WORLD BANK LAND CONFERENCE 2024

WORLD BANK GROUP

Application and results of land repurposing in Kosovo

Erdoan Zasella, Manager of RES at KEK J.S.C.

05/15/2024

KEK J.S.C. and Kosovo - current situation

Kosovo Energy Corporation – KEK J.S.C. is Kosovo's largest coal mining and electricity generation company.

As a publicly-owned company, KEK operates with following capacities:

- ***Thermal Power Plant - Kosova A***, with three generation units (A-3, A-4, and A-5) with an estimated net capacity of 405 MW.
- ***Thermal Power Plant - Kosova B***, with two generation units (B-1 and B-2) with a net capacity of 520 MW for electrical energy and an additional 140 MW for thermal energy generation, used for residential heating.
- ***The Coal Production Division (CPD),*** ensuring planned coal generation and maintaining ample reserves to supply both Power Plants.

Current installed capacity in Kosovo

Fuel	Name	Year of commissioning	Installed capacity, MW	Available capacity, MW
Lignite	Kosovo A3	1970	200	135
	Kosovo A4	1971	200	135
	Kosovo A5	1975	210	135
	Kosovo B1	1983	339	260
	Kosovo B2	1984	339	260
Wind		-	137	-
Hydro		-	110-132	-
PV		-	10	-
Biomass		-	1.2	-
Total		-	1546 - 1568	-

The Kosovo Energy Strategy 2022-2031

STRATEGIC OBJECTIVE: DECARBONIZATION AND PROMOTING RENEWABLE ENERGY

The new Kosovo Energy Strategy 2022-2031 envisions a gradual phase-out of coal, with scaling up of solar and wind power generation.

In the power sector, the most important instruments to diversify the generation mix will be investments in renewable energy sources and gradually phasing out lignite-based generation. New RES capacities, with existing and innovative technologies, will gradually replace the use of coal, achieving coal phase-out by 2050 at the latest.

Ambitious targets have been set on renewable energy sources, reaching a total of 1300 MW installed PV+Wind capacity by 2031:

PV capacity [MW]: from **10MW in 2022**, to **710MW in 2031**
Wind capacity [MW]: from **137MW in 2022**, to **737MW in 2031**

KEK – future plans

Planning the coal transition ahead of time is critical to guarantee security of supply;

For KEK, a suitable starting point for engagement is the assessment of repurposing and development options for idle mining lands and assets already decommissioned or idle (such as ash deposits, mined out areas, coal gasification & fertilizer plant etc.), as this allows their reintegration into productive uses, creating economic activities, jobs and renewable energy production, while the mines continue to operate but prepare for gradual phase out.

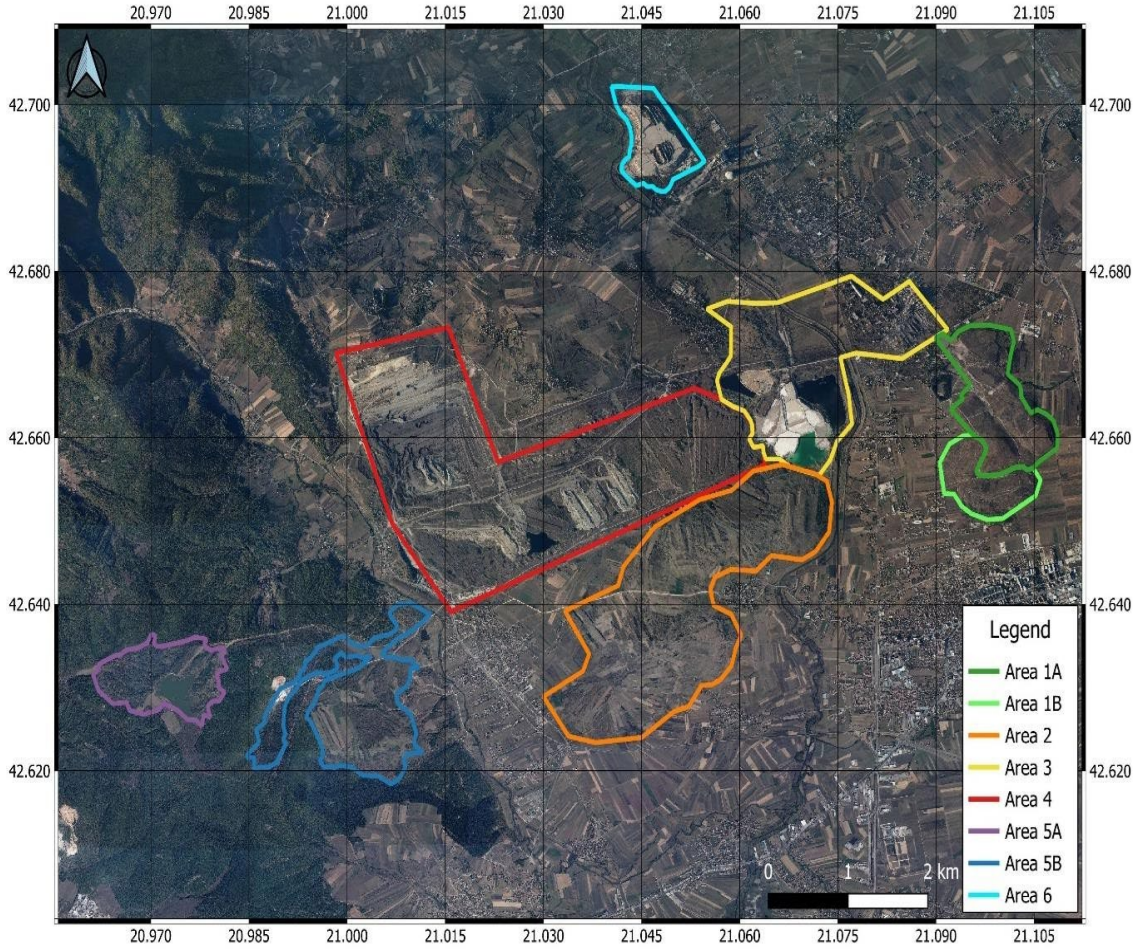
Last year, KEK in corporation with the World Bank has finished Land Repurposing Assessment for the KEK's lands.

In this project were analyzed around 2600 hectares of land owned by KEK including former ash dumps, overburden dumps, mined pits etc.

LURA Repurposing assessment for the KEK's lands

Implementation of LURA was undertaken in six (6) functional areas located within the KEK mine concession as part of the World Bank Technical Assistance. These total about 26 km2, are defined as follows:

- Former ash dump Kosova A (1A) and Dragodan outside overburden dump (1B) with a ground surface area of ~2.4 km2
- South outside overburden dump (2) ~ 6.13 km2
- Liquid fly ash deposition, municipal waste landfill, overburden dump Palaj and gasification plant area (3) ~ 4.09 km2
- Bardh and Mirash mined-out open pits, and currently active Sibovc coal mine (4) ~ 9.48 km2
- Former outside overburden dumps Vasileva (5A) and Kalaja (5B) ~ 3.24 km2
- Kosova B Ash Dump (6) ~0,93km2

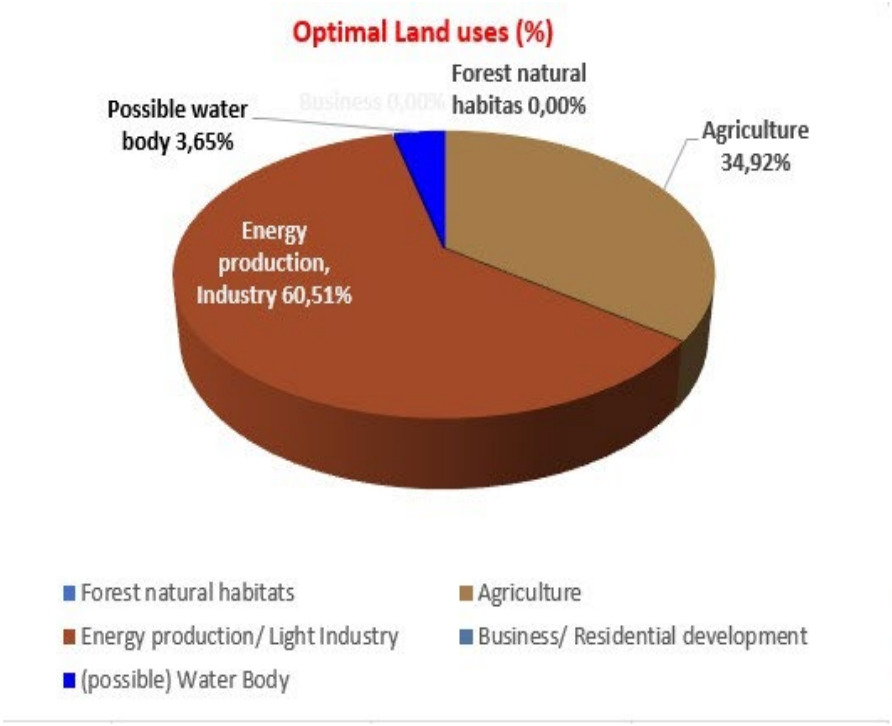


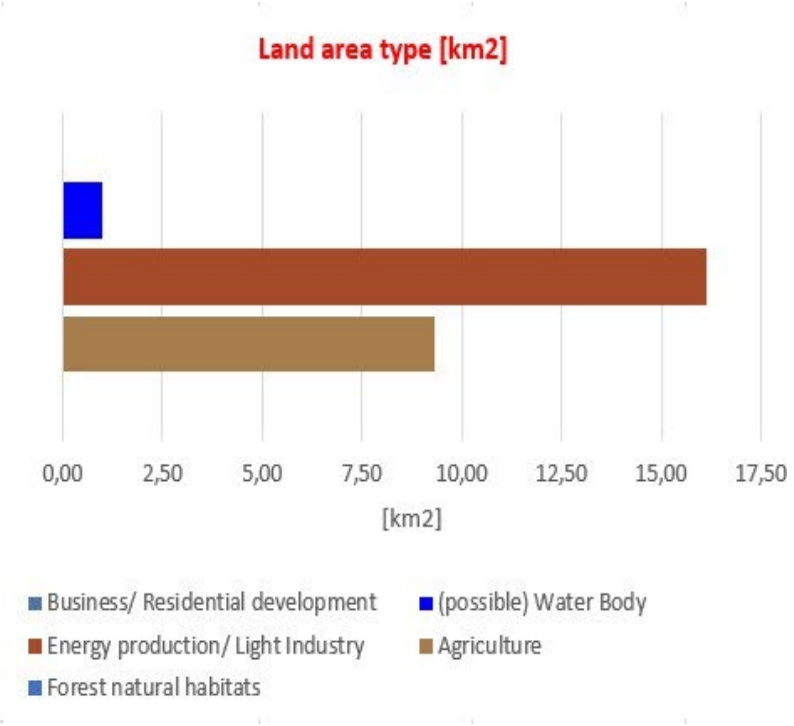
Functional areas of mining and post mining lands for LURA assessment (Base Map: KEK Orthophoto Images)

