



Welcome

Just Transition Projects I: Energy transition and Heating

Platform for Coal Regions in Transition

#CoalRegionsEU

Energy



Ústecký kraj

 **RE:START**

Coal Regions in Transition Ústí Region

Beauty and pain. Disadvantages and opportunities.



INTRODUCTION

Hard-tested Region

01

TRANSITION

From coal region to region of
21st century

02

PKÚ s.p.

Responsibility for
revitalization of the
landscape affected by mining
activities

03

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UJEP

University as a center of
education, R&D and
innovation for region of 21st
century

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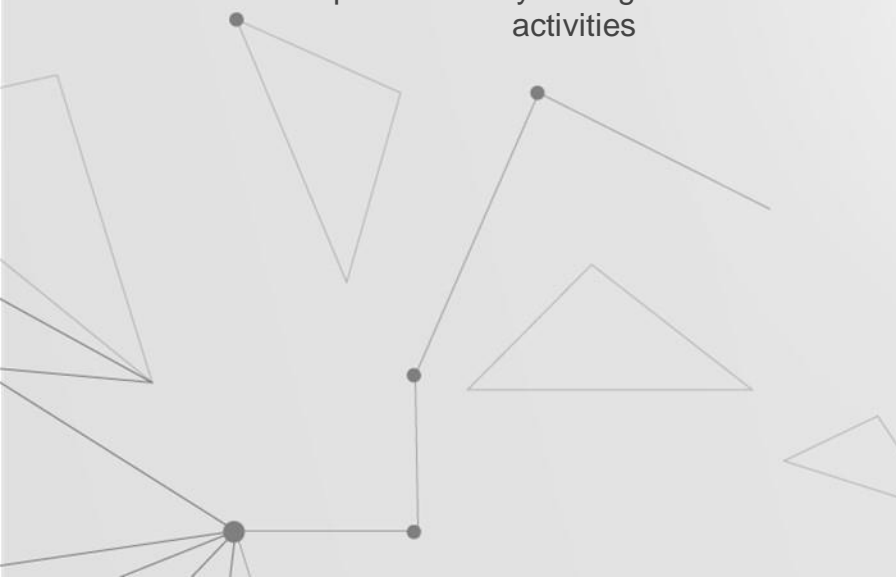
INNOVATION

Key for successful transition

06

**REGIONAL
GOVERNMENT**

Coal Region in Transition
must be Smart Region



01

INTRODUCTION

Hard – tested region



ÚSTÍ REGION

SOME FACTS AND FIGURES

AREA

- 5 335 km² (6,8% of Czech Rep.)

POPULATION

- 820 789 (7,7% of Czech Rep.)

UNEMPLOYMENT

- 4,7% (3,2% Czech rep.)

GDP PER CAPITA

- 65% of the EU average

MAIN SECTOR OF INDUSTRY

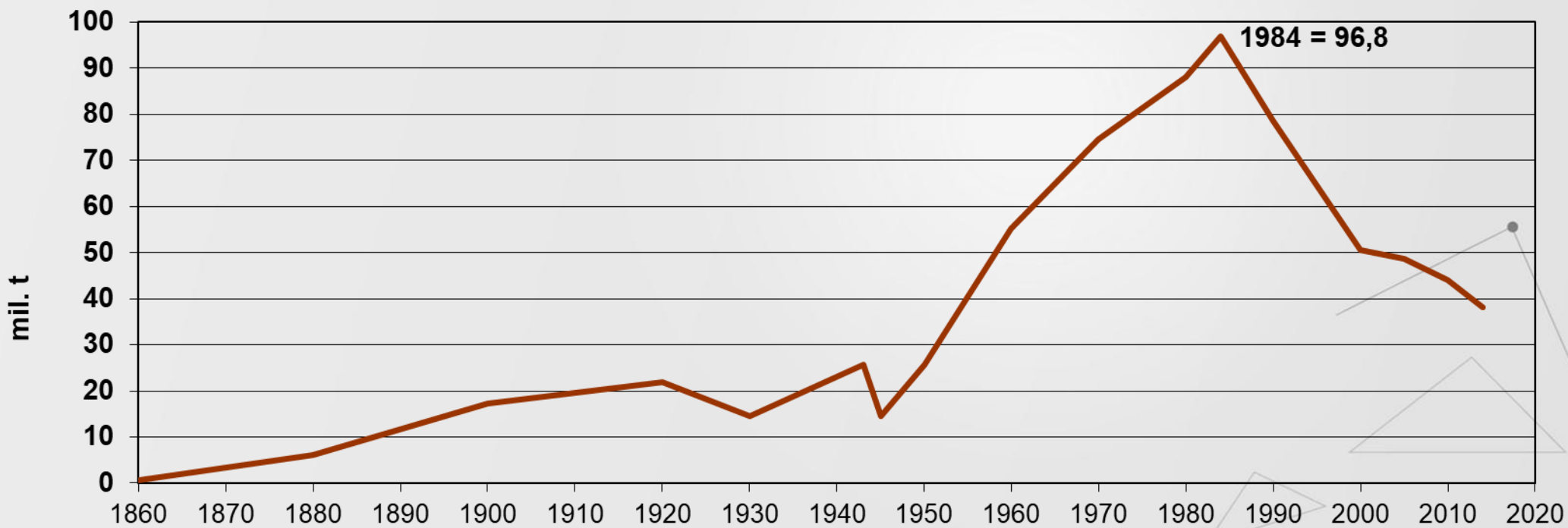
- Energy, coal mining, engineering, chemical, glass industry

400 KM² AREA AFFECTED BY COAL MINING FOR TRANSITION



DEVASTATION OF THE REGION

- ethnic riots between world wars
- 1939 – expulsion of the Czech population
- 1945 – expulsion of the German population and subsequent settlement of the territory by Bohemia, Slovaks, Volhynian Czechs and Roma - people without roots and without relationship to the region
- 1948 – 1991 open-cast mining of coal in large areas and operation of coal-fired power plants - the devastation of the environment and human values



BEAUTY AND PAIN





02

TRANSITION

From coal region to region of 21st century

TURN DISADVANTAGES INTO OPPORTUNITIES

- From coal energy to clean energy
- From coal mining to data mining
- From a depopulated region to the region it attract
- From existing ghettos to social inclusion
- From assembly factories to innovative and creative industries
- Region with the potential for significant water resources to combat climate change
- Region restoring quality agricultural land and forests



Reclamation

→ **Revitalisation**

→ **Resocialization**





03

PKÚ s.p.

Lakes landscape

PLANS – VISION

LAKES LANDSCAPE

WATER SUPPLY

CLEAN ENERGY CENTER

URBANIZATION OF MINING MINERAL TERRITORIES



COMPREHENSIVE APPROACH PKÚ s. p.



ENERGY

- Pumped-storage hydroelectric power plants
- Geothermal use of mine water
- Floating photovoltaic and wind power plants

- The former area of auxiliary operations
- Classification of object and land composition

AGRICULTURE AND FORESTRY

- Effective management of forest stands
- Creating quality agricultural land
- Growing energy-efficient plants

IMMEDIATE PROCEDURE IN THE CSA LOM

- Ensuring adequate protection of the unloaded part of the bearing
- Extraction of brown coal in slopes
- Hydric reclamation dimension

