ResilEast-program

How can the eastern border regions increase their resilience, the defense capabilities of their states, and at the same time improve both their economy and the state of the environment?

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1. Introduction

Strengthening the EU's eastern border against the threat posed by Russia has received new international attention as a means of ensuring European security. **European Union member states, especially on the eastern border, must ensure that our societies function in times of war, peace and foreign interference in the case of hybrid warfare actions.**

The transition to a carbon-free economy has become a key measure to improve Europe's competitiveness. **ResilEast is a programme to enhance Europe's carbon-free energy supply, resilience and security by ensuring infrastructure, energy supply and defence function in all situations.** ResilEast supports the EU's Preparedness Strategy, based on President Niinistö's report.

ResilEast is a component of the EU Defence White Paper implementation and a concrete follow-up to the Eastern Finland Program. **The ResilEast program is based on the premise that close local and international cooperation and innovative investments can simultaneously increase both defence capability and economic productivity while reducing overall costs and environmental impacts.**

The programme area can be expanded to cover the entire eastern border of the EU and NATO and the Baltic Sea region. ResilEast touches on or covers the development of energy production and networks, national defence, data, road and rail networks, personal and equipment protection, crisis medical care and rescue services infrastructure. This is a broad change linked to the core functions of society, which is also an economically viable investment. **The aim is for eastern Finland to take the initial and pilot responsibility for the development of the ResilEast programme, with other eastern European regions and Europe increasing their share as the programme progresses.**
Whereas European demand for renewable energy is increasing, so are the challenges. Finland's success in generating emission-free, renewable energy for use in domestic manufacturing has caught the interest of other European countries. In particular, Eastern Finland offers unique opportunities with substantial, untapped potential to fill the demand. However, to create the needed supply, common will and understanding between all parties in the region is needed.
Our studies are most advanced for the Finnish market so going forward, we will describe the ResilEast program mainly through the example of Finland. Similar supporting information would be needed to perform a full analysis of potential in other eastern regions of the EU.

The broader the consensus within the region, the better Eastern Finland's opportunities are. Eastern Finland can greatly contribute to the larger regional goals for European security and competitiveness as represented by EU plans and funding. Eastern Finland can function as a trend-setter for other countries on the EU's eastern border. **This unique opportunity to present forward looking solutions rarely arises.**

2. Civil security and regional development

The operational models for Finnish civil security have been shaped over a long period of time. The total national defence model, shaped by experiences of World War II, aims at ensuring that civil society is able to fully support military readiness. The time of peace and development of the welfare society have shifted the emphasis of preparedness to economic preparedness and, in particular, to ensuring the uninterrupted operation of industrial activities and infrastructure. This is the aim of the Finnish security of supply concept, established in the 1990s.

During the first decades of the Millenium a comprehensive security model has been introduced, the aim of which is to secure the functions of different sectors of society in all circumstances. The focus is on the active participation of the entire society: individuals, companies, communities and authorities. The basic idea is that careful management of normal conditions creates basis for preparation for all disruptions, including extreme exceptional circumstances. Alongside the preparedness organizations of the security authorities, the preparedness of different administrative branches is based on both regulation of exceptional situations and emergencies and ensuring the sustainable arrangements for normal conditions.

Regional development is part of the EU's cohesion policy, which aims at reducing disparities between regions in terms of economy and vitality. The national implementation of this policy offers significant means for strengthening regional and national resilience. Vibrant regions create the basis and economic foundations for maintaining security in all its forms and dimensions.

The ResilEast programme offers solutions to key issues of coordinating overall security and regional development by creatively exploiting the potential of the regions. The starting point for regional development is location-based regional cooperation based on the resources and strengths of each region. This region-oriented way of thinking is central when building the common crisis resilience and defence support of the border regions of Eastern Finland and Europe more broadly through the ResilEast programme. The impacts on regional vitality, energy and transport infrastructure, supply and production security are essential. This strengthens regional economies.

The vitality impact of the ResilEast programme is focused on research, development and innovation activities. The aim is to strengthen local administrations, research, education and business ecosystems, which increases regional and national resilience. The growth and internationalisation of all companies, especially SMEs, is vital for Eastern Finland and Europe. The jobs created through this promote the retention and migration of an educated, young population to localities, which in turn strengthens the basis for the production of public services. A vibrant population base is a significant security factor and a necessary prerequisite for securing and strengthening the critical functions of the region. A broad investment programme that increases security is the most effective and, over time, the most cost-effective way known to create a positive cycle and create a common will and the participation of various actors to defend the region with wider international forces.

