Public procurement of innovations – Finnish perspectives

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Programme Manager

Smart Procurement programme 2013-2016
Budget 30Milj.€

Tekes – The Finnish Funding Agency for Innovation

17th December 2015@Geneva
UNECE, The Innovation Adoption Gap
Finland as a country of Sibelius, sauna, cold dark winters and eternal summer sun

..without own sources of fossile fuel..
..forest industry has been one of our cornerstones..
.. and Nokia was born. Finland tops the rankings of applying ICT to boost competitiveness and wellbeing.

“With more than 90% of its population using the internet, and with high levels of innovation, **Finland** is reaping the rewards of investing heavily in ICT in the mid-1990s, which it did in response to a financial crisis.”

Tekes - strategic goals

Globally competitive business and industry
- New and boldly renewing business ecosystems
- Pioneering businesses and enterprises
- Market access and global growth

Top-level innovation environment
- The world's most successful comprehensive package of expert advice and funding services for clients' innovation activities and international growth
- International top-level knowledge, networks, and approaches and practises for companies' use in their innovation operations
- Unique public actor cooperation as a catalyst for innovative renewal
Natural resources and efficiency
Wellbeing and health

Digitalisation
Value creation

Market access
New business ecosystems
Tekes R&D funding in 2014

Total 550 million euros and 2,750 projects

- Research funding for universities, research institutes and polytechnics
- R&D loans to companies
- R&D grants to companies and public organisations

Million euros

The funding for R&D includes 2 million euros from EU Structural Funds.
Tekes programmes

Natural resources and a sustainable economy
- Arctic seas 2013-2017
- BEAM – Business with Impact 2015–2019
- Green Growth 2011–2015
- Green Mining 2011–2016

Vitality of people
- Bits of Health 2014–2018
- Skene - Games Refueled 2012–2015
- Liideri – Business, Productivity and Joy at Work 2012–2018

Intelligent living environment
- 5thGear 2014–2019
- Feelings – Intangible value creation and experienced value 2012–2018
- Industrial Internet 2014–2019
- Innovative Cities INKA 2014-2017
- Witty City 2013–2017

Smart Procurement 2013-2016
Leaders and partner cities for INKA themes

- FUTURE HEALTH
  - Oulu
- METROPOLITAN AREA

- CYBERSECURITY
  - Jyväskylä

- SUSTAINABLE ENERGY SOLUTIONS
  - Vaasa
  - Pori
  - Lappeenranta

- SMART CITY AND RENEWABLE INDUSTRY
  - Tampere
  - Oulu
  - Lahti
  - Turku

- THE BIOECONOMY
  - Joensuu
  - Seinäjoki
Main focus areas for the program are those areas where the public (or private) procurement has major impact on the market. The main impact comes from bringing innovative supply and demand together.
Aim of the Smart procurement program

1. First commercial references for innovative SMEs.
2. New research knowledge about the impact of smart procurement.
3. Creation of thematic or geographical centers where innovative supply and demand meet.
4. Examples of improved public services through innovative procurement.
5. Smart procurement shortens the time for innovations to enter the market.
6. Influence the general attitude for innovative procurement as an enabler for renewal.
Smart Procurement Program 2016 - systemic approach

- IPP & ecosystem funding
- Focus of activation on themes in government strategic programs (1,6B€)
  - Large-scale influential collaborative development projects among buyers
- Team Finland collaboration
- Global collaboration
Activation for large-scale influential collaborative IPP projects

- Education, digital learning environments
- Healthcare and wellbeing, preventive solutions
- Bioeconomy and clean solutions
  - carbon-free, clean, renewable energy
  - new products from forest
  - water treatment
  - circular economy
  - food production
- Open data & smart mobility

1. Collecting network of forerunners (companies & buyers)
2. High ambition forums – ”controlled” first market negotiations
3. Support for individual project preparation

... 

1. Networked IPP & ecosystem development projects
2. Spreading learnings substance-based
Funding scheme for public procurement of innovation

Funding available for the procurement unit for preparing procurement

- To define what is procured, market dialogue, defining criteria …
- Buy competence when needed

About 80 projects funded so far (2009-2015)

Main focus areas so far:

- Construction and real estate
- Social and health care
- Energy and environment, water supply

Aim

- Goal is to create added value, for example by having lower life cycle costs, by offering better quality, by employing innovative processes and by environmental friendliness
- Develop new markets, new services
- Stimulate innovations on markets with tradition on pure price competition
- Demonstrate new technology and innovations, references for SMEs

The funding typically amounts to 50% of a project's total costs.

