# Innovation, state-of-art manufacturing technologies, renovated Ukraine

Top-10 proposal
of Ukrainian Cluster Alliance
for Internationalization
of the national clusters and SMEs Series

Ukrainian
Cluster
Alliance

# FOREWORD

The war between russia and Ukraine turned over the notions of human values in all civilized countries. The statements of Western politicians about «good and friendly russia», promoted by decades, took a full fiasco on 24th of February 2022. And today, Ukraine pays the highest price for holding the front for the whole Europe, for the whole democratic world.

In Ukraine, we all believe in our victory. We do not know when it will come. But we know that united with all Western countries, facing both economic and military challenges, we will win faster, and saving more human lives and material assets.

However, as the Ukrainian Cluster Alliance (UCA), we understand that planning future in economy needs more clear perspectives. We aware that is impossible to win on the military front without the economic one.

Our government started the grand plan of Recovery of Ukraine in June 2022. It creates big lines of recovery for destroyed regions, but it also considers main economic challenges in **Energy, Infrastructure, Building, Manufacturing and Logistic** in Ukraine. This first initiative has been supported by leading Western analytic groups, and in September 2022 the clear proposal of Marshall plan has been appeared. The overall recovery programs varies from 100 to 300 bln US dollars and they will be done with US and EU partners.

As the leading union of Ukrainian clusters, UCA comes into this arena of grand reconstruction with its own programs and projects. We believe in the power of clusters to build resilient and innovative values chains. Today we start to rebuild these chains inside of the countries but also to link them with our EU partners. We heavily promote the idea of **integrated value chains UA-EU** and we are first to support this strategy at the level of our clusters.

That is why we developed this proposal «top-10». It proposes 10 big initiatives declined into concrete projects, and which we can do with EU partners.

Followed to the experience with military and other kind support we strongly believe in the power of Eastern Europe and Baltic countries to support us the best way. Thus, we position these proposals firstly for them, but finally we invite all our partners to participate in Recovery of Ukraine.

It is a time build relationship now. And now support Ukrainian companies and sectors, many of them are in really difficult situation. We starts with Advanced Manufacturing sectors and we will soon follow with other ones.

This offer will be promoted by UCA in all international events where we participate.

*Head of UCA Alexandre Yurchak*

# UCA CLUSTERS IN ADVANCED MANUFACTURING

Ukrainian Cluster Alliance (UCA), https://www.clusters.org.ua/en/ is the leading national association in Ukraine, uniting 37 clusters. 9 of them represent sectors of Industrial Engineering, Automation and IT, Metalworking and Machinery, that we refer to Advanced Manufacturing.

The table below resumes the main information about these clusters.

| # | Cluster Name | Specialization | Region | Web-site, contact person |
|---|---|---|---|---|
| 1 | Association of Industrial Automation of Ukraine (APPAU) | Industrial Automation and IT / Industry 4.0-5.0 | National level | https://appau.org.ua/en<br>Alexandre Yurchak, yurchak.alexandre@appau.org.ua |
| 2 | Vinnytsia Automation and Instrument Making (AIM) | AIM cluster focuses on Industrial automation and instrumentation manufacturing | Vinnytsia | https://www.aimcluster.org/<br>Yurii Klymenko klymenko.ym@gmail.com |
| 3 | Dnipro space cluster | A platform for innovations and creating high added value in rocket engineering, exploration and (ci | Dnipro | https://www.facebook.com/dnipros pacecluster<br>Evgen Rokitsky<br>tristar.ua@gmail.com |
| 4 | Zaporizhzhia EAM | AIM cluster focuses on Industrial automation and instrumentation manufacturing | Zaporizhzhia | https://www.iamcluster.zp.ua/en<br>Andrii Karpenko andriikarpenko77@gmail.com |
| 5 | Kharkiv EAM | AIM cluster focuses on Industrial automation and instrumentation manufacturing | Kharkiv | https://www.iamcluster.kharkiv.ua/<br>Oksana Sytnyk oksana049@gmail.com |
| 6 | Sumy energy equipment | The Sumy machine-building cluster of power equipment | Sumy | https://www.en.e-cluster.org/<br>Vladislav Kondus vladislav.kondus@meta.ua |
| 7 | Maritime Cluster of Ukraine | Ukrainian Maritime Cluster connection point for entire maritime sector | Mykolaiv | https://www.en.e-cluster.org/<br>Yuri Zhukov y.zhukov@c-job.com.ua |
| 8 | Ukrainian Automotive and Mobility Cluster | Cluster created by the leading component manufacturers for the automotive industry. | Kyiv | https://automotivecluster.org.ua/<br>Olga Trofimova olgatok@gmail.com |
| 9 | Ukrainian union of aerospace clusters | Ukrainian union of aerospace clusters | Odesa | https://spacecenter.od.ua<br>Evgen Rokitsky<br>tristar.ua@gmail.com |