3. Increasing military support and security through the ResilEast program

Snapshot

The Finnish Government Defence Report 2025:5 (later VPS) discusses the starting point of the military security component of the ResilEast programme, among other things, as follows: *"In accordance with the principle of comprehensive national defence, Finland's defence relies on the support of society. Finland must have the continuous ability to respond to wide-ranging influence, long-term military pressure and large-scale warfare lasting for years with national resources and as part of NATO. During the reporting period, military mobility, logistics, host country support and advance storage and the infrastructure required for them will be developed. Large-scale, long-term and high-intensity warfare has returned to Europe. Military preparedness and civil protection are based on the same threat scenarios. Society's strong ability to protect the civilian population and critical infrastructure from weapons impacts will enable the continuation of activities important to military defence."* (VPS p.8, p.9 p.79)

The above analysis raises the question of how civil society maximize support for defence and resilience without putting too much strain on the economy? The ResilEast program provides an alternative that takes into account the development and the vitality/prosperity at regions being defended and the economic sustainability of states and municipalities. The key added value of the ResilEast program is to be a winner in the battles for vitality/prosperity, economy and clean energy in peacetime, in addition to times of crisis and war.

Medical care, rescue operations and emergency services is an essential component of military security in times of crisis. To maintain survivability, these services must be decentralized, protected and rapidly scalable. The ResilEast program offers new solutions in these respects.
Based on the experiences of Ukraine, long-range weapon systems, unmanned aerial vehicles (drones) and ballistic missiles plus the return of "traditional" heavy warfare using hardened fortifications and artillery, defence infrastructure requires new countermeasures for survivability. The ResilEast program seeks solutions to enhance defence infrastructure with multi-use solutions based on civilian and energy structures.

In addition to hardened protection, the networks required by the energy system with their network devices can be built crisis-resistant, completely protected and hidden underground. This multi-use, joint construction concept will benefit both military and civil applications. This requires that the location, arrangement, proximity to the border, support facilities and structural protections of the asset infrastructure are determined with increasing survivability the closer you are to potential areas of risk.

Dormant fortresses at reasonable cost or even profitable

"The performance of the Army consists of mobility, firepower and protection." (VPS p.10) The ResilEast program can be used to produce substantial added value for mobility and protection. The construction of energy production and network systems requires major transportation, electricity and data network construction projects in parallel. This is especially true for construction of wind power assets.

When the network is designed for a dual-use defence role, it's possible to synergize defence transportation network requirements along the same heavy traffic routes without any significant additional costs. Properly designed and located construction projects also provide excellent opportunities to build even large, permanent protection structures at substantially lower costs if they're implemented in connection with or near energy production facilities. ResilEast supports networked fortifications while energy structures share costs and bring a return on investments. Fortifications and defence-supporting infrastructure can be implemented affordably and with high quality.

Military mobility

In addition to improving mobility on forest roads needed by power plants in the vicinity of hardened shelters, the ResilEast program adds to and improves larger and international transportation networks. The construction and strengthening of roads, bridges, railways and even airports required by a large-scale energy and infrastructure project such as the ResilEast program also serves the needs of international defense. In particular, most west-east connections, especially Lapland, will require investments to improve mobility and accessibility. A decision has already been made to build a rail connection from Narvik Norway to northwest Finland. The needs for mobility, especially with regard to heavy loads needed for constructing and maintaining power facilities during peacetime and various requirements in times of conflict have strongly converged with each other. It's essential that the movement of troops and material from west to east is ensured under all circumstances, while hostile movement from east to west across the border must be made as difficult as possible.

Civilian infrastructure support for soldiers

Modern national defence is increasingly dependent on data, electricity and fuel networks. In connection with the ResilEast program, robust electricity and data connections are being built for power plants and industrial use in connection with each wind and solar power plant. It's logical to consider these assets as multi-use. Otherwise, the construction of dedicated military use assets built in parallel can provide an economical solution at fractional cost. *"At the same time, the sufficient capacity and operational reliability of national and external telecommunications networks are emphasized."* (VPS p.72) Industrial plants and other facilities, and of these, data centers in particular, require significant reserve power, which is worth using in the ResilEast areas as a broader reserve power and as a balancer for the network and electricity prices. Protected reserve power facilities can also be built relatively easily in connection with the power plants.

