BUSINESS FINLAND

SMART ENERGY ECOSYSTEMS AND TEST PLATFORMS

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Energy solutions for the block level – Opportunities in Smart City business environment -seminar

Oulu 12.9.2019

Smart Energy Program 2017-2021

Responding to the challenge of climate change

Contributing to the transformation of the energy sector

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CONNECTIVITY
SECURITY
RELIABILITY

The **ENERGY DISRUPTION** will come long before we run out of fossil fuels

Energy investments in **INDUSTRY AND POWER** between 2015-2050 **29.6 USD trillion**

Global market for **BIOENERGY** in 2018: 18.3 bn $ and in 2020 26.1 bn $
▲43% increase

Changing roles of **CONSUMERS AND UTILITIES**

Energy investments in **TRANSPORTATION** between 2015-2050 **14.2 USD**

DATA MANAGEMENT
GRID FLEXIBILITY

In 2030s most of energy capacity will be **SOLAR OR WIND, 15-FOLD BATTERY** volume increase, **EVs** are majority

Timing of using energy becomes more important than using kilowatt-hours in the new energy system.

BLOCKCHAIN, IOT, AI set to disrupt energy business, but it is still unclear how

Energy investments in **BUILDINGS** btw 2015-2050 **39.6 USD TRILLION**

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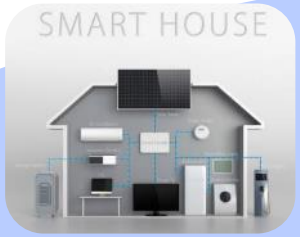
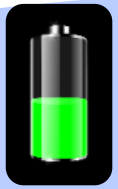
Actions

SMART CHARGING OF ELECTRIC VEHICLES



SMART HOMES AND PV



ENERGY STORAGE

POWER TO GAS

BALANCING

MICROGRIDS, ENERGY COMMUNITIES

AGGREGATOR

Ecosystems
Test Platforms
Pilots and Demonstrations

ADVANGED MONITORING

DISTRIBUTION AUTOMATION

CONTROLLABLE LOADS AND ENERGY EFFICIENCY

SYSTEM MANAGEMENT AND DESIGN

MARKET DESIGN

Ecosystems

Smart Otaniemi

Smart Otaniemi aims to solve systemic challenge - the biggest question of smart energy

Smart Energy Åland

100% Renewable Island

Batteries from Finland

Blue Electrification

Power to X to power and products

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Test platforms in Finland

- Smart Otaniemi
  - Unique place with innovation environment, VTT’s research centre and Aalto University campus
  - Startups
  - 5g network
  - Students as consumers
  - Living lab with real customers involved
  - Developing and demonstrating system-level solutions
  - Legislation and market models supporting transition
- Åland Islands
  - Society scale, comprehensive but small enough
  - Excellent wind and solar conditions
  - 80% of electricity imported
  - Self-governed
  - Full society of 30 000 citizens
  - Readiness up to 125 % RESe
  - 0.5% of Finnish GDP, electricity consumption, population etc.

Why Smart Otaniemi?

- Energy challenge is global - **solutions need to be implemented locally.**
  Energy will be produced and consumed in different regions - **unique features.**
  No one-size-fit-all solutions in energy transition.
  - Smart Otaniemi is a place where you have possibility to design, test and tune the most suitable toolbox for your systemic change.
  - Smart Otaniemi is not based on specific technology, energy source or solution.
  - Smart Otaniemi aims to solve systemic challenge - the biggest question of smart energy. The working method is bringing together experts, companies, investors and public sector to pilot novel solutions.
- Smart Otaniemi is like a mosaic book of energy that is build piece by piece the big picture in mind.

