**Smart strategies for the transition in coal intensive regions**

**Project No: 836819**

# *Blueprint on energy transition in Jiu Valley / West Region (RO42), Romania*

***WP 6 – Task 6.4 / D6.5***

**July 2022**

Authors: Marian Dobrin, ISPE – PC, Romania
Ion Chițescu, ISPE – PC, Rmania
Gloria Popescu, ISPE – PC, Romania
Sabina Irimie, AISVJ, Romania
Emilia Dunca, AISVJ, Romania

Editors: Charalampos Malamatenios, Centre for Renewable Energy Sources and Saving, Greece
Rita Mergner, WIP Renewable Energy, Germany
Rainer Janssen, WIP Renewable Energy, Germany

Contact: ISPE Proiectare și Consultanță
Marian Dobrin
Email: marian.dobrin@ispe.ro
Tel: +40 372 82 1326
1-3 Lacul Tei blvd.
020371 București, Romania
www.ispe.ro

Asociatia Institutul Social Valea Jiului (AISVJ)
Sabina Irimie
Email: sabina.irimie@gmail.com
Tel: +40 (0) 723 718 829
20 Universitatii str
332006 Petrosani, Romania
www.institutulsocialvj.ro

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 836819. The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the INEA nor the European Commission are responsible for any use that may be made of the information contained therein.

TRACER website: www.tracer-h2020.eu

# Contents

**Executive summary** 5

**1. Jiu Valley common vision statement** 5

**2. Jiu Valley projection of the energy mix** 6

**3. Jiu Valley available options meeting the planned energy transition** 8

**4. Jiu Valley high priority measures and concrete actions** 12

**5. References** 14

**ANNEX - Blueprint Benchmark of Jiu Valley / West Region (RO42), Romania** 16

## List of Figures

Figure 1 Projections of the energy mix in Jiu Valley micro-region, installed capacities (MW) ..... 7
Figure 2: Evolution of estimated jobs potentially generated by RE and EE industry in Jiu Valley ..... 12

## List of Tables

Table 1 Projections of the installed capacities in Jiu Valley (MW) ..... 7
Table 2: Jiu Valley technological options available ..... 8
Table 3 Projections of jobs creation potential in Jiu Valley (Total labours years per MWi) ....12
Table 4: Jiu Valley high priority measures and concrete actions .....13

## Abbreviations

| | |
|---|---|
| ADR Vest | West Regional Development Agency |
| ADTIVJ | Association for Integrated Territorial Development Valea Jiului |
| AFM | Environmental Fund Administration |
| CEH | Hunedoara Energy Holding (Complexul Energetic Hunedoara) |
| CHPP | Combined Heat and Power Plant |
| CRIT | Coal Regions in Transition Platform |
| CVET | Continuous Vocational Education and Training |
| DG | Directorate General |
| DSO | Distribution System Operators |
| EC | European Commission |
| EDP | Entrepreneurial Discovery Processes |
| EE | Energy Efficiency |
| HD | Hunedoara County |
| HP | Heat Pumps |
| HPP | Hydro Power Plant |
| LLL | Long Life Learning |
| MIPE | Ministry of European Investments and Projects (former MEF) |
| NUTS | Nomenclature of Units for Territorial Statistics |
| PNRR | National Recovery & Resilience Plan |
| POR Vest | Regional Operational Programme in West Region |
| POTJ \| PTTJ | Operational Programme for Just Transition \| Territorial Just Transition Plan |
| PV | Photovoltaic |
| R&I | Research and Innovation |
| RES \| RE | Renewable Energy Sources \| Renewable Energy |
| SNIMVJ | National Society for Mine Closure in Jiu Valley |
| SRSP | Structural Reform Support Programme within the European Commission |
| SRSS | Structural Reform Support Service within the European Commission |
| START | Secretariat's Technical Assistance to Regions in Transition |
| TSO | Transmission Systems Operator |

# Executive summary

Blueprints are key documents, which provide a detailed description of a process planning/development and implementation over time.

This Report could be considered as a Jiu Valley TRACER key document, which synthetically describes and schedules, the energy transition process over time ('20/'30/'40/'50).

Based on several previous TRACER deliverables as

- D6.1 - Projections for the transition to 2030/2050 in the target regions;
- D6.2 - R&I Strategy in the field of energy for Jiu Valley / West (RO42) target region, Romania;
- D6.3 - Report on the needs for workforce retraining;
- D6.4 - Roadmap for Jiu Valley / West (RO42) target region, Romania,

Jiu Valley Blueprint on energy transition will be a summary, starting from the common vision statement, continuing with the micro-region's energy mix projection and related technological options, up to its high priority measures and concrete actions scheduled in time, according to the stages defined in the R&I Roadmap:

- ✓ STAGE I (2022-2030) „Just transition from coal and economic transformation";
- ✓ STAGE II (2030-2050) „Innovative growth and regeneration".

In the end a referential "in brief" document was conceived and annexed, entitled **Blueprint Benchmark**, for helping stakeholders to understand Jiu Valley micro-region pathway to a sustainable energy system and easily compare all 9 TRACER targeted coal intensive regions.

# 1. Jiu Valley common vision statement

In order to perform the following key deliverables, during the development of all 4 (four) initiatives, supporting actions and projects (SRSS, START, SRSP and TRACER):

1. "*Action Plan and Strategy for the economic, social and environmental development of Jiu Valley (2021-2030)*", developed with the financial and technical support of the EC – DG Reform, through SRSS (Structural Reform Support Service within the European Commission), under the coordination of the Ministry of European Investments and Projects (MIPE, 2021);
2. "*From Strategy to Action: Delivering a Just Transition in the Jiu Valley, today and tomorrow*" (EC-CRIT, 2022), developed through the assistance services of EC - DG Ener-CRIT, accessed in 2019, by all 6 Jiu Valley's Mayors via START (Secretariat's Technical Assistance to Regions in Transition);
3. "*Territorial Just Transition Plan for Hunedoara County*" (PTTJ Hunedoara, 2021), performed by Hunedoara County Council (NUTS3/RO423) with the financial and technical support of EC – DG Reform, through SRSP (Structural Reform Support Programme);
4. "*Research & Innovation Strategy in the field of energy for Jiu Valley / West (RO42) target region, Romania*" (TRACER-D6.2, 2022),

in Jiu Valley micro-region took place unprecedented stakeholder consultation and entrepreneurial discovery processes (EDP), which finally generated a common vision, valid for any approach for the next period.