UCA closely collaborates with many actors of innovative ecosystems in Advanced Manufacturing, such as:

1. *Industry4Ukraine policymaking platform.*
2. *Digital Innovation Hubs – Center 4.0 KPI and Kyiv Academic University.*
3. *Technical Committee 185 «Industrial Automation».*
4. *Incubator «Sikorsky challenge».*

Association of Industrial Automation of Ukraine (APPAU) is the leading national association uniting 300+ participant in the national movement 'Industry 4.0 in Ukraine' and playing the role of orchestrator and assets builder in the local innovative ecosystem.

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# Initiative #1: To develop programs of integration into European Value Chains

**Necessity**:

The war clearly showed dependence of Ukrainian supply chains and export on transport ways through Eastern European countries. Today there are many initiatives and ideas – from «dry ports» to logistics corridors (solidarity lanes etc.). UCA proposes to expand them also to programs of **greater integration into EU value chains**, which have already proven well, for example, in the automotive and textiles industries. Why can't these examples be extended to other industries, including the defense industry?

**Relevance to the wartime challenges**:

Similar programs, designed to significantly improve industrial cooperation between neighboring countries and supported by governments of Poland, Czech Republic, Slovakia, and Romania, would lead to a significant improvement in trade with Ukraine, creation of new jobs in all partner countries, and most importantly, they would allow to keep alive Ukrainian SMEs in many industry sectors, which are currently in a critical state.

**How it can work**:

Obviously, it is worth distinguishing several sub-programs here, and not to confuse, for example, logistics corridors with issues of production cooperation in the defense industry. The main mechanism for integration into VC: partners create working groups that consider a complex of problematic issues to accelerate integration of Ukrainian enterprises into East European VC. Clusters and industry associations on both sides are key actors in developing these proposals.

## Project #1: Collaboration of dual-use clusters of Europe with the focus on UA needs

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| **Participants** | UA side: APPAU, 5 EAM regional clusters, Association of defense technologies, Aerospace clusters (80 selected SMEs, developers and integrators).<br>EU side: key clusters and business associations from Europe having direct relation to dual-use technologies. |
| **Objectives** | • To unite and to coordinate EU-UA alliances in dual-use technologies.<br>• To ensure faster 'go-to-market' processes with regard to urgent needs of Ukrainian and Eastern Europe defense sectors.<br>• To enforce and grow UA industrial defense and dual-use technologies sectors. |
| **Activities** | • Series of C2C/B2B events / defining, profiling and prioritizing challenges, opportunities.<br>• Forming cluster initiatives and funding projects.<br>• Launch of 5-7 projects between UA-EU clusters (incl. possible production facilities in Czech Republic and Poland). |
| **Outcomes** | • Launch of Eastern Europe cluster collaboration in dual-use technologies.<br>• Improving resilience of value chain and capacities of defense sectors of Ukraine and other EE countries. |
| **Period and budgets** | TBD (exchanges to be launched ASAP). |

***Cases to be scaled up:*** *there is no (yet) dual-use cluster in UCA. Contrary, UCA* ***practices to group the limited cluster resources into one bigger pool with a centralized coordination****. Such Center (called Emergency Support Centers) was launched in Utilities sectors, Food and Industrial Engineering. Similar initiative is under development in dual-use technologies. Here UCA collaborates with Association 'Ukrainian Defense and Security Technologies' and unities SMEs & developers by industry or specialization in defense / dual-use technologies. Such initiatives are quite necessary today in Ukraine where there is a huge deficit of dual-use technologies. On the one hand, the local defense industry is significantly depressed, and on another hand, there are hundreds of volunteer groups but which struggle of lack of coordination.*

*As example, see the solutions from Infocom Ltd, one of the leaders of Industrial Automation market, but which heavily invests into dual-use robotic platform since 2015. Infocom looks for EU partners in this area.*

## Project #2: Logistic HUB in electrical engineering for restoration of critical infrastructure in Ukraine

*Problem: After devastating hostilities and missile strikes, the Ukrainian economy will be restored using modern technological solutions, including in electrical engineering.*