"Fuel storage, transport and distribution capabilities will be improved with national and multinational solutions. Additional storage capacity will be acquired for the Defence Forces from partners." (VPS p.73) The Defence Report states that the needs for fuel distribution and storage can be partly combined with civilian needs and the decentralisation of stocks can be implemented quickly. The ResilEast programme also offers a completely new, more environmentally friendly perspective on defence fuel supply in Finland. Combining carbon dioxide emissions from wood processing in Eastern Finland with hydrogen produced with electricity will enable significant production of so-called e-fuels in the region.

In connection with the ResilEast program, it is reasonable and possible to produce fuels for domestic use, export, defence and reserve power needs. *"The controlled transition of national defense towards carbon neutrality is a major challenge, for which a solution must also be sought in international cooperation, especially in NATO and the EU. National defense will still need fossil fuels for a long time, but other energy sources and solutions related to the diversity of energy sources and the decentralization of production must be developed alongside them."* (VPS p.104) If the ResilEast program is implemented extensively, the Defence Forces will make a step-change green transition significantly improve their defence capabilities in parallel. Eastern Finland could therefore be an optimal place to pilot the military's transition to low-emission fuels, especially since Finland has traditionally been a leading developer of low-emission diesel fuels.

In terms of maritime defence, ResilEast program integrates offshore wind farms with emerging defence requirements. Support facilities for drone operations or radar/passive sensor installations are part of the dual-use concept. Baltic Sea maritime defence integration with other European and NATO allies is a key objective to provide a comprehensive and integrated situational awareness and provide more effective response options to crisis events. New innovations in sensors and artificial intelligence enable more diverse and therefore more effective situational picture and response solutions than currently available. *"The performance of maritime defence is based on comprehensive operational environment awareness and combat-resistant situational picture and leadership."* (VPS p.66)

The Air Force requires increasingly improved situational awareness, and especially ballistic missiles and their countermeasures over large areas require new solutions from NATO. A substantial increase in air surveillance protection, mobility, and wide baseline of over the horizon sensors is one of the possibilities included in the ResilEast program. The number of wind towers and solar panel fields, which will reach thousands, can also be used as a producer of various defence-supporting infrastructure. *"The goal is also to improve the reach and observation capability of air surveillance, as well as the detection and tracking capability of ballistic missiles. During the reporting period, the regional coverage, layering, and target designation capabilities of air defence will be increased, and the development of mobile air defence combat methods will continue."* (VPS p.68)

Social and community support and enabling defense

Defence is above all about enabling movement and the flow of energy, maintenance and information. In addition to these, community support is an important psychological motivation factor for the defending forces. It should be noted that the protection provided by fortifications and terrain significantly increases defence capability against various threats. ResilEast contributes to all those above intangible benefits, to include giving the feeling of equitable development across different regions.

Wind power solutions in Eastern Finland provide an opportunity to improve vitality/prosperity, and at the same time widely strengthen our ability to defend ourselves. In this context, the shadows and interference caused by wind turbines on radar coverage must be resolved or their impact minimized/replaced with other

technical solutions. The aim of the ResilEast programme is to create a better, more diverse and more fault-tolerant situation for defence in both peacetime and crisis.

4. Resilience and vitality through energy

The impact of energy on the development of vitality and resilience

Historically, energy availability has driven the progression of eastern Finland. For example, the economical and industrial evolution of Imatra, Varkaus and Joensuu cities depended upon reliable supply of energy. The traditional source of energy has been hydropower. As time progressed, wind, solar, nuclear and biomass developed as prevalent sources of electrical power. However, the need for power for transport and many industrial processes still largely rely on fossil energy sources. The need for power, and especially electrical power, will continue to grow significantly. This is due to the shift away from fossil sources and the transition of industrial processes, especially in the steel industry from coal to electricity. Most notably, the enormous energy demand, especially in the cold north, required by artificial intelligence and data management is outpacing all other electrical consumer needs. Electricity is the raw material of the future, replacing fossil energy and many raw materials.