**Jiu Valley - a micro-region socially revitalised, sustainable and interconnected with a competitive economic environment, supported by investments, innovation and recognised for its local specificity.**

This common vision statement was completed within the TRACER project with the following paragraph:

**The integrated transition of Jiu Valley micro-region will be implemented by investing in human's potential, education, spirituality and morality, thus creating the right environment and generating the necessary force for the human capital, able to develop the local economy by implementing innovative ideas.**

## 2. Jiu Valley projection of the energy mix

The RES theoretical or technical potential have never been properly determined at either regional (NUTS2 or NUTS3) nor local (Jiu Valley micro-region) level, besides the assessment performed by JRC (European Commission Joint Research Centre) for RO42 Vest Region (NUTS2) onshore wind, solar and bioenergy (Kapetaki, Z., R., 2020) and presented in the R&I Strategy in the field of energy for Jiu Valley (TRACER-D6.2, 2022).

In 2020, data provided for Jiu Valley micro-region, by the electricity DSO and the National Environmental Fund Administration (AFM), registered about 6 MW installed in electricity and 0.44 MW in thermal energy as micro-hydropower (MHP), photovoltaics, solar thermal and biomass/biogas (TRACER-D6.2, 2022). Regarding the new approvals for the connection to the electricity distribution grid, the signed contracts and the new RES installations put into operation mainly by prosumers in 2021-2022 brought, according to TRANSELECTRICA (National TSO), a slight increase in the power installed, but nothing significant (243 kW in MHP and 228 KW in roof PV).

The boost for consistent public investments in RES for the next 5-8 years is expected to come together with the launch of new financing sources (e.g. Resilient & Recovery Fund, the operational programs POR Vest and POTJ Hunedoara, the Modernization Fund etc.) and private investments.

According to the R&I Strategy in the field of energy for Jiu Valley (TRACER-D6.2, 2022) a projection of the energy mix was estimated for Jiu Valley micro-region, considering the followings:

- the analysed scenarios: Scenario A “with RES and natural gas as transition fuel”; and Scenario B “with RES and alternative energy sources”, with recommendation made in favour of Scenario B, according to TRACER Report on Projections for the transition to 2030 / 2050 in the target regions (TRACER-D6.1, 2021);
- the agreement signed, in autumn 2021, by the Minister of Energy with the Norwegian company Arbaflame for Paroseni CHPP, for replacing hard-coal with “Arbacore” pellets from green biomass (ME, 2021).

In the current geo-strategic context on Romania's borders, with the Russian war on Ukraine, shaking energy security across Europe and putting more pressure on the country’s energy independence, a new legislative initiative was approved by the Romanian Parliament. This will allow the completion of Hidroelectrica works on the controversial project of Jiu River Hydropower Development (Bumbești - Livezeni - Dumitra) at the border of Hunedoara and Gorj counties, which has been in conservation since 2017.

On this new background, the energy mix projection 2030-2050 for Jiu Valley micro-region was updated with two large HPPs (Bumbesti HPP / 40.5 $MW_e$ and Dumitra HPP / 24.5 $MW_e$) according to the following table and figure:

**Table 1: Projections of the installed capacities in Jiu Valley (MW)**

| Installed capacities | | MU | 2020 | 2025* | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|---|---|
| **ETS sources – Paroseni CHPP** | | | | | | | |
| Installed capacity | electric | $MW_e$ | 150 | 150 | 25 | 25 | 25 |
| | thermal | $MW_t$ | 174 | 174 | 50 | 50 | 50 |
| Combustion fuel used hard coal/natural gas/green biomass | | % | 95/5/0 | 50/5/45 | 0/0/100 | 0/0/100 | 0/0/100 |
| **RES** | | | | | | | |
| Total installed capacity, of which | electric | $MW_e$ | 5.69 | 71.30 | 102.60 | 127.60 | 127.60 |
| | thermal | $MW_t$ | 0.44 | 1.94 | 53.44 | 53.44 | 53.44 |
| HPP and MHPP | | $MW_e$ | 4.91 | 69.91 | 69.91 | 69.91 | 69.91 |
| $_{ground}$PVP and $_{roof}$PV | | $MW_e$ | 0.67 | 1.01 | 26.31 | 51.31 | 51.31 |
| WPP | | $MW_e$ | 0.00 | 0.00 | 6.00 | 6.00 | 6.00 |
| Biogas | electric | $MW_e$ | 0.38 | 0.38 | 0.38 | 0.38 | 0.38 |
| | thermal | $MW_t$ | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 |
| Solar thermal / $_{green}$Biomass / HPs | electric | $MW_e$ | NA | 0.00 | 0.00 | 0.00 | 0.00 |
| | thermal | $MW_t$ | NA | 1.50 | 3 | 3 | 3 |

*Source:* (TRACER-D6.2, 2022) *and* (TRACER-D6.4, 2022)