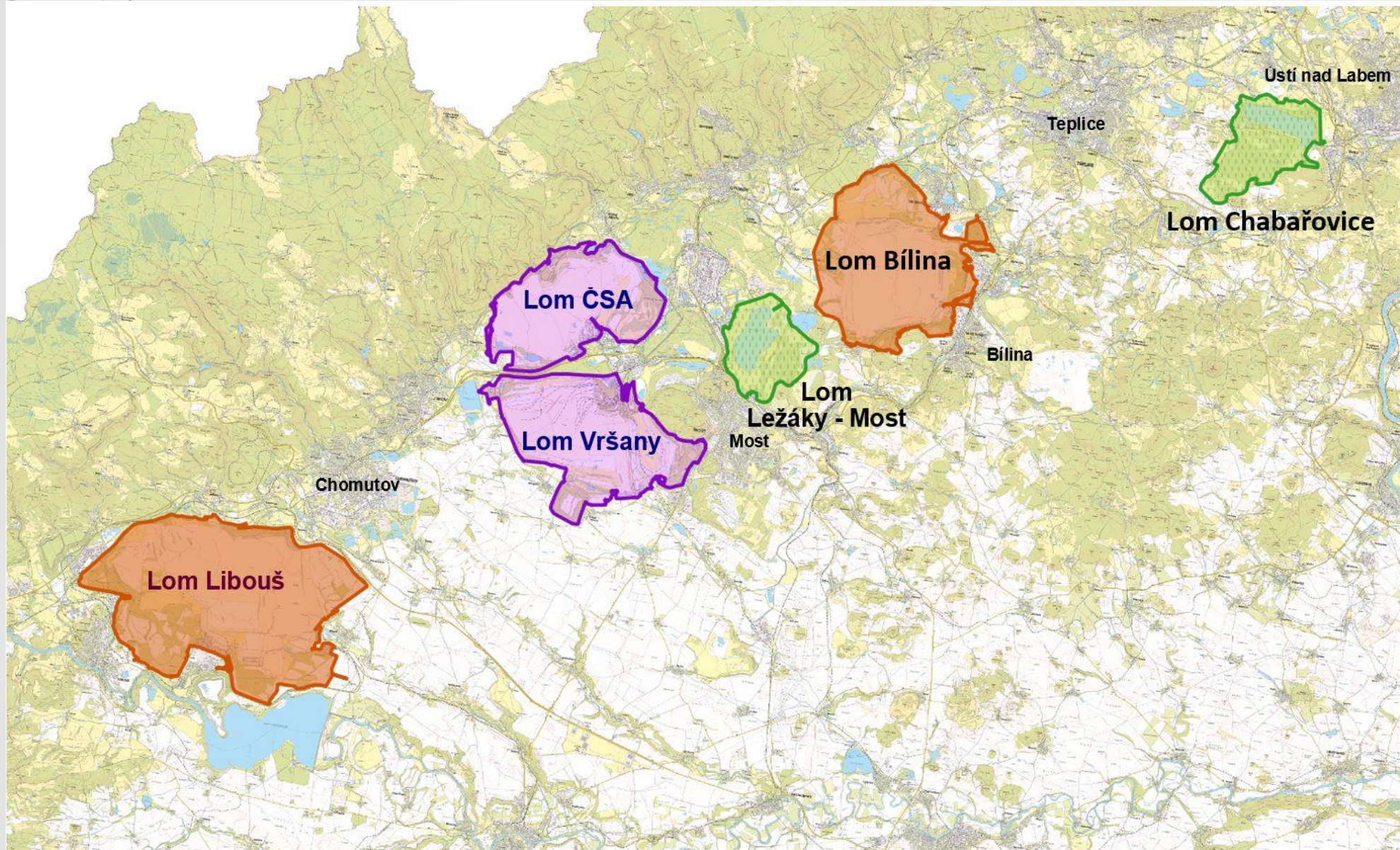
URBANIZATION

- Creation of urban and architectural solutions and their coordination with territorial planning documentation