Output: Land Utilization Zones, Percentages and Area Sizes

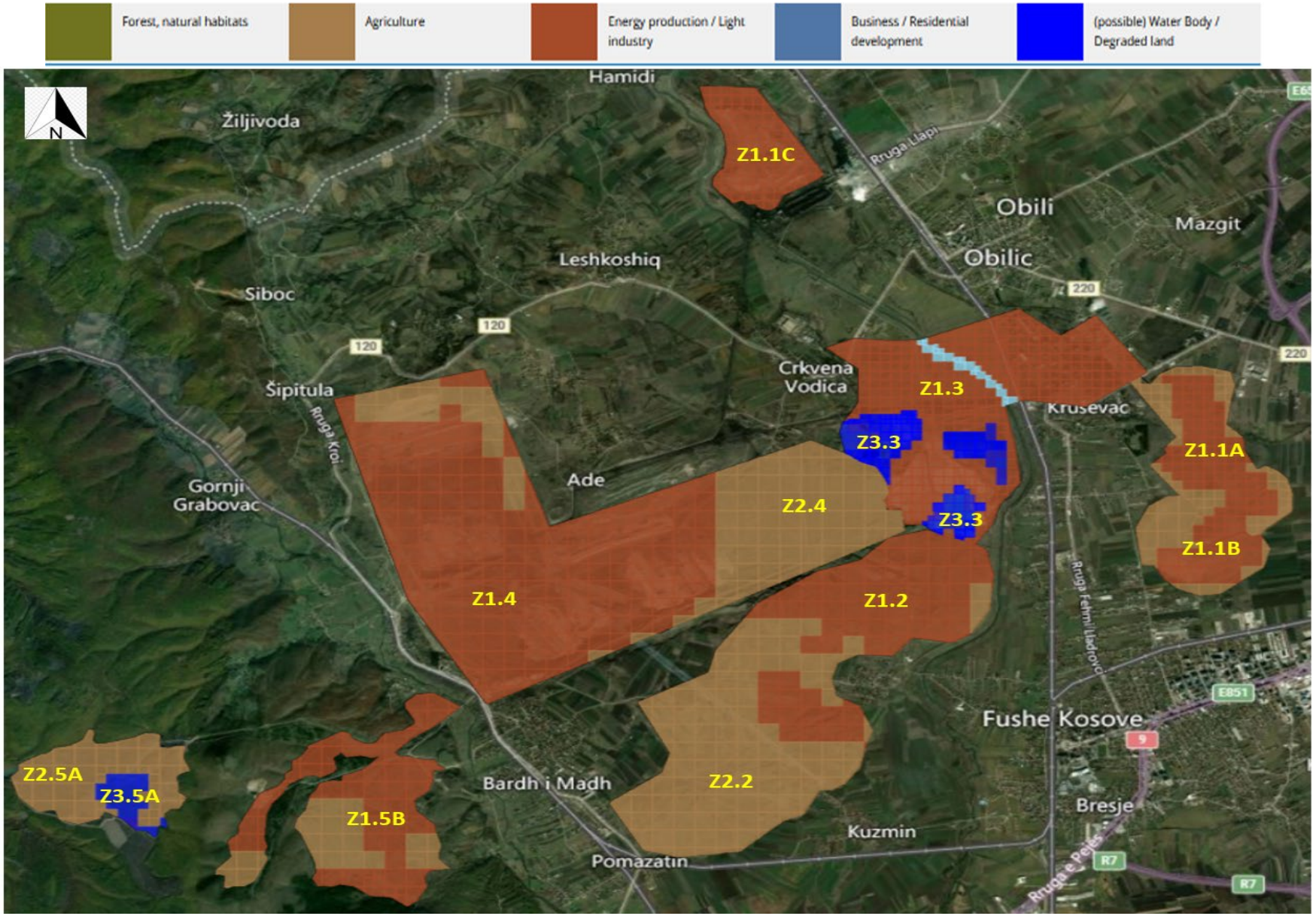
The **overall main land repurposing options** for the KEK mining complex are:

- **energy production and light industry**(60.51%);
- **agriculture**(34.92%);
- the remaining area is currently covered by the possible **water bodies** (3.65%).



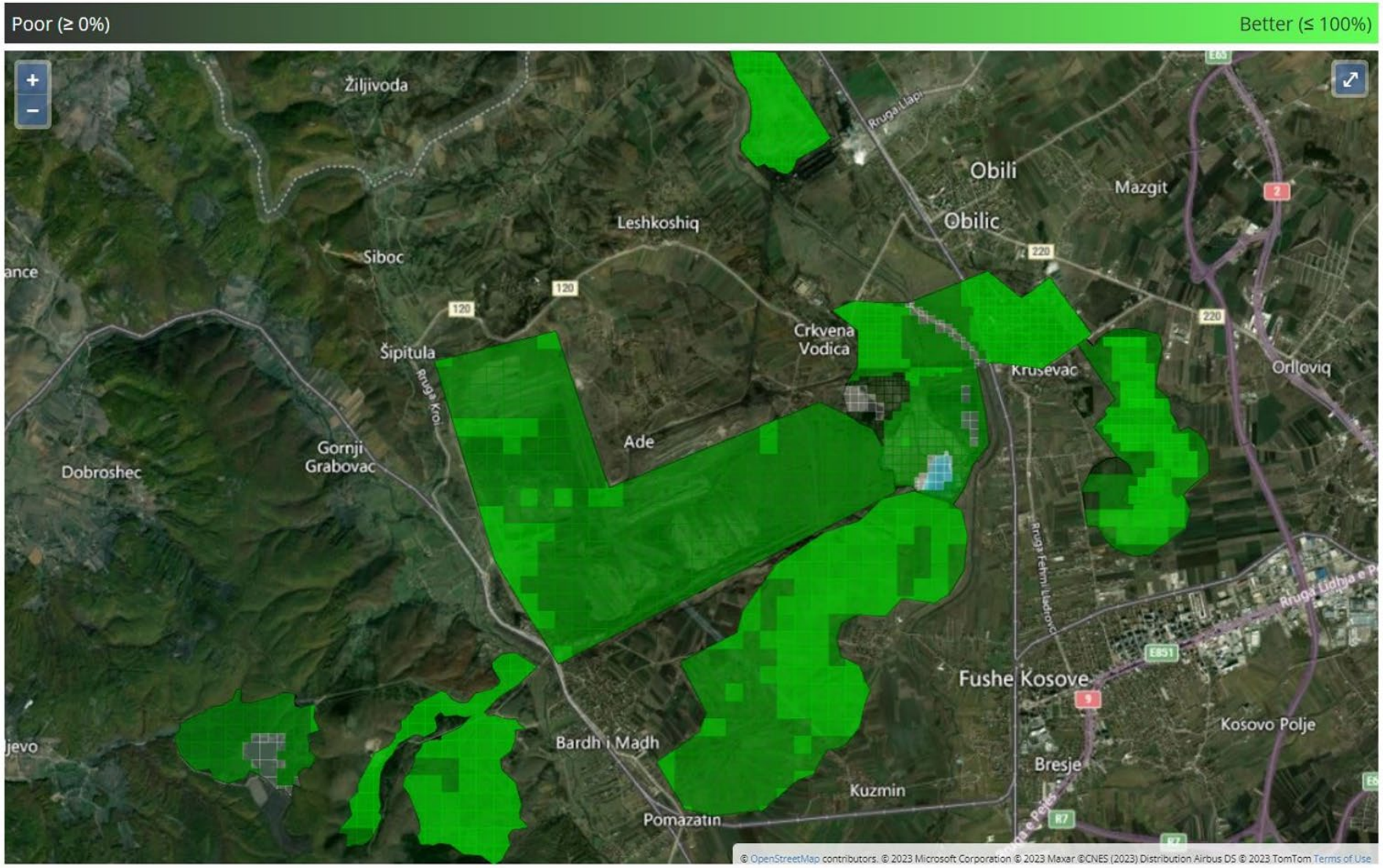


Output: Land Utilization Zones, Percentages and Area Sizes



Proposed land repurposing map of the KEK mine lands, based on optimized matching of properties and utilization scenarios.