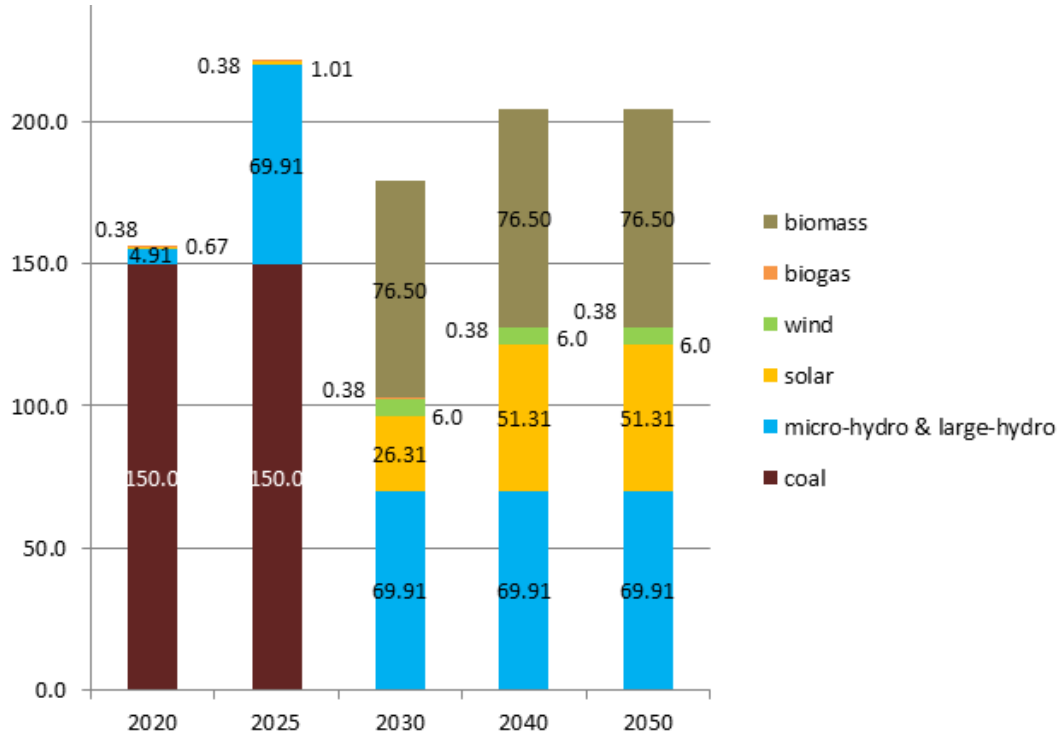



**Figure 1: Projections of the energy mix in Jiu Valley micro-region (installed capacities in MW)**

*Source:* TRACER-D6.4 (2022)

# 3. Jiu Valley available options meeting the planned energy transition

Starting from Jiu Valley energy mix projection (Chapter 2) based on the recommended Scenario B "with RES and alternative energy sources", and knowing the micro-region R&I priority areas, key actions and technologies/systems/services (TRACER-D6.2, 2022), the available options were grouped as follows, in order to meet the proposed planned energy transition:

- Energy technologies and systems, including related services;
- Environmental remediation/reclamation works and services;
- Other connected areas (i.e. urban regeneration, competitive and innovative manufacturing & processing industries, innovative technologies and services for consumers, including CVET, higher-education and dual-education systems and programs).

The technological options are planned on a timeline according to stages of Jiu Valley R&I Roadmap for the energy transition and presented in the following table:

**Table 2: Jiu Valley technological options available**

| Roadmap stages / R&I priority areas | | STAGE I: Just transition from coal and economic transformation 2022-2030 | STAGE II: Innovative growth and regeneration 2030-2040-2050 |
|---|---|---|---|
| Energy technologies and systems, including related services | R&I.I. Renewable and alternative sources; and bioenergy generation | RES potential assessment, mapping and 3D modelling/simulation<br>- GIS, Digital solutions for 3D modelling/simulation and LCA | RES integration for public/private consumers and prosumers and energy communities<br>- Hybrid solar panels<br>- Concentrated solar power / CPV (ground type)<br>- Vertical wind turbines<br>- Various type of HPs and geothermal pumps |
| | | RES integration for public/private consumers, prosumers and energy communities and/or Performant RES integrated in the NPS<br>- Solar roof PV s and solar thermal (roof type)<br>- Ground PV<br>- Various type of HPs and geothermal pumps, including research drillings for assessing the shallow potential | Renewable fuels production<br>- RNG (renewable natural gas) from landfills, sewage, farm waste, food waste and from energy crops to produce bio-methane<br>- Green sustainable biomass |
| | | Renewable fuels production<br>- RNG (renewable natural gas) from landfills, sewage, farm waste, food waste and from energy crops to produce bio-methane<br>- Green sustainable biomass | Green hydrogen generation hub<br>- Green hydrogen from RES for heating,<br>- transport, electricity storage |
| | | | Nuclear energy<br>- Training simulators for different nuclear energy technologies |
| | R&I.III. Energy storage | Electricity storage hubs for e-mobility and stationary sources<br>- Energy management<br>- Digital solutions to optimise the storage systems for different technologies (i.e. li-ion, sodium-sulphur or second life eVs batteries) | Electricity storage hubs for e-mobility and stationary sources<br>- Digital solutions to optimise the storage systems for different technologies (i.e. hydrogen from electrolysis)<br>- Energy storage systems with bidirectional charging |
| | | Thermal energy storage pilots/proof of | |