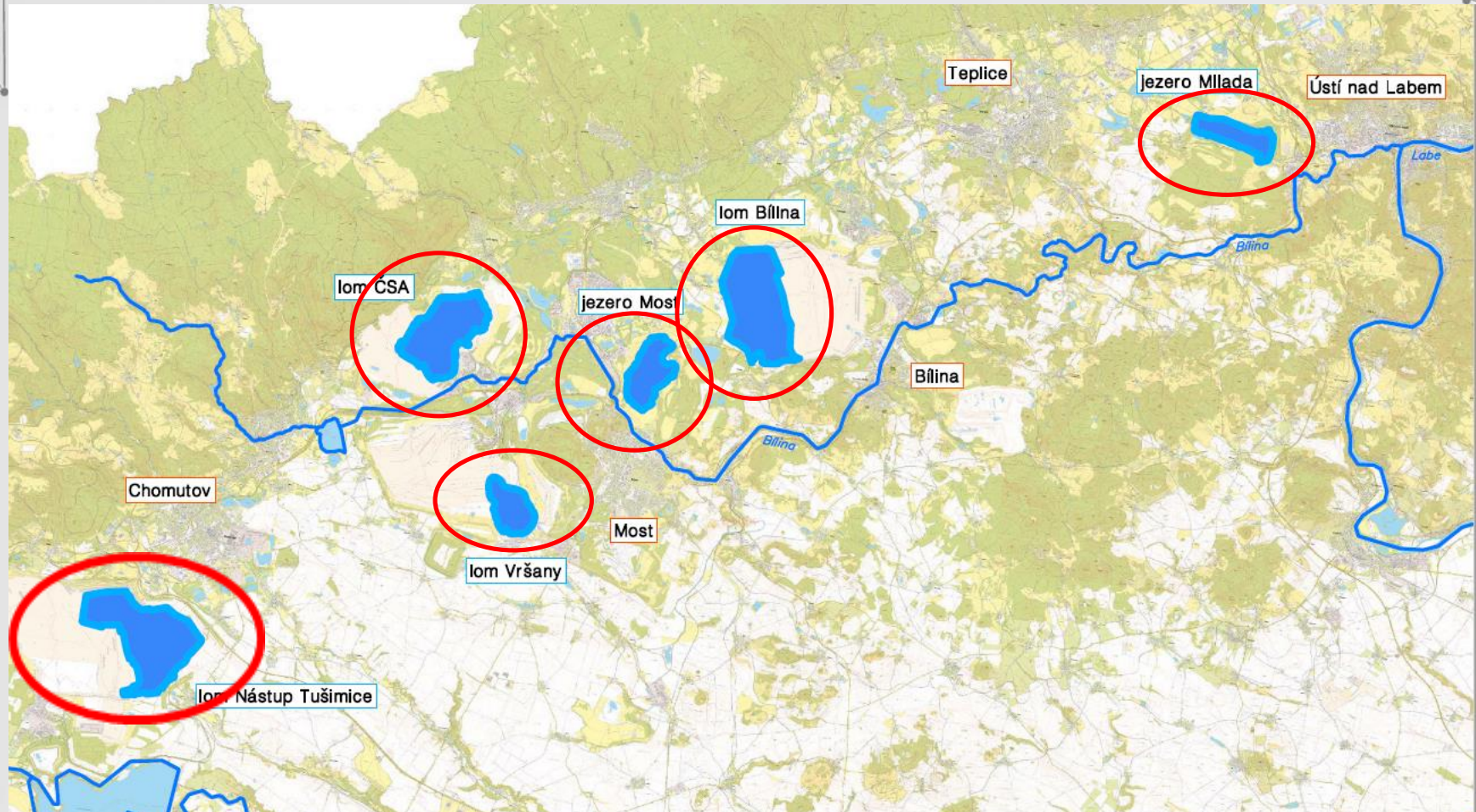
WATER MANAGEMENT

- Connected system of lakes

MINING AFFECTED AREAS



ORIGINAL SCHEMES TO THE PRESENT

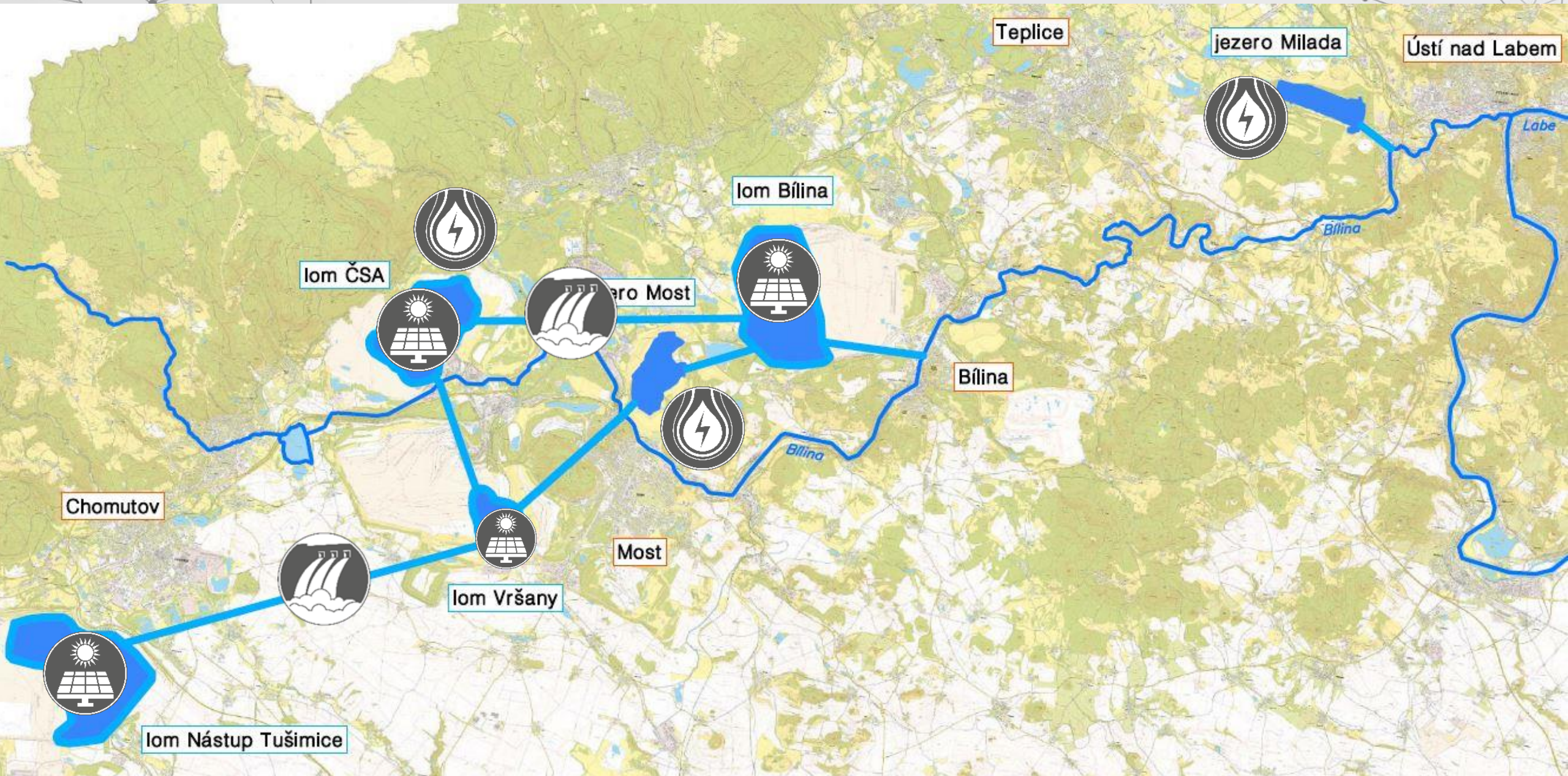


Original plans of water recultivation

Re-evaluation of plans

New solution

LINKED LAKE SYSTEM



04

UJEP

Materials and technologies for quality of life



PROJECT

MATECH

Materials and technologies for quality of life

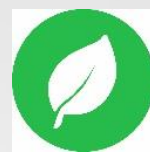
<https://smart-mateq.cz/en/home/>

Motivation: To promote the transition of the coal region into the advanced technological region.

The way to this goal: Strengthening the innovation potential and competitiveness of the Ústí Region and creating the conditions to shift the focus of the large-scale production towards technologies and materials with high added value.

The main topics of **MATECH** project and their interconnection

Green chemistry and renewable energy materials and technologies for chemical separation in biomass processing



Hydrogen and electro - mobility
Development of hydrogen storage materials



Nanomaterials and technologies for environment protection and quality of life

Readiness of the region: 2 large research infrastructure projects: **NanoEnviCz** and **CATPRO** are running in Ústí region, that means: there is sufficient research infrastructure for technological innovations
(see the road map <https://www.vyzkumne-infrastruktury.cz/en/>)

PROJECT OUTCOMES



Green chemistry: ► Innovative chemical technologies for the biorafinery i.e. the transformation of renewable raw materials (biomass) into green chemicals.

► New materials based on functionalized nanofiber membranes for separation processes in biorefinery to extract products of biorafinery for subsequent use in chemical industry.



Nanomaterials and technologies for environmental applications and quality of life: ► New nanomaterials for environmental applications with the focus on surface and waste water treatment.

► New nanomaterials for chemical safety with regard to toxic substances that are difficult to degrade.

► New nanomaterials for medical use: drug carriers for targeted transport in the body, biosensors for body fluid diagnostics, tissue engineering.



Hydrogen and electro mobility: ► Hydrogen storage materials based on "foamed" magnesium or aluminum alloys.

► Methods of testing fast-charging stations for electric vehicles.



05

INNOVATION

Key for successful transition

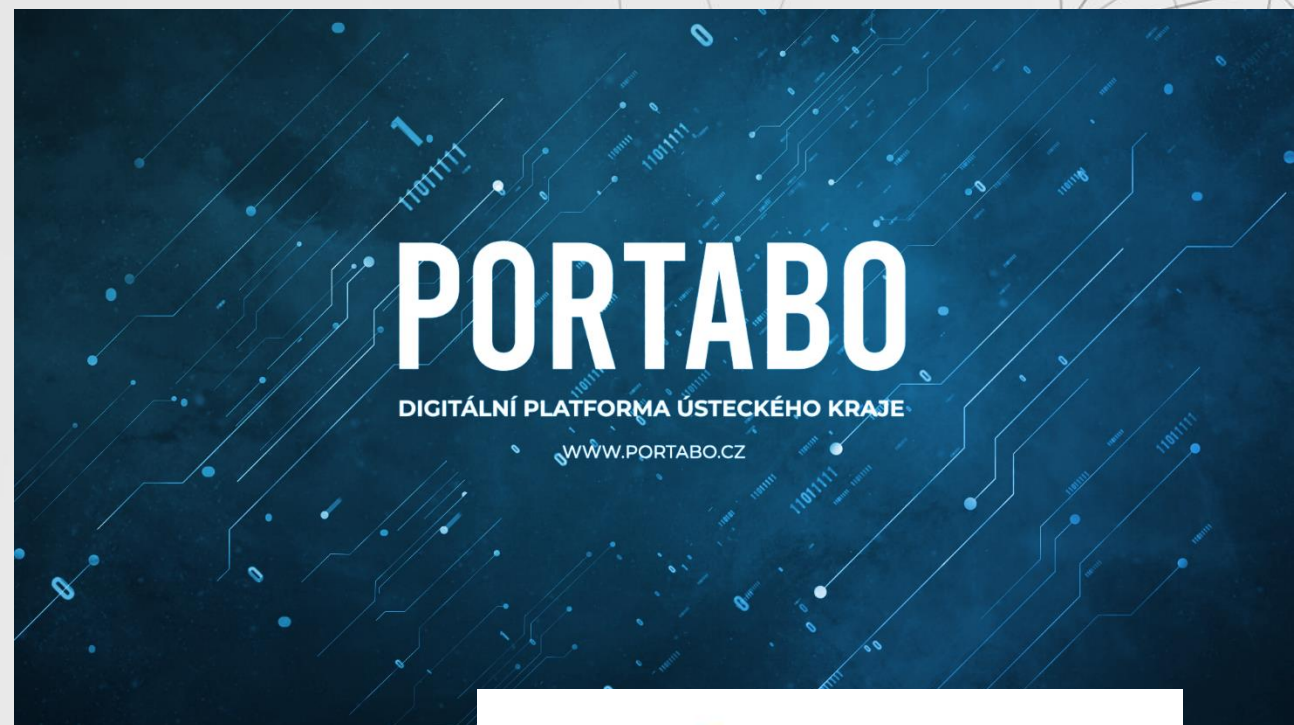


ICUK

MAIN INNOVATION PARTNER

ICUK (Innovation Center of Ústí Region)

- U Smart Zone – test polygon for autonomous vehicles
- Mobility Innovation Hub – part of European network of Digital Innovation Hub's
- PORTABO - One unified data platform for regional government, cities and villages and other subjects in Ústí Region
- Smart Region Concept - one of the ways to improve living conditions in the region
- R&D knowledge transfer to the SME's
- Start-Up's support



Ústí Region
#A NEW START



06

REGIONAL GOVERNMENT

Coal Region in Transition must be Smart Region

HOLISTIC VIEW

- Our strategy is cooperation
- Strategic projects as a part of the whole complex of solutions
- The conversion of the region to the Region of the 21st century
- Teams of experts in this task
- Free areas for housing, jobs and recreation
- Economic activities in area
- Smart Region for our cities, villages, but above all our citizens



We must learn to think of the entire pelvic area as a unique and beautiful landscape, the uniqueness and beauty of which will be complemented by water bodies and engineering parts such as jewelry underlining its overall quality.



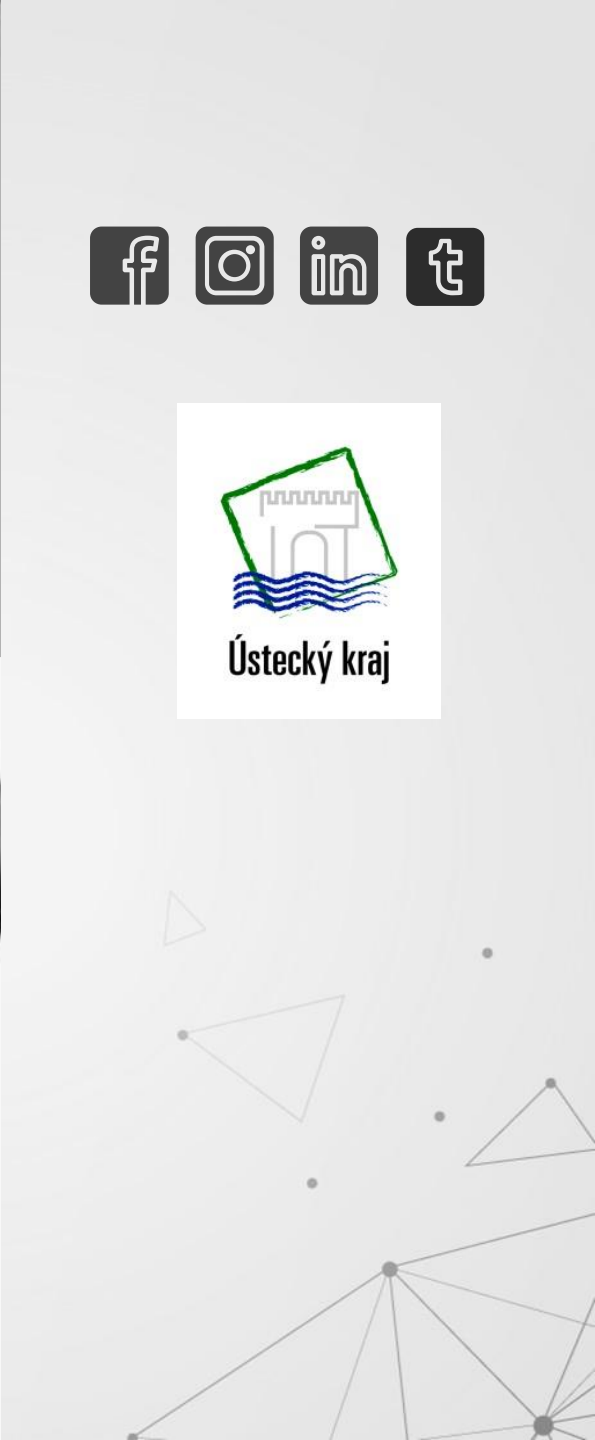
THANKS

Does anyone have any questions?