Output: Land Utilization Zones, Percentages and Area Sizes



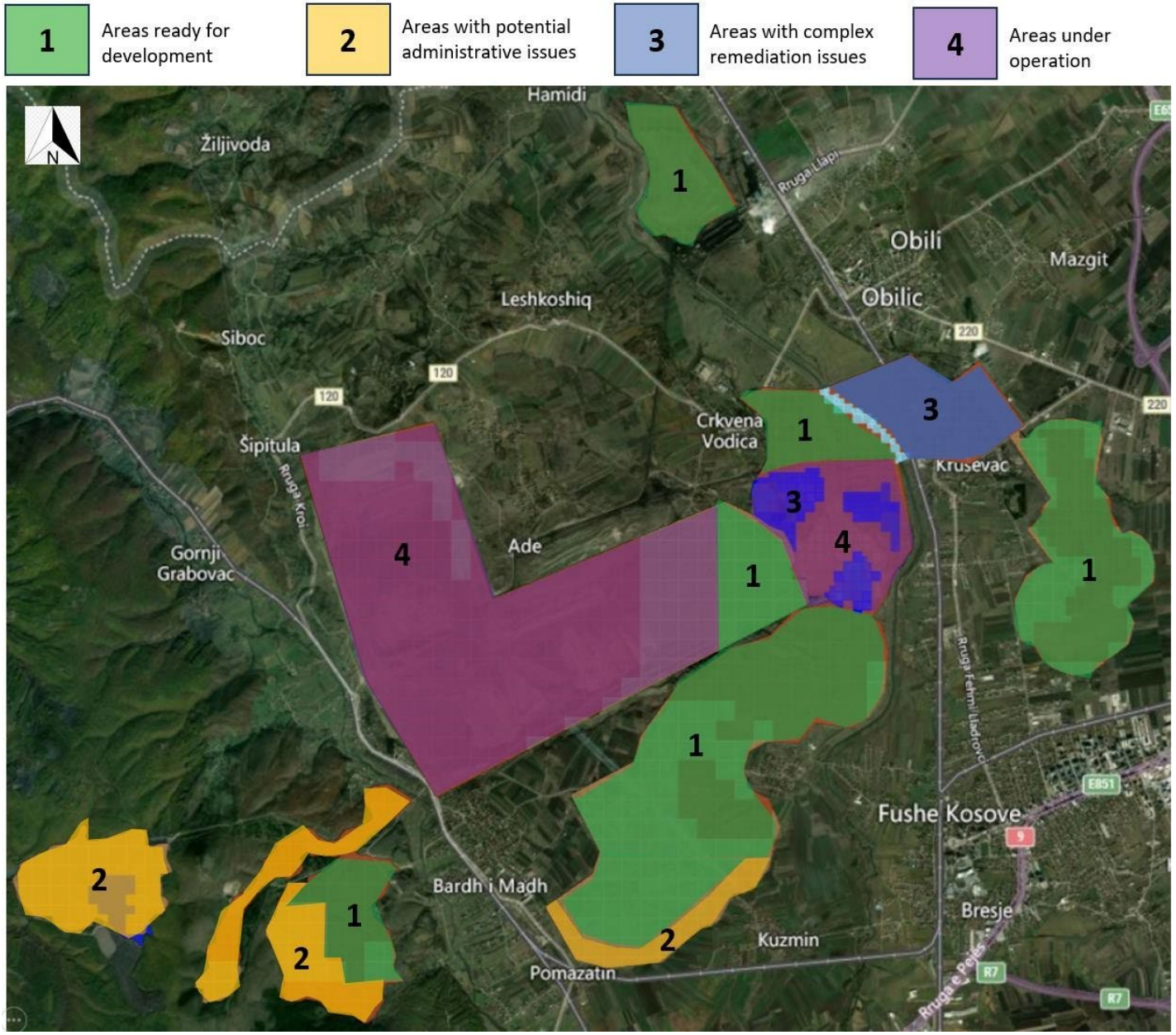
Land use suitability map for **RE / light industry scenario** (incl. PV)

Brighter shades of green indicate better suitability, while darker shades indicate less favorable conditions. Note that most lands in the KEK concession are highly suitable to moderately suitable.

Output: Land Utilization Zones, Percentages and Area Sizes

Prepare a **sequencing of investment areas** according to their readiness:

1. Areas ready for development: available now for (almost) immediate repurposing;
2. Areas with potential administrative issues;
3. Areas with complex remediation issues: in principle available for repurposing, but may have complex “technical barriers” to overcome before investment ready;
4. Areas under operation: will become available only after current operations have concluded;



Areas “ready for development”

Ash dump Kosovo A (~240ha)

Remediated ash dump; of the total area, 153 ha are already reserved for the KfW photovoltaic project 100MW.

Area 4 Western mine Sector (60ha)

Decommissioned from mining operations, no indication of additional overburden deposition.

Area 2 (~240ha) – South overburden dump

Without or with minor encroachment, will need some negotiations with informal users, potential land swapping could resolve issues quickly.

Area 5B (~100ha) – Vasileva dump

Sectors suitable for PV and with minor / no encroachment; the polygon has 150 ha but contains some areas with current informal uses.

Area 3 Palaj dump (~60ha)

Eastern Sector (North of Municipal Waste Dump).

Kosovo B ash dump; (~45ha)

Due to exposition about half of total area (ca. 90 ha) is deemed suitable for PV.

Proposed Next Steps

- **Share, discuss and verify results from the LURA assessment with key stakeholders** involved in lignite mining, energy production, environmental management, spatial planning.
- **Review and discuss LURA outputs in conjunction with other plans** (e.g. environmental assessments, solar power assessments, urban development plans etc.).
- Identify areas with a **need for additional, more detailed assessments, e.g. (strategic) environmental assessments**; (pre)feasibility studies for PV, wind, PSPs; geotechnical investigations; decontamination plans etc.
- **Use outputs from LURA as inputs and supporting information to future spatial planning** efforts for the various sectors and sites within the mining lands.

✓ Municipality of Fushë Kosova has involved the results from the LURA assessment in their ***Municipal Spatial and Development Plan*** 2023-2031, and

✓ Municipality of Obiliq has involved the results in their ***Municipal Zonal Map*** 2023-2031.

Next Steps – Ongoing Effort for Asset Repurposing

- ✓ At the **ash dump Kosova A**, covering an area of 153 hectares, KEK and KfW are implementing a **PV project with a capacity of 100MW.**

- ✓ At the selected area of **South overburden Dump**, identified in the LURA assessment as suitable for development, covering approximately 240 hectares, KEK intends to prepare a **detailed feasibility study** for a **200MW PV project**.

- ✓ KEK is currently in the discussion phase with the World Bank to proceed with **a feasibility study** for the development of a **solar district heating plant** near the **Municipality of Fushe Kosova.**

- ✓ The World Bank has identified a **potential site for a PSP**, on or near KEK lands based on the LURA assessment. The next step in the assessment process involves preparing a **pre-feasibility study** to determine the actual potential of the site for the PSP.

Potential for Asset Repurposing

Besides the mentioned plans in preview slide, **additional opportunities** exist for repurposing assets on the KEK concession:

1) TPPs to synchronous condensers;
2) Kosovo A site housing large scale battery storage;
3) TPPs to waste-to-energy plant (could be combined with district heating); combined with a waste management / processing plant;
4) Explore other opportunities, e.g. logistics center, commercial / business parks;

Thank you!

WORLD BANK LAND CONFERENCE

WORLD BANK GROUP

Brownfields to Green Energy: how land repurposing can support climate action and a Just Transition for All

WELCOME!

PART ONE: SETTING THE SCENE

- Demand for land and the energy transition
- Introduction to land repurposing and the LURA tool

PART TWO: REPURPOSING IN PRACTICE

- Live demonstration
- Results of land repurposing in Kosovo

PART THREE: BRINGING IT ALL TOGETHER

- Reflections
- Discussion and Q&A
- Wrap up and final messages

PART I

Setting the Scene

Speakers:

- Justine Sylvester, Land Tenure Specialist, World Bank
- Wolfhart Pohl, Lead Specialist, Environment & Geosciences, World Bank

How it all started…

1. **Building on** 11 coal closure investment projects (over $3 billion USD) in the 1990s and 2000s in Poland, Romania, Russia, and Ukraine.
2. **Comprehensive review and additional studies** from 2019; paradigm shift from closure to transition
3. **Retrospective assessment** of unaddressed, negative long-term environmental and social impacts
4. **Additional Studies** on coal mine closure and regional transition in China, Netherlands, UK and USA
5. **New approach developed** that promotes a comprehensive coal transition framework putting people and communities at the center and high emphasis on governance and environmental remediation and lands repurposing.

The Coal Transition Framework (3x3 Matrix)

Shaping a National Vision for Coal Phasedown

	Institutional Governance	People and communities	Repurposing Land & Assets
Initiate dialogue **Phase 1** Pre-closure planning **18 months**	• Strengthen laws, policies and regulations relevant to coal industry transition • Build vision and strategies for coal industry transition through an inclusive stakeholder engagement	• Assess labor profiles, user-needs and current social protection programs • Develop a pre-layoff plan, including income support, active labor market policies and institutional capacity building • Appraisal of social sustainability outcomes	• Identify and assess land and assets to be closed and decommissioned • Prepare for reclamation and repurposing • Assess environmental remediation costs • Community engagement in repurposing process
Phase 2 Coal mine closure **3+ years**	• Develop institutional structures for implementing closure and repurposing • Coordinate closure and decommissioning activities between government agencies and firms	• Provide social assistance to workers and communities • Active labor market policies for workforce transition, including re-skilling, education and incentives	• Develop and apply health, safety and environment (HSE) and technical standards for closure and decommissioning • Apply careful monitoring mechanism for environmental legacy issues
Phase 3 Coal region transition **10+ years**	• Coordinate transition implementation through institutional arrangements • Manage funding sources and budgetary support	• Provide longer term re-skilling and education to help preparing workers for future jobs • Locally-led participatory planning and development investments for regional economic development	• Environmental remediation of land/assets • Re-permitting and re-purposing land/assets to sustain regional transformation • Mobilize private investment through public-private partnership

How Can Post-Mining Lands Look?

