITE ERA (WWF, July 2016)
 • <https://www.nationmaster.com/country-info/stats/Industry/Patent-applications/Residents/Per-capita>
 • Hellenic Statistical Authority

SMART SPECIALISATION STRATEGIES

Fields of action

- Infrastructure development
- ICT diffusion support (development of ICT structures & infrastructures)
- SMEs technological capacity upgrading
- Innovation & Science – Business collaboration (enhancement of scientific specialization)
- Environmental protection
- Training of professionals to re-enter the labor market

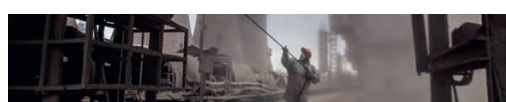


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SMART STRATEGIES FOR THE TRANSITION IN COAL INTENSIVE REGIONS



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