MARTIN KLIKA

Vice Governor of Ústí Region

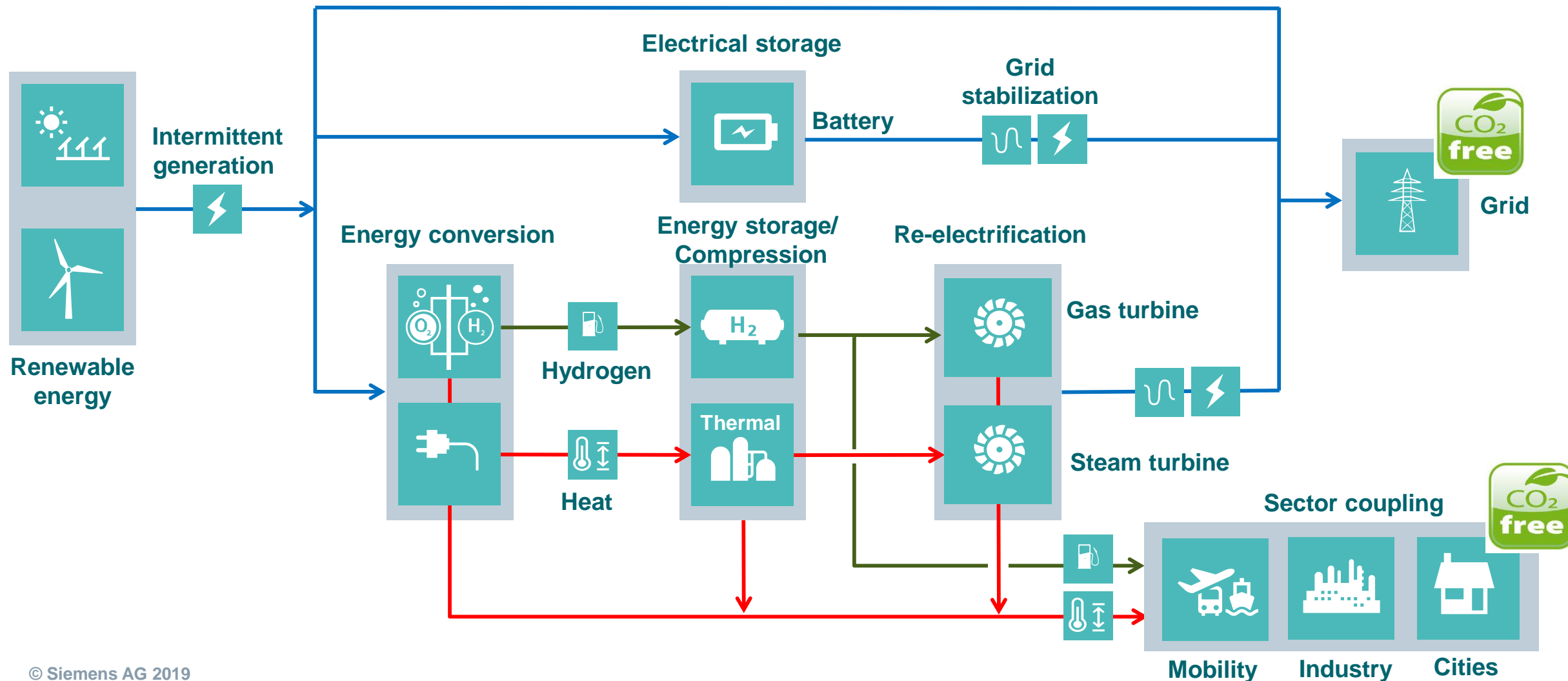
klika.m@kr-ustecky.cz



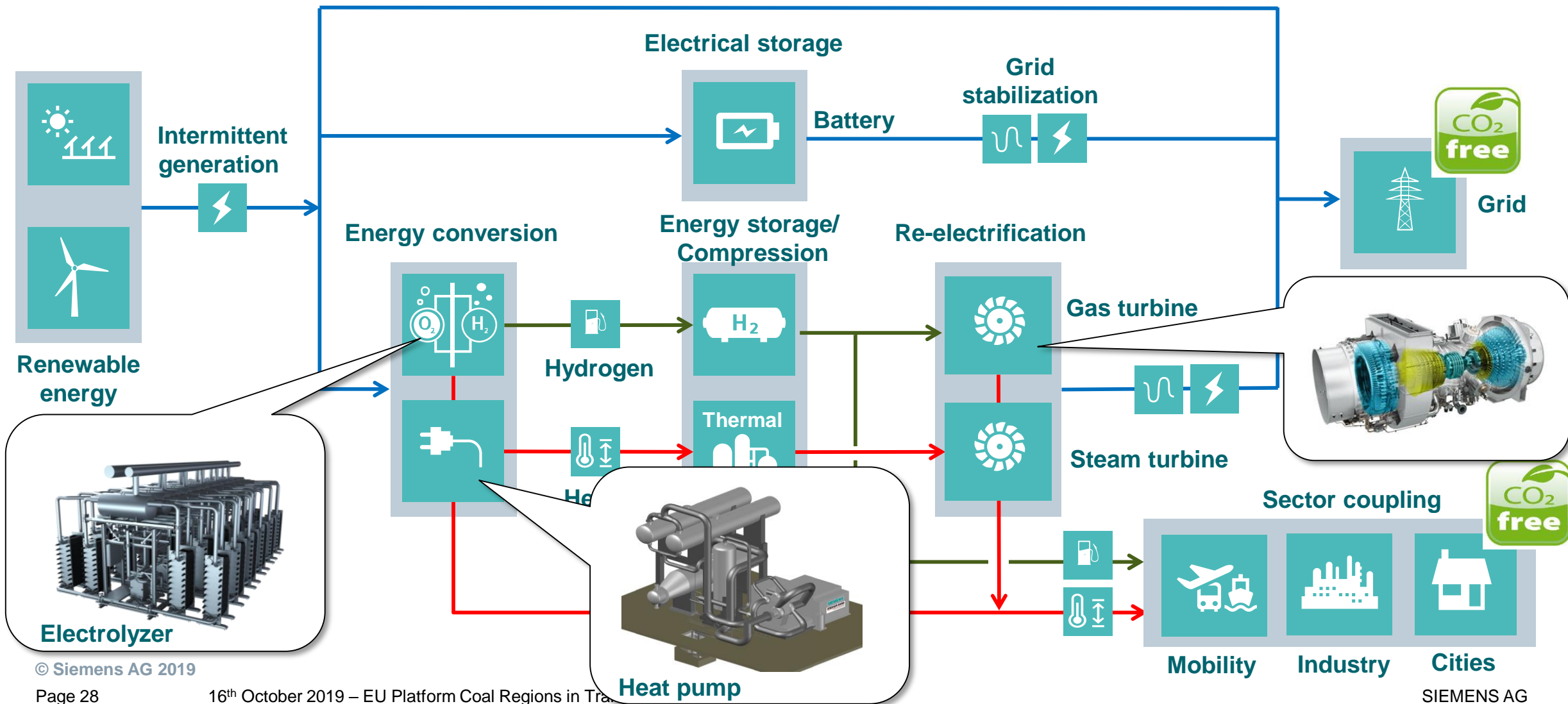
CO₂-free energy supply and mobility at the RWTH Aachen Campus

