DESIRA POLICY BRIEF

Bioeconomy and digitalisation in Finland

The scenario workshop of the Biovalley Finland Living Lab wanted to answer the following question: **What will the bioeconomy in Central Ostrobothnia be like in year 2031, given the progress of digitalisation, circular economy, energy transition and research, development, and innovation (RDI)?**

This policy brief focuses on two scenario narratives. Better scenario was built on the advancement of distance work. When more people combine near and distant work, they help reconnecting the rural and urban living worlds. Worse scenario was built on fast energy transition where inhabitants 'rush to adapt'.

In 2031 we should have a broad mix of sustainable energy sources (including photocatalysis) and a large menu of housing-working combinations. Rural areas should not invest only in automation that replaces human work. We should combine human creativity with the advantages that digital technologies offer.

CONTEXT

Finland is usually high in international comparisons that rank the level of digitalisation in the developed countries. Still there are differences in digitalisation between regions and inside regions. Rural-urban digital divide means that access to broadband and fast mobile networks is much better in urban areas where the supply comes from commercial operators. In rural areas there can be fast broadband connections where public subsidies have been used to build fibre networks.

In Central Ostrobothnia (CO) automated production lines and robots are used in the Kokkola Industrial Park (KIP). Also, bigger dairy farms use automated milking systems and manure robots that help scheduling work in family farms. Forest harvesters use public geographical data that connects forest owners with wood amounts in different areas.

Biovalley Finland (BF) is a "system of systems" which makes it difficult to understand. BF connects RDI actors, companies, SMEs, farms, regulators, and education institutes. All the parts of BF network (see Figure 1) are known before but only putting them in interaction starts the development processes. Sometimes BF is the needed catalyst, but emergent systems also have characteristics that no stakeholder has on its own. Keeping things apart leads either to regional path dependency or to scientific silos. Combining different knowledge bases (analytical, synthetic, and symbolic) is advantageous even if in practise new ideas are found by pilot projects and experimenting. Random events or infrequent formal meeting are not enough. Trust and capacity to accept novelties develops slowly.

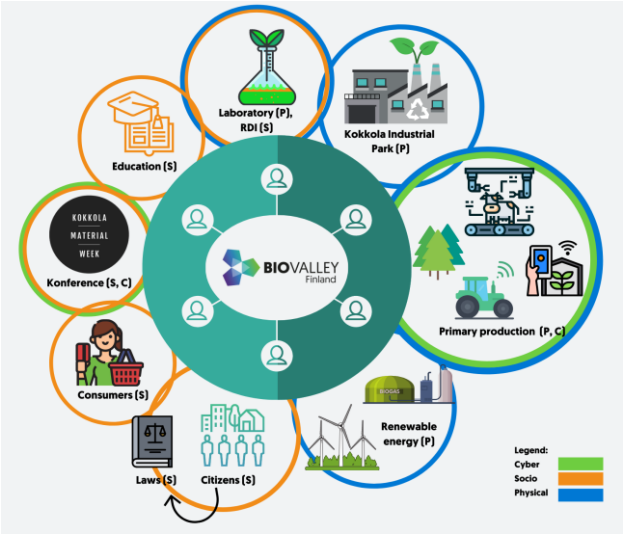

Figure 1. Social-cyber-physical (SCP) system oft the Biovalley Finland consist of numerous functional and sectoral networks.

RESEARCH APPROACH

To develop resilient and successful bioeconomy in Central Ostrobothnia, there is a need to anticipate different pathways that can start from the present situation. By imagining what to do when different threats and opportunities unfold, we can identify what most urgent resources are needed.
The scenario question (SQ) is*: **What will the bioeconomy in Central Ostrobothnia be like in 2031**, given the progress of digitalisation, circular economy, energy transition and research, development, and innovation (RDI)*. The SQ tells that these pressures are the ones where we must concentrate our development efforts.

THE LIVING LAB SCENARIOS WERE BASED ON FOUNDATIONAL ECONOMY - BASIC NEEDS (ENERGY, FOOD, HOUSING, EQUALITY, AND KNOWLEDGE) MUST BE SATISFIED IN ALL CIRCUMSTANCES.

The scenario workshop took place in face-to-face in October 2021. Having a live event was a gamble as some possible partners would not show up because of fears of COVID-19 pandemic. Doing group work and co-creating the future scenarios was still considered the most important task.

SCENARIOS DEVELOPED

The LL participants developed two main scenarios that had an intermediate character compared with business –as -usual (BAU) and extreme situations (utopia/dystopia).

A better but not best (BnB) scenario was built on the distance work. When people combine near and distant work, they can mix living in the rural area and working in the city. Mentally being part of rural and urban networks is good as it prevents living in silos in a shared society.

Digitalisation makes it possible for people to choose where they want to live. Energy is saved if people commute less, but overall, multi-locality living can create more emission of greenhouse gases.

Multifunctional agriculture is easier if a family can earn some income from crops and grass growing, something from forestry and something from distance work. Not all work has to be full time and all year round. Tourism can offer income from renting summer cottages, which can be advertised on some specialised platform.

A "worse not worst" (WnW) scenario was based on **energy transition**. Cold winter, high energy and electricity prices and almost ending of the traditional use of peat for energy purposes has created feelings of an energy crises. As the energy use of peat ceases, the supply of growth and bedding peat will also deteriorate. As time goes by, new bio-based product from forests and biogas production by-products will be developed to replace them.