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| **Participants** | UA side: EAM clusters head by Kharkiv regional EAM cluster (SMEs developers and integrators of control systems and power distribution devices).<br>EU side: Slovakian clusters, business associations, SMEs distributors of electrical products, system integrators and developers of control systems and power distribution systems from Europe. |
| **Objectives** | • Assistance in restoration of critical infrastructure of Ukrainian cities, which was destroyed as a result of shelling by the russian federation (electrical substations, electricity distribution points, thermal power plants, pumping stations, etc.).<br>• Assistance in restoration and strengthening of power supply systems for social facilities (hospitals, orphanages, nursing homes, etc.).<br>• Assistance to the military on the frontline (electric generators, autonomous lighting and heating systems, etc.). |
| **Activities** | • Organization of a warehouse on the territory of the EU (Slovakia, Bratislava, Automatic Complex Systems s. r. o.).<br>• Reception, storage and consolidation of humanitarian aid.<br>• Identification of an object for assistance in cooperation with APPAU and regional EAM clusters.<br>• Delivery of humanitarian cargo to Ukraine to facility to which assistance is provided. |
| **Outcomes** | • Participation in projects for restoration of Ukraine.<br>• Assistance to the Ukrainian military.<br>• Assistance to critical infrastructure and country's activity. |
| **Period and budgets** | 1.5 years/ 10.5 mln euros. |

***Cases to be scaled up:*** *Considering different accommodation options, we settled on the ELAKS company (a member of the Kharkiv cluster), whose facilities have already been relocated to Bratislava, Slovakia. ELAKS has its own and successful experience in delivering electrical goods and services to Ukraine, with much better delivery times compared to traditional schemes. The idea of the project comes from this experience and involves creation of a single logistics center in Europe for permanent work and solving accumulated needs in Ukraine in electrical engineering.*

***Contact persons****: ELAKS, Vitalii Aksonenko, v.aksonenko@elaks.sk;*

*Kharkiv EAM cluster: Vitaliy Zaitsev, vitaliy.zaytsev@gmail.com.*

*Bratislava can serve as a hub between EU countries and Ukraine. The main office of ELAKS is relocated from Kharkiv to Rivne. ELAKS is the biggest panel builder in electrical engineering in Ukraine. They have relocated a part of facilities in Bratislava on March 2022.*

## Project #3: Technical standardization: improving the quality of technical standards in Ukraine in Oil & Gaz / Energy sectors, by setup of a modern metrological center

*Problem: the need to create the first verification and calibration center for gas meters for natural gas in Ukraine at an operating pressure of 1 to 40 bar in the range of an operating flow rate of 1 to 2500 m3/h for meters with a diameter of 50 to 200 mm.*

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| **Participants** | Ukrainian side: Kharkiv EAM cluster, State body 'NaftoGaz of Ukraine'/Ukrtransgaz.<br>EU side: TBD. |
| **Objectives** | • Creation of a modern metrological center for verification of both gas meters and accounting tools for alternative energy sources.<br>• Facilitating provision of quality infrastructure within defined value chains in accordance with European standards.<br>• Provision of new solutions to improve the quality infrastructure of Ukraine in the direction of green economy and digitalization. |
| **Activities** | • Exchange of the best European practices.<br>• Preparation for joint projects in the format of round tables.<br>• Analysis of possibilities of project implementation in view of integration into European LDVs and quality infrastructure improvement programs.<br>• Development of technical and economic justification of the project.<br>• Presentation of the project feasibility study to stakeholders.<br>• Finding and attracting funds for implementation of the project in Ukraine.<br>• Development of design and estimating documentation.<br>• Construction of the center.<br>• Joint participation in EU programs. |
| **Outcomes** | • Support and improvement of the quality infrastructure of Ukraine.<br>• Metrological center for accounting of gas and alternative energy sources is created.<br>• Procedure for using the center is determined together with European partners.<br>• Development plan for the center and additional examinations for Ukrainian and European consumers is developed. |
| **Period and budgets** | 2 years / 3,5 million euros. |

***Cases to be scaled up:*** *the city of Bogorodchany is conveniently located: 10 km from Ivano-Frankivsk, a large regional center, which houses the Ivano-Frankivsk National Technical University of Oil and Gas (a powerful scientific school) and the SE "IVANO-FRANKIVSKSTANDARDMETROLOGY", which stores the primary standard of Ukraine for gas consumption. Convenient location, proximity to potential consumers and scientific centers, as well as presence of a gas hub in Bogorodchany make choice of the city a good one for implementation of this project.*

***Contact person****: Oksana Sytnyk, oksana049@gmail.com.*

## Project #4: Creation of an engineering competence center for metalworking

*Problem: the project will improve training of engineering and technical specialists. It is possible to update the material and technical base – for training, conducting experiments, etc.*