Support and awareness rising of the possibilities even more important.
Hurdles in procuring innovative solutions

- Lack of expertise and knowledge of procurers
- Limited interaction between buyers and suppliers
- Absence of strategy to link policy objectives, procurements and market/technology developments
- Perceived conflict between value for money and innovation
- Tendency to favour lowest cost bids
- Fragmented markets
- Limited networking and collaboration between procurers
Key lessons learned so far - How to promote innovations through public procurement

• Need identification, outcome-based specification (long term perspective, functional specifications), procuring results
• Market dialogue prior bidding process, openness for unexpected and innovative solutions, engage suppliers broadly at the early stage
• Focus on procurement methods, contract models, incentives, competitive dialogue
• Engage end-user and other stakeholders in the process early on
• Holistic approach needed in order to avoid sub optimizing value
Key lessons learned so far - How to promote innovations through public procurement (2/2)

- Need to have a strategy for procuring innovations
- The buyers are unaware of the possibilities of procurement of innovation – if you ask for innovation you get innovation!
- Need to allocate resources to the pre-procurement / development phase of PPI
- Markets are not changed by one single project, the market need a signal of continuity in order to keep developing
- Typically innovative solutions are based on ICT and new business models (key enablers)
Have procurement practises you have encountered, encouraged, hindered or had no impact on organisation’s innovation activities?

VTT survey 2013 to suppliers for public sector

VTT, Procuinno research project, preliminary results, Valovirta, Oksanen,
http://www.vtt.fi/sites/procuinno/?lang=en
Piloting complements PPI & PCP

Public Procurement of Innovation (PPI)

- **Pre-commercial phase**
  - Preparation: market dialogue, defining the requirements
  - Bidding
  - Agreement

- **Commercial phase**

→ Incremental development, there is no space for radical new innovative solutions

Pre-commercial procurement of R&D (PCP)

- **Preparation:** Defining the need
- **Concept**
- **Proto**
- **Piloting**

→ Heavy and long process; many cases do not lead to commercial procurement

“Piloting program”

- **Pre-commercial phase**
  - Preparation: Defining the need
  - Piloting
  - Piloting
  - Piloting

- **Commercial phase**

→ Aim is to have a light process for pre-commercial testing of already developed solutions

Source: Valovirta 2014.
The communication of the ongoing projects should be strengthened to get the vast number of actors committed.

- It is important to get the key local actors committed to the planning and implementation of the project.
- The projects should be very active in communicating inside their own organizations to inform about the objectives and implementation early on.
- The objectives and contents of the innovative procurement cases should be as customer oriented as possible. This usually requires cooperation between different sectors of municipalities.
The experiences and innovations of the projects should be utilised systematically and the created methods should be integrated to the whole organisation.

- The plan how the new ways to procure are going to be integrated in the organization should be part of the project planning.
- Municipalities should develop procurement also by producing a strategy for procurement. That would also emphasize the need and role of managing procurement.
The government has stated 5% aim for innovative public procurement

(5% of 35 billion € equals 1,8 billion € annual procurement volume)
- New growth agreements with cities (municipalities make 2/3 of the volume)
- Guidance for innovative procurement but not clear requirements

Program activities currently ongoing
- mapping of forthcoming strategic purchases & investments, search for synergies, building international collaboration among buyers
- training for 15 cities and hospital&healthcare sector including
  - principles of innovative procurement covering whole chain of strategic planning to operative procurement decisions
  - hands-on intra/inter-city procurement case work around most potential themes
  - Inter-city learning boosted with MOOC (mass open online course) tools.
- development of public procurement portal HILMA
  - open APIs needed (e.g. agreements, history data, analysis purposes)
CASE EXAMPLES
Huhtasuo School and day care center in city of Jyväskylä

Need
- To build a learning environment with a clear focus on life cycle
- Efficient and multi use of spaces; setting, controlling and reporting usability and indoor air quality requirements (functional requirements)
- To utilize new technological solutions
- Ambitious goals for sustainability and energy efficiency