| Roadmap stages | | STAGE I: Just transition from coal and economic transformation 2022-2030 | STAGE II: Innovative growth and regeneration 2030-2040-2050 |
|---|---|---|---|
| R&I priority areas | | | |
| | | concept<br>- Thermal energy storage tanks in former underground mines | |
| Environmental remediation/reclamation works and services | R&I.IV. Environmental protection | Monitoring and preserving air, water and soil quality<br>and<br>Assessing and constantly monitoring the carbon footprint of Jiu Valley micro-region<br>- Digital and sensors solutions for LCA and EIA and carbon footprint calculation, for air and water quality<br>- Digital solutions for modelling and simulation | Constant monitoring and preserving air, water and soil quality<br>and<br>Assessing and constantly monitoring the carbon footprint of Jiu Valley micro-region<br>- Up-to-date digital and sensors solutions<br>- Ecosystem services to increase life quality by increasing the quality of the environment |
| | | Updating mining closure guidelines and regulations for a sustainable remediation of former mining sites / mine tailings<br>- New innovative solution for industrial wastes re-use<br>- Innovative soil remediation solutions by making the most of its energy potential (i.e. reuse of mine waters for heating, ground PV on unproductive lands, energy crops and biofuels production etc.) | |
| | | Unproductive lands mapping and capitalisations<br>- Post-mining landscape management (ie re-greening the historically polluted site; energy use; agriculture use etc.) | Industrial wastes re-use (i.e. ash and slag, construction materials from buildings demolition/renovation etc.) – circular economy |
| | | Industrial wastes re-use (i.e. ash and slag, construction materials from buildings demolition/renovation etc.) – circular economy | |
| | | Development of green-blue corridors between urban, peri-urban and the natural environment | |
| Other connected areas | R&I.II. Urban regeneration | Integrated urban and territorial planning, specific to a functional urban area (such as Metropolitan Area or Integrated Territorial Development Association)<br>- GIS<br>- BIM (Building Information Modelling)<br>- Digital solutions for innovative energy technologies planners<br>- Smart metering and data centres<br>- Digital innovative solutions for traffic management | Smart and green solutions for district heating and cooling (H&C)<br>and<br>RES integration in district / zonal / building H&C systems<br>- Digital solutions for integrated energy demand-response<br>- Smart micro-grid infrastructure<br>- Former thermal station transformation into thermal plants or small/micro-CHPs biomass-based and/or syngas-based and/or including reversible HPs with |
| | | Smart and green solutions for district heating and cooling (H&C)<br>and<br>RES integration in district / zonal / building H&C systems | |

| Roadmap stages<br>R&I priority areas | | STAGE I: Just transition from coal and economic transformation 2022-2030 | STAGE II: Innovative growth and regeneration 2030-2040-2050 |
|---|---|---|---|
| | | - Energy and resource efficient workflows<br>- Smart micro-grid infrastructure<br>- Former thermal station transformation into thermal plants or small/micro-CHPs biomass-based and/or syngas-based and/or including reversible HPs with no GHG<br>- Mine Methane Capture (MMC) or Underground Coal Gasification (UCG) for syngas production used in micro-CHP | no GHG<br><br>RES integration in buildings combined with digital solutions for urban service facilities<br>- Smart city – smart micro-region concept integration and implementation<br><br>Architectural aesthetic in line with the local cultural heritage<br>- New or reconverted smart green constructions |
| | | Energy and resource efficient buildings renovation<br>and<br>RES integration in buildings combined with digital solutions for urban service facilities<br>- Cost-effective innovative construction materials (converting the building envelope into electricity-producing surfaces, sheep wool thermal-insulation etc.)<br>- Adopting the circular economy concept in the construction waste management<br>- Innovative and more energy efficient Building Integrated Photovoltaics (BIPV)<br>- Micro-CHP biomass-based and/or syngas-based<br>- Reversible HPs with no GHG<br>- NZEB and positive energy buildings / districts / neighbourhoods<br>- Digital solutions for building automation control<br>- Smart districts, smart campus | |
| | | Buildings' functionality reconversion<br>and<br>Architectural aesthetic in line with the local cultural heritage<br>- NZEB and positive energy buildings / districts / neighbourhoods<br>- New construction standard / Smart-green renovation concept and creation of the Jiu Valley buildings registry<br>- Air quality/natural ventilation, natural lighting<br>- New smart green constructions on unproductive lands / former historically polluted site based on new construction standard and re-greening an equivalent surface | |

| Roadmap stages<br>R&I priority areas | | STAGE I: Just transition from coal and economic transformation 2022-2030 | STAGE II: Innovative growth and regeneration 2030-2040-2050 |
|---|---|---|---|
| | R&I.V. Competitive and innovative manufacturing and processing industries | Energy efficiency and sustainable use of resources - solutions for industry<br>- Heat recovery in industry<br>- Digital solutions for smart metering<br>- Digital solutions for industrial process automation & control<br>- Digital hubs / industrial parks / business incubators | Energy efficiency and sustainable use of resources - solutions for industry<br>- Digital solutions for products LCA and EIA<br>- Digital solutions for processing and decision-making support tools<br><br>Cost-effective manufacturing of electric and electronic, micro-electronic parts for various fields/niches (i.e. e-mobility, urban digitalisation, smart metering, industry automation, RES spare-parts etc.)<br>- Advanced electricity storage systems production |
| | | Cost-effective manufacturing of electric and electronic, micro-electronic parts for various fields/niches (i.e. e-mobility, urban digitalisation, smart metering, industry automation, RES spare-parts etc.)<br>- VxG charging systems production for e-buses, e-vehicles, e-bicycles and e-scooters<br>- PCB (printed circuit board) production in compliance with RoHS and REACH Directives | |
| | | Green biomass sustainable generation from wood processing industries and agriculture<br>- Innovative green biomass production | |
| | R&I.VI. Innovative technologies and services for consumers | Utilities, fuels and other urban indicators monitoring, reporting and management (i.e. energy, water, carbon footprint, climate, indoor-outdoor air quality, biofuels and others (n.g.), wastes etc.) at building and city level<br>- Smart metering<br>- BMS – building management system<br>- Mobile applications<br>- User-friendly interfaces | Utilities, fuels and other urban indicators monitoring, reporting and management at integrated territorial level<br>- IoT, big data, open data models<br><br>Advanced protection for industries and civilian areas against toxic / inflammable / explosion hazard<br>- Innovative protective systems for potentially toxic / inflammable / explosive atmospheres<br><br>Facilitating social innovation, co-creation, promote education and CVET for sustainability<br>- Living labs<br><br>Consumers' behaviour constant monitoring for rising awareness and changing attitudes |
| | | Advanced protection for industries and civilian areas against toxic / inflammable / explosion hazard<br>- Innovative protective systems for potentially toxic / inflammable / explosive atmospheres | |
| | | Use and/or develop Decision Support Tools (guidance, software) | |
| | | Developing new and supporting the existing CVET, higher-education and dual-education systems and programs curricula to be more innovative, flexible and adaptive to market needs<br>- Green schools and innovative, flexible and adaptive curricula<br>- Proof of concepts | |
| | | Consumers' behaviour constant monitoring for rising awareness and changing attitudes | |

Regarding the workforce structure, according to Jiu Valley R&I Roadmap for the energy transition (TRACER-D6.4, 2022), in the recommended and planned Scenario B "with RES and alternative energy sources", the renewable energy (RE) industry and other associated sectors will have the potential to absorb the existing direct coal industry jobs, recent layoffs and, partially, Jiu Valley unemployment (other indirect coal industry related jobs).