Dr. T. Neuenhahn

CO₂-free energy supply system



CO₂-free energy supply system



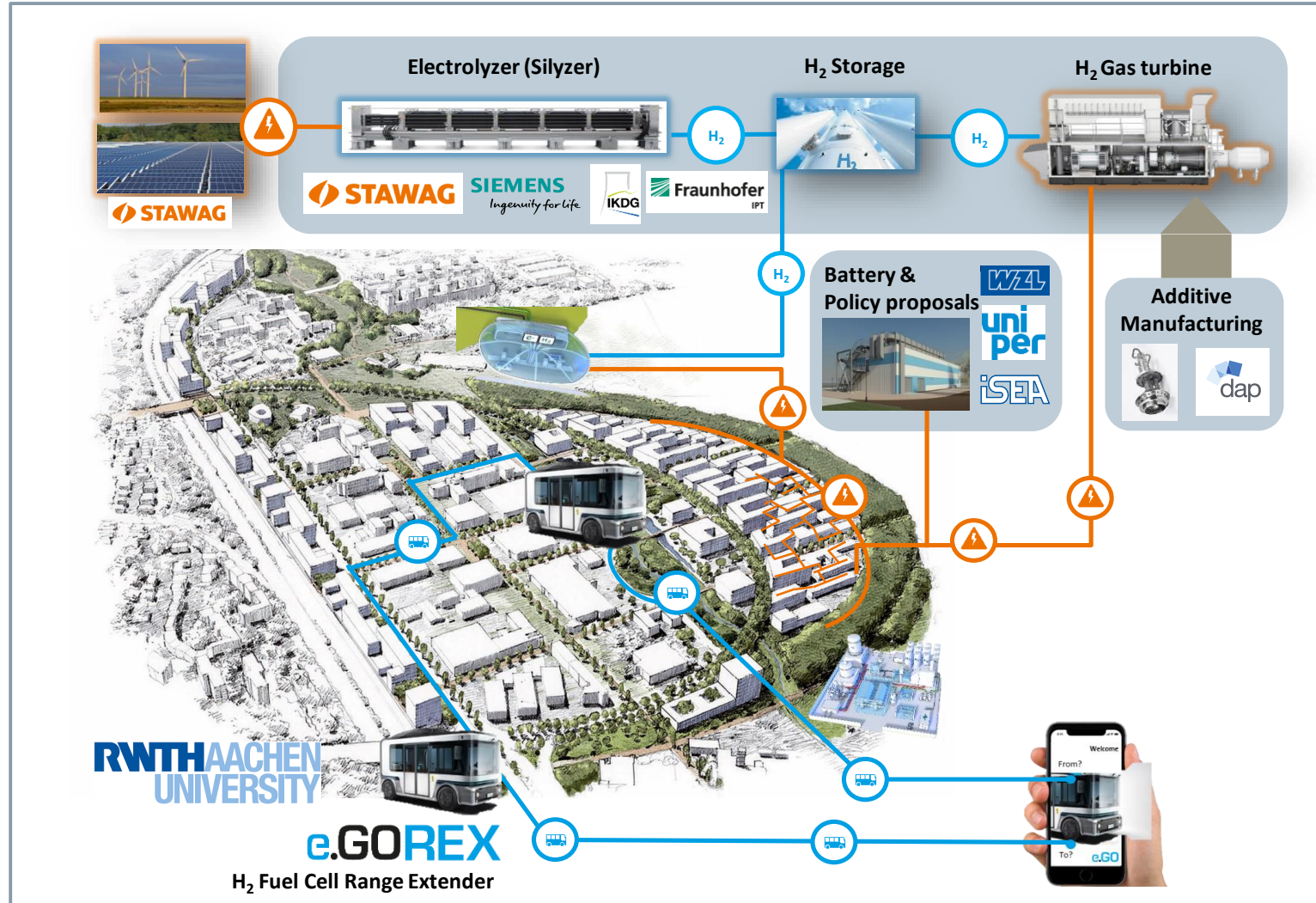
German state government NRW co-funds study for CO₂-free energy supply system

SIEMENS
Ingenuity for life



**Investigation of system for power plant designs:
5-20 MW, 20-100 MW & >100 MW**

Green “Hydrogen Economy” at RWTH Aachen University Campus – “H2-RWTH”



Goals

- Green electricity, heat & mobility
... also during dark doldrums
- Highest efficiency via sector coupling & innovative technologies
- Demonstration plant for
 - Education
 - Research
 - New Business Models
 - Development

Summary

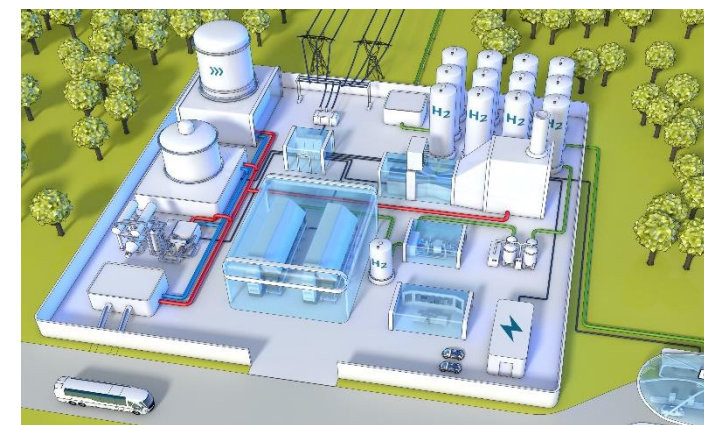
“CO₂-free dispatchable power generation systems”

SIEMENS

Ingenuity for life

Today

- CO₂-free systems: Technically feasible incl. H₂ utilization in GTs
- Main core components: Available
- Public funding programs required for first projects



Outlook

- Roadmap for GW range of electrolysis systems
- Policies for CO₂-free power generation
- Upgrade existing assets as basis for future energy system



Contact page

SIEMENS
Ingenuity for life



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siemens.com



Participation in the Energy Transition of Coal Regions "Coal Platform"



Zbigniew Stępniewski
Management Board Advisor
6th Working Group , 2019

Zespół Elektrowni
„Pątnów-Adamów-Konin” S.A.



PAK

Electricity for you

AK
dla Ciebie

ZE PAK SA Group

Key information



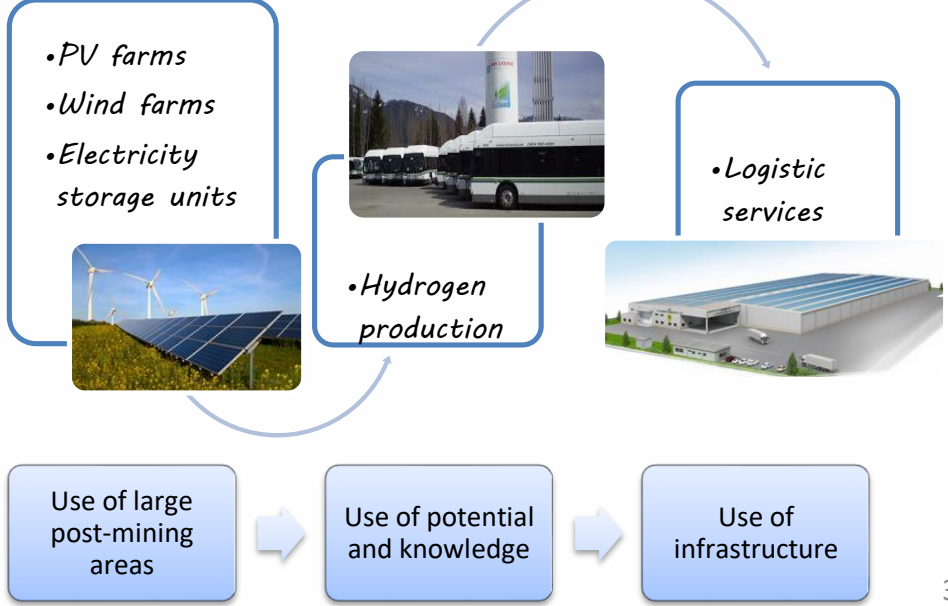
Current conventional areas



ZE PAK SA Capital Group is one of the biggest employers and very important company for Eastern Wielkopolska Region. The Group consists of 3 power plants and lignite mines in Adamów and Konin. The Group generates electricity from lignite and biomass. Apart from the core business, the Group comprises also other companies which perform e.g. construction works, maintenance works, provide services, deal with production and trade.

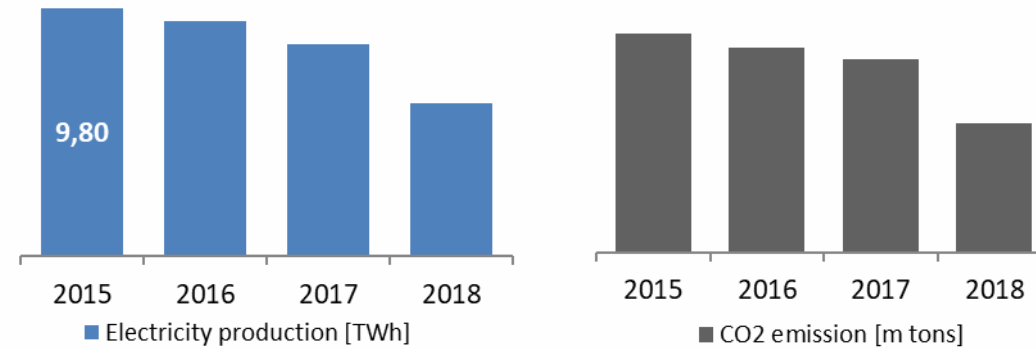
ZE PAK SA is currently and will be in near future a company in transformation. For many decades, the company was focused on lignite deposits, but current plans assume a wide transformation into renewable sources electricity generation technologies. Based on its potential, the company also wants to appear in other areas.