Approach
- Clear innovation goals
- Life cycle contract model (20 years, 55M€)
- Competitive dialogue

Benefits
- The approach enabled to reach goals during the whole life cycle, new solutions can be developed
- Innovative incentives; 50/50 split for overruns/ savings on energy, heat and water consumption
- Usability and indoor air requirements fulfilled, multi use partly fulfilled

Users
- Huhtasuo school: children, teachers, other personnel, parents, evening users
Catalytic procurement - Electric Bus procurement of HSL

Kuva: Linkker
Idea: An operator of a nationwide network of charging stations for electric cars. Due to its open operating concept, it is simple for different actors to join the network and incorporate their own services.

Impact: The user experience of electric car owners is just as seamless regardless of which Virtapiste charging station they visit. In 2014, Liikennevirta sold its charging network operator model to Switzerland.

Many aspects of our development work have been successful, and we have been able to proceed at a quick pace. The EVE programme has helped us recruit a broad group of actors.

Jussi Palola
Managing Director
Liikennevirta Oy
Smart cities
Tekes is funding several Smart City projects in Finland.
Key Problem → Fragmented Vertically Integrated Solutions

- Current **smart city solutions are fragmented** → new innovations don't diffuse widely but remain local
- Fragmentation
  - Between sectors (e.g. energy, transportation, built environment)
  - Between cities
- Businesses offer **vertical solutions**, procurement by cities is typically conducted in silos
  - Vendor lock-in situations → city becomes a passive entity
- **An open and modular business ecosystem is needed**
  - Cities can define a modular architecture together with infrastructure vendors and service providers
  - Would form a basis for multi-vendor solutions, continual innovation and progress
MyData will break the silos.
MyData Principles

- **Human Centric**: right to data, individual in control, privacy

- **Usability of Data and transparent relationship management**: machine readable, open formats, APIs, standards,

- **Open Business Environment**: interoperability, possibility to change services without “data locks”
Need to shift from a closed vertical model to an open horizontal model
Simplified Smart city value chain

Sensors & controllers

Connectivity

IT-systems

Services

Vehicles, road infra
Waste containers
Electricity meters
Homes for elderly people

Better mobility
Efficient waste management
Sustainable energy consumption
Better homecare for the elderly

Smart City market will have a $1565 billion cumulative worth by 2020 (Frost & Sullivan, 2014)
Example:
Demand based public transportation
Smart City Interoperability Vision

Demand

City 2
City 1

Procurement organization 2
Procurement organization 1

End-user 2
End-user 1

Vendor 2
Vendor 1

Service provider 2
Service provider 1

Supply

Smart City Interoperability Environment
- Common procurement practices
- Interoperability certification program
Three important horizontal layers

- Common innovative practices for public actors
- Multi-actor business environment
- Modular ICT-architecture

Mobility
Built environment
Energy

Smart City Sector x
Three important horizontal layers (II)

1. **Common innovative practices** for public actors
   - Innovative procurement of modular systems
   - Harmonized regulation
   - Opening of common resources (e.g. data) for the citizens use

2. **Multi-actor business ecosystem**
   - Multiple buyers and multiple vendors and service providers
   - All delivering their solutions over the same modular ICT architecture

3. **Modular ICT-architecture**
   - Commonly agreed open interfaces, standards (follow principles from GSM, also Internet Protocol)
   - Established interoperability certification mechanism for vendor products
Open & Agile Smart Cities

What is the Open & Agile Smart Cities (OASC) initiative? Here you will find answers to the Frequently Asked Questions about the vision, how to join, and governance.

There are currently 75 cities from 15 countries in Europe, Latin America and Asia-Pacific who have officially joined the Open & Agile Smart Cities initiative.

The 4th wave launch is now in preparation, with new cities and countries lined up. The deadline for expressing interest will be announced no later than January 21.

Check the current list of Open and Agile Smart Cities. See the recent 3rd wave pre-announcement for more details.

Vision

**What is the vision of the Open & Agile Smart Cities initiative?**
- One city is not a market. The vision of the Open & Agile Smart Cities initiative is to create an open smart city market based on the needs of cities and communities. Cities need interoperability and standards to boost competitiveness by avoiding vendor lock-in, comparability to benchmark performance, and easy sharing of best practices. They also need solutions that can be implemented with respect for local practices and job creation.