The positive side is that, as the profitability of renewable energy technologies improves, local energy companies, businesses and households are adopting them at a rapid pace. This will also bring economic activity to less populated areas where major decentralised energy production projects are being carried out.

Landowners receive income by renting their forest land to wind farms, solar energy is collected from abandoned peat lands, which will produce fast-growing plants for biogas production.

Exploiting the region's extensive potential for wind power and the growth of mining create jobs for rural experts. Agricultural biomass is utilised in farm-specific or shared biogas plants on several farms. Cost-effective space size technological solutions enable the direct sale of biogas from farms to low-emission transport. Digital platforms enable the matching of demand and supply for energy, biomasses, and other raw materials.

POLICY RELATED DISCUSSION

The LL participants focused on understanding what the drivers of change meant for the region. The following policy options are thought to be relevant for all possible scenarios.

Usually, future scenario workshops focus on different technologies. We also listed photocatalysis, cellular meat, vertical farming, green and turquoise hydrogen production, battery materials for electrical cars et cetera. Our backward and forward timelines noticed many technologies but here we consider mostly changes in regional economy.

The thought processes of the LL can be crystallised to make a distinction between approaches that focus on energy transitions in, of and by regions.

If we conceptualise regions as agents of change through their political powers and administrative capabilities, we can learn how regional twin transition of green and digital technologies advances in Finnish multi-level governance system. The hindsight is that the lessons learned may be context-specific so that transregional and -national usability of the advice is unsure. We should not try to offer globally valid 'best practices', but 'best matches' for areas with similar characteristics.

The supply side is covered by the interaction of green and digital technologies. The new EU funding period 2021-27 offers resources. Managing twin transition in Central Ostrobothnia is still not easy. The biggest gap in knowledge relates to demand side. The determinants of the use of new technologies and attitudes that support the twin transition are difficult to assess. RDI actors increase the absorptive capacity in sparsely populated areas.

Regional characteristics impact the speed of twin transition. Existing physical infrastructure is costly to change as there are irreversible investments. Plants and other sunk costs slow down the transition process. Powerful interest groups may oppose the creation of decentralised renewable energy systems.

Industry mix in Central Ostrobothnia is favourable for change. Multinational companies (MNCs) in Kokkola Industrial Park (KIP) already feel the global pressures to establish more environmentally friendly and circular value networks. For example, a MNC is willing to give up fuel oil and use hydrogen as input in cobalt production process. Some MNCs have a complementary relation with rural areas. For example, some side streams of MNCs are used as fertilizers in agriculture. Circular economy is good for both urban and rural areas.

Rural disadvantage is sometimes a reality. One way to get over this is by 'borrowing size' from core regions through remote work. Increasing outside connections of the regions can also help. Slow innovation is possible in domains that are not connected to fashion or other trends. In bioeconomy rural can be seen as an opportunity (rather than liability). Reconceptualising rural and peripheral as relational phenomenon also helps.

TWIN TRANSITION IS BEST SUPPORTED BY A COMBINATION OF LONG-TERM PLANNING AND EXPLORATIVE ACTIONS THAT HELP THE ACTORS FIND REGION'S HIDDEN POTENTIAL. POLICY IS NEEDED TO PROMOTE LONG-TERM ACTIONS.

Rural SMEs and farms may not contribute much in inventing digital and green technologies, but they offer many opportunities to use new technologies. On the other hand, innovation mode in rural areas is mostly doing-using-interacting (DUI) and not science-technology-innovation (STI). Rural industries develop by creating new and better generations of technologies (like farm-size biogas or wind power production units), not by patenting or directly planning the optimal production unit with the help of latest science.

POLICY OPTIONS

Smoothen the energy transition

- Central Ostrobothnia is experiencing a rapid energy transition. Machine contracting in rural areas is in trouble as peat is no longer used for energy production. Just Transfer Fund should compensate the losers by organising further education and searching for new job opportunities for low educated workers.

Encouraging combinations of distance work and multi-local living style to keep rural areas alive

- Rural policy (via travel expenses deduction) can encourage people to combine near- and distant work. If people mix living in the rural area and working in the city, they get involved both in rural and urban networks. After this double experience, juxtaposition of groups is not easy. Distance work can be used to indirectly reduce intolerance.
- Multi-local lifestyle can increase greenhouse gas emissions more than distant working reduces them. So new rural-urban lifestyle must be compensated by cutting greenhouses gases in some other sectors.

Dairy farming going from 'tradition' to 'automation'

- Specialized dairy farming in Central Ostrobothnia changes from DUI (doing-using-interacting) mode into a STI (science, technology, and innovation) mode. Transition pathways need to be supported by pilots and experiments.
- Replacing manual work with automation does increase efficiency and incomes in rural areas, but jobs disappear. In the long run we need technologies (like cobots) that support humans in their endeavours to create something new.

Revealed competitive advantage of the region needs to be supported by a process of finding new strengths

- Sectoral or cluster based regional development policy based on the traditional planning paradigm is still needed but we must also anticipate the coming changes and cater for the future needs.
- Creating an ecosystem where all the key private and public stakeholders are represented can help the region to mix current resources and create something new (products or industries).

This policy brief is published in the frame of the EU-funded DESIRA project and aims to provide recommendations for policy makers on how to support digitalization in the context of Biovalley Finland.

Contact: Jouni Kaipainen
Institute: University of Jyväskylä
Email: jouni.p.kaipainen@jyu.fi

More information at: www.desira2020.eu

BIOVALLEY Finland

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 818194.

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