New, planned areas



ZE PAK SA Group overview

4th biggest electricity producer in Poland.
The biggest private electricity producer.



ZE PAK SA Group has a great importance for the whole „Wielkopolska Wschodnia Region”



The biggest employer in Region approx. 5.5 thousand of employees



The biggest tax payer in the Region over €50m of annual payments



Very long history of operation in Region.
In 1953 the first power plant started it's operation.



Large post-mining areas which might be used as locations for renewables

„Development of Konin subregion is at risk due to the anticipated restriction of its main business entity - ZE PAK SA Group. The situation of the Group will turn into a subregion economic slowdown, mainly through the liquidation of well-paid jobs and a decrease in income for municipalities. Foreign experience indicates that reindustrialization may be more effective than a total departure from industry (an example of German Lusatia) and that the concept of Just Transformation may be the basis of strategy for mining regions (the example of Spain).”

Independent Institute for Structural Research – „Coal transformation in Konin Subregion” January, 2019

ZE PAK as a partner in Transformation of Wschodnia Wielkopolska Region



We have been operating mainly in the area of conventional energy so far, however we are aware of the indispensable necessity of the process of energy transformation of Wielkopolska Wschodnia Region and the huge challenges that transformation means to the Region.

We want to be part of this process!

We want to optimally use the potential that we have, the areas we possess, knowledge and experience.



former Gosławice opencast



former Lubstów opencast

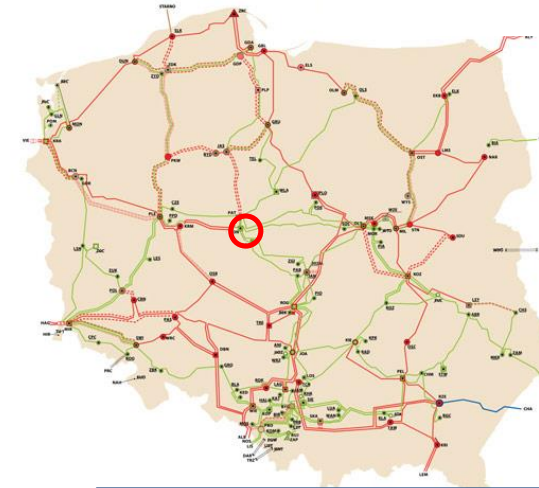


former Władysławów opencast

We have interesting ideas and projects, but they require support of non-commercial financing because their implementation in areas previously exploited in opencast mining usually requires more expenditure than commercial projects carried out in other areas.

What do we want to base on by implementing the planned projects:

- ✓ Central location, extremely important for the National Operator of the Power System
- ✓ Over 7.7 thousand ha of land, in possession, including 1.3 thousand ha of reclaimed land for today, prepared for potential investment
- ✓ GPZ 110 kV power outputs, which in the future may be places for energy outputs from RES
- ✓ Technical infrastructure - buildings, structures, devices
- ✓ Staff of qualified employees
- ✓ Location close to highways and expressways
- ✓ Railway infrastructure - connection to the national railway network



National Power System



highways and expressways system

Projects that are part of the transformation of the Region

1. **Construction of PV farms on reclaimed areas**
2. **Reconstruction of a coal boiler for the exclusive biomass burning unit**
3. **Construction of a thermal energy storage system for the heating needs of the City of Konin**
4. **Construction of wind farms on reclaimed areas**
5. **Construction of an energy storage system at the site of ZE PAK for the needs of RES**
6. **Construction of a logistics center along with the execution of photovoltaic farms on the roofs**
7. **Construction of infrastructure for the production, storage and distribution of hydrogen**

1. Construction of PV farms on reclaimed areas

- use of reclaimed areas (post lignite mining) for photovoltaic installations
- three stages resulting from the gradual completion of the process of land reclamation:
 - I stage, 2019 – 2022, installation of 250 MWp
 - II stage, 2023 – 2024, installation of 150 MWp
 - III stage, 2025-2026, installation of 150 MWp
- the total installed capacity of planned solar farms implemented in three stages reaches 550 MWp



example of PV farm

1. Construction of PV farms on reclaimed areas



- implementation of the Project will allow annual emission reduction of:
 - ✓ about 280 thousand tons of CO₂ in the first stage (total project: 618 thousand tons of CO₂)
 - ✓ about 186 tons of SO₂ in the first stage (total project 410 tons SO₂)
 - ✓ about 315 tons of NO_x in the first stage (the entire project 693 tons of NO_x)
 - ✓ about 29 tons of dust in the first stage (the whole project 63 tons of dust)
 - ✓ about 35 thousand tons of waste in the form of ash in the first stage (total project - 77 thousand tons of ash)

- employment of dismissed workers from the lignite sector

- new, highly qualified positions related to the operation of solar farms

- capacity necessary for the proper work of the grid of the National Power System Operator

2. Reconstruction of a coal boiler for the exclusive biomass burning unit

- ZE PAK is a system heat supplier for the city of Konin. Currently, the city is heated with energy from RES - biomass unit, but in case of its failure or repair, the reserve source is a lignite unit
- the project assumes the reconstruction of one of the functioning boilers for the combustion of lignite - for a boiler for the exclusive combustion of biomass
- the boiler will be adapted to work in fluid technology, which will enable the use of fuels from 100% biomass
- after the reconstruction of the boiler in Konin Power Plant, an additional capacity of 50 MWe (100 MWe total) will be available; the total thermal power of the Konin Power Plant will be about 110MWt
- reconstruction will provide reserve sources of heat supply to the city of Konin exclusively from RES



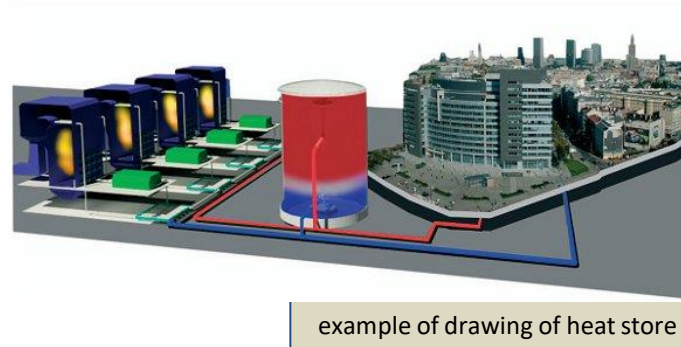
biomass unit in Konin Power Plant

2. Reconstruction of a coal boiler for the exclusive biomass burning unit

- creation of a new unit for electricity and heat generation, RES 100%
- the reconstructed unit will be connected to the National Power System and will support its stability
- installation will meet all requirements for emissions to the environment of pollutants (SO₂, NO_x, dust, etc.), in particular requirements resulting from BAT conclusions (Best Available Techniques)
- emission reduction of:
 - about 444 thousand tons of CO₂
 - about 1 090 tons of SO₂
 - about 474 tons of NO_x
 - about 95 tons of dust
 - more than sevenfold reduction in the amount of ash
- positive impact on the environment and improvement of air quality in Konin
- maintaining workplaces for the employees of Konin Power Plant

3. Construction of a thermal energy storage system for the heating needs of the city of Konin

- increasing the flexibility of the heat source system for the needs of the city of Konin
- heat storage as an integral part of the heating system of Konin Power Plant based on heat produced from the biomass unit



- optimization of the conditions for the production of electricity and heat in cogeneration, in order to be able to use the stored thermal energy in a situation when the demand for it is greatest, and when the production of electricity is the most expensive
- safety buffer for the city of Konin throughout the year, especially in the event of a temporary failure of heat sources

4. Construction of wind farms on reclaimed areas

- use of reclaimed areas for windfarms
- 20 wind turbines with an installed capacity of 3.9 MW each
- total capacity of 2 wind farms will be 78 MW, annual production of approximately 270 GWh



wind farm in reclaimed area

4. Construction of wind farms on reclaimed areas

- annual emission reduction:
 - ✓ about 289 thousand tons of CO₂
 - ✓ about 189 tons of SO₂
 - ✓ about 324 tons of NO_x
 - ✓ about 29,7 tons of dust
 - ✓ about 37 thousand tons of ash

- employment of dismissed workers from the lignite sector for the operation and maintenance of equipment

- new, highly qualified jobs related to the operation of wind farms

- capacity necessary for the proper grid work of the National Power System Operator