Fossil fuels have been the most dependable and relied-upon form of energy reserve within Finland. Backup storage, decentralized distribution system and mobility have been, and still are, based on fossil fuels. In terms of resilience, our electricity grid does not differ significantly from other typical transmission facilities and has vulnerabilities in time of conflict as seen in Ukraine. After the destruction of utility based transmission facilities in Ukraine, the supply of electricity is largely dependent on private generators using fossil fuels. This situation leads to the question; **How can we maintain and increase our level of resilience as our society continues to become more dependent on electricity?** The ResilEast program is used to find answers to this question and provides significant counter measures. The processing of carbon dioxide into methanol using electricity and further conversion into alternative fuels such as jet fuel/diesel is one possible and likely option for overcoming the challenge. Redesign, protecting and doubling the electricity grid in eastern Finland is part of a broad strengthening of the network in the new situation of increased energy demand.

ResilEast is a program centered around building energy production, distribution and industrial (energy to products) processing chains. The end products include heat, data, fuels, fertilizers, food, raw materials (steel, carbon fiber, etc.) and transport. These extensive energy structures and networks are being built in a crisis-resistant and defense-supporting manner.

This presentation will further discuss wind power in principle, as wind is the largest and currently most cost-effective opportunity for producing large amounts of energy in eastern Finland. In addition to wind power, the ResilEast program also needs to include other energy production options, including:

- Solar power, which supports wind power production well and is easier to locate near settlements.

- Nuclear power, which, especially in the case of small nuclear (SMR) power plants, is suitable as a large heat producer near large cities, but is an attractive, static target in time of conflict.
- Hydropower, which is very necessary as a regulating power, especially in winter periods. As a regulating power solution, pumped storage power plants also need to be included as part of the overall resilience package. Kainuu and Lapland in particular have good opportunities for hydro.

The potential of wind power and free biogenic carbon dioxide in eastern Finland
The prosperity of Eastern Finland can be built on renewable, wind-generated electricity and biogenic (wood-derived) carbon dioxide. The potential is enormous in terms of investments, employment and new industries, export products and a strengthening trade balance.
The potential economic and employment impacts of wind power can be assessed based on the number of wind turbines to be built and rate of development. The area under assessment consists of Kymivalley, South Karelia, North Karelia, South Savo, North Savo and Kainuu. We are not yet taking a position on North Ostrobothnia and Lapland at this stage as they require further studies.

Wind power production in Finland increased (37%) to 19.9 TWh in 2024. Total electricity consumption increased by three percent to 82.7 TWh in 2024. Electricity production in Finland increased by two percent and wind power production exceeded hydropower production for the first time. (Statistics Finland) However, recent massive investment plans, especially in data centers, will have a strong impact on electricity demand.

The estimated economic and employment impacts of the wind power potential are based on the Savikko & Hokkanen 2023 report, the latest regional plans and the Ramboll 2023 report, as well as LUT-university reports. The assessment is based on distances to settlements, roads, nature reserves and waterways.

According to an optimistic estimate, the region has a total construction potential of 13,019 wind turbines, which would result in wind turbine investments of almost 100 billion euros.

The economic impacts, calculated based on a 46-year operating period, would then be approximately:

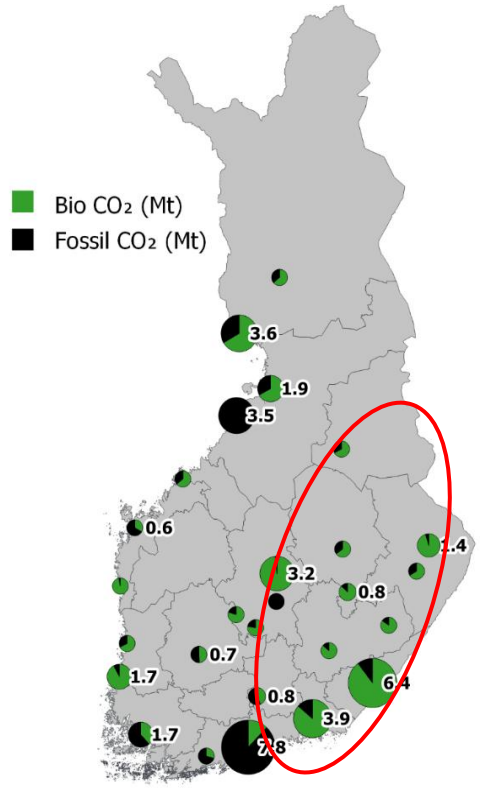
- Increase in GDP/BTK: €431 billion
- Tax revenue: €174 billion
- Person-years: 1,235,000
- Energy production: 266 TWh/year (more than three times the electricity production in Finland in 2023)