*Renewal of research works, carrying out innovative examinations, including areas of digitization, research on the characteristics of metals, etc.*

*Improvement of specialization and professional standards in areas - mechanical processing of metals, welding processes and others.*

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| **Participants** | Ukrainian side: Kharkiv, Zaporizhzhia EAM clusters /Engineering services.<br>EU side: key clusters and/or associations specializing in engineering and ICT from the Czech Republic, Slovakia, Poland, Lithuania (Recovery curators in a certain sector / region in Ukraine). |
| **Objectives** | • Creation of centers of expertise / engineering consulting.<br>• Improving cooperation between local and foreign contractors and cluster organizations.<br>• Exchange of the best practices, study of mutual experience, integration into European value chains. |
| **Activities** | • Research of modern technologies in the field of metalworking / definition of the main needs of Ukrainian manufacturers.<br>• Exchange of the best practices.<br>• Organizational changes / personnel training.<br>• Market development for suppliers and contractors. |
| **Outcomes** | • Improved awareness of Ukrainian manufacturers about metalworking technologies.<br>• European partners are informed about the possibilities of cooperation in Ukraine.<br>• Creation of new cooperation projects, exchange of technologies and skills.<br>• Developed training and internship programs, exchange of personnel training experience. |
| **Period and budgets** | 2 years/10.2 million euros. |

***Cases to be scaled up:*** *Kharkiv, Zaporizhzhia, Mykolaiv, Dnipro are recognized cities of Ukraine with strong traditions and expertise in metalworking. Strong deindustrialization processes of the last decade degrade positions of big (post-soviet) enterprises when new SMEs are still growing. United in Industrial Engineering clusters, such SMEs need support of new quality standards, skills and technologies. The war only actualized and deepened these issues in all the mentioned cities. New competence center, specialized in metalworking, can provide shared assets and services for hundreds of SMEs, and so far foster and save their businesses.*

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*Andriy Karpenko, karpenko.a.v2@gmail.com.*

## Project №5: Development of practice-oriented training of specialists in automation, engineering and mechanical engineering

*Problem: Modern transformations of Ukraine in Industry 4.0 will require:*

- *Implementation of modern technologies and equipment for their implementation.*
- *Modern software and hardware.*
- *Creation of industrial value added chains, which will allow building new production systems.*
- *Highly qualified specialists who must perform all of the above.*

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| **Participants** | Ukrainian side: Vinnytsia Automation and Instrument Making Cluster, Kharkiv Regional EAM Cluster, Zaporizhzhia EAM Cluster, Ukrainian Maritime Cluster.<br>European side: Technical University of Kosice, Brno University, Klastr MECHATRONIKA (Czech Republic), Industry Innovation Cluster. |
| **Objectives** | • To increase efficiency of "university-business" relationships.<br>• To support development of high-tech SMEs through implementation of project-oriented training programs that involve solving real business problems (cases). |
| **Activities** | • Survey of business, formation of database of cases.<br>• Formation of project groups with participation of universities and businesses.<br>• Training of project groups.<br>• Monitoring resolution of cases.<br>• Examination of technical solutions.<br>• Development of recommendations for development of practice-oriented training of specialists. |
| **Outcomes** | • Solving part of the business problems presented in the case database.<br>• Identification of talented students and young scientists by conducting a competition for the best technical solutions.<br>• Update of scientific directions of universities.<br>• Involvement of business practitioners in educational process at universities. |
| **Period and budgets** | 1 year, 670.000 euros. |