Mined out area used as overburden deposit
Brod Mine in North Macedonia

Freshly deposited external overburden dump, TPP in the background
Kardia Mine, West Macedonia, Greece

(1) High-capacity transport infrastructure in Libiaz, Poland

(2) Co-located Thermal Power Plant in Kardia, Greece

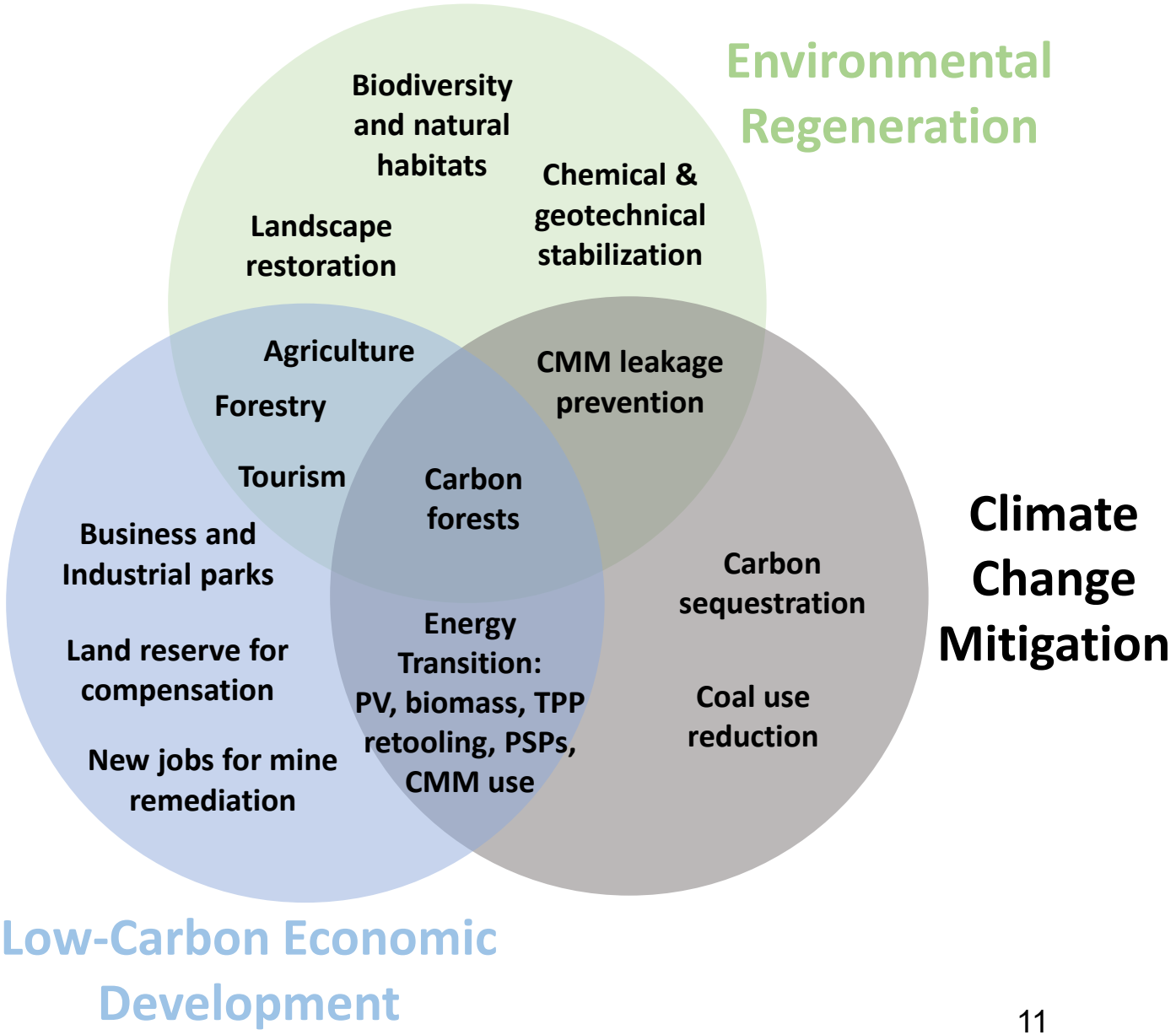
(1) Leachate salt emanations in Libiaz, Poland

(2) Fly-ash deposits in Gacko, Bosnia-Herzegovina

Residual pits and waste rock deposits
Piparwar Mine in Jharkhand, India

Objective of lands repurposing:

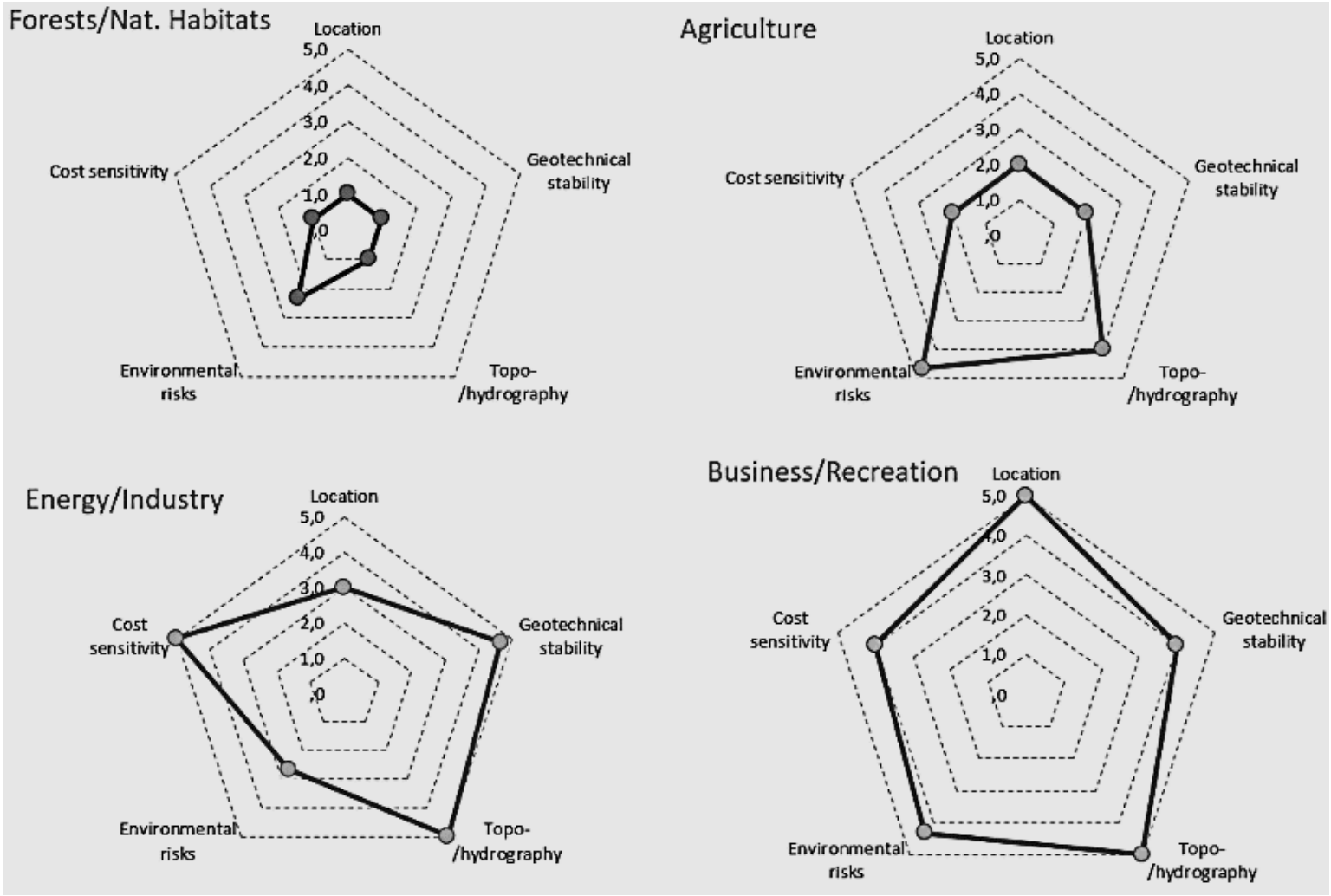
"To enable the restoration of degraded lands **for productive uses**, and thus **provide sufficient space** to replace energy production and jobs lost due to coal transition, while enhancing environmental quality, fostering livable communities and **avoiding unnecessary consumption of green space**."



Defining a Classification Model

Land Classification Criteria:

- **Geotechnical properties**: settlements, slope stability, erosion potential, collapses, sinkholes, surface subsidence
- **Topography and hydrography**: flooding, water logging, groundwater rise
- **Environmental risks**: soil chemistry, residual contaminations, ambient pollution, methane emissions
- **Location**: distance from urban / economic centers, transport infrastructure and energy grids
- **Cost sensitivity / added value**: how much would repurposing cost, what is the potential value gain.



Typical scores for various utilization scenarios

LURA Core Team

- Helen Ba Thanh Nguyen
- Wolfhart Pohl
- Michael Stanley
- Justine Sylvester
- Vaishnavi Honap
- Chrysanthos and Nikolaos Steiakakis (Geosysta Ltd.)
- Dr. Peadar Davis (Consultant Chartered Surveyor)

Above: Post-mining land before reclamation and repurposing.

PART II

Repurposing in Practice

Speakers:

- Nikos Steiakakis, Software Developer & Co-Founder, Geosysta Ltd
- Erdoan Zasella, Manager of RES, KEK J.S.C

Quick facts about LURA

- Web based application for Land Use Rating and Reporting
- Accessible with a web browser wherever an internet connection is available, using a pc/laptop, tablet or smartphone.
- Designed to be user friendly and easy to use, no prior training required!
- Enables collaboration and information dissemination regarding Land Repurposing and Utilization

Brief history of LURA…

- Development started in 2019 with the production of a *Coal Transition Road Map for the Kozani Coal Region, Western Macedonia, Greece* and has been in continuous development ever since.

- LURA has already been used for projects in 7 countries

- Demo version is available and free to use

LURA Demonstration

- Project Creation and Area Definition
- Land Rating process
- Land Use Reports and Applicability Maps
- Land Valuation
- Usability features of the application

Enough with the Powerpoints…

... let’s see a live demo of the application…!

Thank you!