According to a conservative estimate, the construction potential of the region is a total of 6,186 wind turbines, which would result in turbine investments of approximately EUR 37 billion.

The economic impacts, calculated based on a 46-year operation period, are:

- Increase in GDP/BTK: EUR 205 billion
- Tax revenue: EUR 83 billion
- Person-years: 587,000
- Energy production: 126 TWh/year

At the end of February, there were a total of 326,400 job seekers (12% of the workforce) in municipal employment services, of which approximately 220,000 (67.4%) live in Kymivalley, South Karelia, North Karelia, South Savo, North Savo and Kainuu. The figure is 1.2% higher than a year ago. The construction and services sectors have been negatively impacted by the effects of the war in Ukraine.
According to an optimistic estimate, the employment impact of wind power is approximately 26,000 person-years per year. When our country's employment rate is an average of 72%, this means that the working-age population of a medium-sized city (population approx. 36,000) such as Kajaani will be employed for 46 years. The construction of wind power has largely been the work of international specialists, however the surrounding road infrastructure, networks, services and especially energy processing plants provide local construction and operations employment. This calculation only applies to the estimated work directly related to wind power plants.
Eastern Finland has approximately 11 Mt of bio-based carbon dioxide based on the 2022 CO2 statistics. This is over 50% of all bio-based carbon dioxide in Finland.



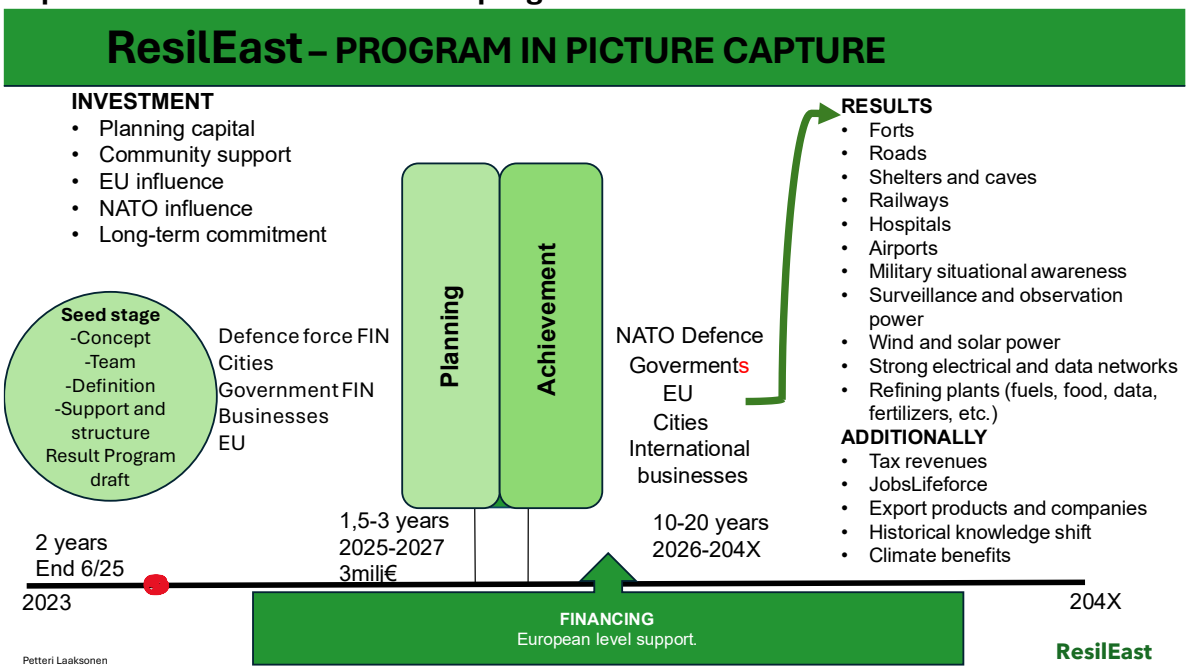
Green carbon dioxide in Eastern Finland

If carbon dioxide is to be processed into methanol, the electricity requirement is 112 TWh. The amount of methanol produced would then be approximately 11 Mt/a. Based on this, the annual turnover would be 11 billion EUR/year, assuming that the price of a tonne of carbon-free methanol would be €1,000, or €1.26/litre (Methanol is 26% less