## Project #6 Creation and organization of energy efficiency and energy management center

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| **Participants** | UA side: Sumy Machine-Building Cluster of Energy Equipment (developers and integrators of power equipment), Sumy regional state administration (Developer of the Strategy for economic recovery and development of the Sumy region until 2024).<br>EU side: key clusters, business association, SMEs distributors of energy control equipment, system integrators and developers of control systems and power distribution systems from Europe. |
| **Market problem** | The main problem of Ukraine's economy is an extremely high level of energy intensity of its industrial complex. Today, for Ukraine, this indicator is about 0.7 kgoe (kilograms of oil equivalent) / 1 USD of finished products. For example, this indicator for the USA is 0.12 kgoe / 1 USD, EU countries - 0.11-0.22 kgoe / 1 USD, Slovakia - 0.16 kgoe / 1 USD, China - 0.3 kgoe / 1 USD, the world average - 0.21 kgoe / 1 USD. High indicators of energy consumption make the products of the industrial complex uncompetitive, increase the cost of works in the service sector, the cost of heating the housing stock. |
| **Objectives** | • Implementation of state policy in the field of energy conservation, creation of an energy management system for enterprises and institutions;<br>• Informational and methodological support for implementation of promising scientific and technical projects in the field of energy-efficient technologies;<br>• Implementation of self-developed heat and energy consumption monitoring systems of enterprises and institutions with the aim of rationalizing energy consumption. |
| **Activities** | • Organization of Center for Energy Efficiency and Energy Management;<br>• Determination of the main criteria for assessing efficiency of heat and electricity consumption by industrial and household consumers, budget and private institutions and offices;<br>• Creation of systems for monitoring heat and energy consumption of enterprises, institutions and organizations;<br>• Development of heat, water and energy supply schemes for industrial facilities, state institutions, urban areas, cities, towns, etc. |
| **Outcomes** | • Implementation of the Sustainable Development Goals (SDGs) of the UN for 2015–2030 in the direction of Affordable and clean energy (SDG No. 7);<br>• Implementation of the state policy in the field of energy conservation and restoration of Ukraine (National program #10: Modernization of regions and housing in the amount of $227 billion), Strategy for economic recovery and development of the Sumy region until 2024 (in the direction of "Industrial complex" in the amount of $450 million);<br>• Annual reduction of energy resources by enterprises and institutions for: thermal energy at the level of 15%; electricity – at the level of 10%;<br>• Payback of project implementation measures within 5-7 years. |

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| **Period and budgets** | 18 months / 350,000.00 euros. |

***Cases to be scaled up:*** *implementation of the latest energy-saving measures and heat and energy consumption monitoring systems will allow identifying and reducing the main sources of inefficient energy use. In the future, this will increase competitiveness of products of the industrial complex and integrate Ukrainian manufacturers into the EU value added, create prerequisites for inflow of investments into the Ukrainian industrial complex.*

***Contact person****: Sumy Machine-Building Cluster of Energy Equipment, Vladyslav Kondus, info@e-cluster.org.*

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## Project #7 Design of energy-efficient parametric series of industrial pumps for water supply systems and pumping of contaminated liquids

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| **Participants** | UA side: Sumy Machine-Building Cluster of Energy Equipment (SME developers and integrators of pump equipment).<br>EU side: key clusters, business association, SMEs distributors of energy equipment, system integrators and developers of control systems and power distribution systems from Europe. |
| **Market problem** | High energy intensity of the industrial complex of Ukraine (see project #1) is caused by use of inefficient equipment, in particular industrial pumps, the share of energy consumption of which in some sectors of the economy can reach up to 60%. In view of this, development and introduction of energy-efficient pumping equipment for industrial enterprises and communal institutions are the first priority measures for integration of Ukrainian manufacturers into European value chains. |
| **Objectives** | • Development of parametric series of high-speed energy-efficient submersible pumps for water supply systems;<br>• Development of parametric series of high-speed energy-efficient torque-flow pumps for pumping contaminated liquids. |
| **Activities** | • Organization of a Center for Energy Efficiency and Energy Management;<br>• Determination of the main criteria for assessing efficiency of heat and electricity consumption by industrial and household consumers, budget and private institutions and offices;<br>• Creation of systems for monitoring heat and energy consumption of enterprises, institutions and organizations;<br>• Development of heat, water and energy supply schemes for industrial facilities, state institutions, urban areas, cities, towns, etc. |

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| **Outcomes** | • Implementation of the Sustainable Development Goals (SDGs) of the UN for 2015-2030 in the direction of Affordable and clean energy (SDG No. 7), industry, innovation and infrastructure (SDG No. 9), mitigation of the consequences of climate change (SDG No. 13);<br>• Implementation of the state policy in the field of energy conservation and restoration of Ukraine (National program #10: Modernization of regions and housing in the amount of $227 billion), Strategy for economic recovery and development of the Sumy region until 2024 (in the field of "Industrial complex" in the amount of $80 million);<br>• Increasing competitiveness of Ukrainian pumping equipment due to: increasing energy efficiency of pumps – up to 55%, reducing material capacity of pumps – up to 60%;<br>• Reducing the negative impact on the environment as a result of introduction of hermetic end seals;<br>• Payback of project implementation measures within 3–6 years. |
| **Period and budgets** | 18 months / 650,000.00 euros. |

***Cases to be scaled up:*** *a way to reduce the energy intensity of Ukraine's industrial complex can be deepening cooperation with European manufacturers of pumping equipment. It can be localization of production of their equipment on the territory of Ukraine (including large-scale assembly) and service partnership for repair of pumping equipment based on the capacities of enterprises of the Sumy machine-building cluster of energy equipment.*