Free demo version available, talk to us if interested…

KEK J.S.C. and Kosovo - current situation

Kosovo Energy Corporation – KEK J.S.C. is Kosovo's largest coal mining and electricity generation company. KEK operates with two Thermal Power Plants (TPP) and the Coal Production Division (CPD).

In 2024, KEK aims to achieve an annual electricity generation of approximately 5.6 TWh (gross) and aims to produce around 9 million tons of lignite (coal).

KEK has workforce of 3,316 people, with

- 574 working at TPP Kosova A
- 465 at TPP Kosova B
- 2023 at CPD

Fuel	Name	Year of commissioning	Installed capacity, MW	Available capacity, MW
Lignite	Kosovo A3	1970	200	135
	Kosovo A4	1971	200	135
	Kosovo A5	1975	210	135
	Kosovo B1	1983	339	260
	Kosovo B2	1984	339	260
Wind		-	137	-
Hydro		-	110-132	-
PV		-	10	-
Biomass		-	1.2	-
Total		-	1546 - 1568	-

Current installed capacity in Kosovo

The Kosovo Energy Strategy (2022-2031)

STRATEGIC OBJECTIVE: DECARBONIZATION AND PROMOTING RENEWABLE ENERGY

The new **Kosovo Energy Strategy 2022-2031** envisions a gradual phase-out of coal, with scaling up of solar and wind power generation.

- New RES capacities, with existing and innovative technologies, will gradually replace the use of coal, achieving coal phase-out by 2050 at the latest.

- Ambitious targets have been set on renewable energy sources, reaching a total of 1300 MW installed PV+Wind capacity by 2031:
  - PV capacity [MW]: from **10MW in 2022**, to **710MW in 2031**
  - Wind capacity [MW]: from **137MW in 2022**, to **737MW in 2031**

KEK's Future Plans

Planning the coal transition ahead of time is critical to guarantee security of supply.

For KEK, a suitable starting point for engagement is the **assessment of repurposing and development options for post-mining lands and assets** already decommissioned or idle (such as ash deposits, mined out areas, coal gasification & fertilizer plant etc.).

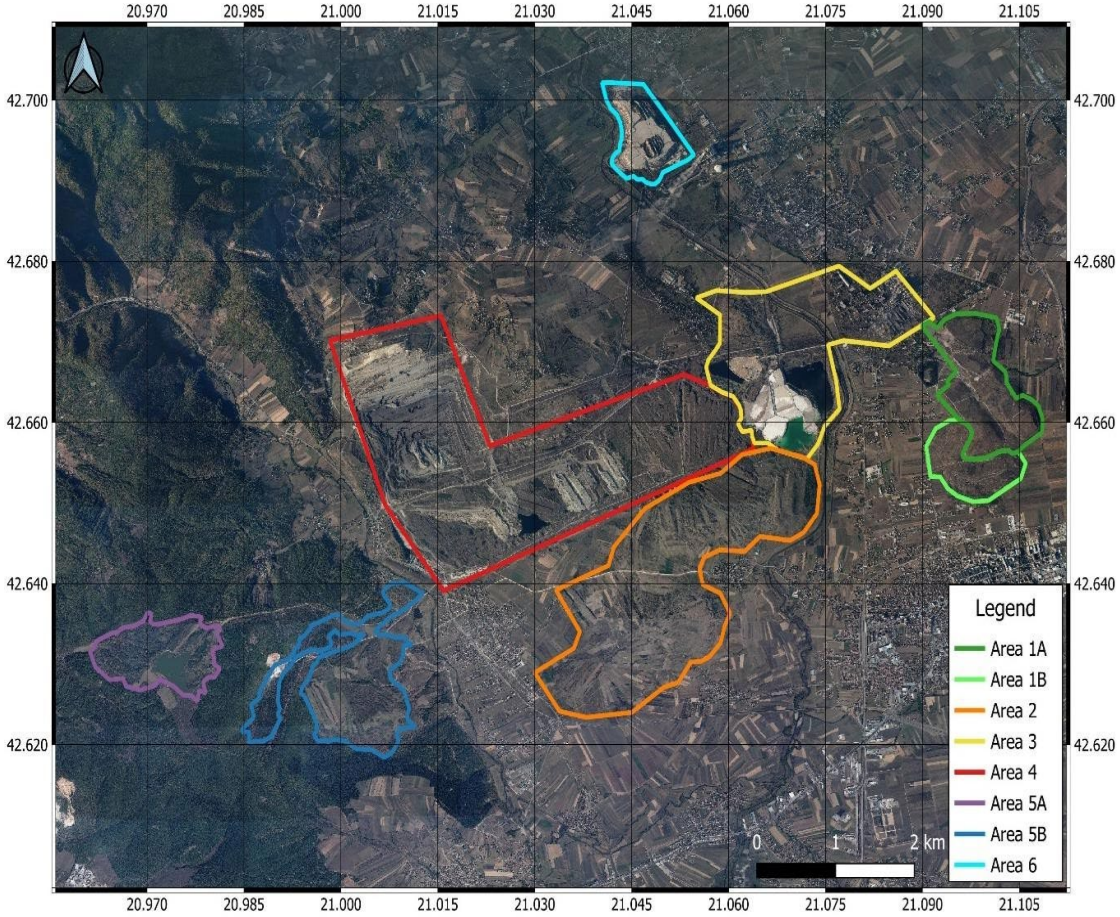
Last year, KEK in cooperation with the World Bank finished the Land Repurposing Assessment for the KEK's lands.

In this project, around **2600 hectares of land owned by KEK** were analyzed including former ash dumps, overburden dumps, mined pits etc.

LURA Repurposing assessment for KEK's lands

Implementation of LURA was undertaken in six functional areas located within the KEK mine concession.
These total about 26 km2:

- Former ash dump Kosova A (1A) and Dragodan outside overburden dump (1B) ~2.4 km2
- South outside overburden dump (2) ~ 6.13 km2
- Liquid fly ash deposition, municipal waste landfill, overburden dump Palaj and gasification plant area (3) ~ 4.09 km2
- Bardh and Mirash mined-out open pits, and currently active Sibovc coal mine (4) ~ 9.48 km2
- Former outside overburden dumps Vasileva (5A) and Kalaja (5B) ~ 3.24 km2
- Kosova B Ash Dump (6) ~0,93km2

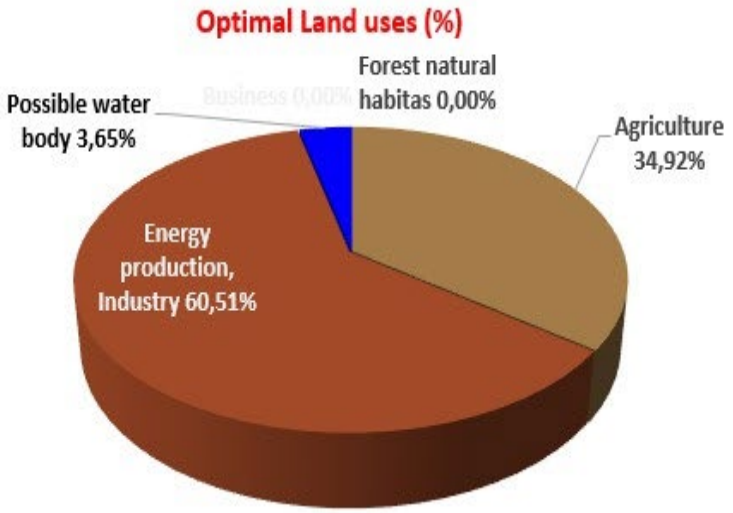


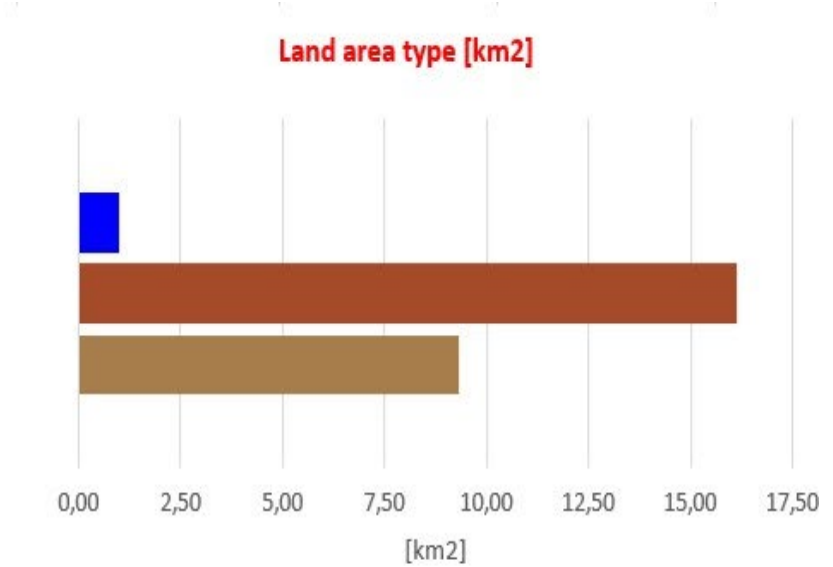
Functional areas of mining and post mining lands for LURA assessment (Base Map: KEK Orthophoto Images)