**How can the Open & Agile Smart Cities initiative achieve this vision?**
- By advocating cities to adopt four simple mechanisms as de facto standards. The first mechanism is a driven-by-implementation attitude. The other three mechanisms are technical (an API, a set of data models, and an open data platform, described in the Background Document).

**How can companies benefit from the Open & Agile Smart Cities initiative?**
- Companies can offer services that comply with the mechanisms, and help cities implement the mechanisms. There is no official certification yet, but companies can be listed on the initiative website and join the events.
Two large-scale IPP projects funded for cities of Oulu & Tampere (5/2015-)

- Aim is to make innovative procurement daily routine
- Pilot cases chosen from topical procurement needs – ambitious search for completely new solutions
- Tekes requires collaboration with other cities
CASE 1 – City of Oulu
Strategic development of procurement

AIM
- Demand-driven "competence center" that supports innovation policy of the city
- New ways of management&leadership, processes and new ways to organise procurement
- Cost-efficiency & better quality with new incentives

PILOT CASES
- Arctic Smart City Hiukkavaara pilot area
- Hiukkavaara community center
  - Alliance agreement & life-cycle approach
- Social services
- Safe living at home – connected home
- ICT systems
- …
RESCA (Renewable Energy in City Areas)

- Pilot area for companies and research institutes to create methods for use of renewable energy in small housing from different sources
- Plots were given to companies who filled the following requirements
  - Energy efficiency (structures, architecture, space efficiency)
  - Readiness to zero-energy
  - Innovativeness
Residential services for the world from the Karjasilta School area

Idea: In Oulu, the soon-to-be-vacated vicinity of the Karjasilta School is being developed into a diverse residential area. Before then, the area will serve as a business development platform for new residential products and services.

Impact: Business development environment for digital residential services. The site will also serve as a reference for the companies involved in development activities, based on which they can target international markets.

The INKA programme and its objectives of benefiting from urban environments as a development platform were tied into business plot allocation competitions. This was a new departure for us.

Sari Matinheikki
City of Oulu

Winning consortium consists of 19 companies
Smart District Kalasatama – Driving Smart Helsinki innovation

One hour more per day
Smart Kalasatama

- Innovation district of smart urban development
  - Area construction until 2030: 20 000 people, 8000 jobs
- Developed through experimenting, ICT technologies and the use of data
- Grows from the collaboration between the city, companies, and the citizens
**Smart Kalasatama Innovation Platform**

<table>
<thead>
<tr>
<th>Innovation Platform</th>
<th>Forum Virium as Facilitator, Orchestrator of PPPP Governed by the City of Helsinki</th>
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<tr>
<td><strong>Target</strong></td>
<td>Open innovation testbed of sustainable Smart City services for Citizens</td>
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| **Key structures**  | • District level City regulation  
                        • Vision  
                        • Real life platforms: school, health station, smart grid, City infra, estates…  
                        • Engagement methods (e.g. Network of developers programme; events, hackatons…)  
                        • Innovation programme portfolio |
| **Stakeholders**    | City (30+ departments), residents, citizen organizations, Industry, SMEs, start-ups, academia |
| (200+ active)       |                                                                                   |
Smart Kalasatama Vision

- Co-creation
- Agile piloting
- Local smart services
- Resource efficiency
- One more hour a day own time
Innovator’s Club

Regular clubs for joint industry-city-people-academia smart district development.
Kalasatama Program for Agile Piloting

- Testing and developing experimental service pilots in real environment with real users.
- Procuring small pilots up to 8000€/each.
Five agile pilots spring 2016

- Mobility as a Service for housing
- Open APIs for smart trash
- Reducing domestic food waste using sensors/IoT
- Charging & parking service for e-cycles
- Local service model using citizen service trading platform and crowdfunding tools.
CASE 2 – City of Tampere
Roadmap to innovative procurement (5/2015 - )

AIM
- New procurement practices that support innovation policy of the city
- Develop cost efficiency and openness of the procurement
- Develop impact of service system of the city
- Create roadmap for innovative procurement and develop practices to manage procurement

PILOT CASES
- Smart lightning
- Intelligent transport
- Block of life-cycle living at Tesoma quarter
- Wellfare center combining social and healthcare services to other wellbeing services
- Senior center concept with life quality measures
- New concepts for ecopark (Vuoreksen Havupuisto)
Transforming street lighting into a service opens a new commercial potential

**Idea:** In this project, a smart service network will be created utilising city street lighting. Network serves the city dwellers and the operator creating services and information of its use and surroundings.