5. Construction of an energy storage system at the site of ZE PAK for the needs of RES

- no "controllability" of production from RES (especially wind and solar) as a problem when balancing energy demand and supply
- energy storage systems as stabilizers of the balance between supply and demand for energy from RES
- energy storage also affects generation control in order to maintain network stability and security of supply. With the development of the RES, a careful distribution of energy storage is necessary for the stability of the energy system

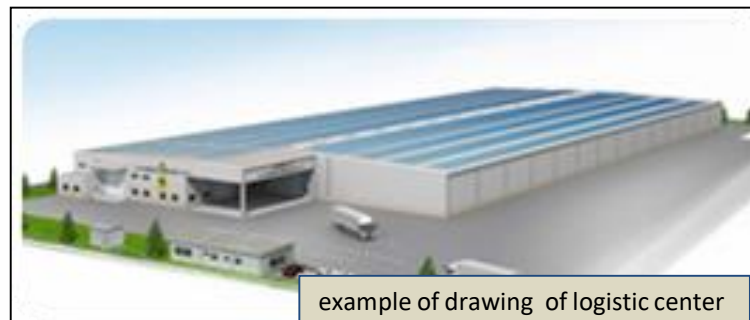


example of the energy storage system

- the project assumes the construction of an energy storage in lithium-ion technology with a nominal power of approx. 15MW and a capacity of approx. 67.5 MWh. The parameters will enable uninterrupted operation of the system with peak power for about 4.5 hours
- energy storage as part of the RES installation (wind farms under project no. 4)

6. Construction of a logistics center along with the execution of photovoltaic farms on the roofs

- the transformation process of the region should also cover areas of the economy that are not directly related to energy production, but should be an incentive for the economic development of the region
- the project implementing the assumed development strategy of the Wielkopolska Wschodnia Region is the construction of the logistics center
- location of the logistics center in village of Warenka, due to the availability of land and proximity to important highways (A1 and A2) and the airport in Łódź. The distance to the A2 highway is only approx. 22 km, the distance to the A1 highway is approx. 90 km, the distance from the airport in Łódź, which also carries cargo, is approx. 85 km
- the project assumes the construction of a high storage hall (or halls) with a usable area of approximately 15 thousand m² equipped with the solar farm on the roofs with a nominal capacity of approx. 1.5 MWp, in order to generate electricity for the needs of the Logistics Center



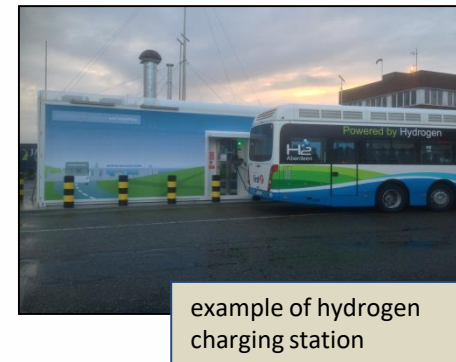
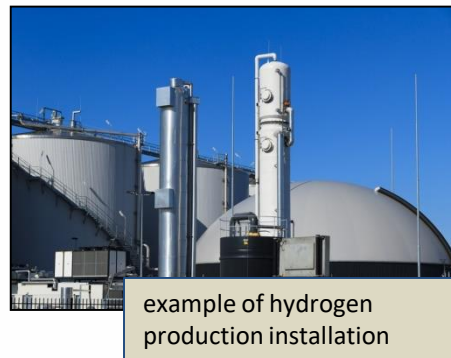
6. Construction of a logistics center along with the execution of photovoltaic farms on the roofs



- a modern facility based on automated management processes with its own power supply, using a photovoltaic farm. Heat recovery systems, recycling, recuperation = lower operating costs
- place of employment of people who, as a result of transformation, will lose their current job, including people with low qualifications, for whom the transformation process will be the most severe
- stimulation of local economic growth
- local residents, finding employment and local government as beneficiaries
- current municipal revenues from mining operations replaced by new donations = maintaining budgets in the scope of tasks implemented by local governments for the needs of the local community
- electricity production from solar panels placed on the roof = reduction of carbon dioxide emissions - 1 680 tons of CO₂
- the project will attract investors from other sectors of the economy, providing logistics and warehousing services and providing access to the infrastructure around the investment, as well as access to clean electricity

7. Construction of infrastructure for the production, storage and distribution of hydrogen

- construction of a hydrogen production plant using the method of water decomposition in electrolytic cells working in PEM proton technology for the needs of car transport
- currently, the lack of hydrogen production and distribution networks is a barrier to the implementation and development of zero-emission transport
- factory with an electricity capacity of 45 MW,
 - several sets of electrolyzers with a total capacity of approximately 9,000 Nm³ / h
 - production of 20 Mg of hydrogen per day
 - power supply from 50 MW biomass unit RES (project 2) and then connected to wind farms after they have been installed in the network
- construction of a hydrogen warehouse with a daily production capacity and a charging station for cars and buses equipped with fuel cells and hydrogen charging stations for cars - tanks for its distribution



7. Construction of infrastructure for the production, storage and distribution of hydrogen

- popularization of the idea of using hydrogen in Poland, in relation to the European project HIT-2-Corridors aims to actively participate in the network of hydrogen charging station developed in the scale of Europe
- "Energy Plus" program co-financing local governments with the purchase of collective transport with low or zero emissions = increasing the chances of success of the transformation of the transport system and the basis for a permanent change in Konin region in terms of reducing emissions and improving air quality
- an incentive to make a decision about the purchase of a hydrogen-based transport vehicle, which has not been considered until now due to the lack of places for refueling
- beneficial influence on the development of the region through the merger with the project implemented by the Provincial Government under the Regional Operational Program for Wielkopolska "Construction of the H2Lab hydrogen application center" and the creation of a center for research and development and application in the hydrogen economy
- generation of electricity for the production of hydrogen in the RES source with a capacity of 50MW from biomass and then wind farms will reduce the CO₂ emission by 70 thousand tons annually eliminating emissions from the combustion of gasoline or diesel oil, using hydrogen

- The implementation of projects will have a significant impact on the changes in Konin Region
- The main postulate of a just transformation of coal regions will be implemented
- Taxes on implemented investments will feed budgets of municipalities and cities in which they will be implemented
- New jobs will be created in RES sector and others
- There will be a demand for new highly specialized competences, training market for new qualifications will develop
- Development of new technologies and innovative solutions in the field of energy production and storage from RES

- The implementation of all projects will significantly affect climate change by reducing CO₂ emissions by approx. 1.4 million tons
- The air quality in the Region will improve by reducing emissions SO₂, NO_x and dust
- Improvement of the environment by reducing emissions will have a positive impact on the health and life of the Region's inhabitants
- It will be possible to start zero-emission transport - especially collective transport, by setting up a hydrogen refueling station
- The implementation of projects will positively affect the awareness of the Region's inhabitants regarding the need for changes in the field of energy production due to climate change



Coal Regions in Transition Platform

17.10.2019

Polish Mining Group:

The opportunities of transition

Polish Mining Group – key facts

30
MLN

Extraction volume

Of coal with the amount of coking coal

8

Hard coal mines

And also 5 specialized organizational units constituting a wide production and service base for the entire mining sector.

42
thousands

Employees

The company and its environment generate up to 200,000 jobs, being the employment leader in the region.

1,6
mld

Operational coal resources

Including 230 million tons of potential for acquiring new operative coal resources

Polish Mining Group – Value of chain

Knowledge and technology



- **781 MPLN** for the purchase of investment goods and the rental of machines
- **3,5 thous.** providers