Results of the assessment

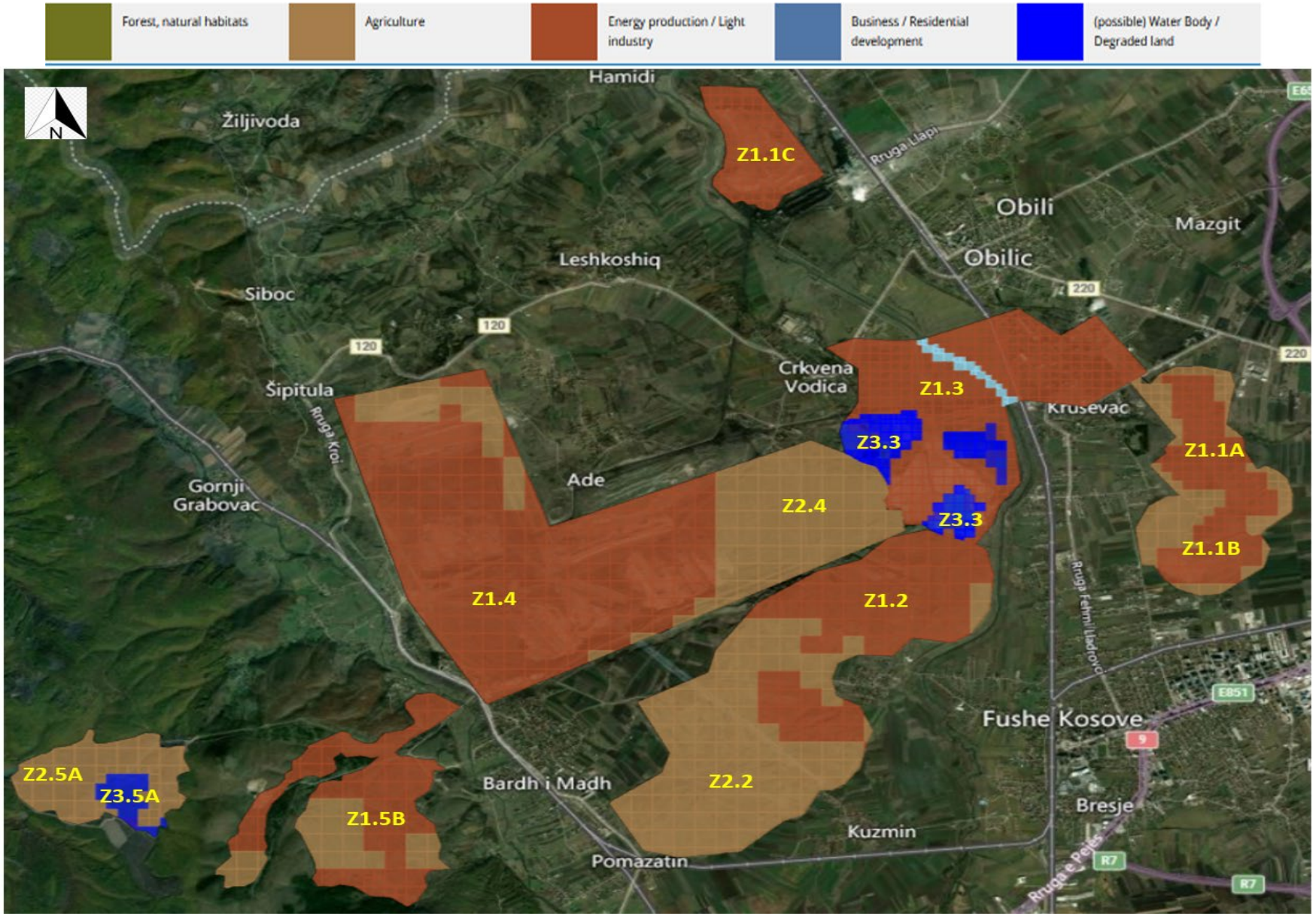
The **overall main land repurposing options** for the KEK mining complex are:

- **energy production and light industry**(60.51%);
- **agriculture**(34.92%);
- the remaining area is currently covered by the possible **water bodies** (3.65%).



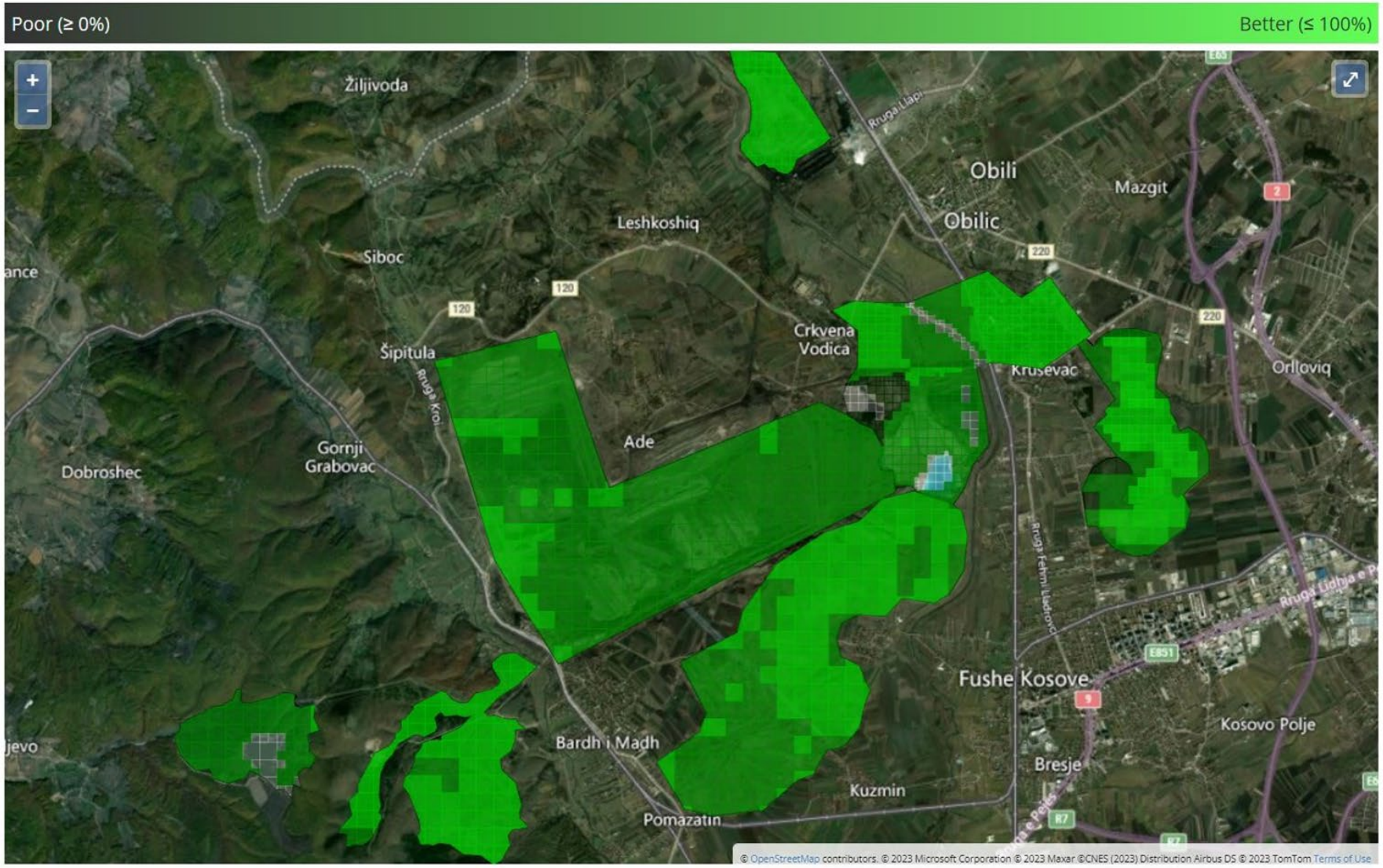


Results of the assessment



Proposed land repurposing map of the KEK mine lands, based on optimized matching of properties and utilization scenarios.

Results of the assessment



Land use suitability map for **RE / light industry scenario** (incl. PV)

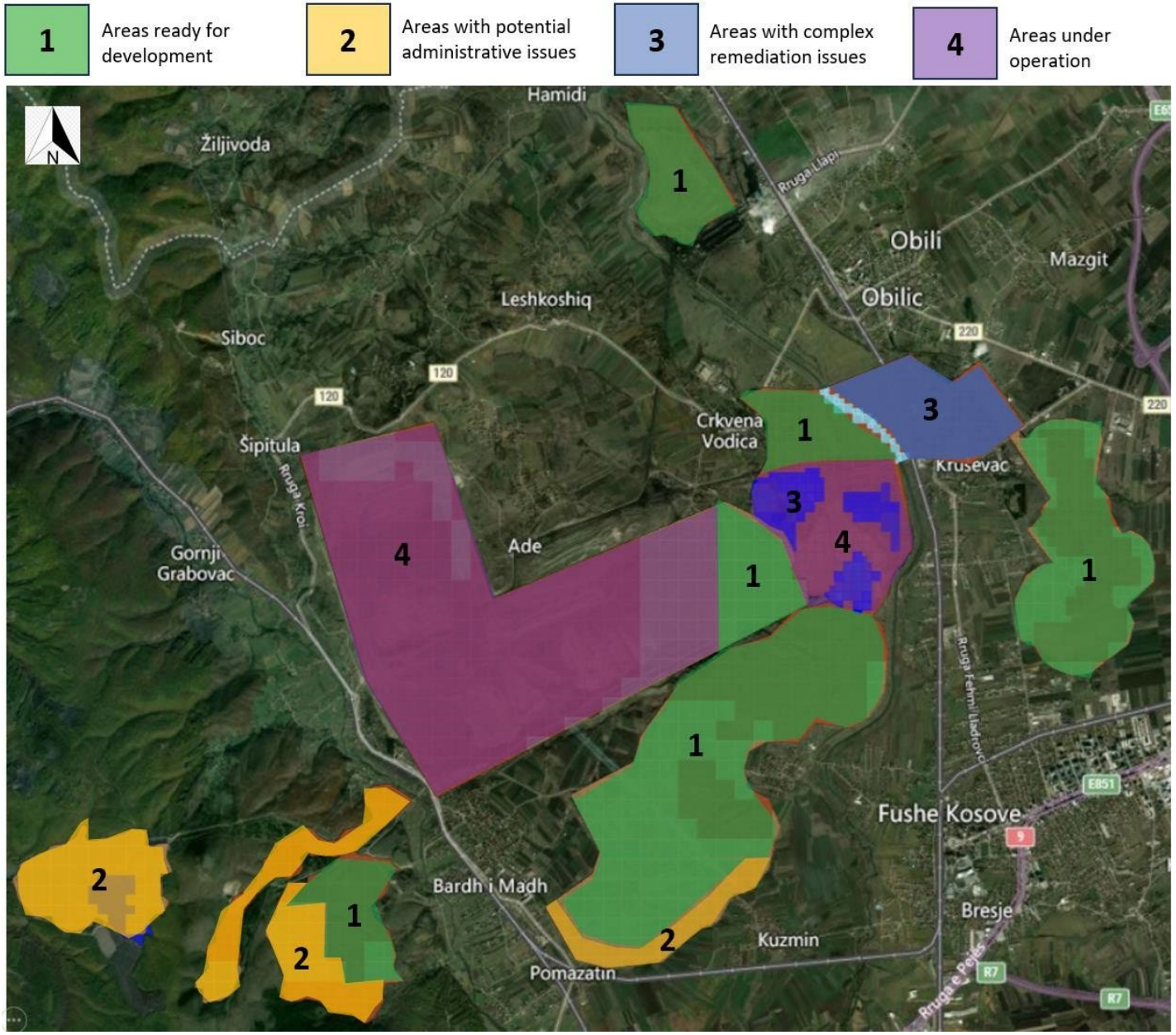
Brighter shades of green indicate better suitability, while darker shades indicate less favorable conditions.