**Impact:** New solutions will be tested in real-live environment, and results of the project can be applied in other cities. Companies aim to develop joint solutions for international markets.

Several cities, two listed companies (Nokia and Elisa), group of SME’s and research institutions join together to build a business ecosystem for innovative lighting solutions.

**Need:**
- As a MS of EU Finland has undertook remarkable energy savings. The heating of the existing building stock has been seen the most potential focus area
- It is important to have show cases of the best new energy saving technologies also for old buildings

**Approach and Methodology:**
- 8 demonstration projects
- Implementation of research results by “PPPP”

**Results:**
- The first three demonstration cases are completed
- The refurbishment projects have succeeded in energy saving target

**Benefits:**
- The demonstrations have attracted the interest and enthusiasm among other housing companies to start their own refurbishment project. This is the main aim of this project.
- Local companies have developed their services and products to energy efficiency renovations

**Clients:**
Project is carried out in co-operation with Tampere city and private housing companies.

**Contact persons:**
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17/12/2015
THE SIX CITY STRATEGY
– Working Together Towards Open and Smart Services

December 2015
30% of the population lives in the Six Cities

1.68m people in the Six Cities

5.44m people in total

= 100,000 people
Creating innovative solutions, services and products

- By testing in real-world conditions
  - Open innovation platforms
- By utilizing open data as raw material
  - Open data and interfaces
- By utilizing operating models for communal development in the design process
  - Open participation and customership
Helsinki Metropolitan
- Global testbed for SmartClean solutions

SmartClean Projects
(20-30)

www.smartnclean.fi
Addressing urban challenges together!
Example of systematic ecosystem building
Case MaaS – Mobility as a Service
Mobility-as-a-Service as a Vision

Tekes’ vision is to enable a seamless and efficient flow of information, goods and people. To this end, new integrated door-to-door service solutions will be launched, based on standardized open interfaces.

The vision will be made real by the end of 2016, with
- Companies
- Regulators
- Transport service purchasers
- Users preferring high quality services
- Research institutions
MaaS Ecosystem Brings Numerous Players Together

**Value creation**

- In-any-city and Inter-city Mobility: Mobility-as-a-Service
- Enabling technology platforms: IoT, 5G
- Existing and new travel modes, e.g. autonomous driving

**Legal and official requirements**

**International cooperation and benchmarking**
Enabling the Emergence of a New Ecosystem: Open Call for Mobility Operator Business, Basic Criteria for Projects

1. Analysis of the mobility needs, generation of user profile fitting door-to-door services
2. Integration of multiple transportation services over open interfaces
3. User need based design of the solutions
4. Scalability
5. Demonstration in real transportation environment
Integration of multiple transportation services over open interfaces – comprehensive ecosystem requires participation of operators on several technology areas.
Integration of multiple transportation services over open interfaces – the role of cities is essential in open data

In the procurement of integrated transport service cities need to open data on public transportation services covering

- different budgeting silos: e.g. elderly care, school rides, food logistics
- anonymized delayed point-to-point data.

Mobility operator integrates several transport modes by utilizing open interfaces to transport service industry’s and public transport authorities’ (PTAs’) schedules,
- location data, and
- payment systems.
4. Scalability: MaaS-Alliance - Interoperability Certification with Ertico

The solutions need to be **scalable** to different user profiles and to the whole of Finland as well as to **international markets**

Source: VTT implementation project to be funded by Tekes
MaaS is demonstrated throughout Finland by several mobility operators:
1. Arctic testing for intelligent transport automation
Technology test sites in real winter conditions with a broad selection of services

2. Digital transport infrastructure and connected cars
Accurate mapping of road infrastructure and signage enabling connected driving and analytics for traffic management

3. Intelligent infrastructure asset management
Data collection to enhance traffic management and refine maintenance processes in the era of automation

4. Mobility as a Service
Flexible and affordable mobility services for tourists and locals without car dependency
Growth Corridor Finland is an ideal testbed for ITS and MaaS

- An alliance of regions and cities along the Helsinki – Tampere axis
- An open data platform for MaaS operators and ITS
- Invites actors worldwide to pilot their services
MaaS is also part of Traffic Lab 2.0 by the Ministry of Transport and Communication
Energy and Bioeconomy
Renewable fuels from Finland

**NESTE OIL**

Renewable fuels have become a business with an annual turnover of EUR 2.5 billion. NExBTL diesel reduces greenhouse gas emissions by 40-90% in the life cycle of the product.