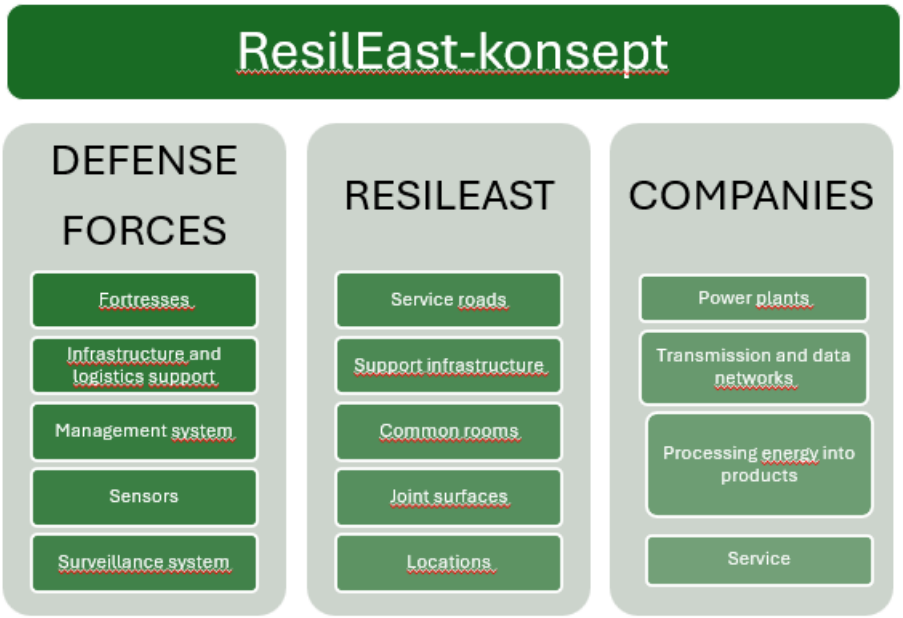
than the weight of water). The cost comparison between carbon-free and fossil fuels must also consider other costs of emissions trading and climate change, the fluctuation and uncertainty of future prices, and the long comparison period. The energy content of the produced energy would exceed the annual fuel consumption of Finnish land transport. The prerequisite is the willingness of the forest industry to sell bio-based carbon dioxide.

The energy solutions will depend on the market and several other variables over the long term of the program, so it's not appropriate to narrowly define the solutions at this stage. Permanent structures such as roads, electricity and data networks, shelters and selected foundations can be relied upon for multiple applications over coming decades. Over the lifetime of the ResilEast program, local investment projects will be implemented based on the continuous evaluation of evolving needs and conditions.

5. Implementation of the ResilEast program



The preparation of the ResilEast program has been carried out as voluntary work with the intent of completing the seed phase, publishing the program concept and defining follow on actions within the summer of 2025. Continued development and planning of the comprehensive program requires secured funding. Detailed planning should begin as soon as possible, within the second half of 2025. The duration of the pilot, which will begin in the final stages of planning, and full implementation of the program would be a minimum of 15 years. This program duration requires a long-term commitment and will be updated based on needs, market forecasts, technology and geopolitical changes.



The main principle of implementing cooperation between companies and the Defence Forces requires civilian construction and technology companies operate as normally as possible, taking into account the interfaces and critical ownership and operator restrictions as defined within the ResilEast concept. It's necessary to create a public/state management entity to interface between the Defence Forces and civilian companies. The management entity is responsible for coordinating the joint key functions mentioned above. The realization of the goal of providing the greatest possible defence support requires both a clear definition of needs in the Defence Forces and NATO defence planning process, as well as sufficient commitment to a broad and long-term development programme.