Note that most lands in the KEK concession are highly suitable to moderately suitable.

Results of the assessment

Prepare a **sequencing of investment areas** according to their readiness:

1. Areas ready for development: available now for immediate repurposing;
2. Areas with potential administrative issues;
3. Areas with complex remediation issues: may have complex “technical barriers” to overcome before investment ready;
4. Areas under operation: will become available only after current operations have concluded;



Areas “ready for development”

Ash dump Kosovo A (~240ha)

Remediated ash dump; of the total area, 153 ha are already reserved for the KfW photovoltaic project 100MW.

Area 2 (~240ha) – South overburden dump

Without or with minor encroachment, will need some negotiations with informal users, potential land swapping could resolve issues quickly.

Area 3 Palaj dump (~60ha)

Eastern Sector (North of Municipal Waste Dump).

Area 4 Western mine Sector (60ha)

Decommissioned from mining operations, no indication of additional overburden deposition.

Area 5B (~100ha) – Vasileva dump

Sectors suitable for PV and with minor / no encroachment; the polygon has 150 ha but contains some areas with current informal uses.

Kosovo B ash dump; (~45ha)

Due to exposition about half of total area (ca. 90 ha) is deemed suitable for PV.

Proposed Next Steps

- **Share, discuss and verify results from the LURA assessment with key stakeholders** involved in lignite mining, energy production, environmental management, spatial planning.
- **Review and discuss LURA outputs in conjunction with other plans** (e.g. environmental assessments, solar power assessments, urban development plans etc.).
- Identify areas with a **need for additional, more detailed assessments, e.g. (strategic) environmental assessments**; (pre)feasibility studies for PV, wind, PSPs; geotechnical investigations; decontamination plans etc.
- **Use outputs from LURA as inputs and supporting information to future spatial planning** efforts for the various sectors and sites within the mining lands.

✓ Municipality of Fushë Kosova has involved the results from the LURA assessment in their ***Municipal Spatial and Development Plan*** 2023-2031, and

✓ Municipality of Obiliq has involved the results in their ***Municipal Zonal Map*** 2023-2031.

Next Steps – Ongoing Efforts for Asset Repurposing

- ✓ At the **ash dump Kosova A**, covering an area of 153 hectares, KEK and KfW are implementing a **PV project with a capacity of 100MW.**

- ✓ At the selected area of **South overburden Dump**, identified in the LURA assessment as suitable for development, covering approximately 240 hectares, KEK intends to prepare a **detailed feasibility study** for a **200MW PV project**.

- ✓ KEK is currently in the discussion phase with the World Bank to proceed with **a feasibility study** for the development of a **solar district heating plant** near the **Municipality of Fushe Kosova.**

- ✓ The World Bank has identified a **potential site for a PSP**, on or near KEK lands based on the LURA assessment. The next step in the assessment process involves preparing a **pre-feasibility study** to determine the actual potential of the site for the PSP.

Potential for Asset Repurposing

Besides the mentioned plans in preview slide, **additional opportunities** exist for repurposing assets on the KEK concession:

1) TPPs to synchronous condensers;
2) Kosovo A site housing large scale battery storage;
3) TPPs to waste-to-energy plant (could be combined with district heating); combined with a waste management / processing plant;
4) Explore other opportunities, e.g. logistics center, commercial / business parks.

Thank you!