Thus, Table 3 and Figure 2 present the estimated projections of the jobs to be potentially generated by the RE and EE industry, on a time line following the energy mix evolution curve in Jiu Valley (Figure 1).

**Table 3: Projections of jobs creation potential in Jiu Valley (Total labours years per MWi)**

| Installed capacities | MU | 2020 | 2025* | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|---|
| Hard coal (power generation and mining) | n°. | 3,408* | 2,530 | 0 | 0 | 0 |
| micro-Hydro & large-Hydro | n°. | 79 | 1,126 | 1,126 | 1,126 | 1,126 |
| Solar | n°. | 22 | 34 | 881 | 1719 | 1719 |
| Wind | n°. | 0 | 0 | 116 | 116 | 116 |
| Biomass and post-mining landscape management | n°. | 16 | 775 | 3,305 | 3,305 | 3,305 |
| Energy Efficiency | n°. | 0 | 200 | 200 | 150 | 50 |
| Total | n°. | 3,525 | 4,665 | 5,628 | 6,416 | 6,316 |

** Coal industry in Jiu Valley (CEH and SNIMVJ); Source:* TRACER-D6.3 (2022)

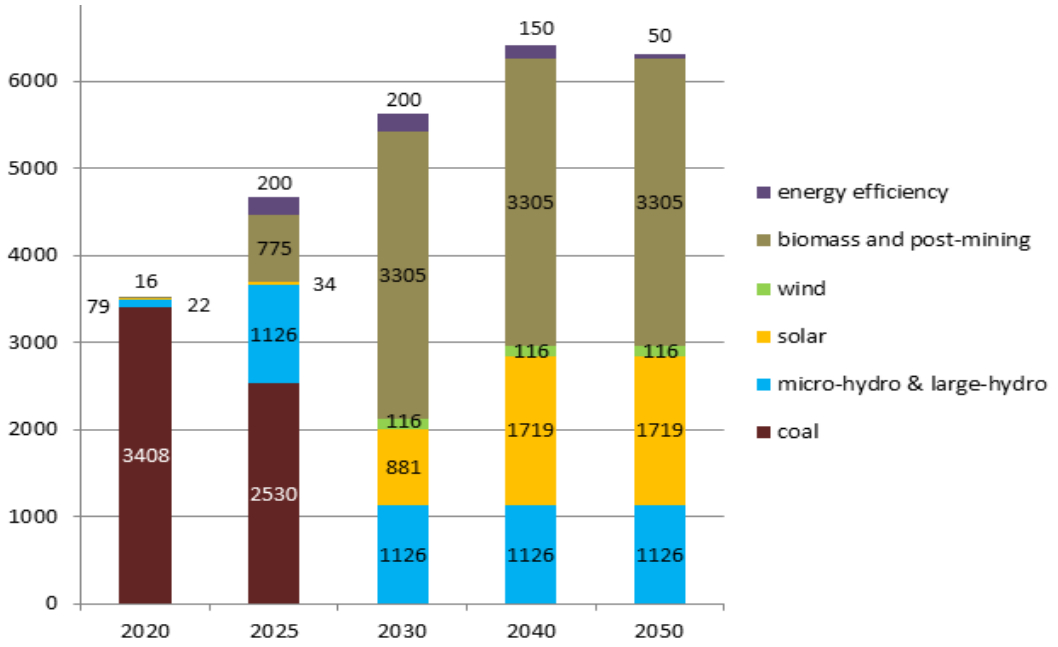



**Figure 2: Evolution of estimated jobs potentially generated by RE and EE industry in Jiu Valley**

*Source:* TRACER-D6.4 (2022)

## 4. Jiu Valley high priority measures and concrete actions

The high priority measures and concrete actions which were proposed and planned in Jiu Valley R&I Roadmap for the energy transition (TRACER-D6.4, 2022) are structured on a timeline according to the stages defined in the action plan: STAGE I (2022-2030) and STAGE II (2030-2050) and presented in Table 4.

**Table 4: Jiu Valley high priority measures and concrete actions**

| Stages | High priority measures | Concrete actions | | |
|---|---|---|---|---|
| | | < 2024 | 2025 - 2027 | 2028 - 2030 |
| STAGE I: Just transition from coal and economic transformation | Strengthen the capacity and enhance competences, for both public (ADTIVJ and local mayoralties) and private entities | Develop & implement LLL and capacity building programs | | Constant update & adaptation of LLL curricula |
| | | Identify and attract assistance/consulting services support to accelerate the commencement of identified projects preparation (pre-investment studies), financing and deployment | | |
| | | Initiate - develop public authorities partnerships and economic connections with transnational value chains & business networks for existing SMEs | | |
| | Mitigate local authorities and existing SMEs co-financing incapacity | Define customised eligibility and state aid rules for coal regions in transition; | Negotiate loans on favourable terms | |
| | | Lobbying activities at governmental level | | |
| | Update the legal & regulatory framework, to be more flexible in terms of ownership transfer, reuse and/or repurpose of post-mining assets (land/buildings) | Lobbying activity for updating the legislative framework related to mine closure procedure and post-mining assets management | Regenerate post-mining perimeters, while preserving the industrial-cultural heritage and adopt the circular economy concept for the mining and construction wastes management | |
| | | Establish a R&I oriented legal & regulatory framework, flexible in terms of ownership transfer, reuse and/or repurpose of post-mining assets | | |
| | Rise investors interest | Establish and develop R&I partnerships and economic connections with transnational value chains and business networks | | |
| | | Adopting a local fiscal incentive package as “transition fiscal regime” | | |
| | Reduce youth migration and brain drainage | Develop special customised programs for youth engagement in the decision-making process | | |
| | | Develop Flexible/adaptive education curricula (educational units, including dual system, accredited trainers, CVET units and apprenticeships in technical disciplines) in line with Jiu Valley new socio-economic profile | | |
| | Rising the interest for up and re-skilling programs of the local human capital included in the inactive workforce category, as former miners and youth | Establish and develop strong European and international connections with accreditation bodies | | |
| | | Enhance foreign language and digital knowledge | | - |
| | | Effective certification procedure for the up- and re-skilling programs | | - |
| | | Updating periodically LLL programs curricula for a higher flexibility and dynamic, with focus on Jiu Valley R&I priority areas, easy to adapt prior to the workforce retraining needs | | |