***Contact persons****: Sumy Machine-Building Cluster of Energy Equipment, Vladyslav Kondus, info@e-cluster.org.*

*The level of electrical energy consumption by pumping equipment depending on the industry and the general level of energy consumption.*

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## Project #8 Development of generation capacities of alternative energy sources

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| **Participants** | UA side: Sumy Machine-Building Cluster of Energy Equipment (developers and integrators of power equipment), Sumy regional state administration (Developer of Strategy for economic recovery and development of the Sumy region until 2024).<br>EU side: key clusters, business association, SMEs distributors of energy control equipment, system integrators and developers of control systems and power distribution systems from Europe. |
| **Market problem** | A significant factor slowing down growth of Ukraine's economy in the post-war period is the limited power generation. This is due to the significant destruction caused by the russian federation and significant dependence on natural gas and |

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| | coal imports. In addition, use of these energy sources has a significant negative impact on the external environment. |
| **Objectives** | • Development of a network of energy-generating facilities based on renewable energy sources (wind, solar) to meet at least 25% of Sumy region's needs;<br>• Implementation of the Sustainable Development Goals (SDGs) of the UN for 2015–2030 in the direction of Affordable and clean energy (SDG No. 7); sustainable development of cities and communities (CSD No. 11), mitigating the consequences of climate change (CSD No. 13);<br>• Implementation of state policy in the field of energy conservation (National Program #4: Support of Europe's energy security and transition to a low-carbon economy, capacity building up to 30 GW). |
| **Activities** | • Determination of preferred type of alternative energy sources based on the possibilities of energy generation in the Sumy region;<br>• Determining number, location and total capacity of power generation facilities;<br>• Development of projects for energy generating facilities (including certification and connection to power grids);<br>• Construction and commissioning of power generating facilities. |
| **Outcomes** | • Ensuring stable, uninterrupted energy supply of enterprises and institutions, ensuring energy independence and improving ecological condition of the Sumy region;<br>• Reduction of consumption of fossil energy resources;<br>• Achieving high rates of electricity generation due to the use of our own innovative systems for analyzing and forecasting the wind situation in specific locations;<br>• Providing electricity from renewable energy sources (RES) for at least 25% of Sumy region's needs. |
| **Period and budgets** | 18 months / 15 mln euros. |

***Cases to be scaled up:*** *creation of a powerful network of energy-generating facilities based on alternative energy sources will reduce risks of lack of fuel for power plants, and reduce the negative impact on the environment.*

***Contact person****: Sumy Machine-Building Cluster of Energy Equipment, Vladyslav Kondus, info@e-cluster.org.*

## Project #9: Expanding possibilities of serial production of braking equipment for railway cars

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| **Participants** | UA side: Sumy Machine-Building Cluster of Energy Equipment (developers and integrators of power equipment).<br>EU side: key clusters, business association, SMEs distributors of railroad transport equipment, system integrators and developers of railroad systems from Europe. |
| **Market problem** | • Significant degree of wear and tear of the stock of railway cars in Ukraine;<br>• Completing railway wagons of Ukrainian manufacturers with components from the russian federation. |
| **Objectives** | • Increasing production volumes of mastered products for freight cars (air distributor 483MU, brake cylinder 188B, regulator of brake lever gears RTRP-675M, auto mode cargo 265A-1, connecting sleeve P17B, end valve 190);<br>• Installation of new products for freight cars (710 model brake cylinder, 265A-4U cargo auto mode, RTRP-300U automatic brake lever gear regulator);<br>• Development of braking equipment for passenger railway carriages. |
| **Activities** | • Expanding machine park capacity and equipping its own testing complex;<br>• Development and approval of design and technological documentation. |
| **Outcomes** | • Expansion of production capacities of the Sumy Machine-Building Cluster of Energy Equipment members;<br>• Satisfying the needs of Ukrainian carriage-building enterprises for products that were previously imported (mainly from the russian federation) and analogues are not produced in Ukraine;<br>• Integration of products of braking systems of freight and passenger railway carriages into European value-added chains;<br>• Payback of project implementation measures within 5-7 years. |
| **Period and budgets** | 18 months / 300,000.00 euros. |

***Cases to be scaled up:*** *Import substitution of components of railway cars, which were previously imported from the russian federation, will allow:*

- *to localize their production in Ukraine;*
- *modernize railway transport of Ukraine;*
- *to create prerequisites for entry of Ukrainian enterprises into EU car manufacturing value added chains.*

***Contact person****: Sumy Machine-Building Cluster of Energy Equipment, Vladyslav Kondus, info@e-cluster.org.*

## Initiative #2: To better integrate Ukrainian engineering potential, which includes outsourcing engineering services

Most engineering companies, SMEs from industrial high-tech sectors today have lost their markets in Ukraine by 50-90%. In the absence of government orders and exports, these enterprises will be forced to go bankrupt or completely change the field of activity. This means extremely negative consequences for a number of critical industries, first of all, the defense industry, where personnel and production infrastructure are based on these sectors.