**UPM BIOFORE**

The UPM Biofuels has received the European Union’s Sustainable Energy Europe Award 2014 for its renewable crude tall oil based UPM BioVerno diesel. UPM has built 2014 the world’s first commercial scale wood-based biorefinery in Lappeenranta, Finland.
EMISSION-FREE FUTURE AVAILABLE

NEO CARBON ENERGY
KEY FIGURES

- 5 years 2014-2019
- 14 M€
- 3 Finnish research partners
- 16 industrial partners
- 3 NGOs
- 5 international partners

Contact:
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Principal scientist VTT, Adjunct professor LUT
The graph above illustrates the historical cost of various energy sources in €/MWh from 1950 to 2015. Key energy sources compared include:

- **Natural gas**
- **Coal**
- **Oil**
- **LNG**
- **Wind Power**
- **Solar PV**
- **Li-ion battery**
- **Power-to-gas**

The cost trends show notable reductions in expenses over the years, particularly for renewable sources like Wind Power and Solar PV.
In the future system ‘bridges’ have to be built from electricity to all energy using sectors.
- For fuel and chemical production CO₂ can be used as a source of carbon.
- Energy storages are needed later on. Not for the time being.
ELECTRIC FUELS FROM CO₂

Electrolysis process:

- Water (H₂O) is electrolyzed to produce hydrogen (H₂) and oxygen (O₂).

Synthesis process:

- Hydrogen (H₂) and carbon dioxide (CO₂) are combined to produce electric fuels.
- Electric fuels include:
  - Gas
  - Diesel
  - Gasoline
  - Kerosin
  - Chemicals
  - Plastics

The process involves:

- Electricity from wind power
- Separation of CO₂ from air
- Electrolysis of water (H₂O) to produce hydrogen (H₂)
- Synthesis of electric fuels from hydrogen (H₂) and carbon dioxide (CO₂)
Example – fuel station of the future

SOLAR POWER

CO₂ from the air

Hydrogen production with electricity

Synthesis: Hydrogen ja CO₂ to electric fuel

Alternatives:
- Electric fuel
- Hydrogen
- Eletricity
Snapshot for EU legislation post 2020

Finland needs market or near market piloting and progressive legislation

Article 1

Amendments to Directive 98/70/EC

Directive 98/70/EC is amended as follows:

1. In Article 2, the following points are added:

"9a. "renewable liquid and gaseous transport fuels of non-biological origin" means gaseous or liquid fuels other than biofuels whose energy content comes from renewable energy sources other than biomass, which are used in transport;"
Bioproduct concept: all side streams 100% utilized

* Current bioproducts
- PULPWOOD
- BARK
- TURPENTINE * AND TALL OIL *

* New biofuels from bark and energy wood
- Producer gas from bark and sludge for the mill's own use
- Sulphuric acid and methanol from odorous gases for the mill's own use
- New bioproducts from lignin
- Biogas from sludge for traffic fuel
- Fertilizers and earth work material from dregs and ashes
- New textile fibres from pulp
- Biocomposites from pulp

Clean Water
DREGS AND ASHES
GLAUBER SALT
BIOENERGY: * POWER, STEAM, DISTRICT HEAT
The ecosystem will be based on a **partnership network**

- The new bio-product mill will create a globally unique ecosystem
  - Efficient partnership network
  - Emerging value chains will be extensive
  - Significant opportunity for various sized companies
  - New processes joining the ecosystem will create synergies for all parties
  - Close collaboration with the city of Äänekoski in various areas incl. water purification and district heating
- Companies focusing for example on biomaterials and bio-energy, will be invited to join the ecosystem
Thank You

Markku Heimbürger, Programme Manager

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