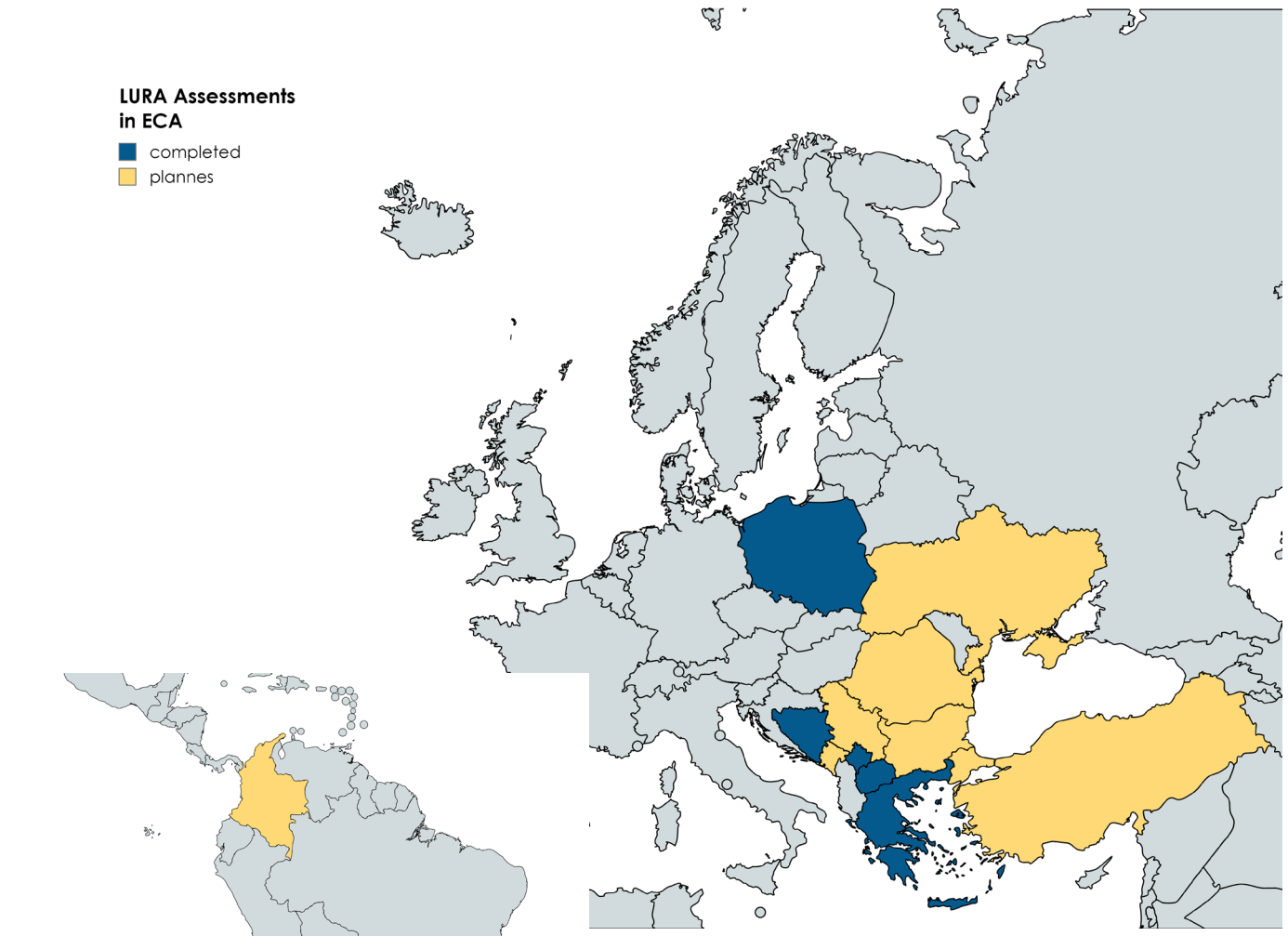
PART III

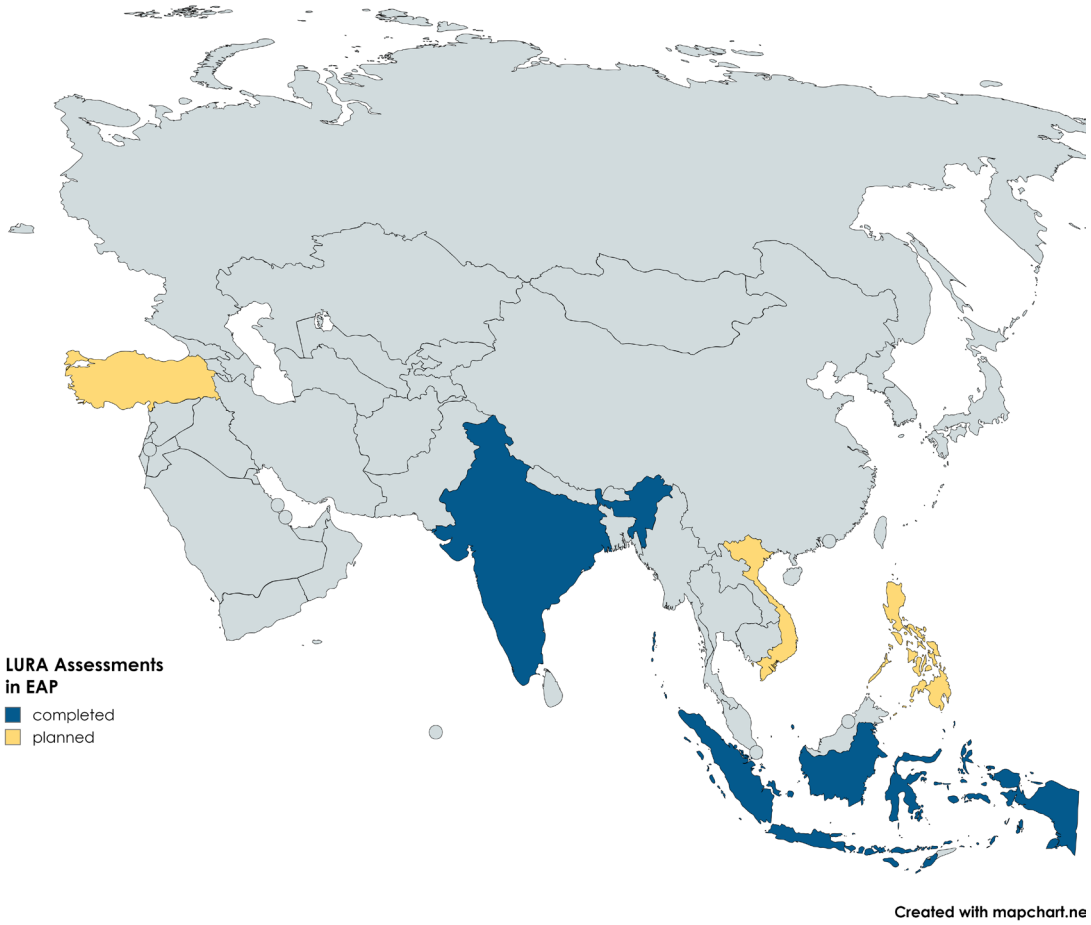
Bringing it all Together

Discussant:

- Victoria Stanley, Senior Land Administration Specialist, World Bank

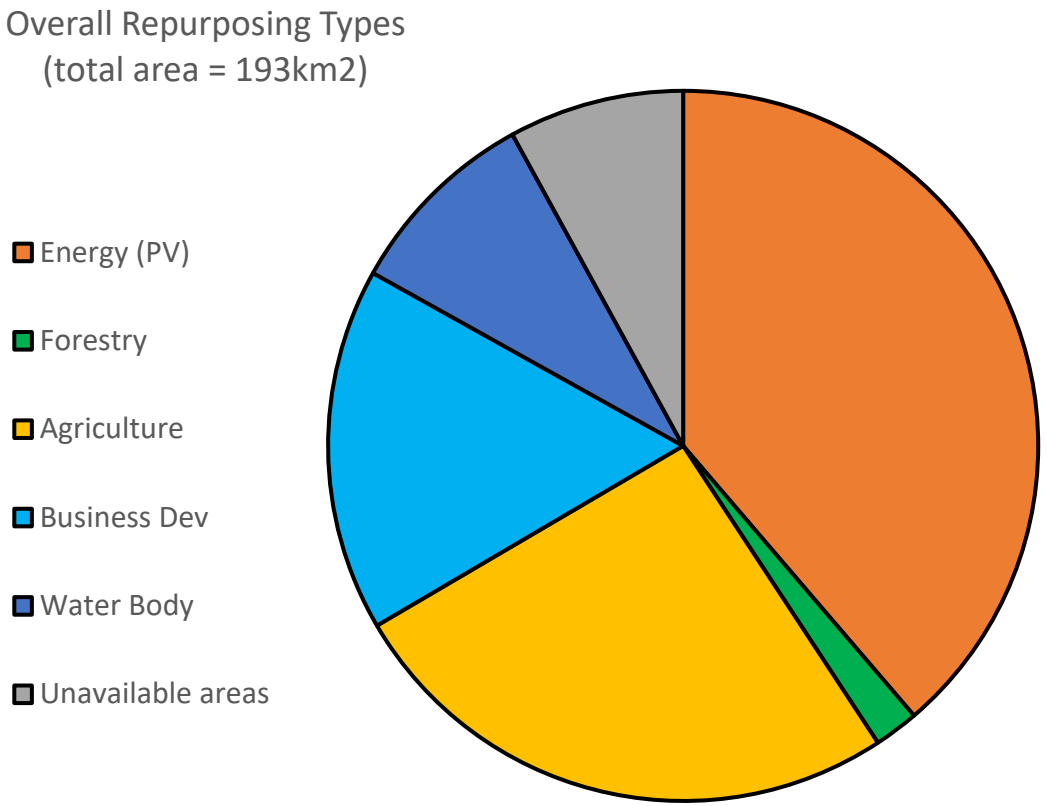
+ Question time for the panelists

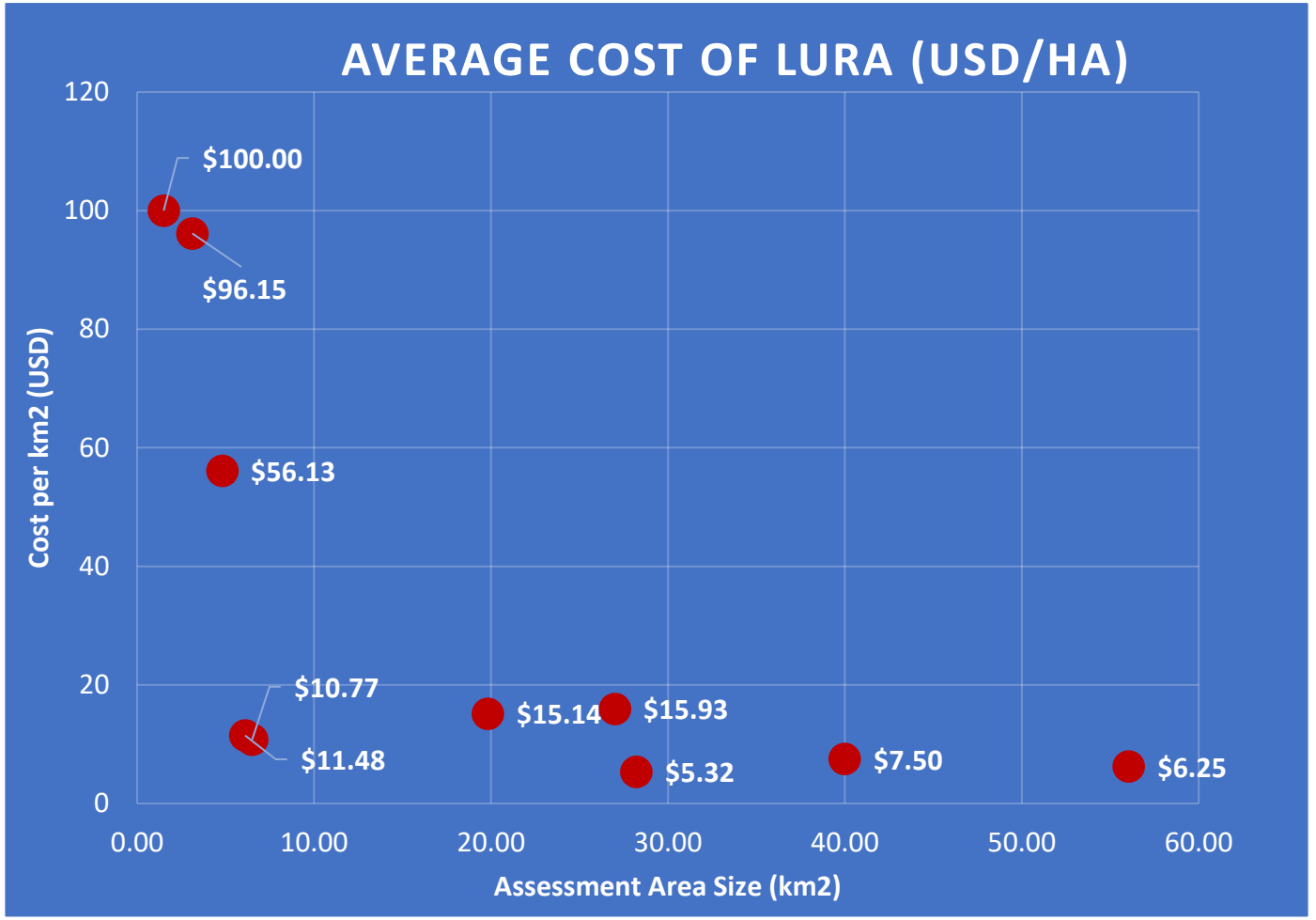




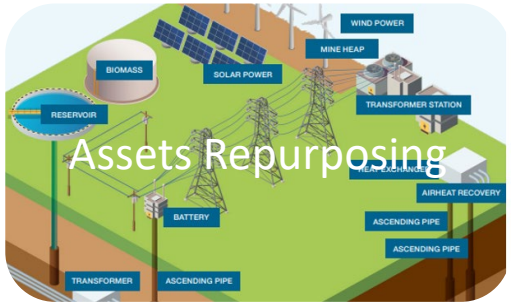
LURA is in demand globally

Aggregate LURA outputs and cost range





Repurposing examples for post-mining lands



…and various other specialized uses

Land for RE is scarce due to intense demand, technical and legal barriers

Lands can provide investment space for a range of productive purposes and natural capital.

Closing mines kills jobs and impacts communities

Many countries have huge stocks of idle brownfields

We need

Mine lands can be long term liabilities to people and environment

Laws on mining, environmental management and spatial planning often miss out on brownfields

Lands can help communities create economic impetus and attract investment

Few countries use tools such as strategic spatial planning / land demand assessments

To Work

Post mining lands have been repurposed to a wide scope of productive uses

Few countries harness strategic brownfields management for RE development

Greenfields use can significantly reduce positive CC impacts of RE and LC economy

Mining is expected to surge, adding to global stock of post-mining lands

Together !!!