**Relevance to the wartime challenges**:

Survival of these sectors will mean keeping alive the domestic defense industry and other medium-high-tech sectors.

**How it can work**:

The program can be implemented through common participation in the Recovery program of Ukraine, and as a sub-program of a larger strategy of better integration in value chains in Advanced Manufacturing in Eastern Europe.

The pathway goes through 3 main stages:

1. Support of UA industrial developers & SMEs in surviving during the wartimes by outsourcing their staff in own projects in the EU and worldwide.
2. Inviting the EU partners into projects of Recovery of Ukraine.
3. Building together strong partnership in providing new innovation solutions across Europe.

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## Project #1: Development of interconnection and partnership between developers and system integrators from Ukraine and Eastern Europe / Baltic countries in Advanced Manufacturing

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| **Participants** | UA side: APPAU and 5 EAM regional clusters (50 selected SMEs, developers and Control / IT System integrators).<br>EU side: key clusters and business association from Eastern Europe (50 selected SMEs, contractors, CSI and software houses). |
| **Objectives** | • Support UA SMEs in wartimes: outsourcing & subcontracting of 30 companies from UA.<br>• Matching to key opportunities in Recovery program of Ukraine with the following joint entering into 30 big projects in Ukraine.<br>• Providing new innovative solutions across Europe. |
| **Activities** | • Targeted campaign of matching key SMEs from both sides.<br>• Activities for approaching and outsourcing UA SMEs. |

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| | • Analysis of opportunities in Recovery programs and targeting the common ones.<br>• Preparing to joint projects / regular exchanges and setup of best practices.<br>• Common participation in EU programs. |
| **Outcomes** | • Maintaining and improving the level of local CSI/IT & developers in Ukraine, services to local end users.<br>• Common participation in at least 30 Recovery projects.<br>• Established common level of high standards in Automation / IT Industrial Systems in majority of Recovery projects with respect to the best quality standards (CSIA, ISO, IEC relevant to Industry 4.0).<br>• Increased engagement and participation of developers and SMEs and startups in Digital / Horizon Europe (from both sides). |
| **Period and budgets** | 2 years / 1,2 million euros. |

***Cases to be scaled up:*** *Luigi de Bernandini, CEO of Autoware (Italy) and Alex Chausovsky (Miller Group, US) are key ambassadors, who highly contributed to APPAU members integrations into CSIA, the leading US association of Control System Integrators. They generated a set of initiatives which already have supported APPAU and increased our capacity to go global. For instance, the Land4Developpers project is under complete rebuilding due to funding organized by Luigi de Bernandini with CSIA.*


*Luigi de Bernandini promotes the initiative «Professionals4Ukraine» at CSIA conference in Denver, US, June 22 2022*

*What if such an initiative could be replicated in EU countries? Can we build trust together and overcome risks that many potential contractors still have considering outsourcing in UA industrial CSI & developers? Can we 'package' such stuff into more inspiring and more concrete perspectives of common participation in big projects across Ukraine & EU in the after war period?*

***Contact person**: Andriy Krotuyk, a.krotyuk@azov-controls.com.*

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## Initiative #3: To support Ukrainian critical industries by providing international technical assistance in smooth operation of enterprises and closing gaps in internal supply chains

These industries include production of medicines and medical equipment, food and processing, light industry, energy, critical infrastructure, construction, defense industry (including mechanical engineering). Critical industries are the basis of economic and military fronts. The first months of the war showed vulnerability of certain infrastructure segments, energy and medicine – such as the need for faster recovery after emergency shutdowns, disruptions in supply chains and shortages of personnel.

**Relevance to the wartime challenges**:

Critical sectors provide the population and the Armed Forces with basic necessities (food, clothing, medicine), living conditions (housing, energy, water). Defense industry is (should be) the basis for maintenance and self-support of the domestic armed forces in conditions of complete dependence on Western supplies of weapons and equipment.