| 2030-2040-2050 | | |
|---|---|---|
| STAGE II: Innovative growth and regeneration | STAGE I follow-up assessment | Constant monitoring (annually) of all STAGE I investments |
| | | Functional data centre - utilities, fuels and other urban indicators monitoring, reporting and management at integrated territorial level |
| | | Effective DST (decision support tools) for corrective measures and actions |
| | Update policies to constantly support sustainable energy systems implementation | Continue to deploy already identified ( (TRACER-D6.4, 2022) or new projects using renewable and alternative sources (solar thermal, PV, green hydrogen, etc.) and digital systems for monitoring-reporting-decision support |
| | | The firewood for heating purposes recommended, after 2035 the latest, to be switched to green biomass - pellets and wheat/straw briquettes, through the development of an integrated collecting and processing mechanism of wood wastes, resulting from wood industrial processing, and agricultural wastes |
| | Attract youth | Constant education and LLL programs curricula updates |
| | | New micro-regional fiscal incentives for youth |
| | Promote Jiu Valley micro-region | Intensify R&I partnerships and economic connections with transnational value chains and business networks |

As underlined by START assistance in their final report “From Strategy to Action. Delivering Just Transition in the Jiu Valley, today and tomorrow” (EC-CRIT, 2022). the next years are critical for achieving a Just transition for the Jiu Valley. Success will require the synchronisation of actions and resources by local, regional and national actors in a programmed manner. To this aim, START assistance emphasise that the new governance structure – the Association for Integrated Territorial Development Valea Jiului (ADTIVJ) will have a difficult, but extremely important task, to align funding and resources and adopt a holistic approach to synchronise policy implementation at regional (NUTS2 and NUTS3) and local level, in order to achieve Jiu Valley strategic common vision.

By enabling a constant and transparent communication with key stakeholders for a correlated and step by step approach of the transition process, ADTIVJ is in the right financial context to pave the way towards a sustainable energy future in Jiu Valley micro-region.

It is recommended for ADTIVJ to constantly monitor and periodically assess the implementation of both Jiu Valley Transition Action Plan (MIPE, 2021) and R&I Roadmap (TRACER-D6.4, 2022), in a close cooperation with ADR Vest and Hunedoara County Council responsible for results evaluation of POR Vest (ADR Vest, 2021) and, respectively PTTJ Hunedoara (PTTJ Hunedoara, 2021).

# 5. References

ADR Vest. (2021). *Programul Opertaional Regional Vest 2021-2027.* Timisoara: ADR Vest. Retrieved from https://adrvest.ro/por-2021-2027/

EC-CRIT. (2022). *From strategy to action: Delivering a just transition in the Jiu Valley, today and tomorrow.* Brussels: European Comission. Retrieved from https://energy.ec.europa.eu/topics/oil-gas-and-coal/eu-coal-regions/secretariat-technical-assistance-regions-transition-start_en

Kapetaki, Z., R. (2020). *Clean energy technologies in coal regions: Opportunities for jobs and growth: Deployment potential and impacts.* Luxemburg: Publications Office of the European Union. doi:10.2760/063496

ME. (2021). *Comunicate de presa*. Retrieved from Ministerul Energiei: http://energie.gov.ro/acord-important-pentru-cet-paroseni-in-prima-parte-a-anului-2022-vor-incepe-testele-pentru-a-inlocui-carbunele-cu-peletii-produsi-de-arbaflame/?fbclid=IwAR3VOilEMWKKwDF3eL0iaBIu6etiUXCQujI8FWoxMvic0aiDybj3ZR38cl8

MIPE. (2021). *Strategia pentru dezvoltarea economică, socială și de mediu a Văii JIului (2021-2030) și Planul de acțiune, PwC.* București: Ministerul Investițiilor și Proiectelor Europene. Retrieved from https://mfe.gov.ro/initiativa-valea-jiului/

PTTJ Hunedoara. (2021). *Planul teritorial pentru tranziție justă Hunedoara 2021-2027.* Deva: Consiliul Județean Hunedoara. Retrieved from http://mfe.gov.ro/minister/perioade-de-programare/perioada-2021-2027/

TRACER-D6.1. (2021). *Projections for the transition to 2030/2050 in the target regions.* Brussels: TRACER. Retrieved from https://tracer-h2020.eu/wp-content/uploads/2021/06/TRACER-D61_Energy-Projections.pdf

TRACER-D6.2. (2022). *R&I Strategy in the field of energy for Jiu Valley / West (RO42) target region, Romania.* Brussels: TRACER. Retrieved from https://tracer-h2020.eu/wp-content/uploads/2021/09/TRACER-D6.2-6_RI-Strategy_RO-Jiu-Valley.pdf

TRACER-D6.3. (2022). *Report on the needs for workforce retraining.* Brussels: TRACER. Retrieved from https://tracer-h2020.eu/wp-content/uploads/2021/09/TRACER-D6.3_Needs-for-workforce-retraining.pdf