Financing

Investments in defence and energy networks are often seen as unrelated to investments in well-being. The discussion then turns to "either/or" options. The ResilEast situation provides "both-and **+**" solutions. Growth investments strengthen defence, vitality and, as a plus, resilience. The ResilEast program offers new opportunities for financing defence mobility and protection. Resources would also remain for other needs as energy investments and economic growth facilitate revenues in addition to cost savings.

The program will bring in private funding and, with a sufficient scale and holistic thinking, also improve the possibilities for EU funding. In this context, Finland will have the opportunity to demand its share of the costs of border (1,340 km) defence infrastructure, support for innovative solutions and the costs of energy transmission networks. *"Finland aims to ensure that sufficient and long-term EU funding is reserved for military mobility and that joint funding could be applied for in the long term also for targets outside the pan-European transport network but most critical for military mobility and for improving dual-use."* (VPS p.81) *"Changes in the security situation and*

Finland's international commitments require significant investments in infrastructure supporting national defence throughout the 2020s." (VPS p.103)
ResilEast also enables solutions where military infrastructure (such as roads or power/communication grids) is created as a by-product of energy infrastructure or where infrastructure, such as shelters, can be put to other productive use during peacetime.

6. Summary of the ResilEast business idea and its significance for security and vitality

The core of the ResilEast program is to combine the needs of defence with a strong increase in vitality and resilience in areas of elevated defence considerations. The operating model supports defence in a cost-effective and productive manner. The final value of productivity depends on market conditions and political decisions in power plant construction. In addition to strengthening economic growth and security, the program provides a process that supports morale crisis resilience, in which border regions can actively utilize their own organic (DNA kind) advantages to develop and strengthen their homeland in parallel.

However, the most important outcome of the ResilEast program is not a concept, program, declarations or plans. The outcome of the ResilEast program should be measured by concrete structures, defence capability, society's crisis tolerance and positive cash flow. The most significant challenge in implementing the program is the weak investment environment in the eastern border region. The eastern region requires energy consumers, transmission infrastructure, functioning markets and a skilled workforce at the same time. All of this can be remedied with a holistic program. The success of ResilEast requires a broad cultural change and raising the bar of expectations/goals to a new level.

7. Recommendations for action for the ResilEast program for Finland

ResilEast planning project (1-3 years):

- Build a planning funding package in cooperation with Eastern Finland
- Create a joint regional ResilEast development structure for Eastern Finland
- Create a military-civilian interface concept and decision-making process
- Network framework proposal for the necessary support infrastructure by region (roads, railways, data, electricity, preliminary locations of power plants and structures)
- Define development programs for universities, colleges and companies
- Cost estimates for different areas and alternatives in Finland
- Identify skills and workforce needs and define training needs
- Productize the operational concept to make it scalable
- Create a network with other border and critical maritime countries and proposals for expanding the program model

Proposal for measures by the Finnish government

- Create the necessary conditions for the Defence Forces to resolve the radar and visibility issue with wind power
- Support the creation of a development and innovation hub built around the ResilEast programme and the allocation of resources
- Build broad parliamentary support for across parliamentary terms for the implementation of the programme in the coming decades during the planning process (1-3 years)
- Influence at the European level to obtain support and funding for the programme for Finland as part of the EU's new financial frameworks and from the funding sources of the current frameworks.
- Take a leading role in developing the resilience and defence of European border regions

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ResilEast program authors

Jari Sistonen eastern region entrepreneur , U-Cont Ltd, Energy Cluster North Savo
Petteri Laaksonen, Research Director, LUT University
Markku Keinänen, Ambassador emeritus
Harriet Lonka, FT
Joonas Hänninen, mayor city of Varkaus
Jami Holtari, DI, managing director, Suomen Vetylaakso ry
Tommi Siikaniva, VTM, communications specialist, Suomen Vetylaakso ry

More information about the ResilEast program

Jari Sistonen +358 40 551 0580; jari.sistonen@u-cont.fi (ResilEast entity, defense support, energy resilience)
Petteri Laaksonen; +358 40 508 8498 petteri.laaksonen@lut.fi (energy, wind power, economic impacts)
Markku Keinänen; +358 40 7490469 mark.keinanen@gmail.com