**How it can work**:

Clusters and business associations of a partner country take over a specific branch segment of critical industry, together with a relevant cluster or Ukrainian association, consider a set of the most relevant priorities, and propose solutions. These solutions include both mobilization of own resources and involvement of assistance at the level of one's country or the EU.

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## Project #1: Creation of Emergency Support Centers in Utilities sector

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| **Participants** | UA side: Kyiv, Sumy, Kharkiv, Chernihiv, Zhytomyr, Zakarpattia regions / utilities.<br>EU side: key clusters and / or associations specialized in Utilities and ITC sectors from Czech Republic, Slovakia, Poland, Lithuania (curators of reconstruction in the given sector). |
| **Objectives** | • Improve availability of utilities services for population by modernizing and digitalizing existing structures.<br>• Creation and management of the project portfolio for the future modernization / reconstruction utility sectors.<br>• Improving collaboration between local and foreign contractors & cluster organizations. |
| **Activities** | • Survey of Utilities sectors / defining main needs.<br>• Exchanges of the best practices / setup of ESC model according to benchmark.<br>• Organizational changes / staff training.<br>• Development of marketplace for suppliers and contractors.<br>• Developing preproject proposals and project portfolio. |
| **Outcomes** | • Improved capabilities of communities to attract investors and the Ukrainian state to support stakeholders by expanding capacities of Utilities services structures to respond to critical situations -> improved availability of Utility services (heat, water, electricity) for population.<br>• Creation of new services and jobs for local communities incl. local clusters.<br>• Smart cities and regions: approaching to the best EU standards and practices, more sustainable and energy saving management. |
| **Period and budgets** | 2 years / 1.5 million euros. |

***Cases to be scaled up:*** *such a project (63k GBP, 6 months) has been already considered by the APPAU and the Sumy region cluster of Energy equipment. It was adopted to the terms of the call on June 22, led by the UK embassy in Ukraine. It can be improved and extended to more complex RFP incl. international collaboration. But it is worth considering and it is useful as it proposes new ideas and initiatives of ESC based on collaborative approach and digital technologies. See in details here. This case appeals to the large market problem linked to low maturity levels of end users in utilities. In particular, all they have obsolete processes and lack of modern skills. APPAU, inspired by Belgium BEMAS, regularly raises such issues on its Asset Performance Management conference.*

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## Initiative #4: Joint projects on the topic of circular and low-carbon economy

**Necessity**:

As noted in the new annual study The Circularity Gap Report: “The global economy is now only 7.2% circular and it’s getting worse year after year — driven by rising material extraction and use. The global economy increasingly relies on materials from virgin sources.” In Ukraine, the numbers are noticeably lower in terms of Circularity. russia's aggression also affected the field of recycling of secondary raw materials.

The Ukrainian economy is focused on the market of the European Union, including in the context of the twin green & digital transition. These things are described in some detail in the new EU Green Deal.

**Relevance to the wartime challenges**:

New circular business models can give the economy a boost. Especially in conditions of limited resources. This is particularly noticeable in the example of the sharing economy.

**How it can work**:

We are ready to consider potential partnership with companies working in the field of secondary materials recycling, repair/restoration of equipment and machinery, ICT Standardization supporting Circular Economy, Disclosure and data analytics on the Circular Economy etc. The Ukrainian side is ready to provide up-to-date information on the state and market participants, organize legal and economic preparation of joint projects at the local and national levels.

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## Project #1: Collaboration of clusters of Europe with the focus on circular economy

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| **Participants** | UA side: APPAU, 5 EAM regional clusters, members of the UCA Sustainable committee.<br>EU side: key clusters and business associations from Europe directly related to circular economy. |
| **Objectives** | • To unite and to coordinate EU-UA alliances in circular economy.<br>• To ensure faster ‘go-to-market’ processes with regard to circular economy.<br>• To enforce and grow UA industrial sectors in terms of circularity. |
| **Activities** | • Series of C2C/B2B events / defining, profiling and prioritizing challenges, opportunities.<br>• Forming cluster initiatives and funding projects.<br>• Launch of 5-7 projects between UA-EU clusters (incl. possible production facilities in the Czech Republic and Poland). |

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| **Outcomes** | • Launch of Eastern Europe cluster collaboration in circular economy.<br>• Improving level of circularity in industrial sectors of Ukraine and other EE countries. |
| **Period and budgets** | TBD (exchanges to be launched ASAP). |

***Cases to be scaled up:*** *there is no (yet) circular economy cases among UCA clusters.*

*Circular economy has been on the agenda in Ukraine only in recent years, so there are no bright examples yet. This, in turn, means that there is a potential in this direction and an opportunity to become a leader of change.*

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