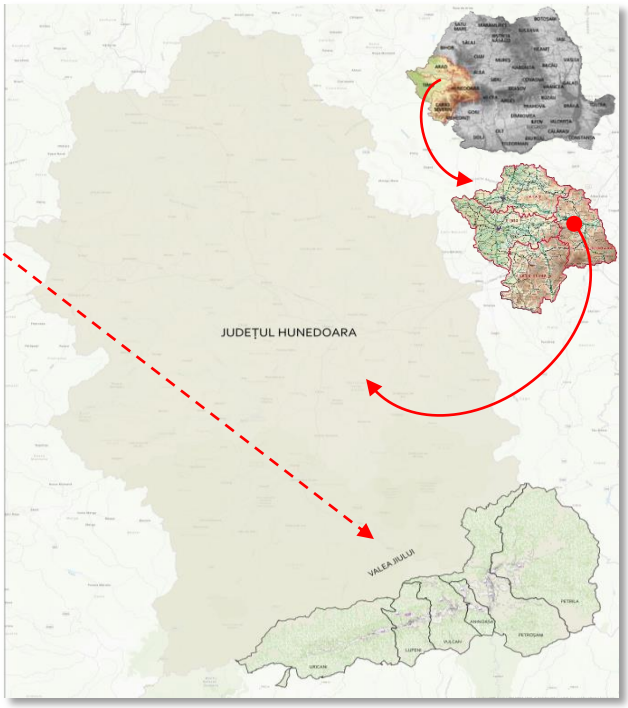
TRACER-D6.4. (2022). *Roadmap for Jiu Valley / West (RO42) target region, Romania.* Brussels: TRACER. Retrieved from https://tracer-h2020.eu/wp-content/uploads/2021/09/TRACER-D6.4-Roadmap_Jiu-Valley_RO.pdf

# ANNEX - Blueprint Benchmark of Jiu Valley / West Region (RO42), Romania

ROMANIA
VEST REGION (RO42)
HUNEDOARA COUNTY (RO423)
**JIU VALLEY MICRO-REGION**

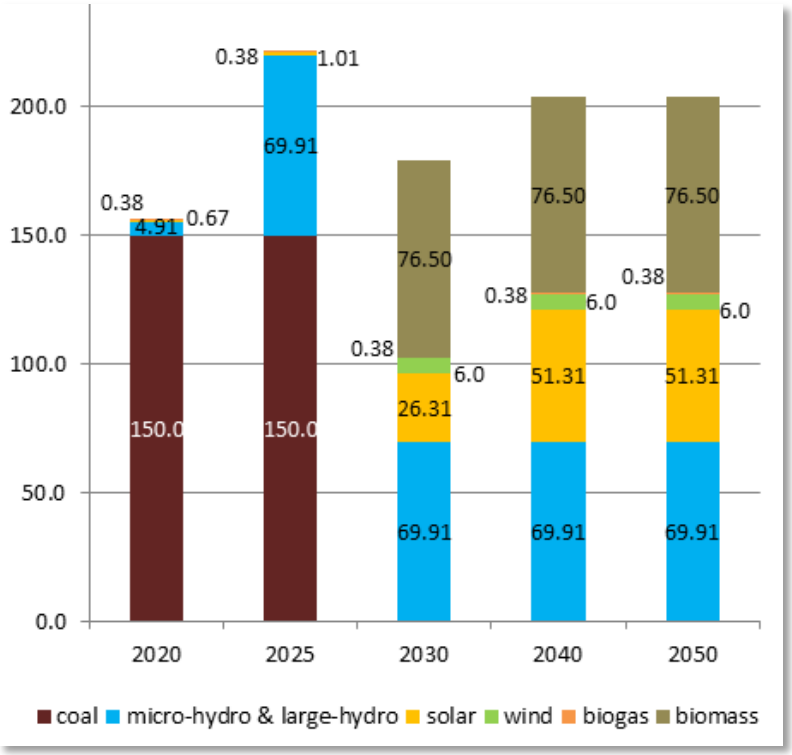
| | *2021* |
|---|---|
| SURFACE (km$^2$) | 1,033 |
| POPULATION (inhab.) Jiu Valley | 130,249 |
| POPULATION (inhab.) RO423 | 448,261 |
| GDP PER CAPITA (EUR) RO42 | 12,968 |
| GDP PER CAPITA (EUR) RO423 | 10,337 |

*Source: National Statistics and Commission for Strategy & Prognosis*




| | *2021* |
|---|---|
| DIRECT EMPLOYMENT IN THE COAL INDUSTRY (power and/or heat generation, mining) (pers.) | 2,871 |
| TOTAL REGISTERED UNEMPLOYMENT (pers.) | 1,773 |

*Source: Hunedoara Energy Holding and National Employment Agency*




**TIME LINE OF JIU VALLEY ENERGY MIX FORECASTING (MW)**

## JOB CREATION POTENTIAL DURING THE DECARBONISATION PROCESS

| TOTAL ESTIMATED LABOUR YEARS (jobs) *2030/2040/2050* | HYDRO | SOLAR PV | WIND | BIOMASS | ENERGY EFFICIENCY |
|---|---|---|---|---|---|
| 5628 / 6416 / 6316 | 1126 / 1126 / 1126 | 881 / 1719 / 1719 | 116 / 116 / 116 | 3305 / 3305 / 3305 | 200 / 150 / 50 |