Human capital



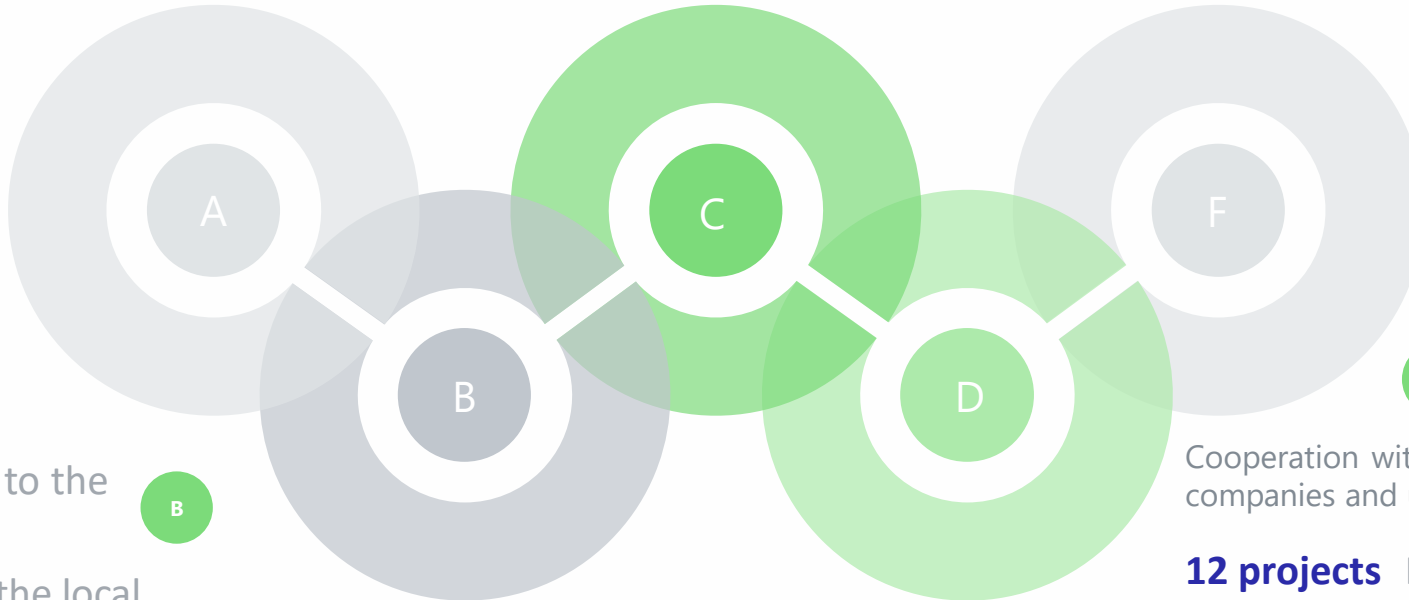
- **200 thousand** workplaces for the region
- about **50%** higher salaries than average in Silesia



Infrastructure

Excellent location in the center of the Upper Silesian Industrial District with real estate and plots of land to be used for investment zones

2 000 ha of lands
1 million m² area of real estate



Taxes and fees

- **3,1 billions PLN** payments to the central budget
- **171,3 MPLN** payments to the local budgets



Cooperation

Cooperation with research units, leading production companies and universities

12 projects R&D

Science, technical thought and engineering knowledge are the main indicator of the region's and society's development. That is why PGG is looking for the new development areas that will complement core business.

Projects



Strategic areas

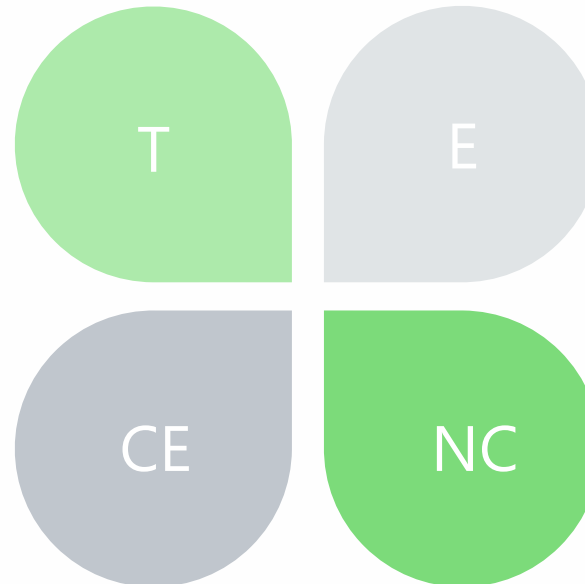
The development of new, technologically advanced business lines requires the development of knowledge and competence. In Polska Grupa Górnicza, we create scientific and expert communities in the areas in which we plan to develop. Low-carbon energy and renewable energy, the circular economy and modern industrial technologies are areas in which we plan to develop and build construction offices and knowledge centers.

Industrial technologies

Development of the automation and robotization sector using IT solutions

Circular economy

Development of the raw materials reuse sector as well as the alternative use of waste and solid fuels



Energy

Development of the high-efficiency heating sector, Renewable Energy Sources and its storage

New competences

Creation of a passive building - a laboratory using the energy resources of mining areas

Strategic area:
Energy



Strategic area - energy

Polska Grupa Górnicza has experience in the management of generating units as part of the functioning heat and power plant in Rybnik.

At the same time, competences are being built within the Photovoltaic Project Team, which initiated the assembly of PV installations on the roofs of the Company's facilities.



Energy

Development of the high-efficiency heating sector, Renewable Energy Sources and its storage

Competitive advantages:

- Location in the most developed area of the country with high energy needs
- Experience in energy asset management
- A team of highly competent engineers and energy engineers
- Experience in implementing renewable energy projects in post-industrial areas

Construction of PV farms

Areas of closed mines, together with their buildings, have been identified as potential places for PV installations.

Large areas and roof installations are ideal to generate green energy linked to the power system through internal networks belonging to the Company.



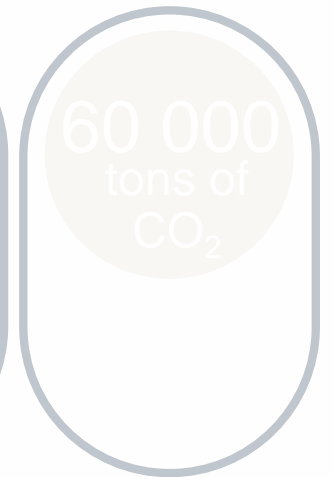
Localisation

area of PGG S.A



Goal

generating green energy
development of unused
potential of non-productive
areas



Effects

Peak power possible
to install
on buildings, heaps

Reduction of emissions

Construction of photovoltaic farms in Upper Silesia

410 kWp of photovoltaic power was installed on the roofs of 9 buildings of the Halemba mine, which will provide about 390 MWh of electricity.

The energy produced was enough to cover the needs of 177 single-family homes





Strategic area:

Industrial technologies



Strategic area: Industrial technologies

The implementation and development of technologies for the effective use of available materials, robotization of production lines as well as process automation are at the heart of the development of high-performance and effective production lines as well as metal processing. Which flexibility in the programming of the production process will enable meeting the needs of the railway, energy and building markets.

T

Industrial technologies

Development of the automation and robotization sector using IT solutions

Competitive advantages:

Experience in the development of a welding plant

High needs within the company allowing to obtain an internal market

Possession of real estate for use in new production plants

Development of the Welding Plant

1

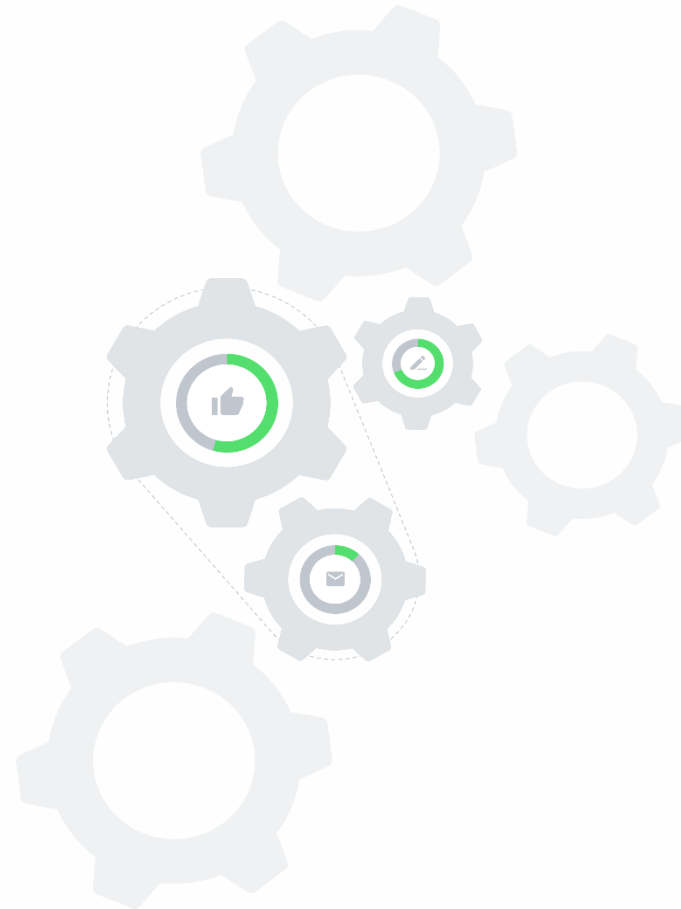
I stage 2018-2021

Expansion of the machine park and development of employees' competences

2

II stage 2020-2023

Diversification of operations and development of new sales markets





New competences

Creation of a passive plus energy building is planned, which will constitute a research laboratory for the possibility of using the energy resources of mining areas.

The facility will be supplied with heat energy from heat pumps with lower heat exchangers located in mining seams, a photovoltaic installation on the facade, as well as using treated mine water and methane cogeneration engines.



New competences

Creation of a passive building - a laboratory using the energy resources of mining areas

Conclusions



In achieving the objectives of the EU climate policy, an important role is played by the projects of the clean technologies sector, research and development works as well as development of investment areas of liquidated mines in the way that it can be used for new industries.

*Polish Mining Group has a **vision, knowledge and experience** how to lead Europe's largest mining company through the energy transition process to ensure the development of the region and reduce the impoverishment of the inhabitants.*



Thank you for your attention

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