*Source: TRACER-D6.4 (2022)*

# JIU VALLEY ENERGY TRANSITION TIMELINE

| Stages | High priority measures | Concrete actions | | | Technologies / Systems / Services |
|---|---|---|---|---|---|
| | | *< 2024* | *2025 - 2027* | *2028 - 2030* | |
| **STAGE I: Just transition from coal and economic transformation 2022 – 2030**<br>*Milestones: 2027 - end of PNRR; 2029 - Operational Programs end; 2030 - hard-coal phase out* | Strengthen the capacity and enhance competences, for both public (ADTIVJ and local mayoralties) and private entities | Develop & implement LLL and capacity building programs | | Constant update & adaptation of LLL curricula | ▪ RES potential assessment, mapping and 3D modelling/simulation<br>▪ RES integration for public/private consumers, prosumers and energy communities and/or Performant RES integrated in the NPS<br>▪ Renewable fuels production<br>▪ Electricity storage hubs for e-mobility and stationary sources<br>▪ Thermal energy storage pilots/proof of concept<br>▪ Assessing and constantly monitoring the carbon footprint, together with monitoring and preserving air, water and soil quality<br>▪ Unproductive lands mapping and capitalisations<br>▪ Industrial wastes re-use<br>▪ Development of green-blue corridors between urban, peri-urban and the natural environment<br>▪ Integrated urban and territorial planning, specific to a functional urban area<br>▪ Energy and resource efficient buildings renovation<br>▪ Buildings' functionality reconversion<br>▪ Architectural aesthetic in line with the local cultural heritage<br>▪ Smart and green solutions for district heating and cooling (H&C)<br>▪ RES integration in district / zonal / building H&C systems<br>▪ Energy efficiency and sustainable use of resources - solutions for industry<br>▪ Cost-effective manufacturing of electric and electronic, micro-electronic parts for various fields/niches<br>▪ Green biomass sustainable generation from wood processing industries and agriculture<br>▪ Utilities, fuels and other urban indicators monitoring, reporting and management<br>▪ Advanced protection for industries and civilian areas against toxic / inflammable / explosion hazard<br>▪ Developing new and supporting the existing CVET, higher-education and dual-education systems and programs curricula to be more innovative, flexible and adaptive to market needs |
| | | Identify and attract assistance/consulting services support to accelerate the commencement of identified projects preparation (pre-investment studies), financing and deployment | | | |
| | | Initiate - develop public authorities partnerships and economic connections with transnational value chains & business networks for existing SMEs | | | |
| | Mitigate local authorities and existing SMEs co-financing incapacity | Define customised eligibility and state aid rules for coal regions in transition; | Negotiate loans on favourable terms | | |
| | | Lobbying activities at governmental level | | | |
| | Update the legal & regulatory framework, to be more flexible in terms of ownership transfer, reuse and/or repurpose of post-mining assets (land/buildings) | Lobbying activity for updating the legislative framework related to mine closure procedure and post-mining assets management | Regenerate post-mining perimeters, while preserving the industrial-cultural heritage and adopt the circular economy concept for the mining and construction wastes management | | |
| | | Establish a R&I oriented legal & regulatory framework, flexible in terms of ownership transfer, reuse and/or repurpose of post-mining assets | | | |
| | Rise investors interest | Establish and develop R&I partnerships and economic connections with transnational value chains and business networks | | | |
| | | Adopting a local fiscal incentive package as "transition fiscal regime" | | | |
| | Reduce youth migration and brain drainage | Develop special customised programs for youth engagement in the decision-making process | | | |
| | | Develop Flexible/adaptive education curricula (educational units, including dual system, accredited trainers, CVET units and apprenticeships in technical disciplines) in line with Jiu Valley new socio-economic profile | | | |
| | Rising the interest for up and re-skilling programs of the local human capital included in the inactive workforce category, as former miners and youth | Establish and develop strong European and international connections with accreditation bodies | | | |
| | | Enhance foreign language and digital knowledge | | - | |
| | | Effective certification procedure for the up- and re-skilling programs | | - | |
| | | Updating periodically LLL programs curricula for a higher flexibility and dynamic, with focus on Jiu Valley R&I priority areas, easy to adapt prior to the workforce retraining needs | | | |
| ***2030 – 2040 – 2050*** | | | | | |
| **STAGE II: Innovative growth and regeneration 2030 – 2040 – 2050**<br>*Milestones: 2032 - coal (lignite) phase out* | STAGE I follow-up assessment | Constant monitoring (annually) of all STAGE I investments | | | ▪ RES integration for public/private consumers, prosumers and energy communities (in buildings and/or DHC)<br>▪ Renewable fuels production<br>▪ Green hydrogen generation hub<br>▪ Nuclear energy / training simulators<br>▪ Electricity storage hubs for e-mobility and stationary sources<br>▪ Constant monitoring and preserving air, water and soil quality<br>▪ Assessing and constantly monitoring the carbon footprint<br>▪ Industrial wastes re-use<br>▪ Architectural aesthetic in line with the local cultural heritage<br>▪ Digital solutions for urban services integration in district / zonal DHC and in buildings<br>▪ Energy efficiency and sustainable use of resources – digital solutions for industry<br>▪ Cost-effective manufacturing of electric and electronic, micro-electronic parts for various fields/niches<br>▪ Green biomass sustainable generation<br>▪ Utilities, fuels and other urban indicators monitoring, reporting and management at integrated territorial level<br>▪ Advanced protection for industries and civilian areas against toxic / inflammable / explosion hazard<br>▪ Facilitating social innovation, co-creation, promote education and CVET for sustainability |
| | | Functional data centre - utilities, fuels and other urban indicators monitoring, reporting and management at integrated territorial level | | | |
| | | Effective DST (decision support tools) for corrective measures and actions | | | |
| | Update policies to constantly support sustainable energy systems implementation | Continue to deploy already identified ( (TRACER-D6.4, 2022) or new projects using renewable and alternative sources (solar thermal, PV, green hydrogen, etc.) and digital systems for monitoring-reporting-decision support | | | |
| | | The firewood for heating purposes recommended, after 2035 the latest, to be switched to green biomass - pellets and wheat/straw briquettes, through the development of an integrated collecting and processing mechanism of wood wastes, resulting from wood industrial processing, and agricultural wastes | | | |
| | Attract youth | Constant education and LLL programs curricula updates | | | |
| | | New micro-regional fiscal incentives for youth | | | |
| | Promote Jiu Valley micro-region | Intensify R&I partnerships and economic connections with transnational value chains and business networks | | | |