The Åland Islands

The ideal place for the demo

SMART ENERGY °ALAND

Åland – An archipelago in the middle of the Baltic Sea

- Best wind and solar conditions in the region
- Self-governed (own energy market regulation) and own grid area
- An ambitious and recognised sustainability agenda

Full society scale

- 30.000 inhabitants, industry & service sector - Results applicable to large markets
- Operating in a deregulated environment connected to the efficient Nordpool market

Adopting future EU regulation

- Current and future market models enabling investments in flexibility sources in focus

In the tempered climate zone

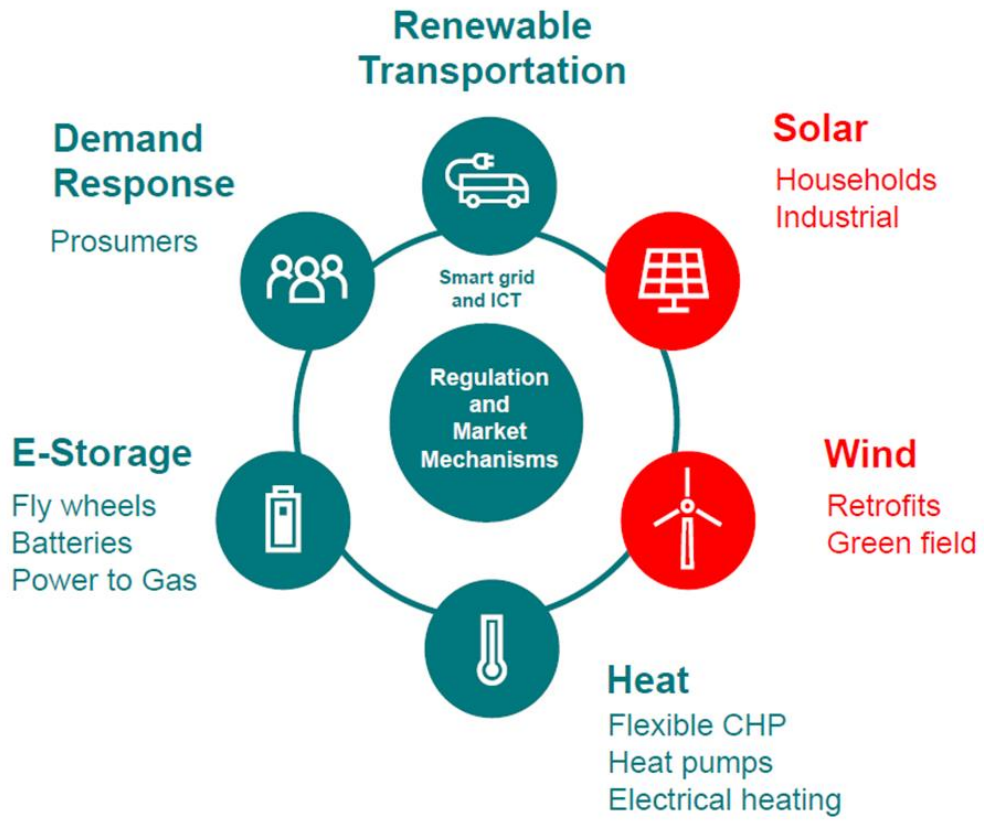
- Heating and cooling central part of the energy mix

A platform supporting open innovation

- Cooperation with leading R&D&I operator

The solution

- An integrated renewable energy system with sector coupling and system integration in focus



The key is managing the interdependencies between subsystems – the renewables integration challenge

To create a cost efficient energy system the integration must comprise all major subsystems

Electricity

Heating / cooling

Transportation

BATTERIES FROM FINLAND

Business Finland is starting to build multibillion business ecosystem in the field of batteries

BATTERY VALUE CHAIN IN FINLAND

LEADING COUNTRY IN SUSTAINABLE PRODUCTION OF RAW MATERIALS

Finland is the only significant European producer of raw materials for electric vehicle batteries.

EXCELLENT PLATFORM F0R COMPONENT AND CELL MANUFACTURING

Finland offers an compelling location for companies aspiring to meet the growing European demand for battery components and cells.

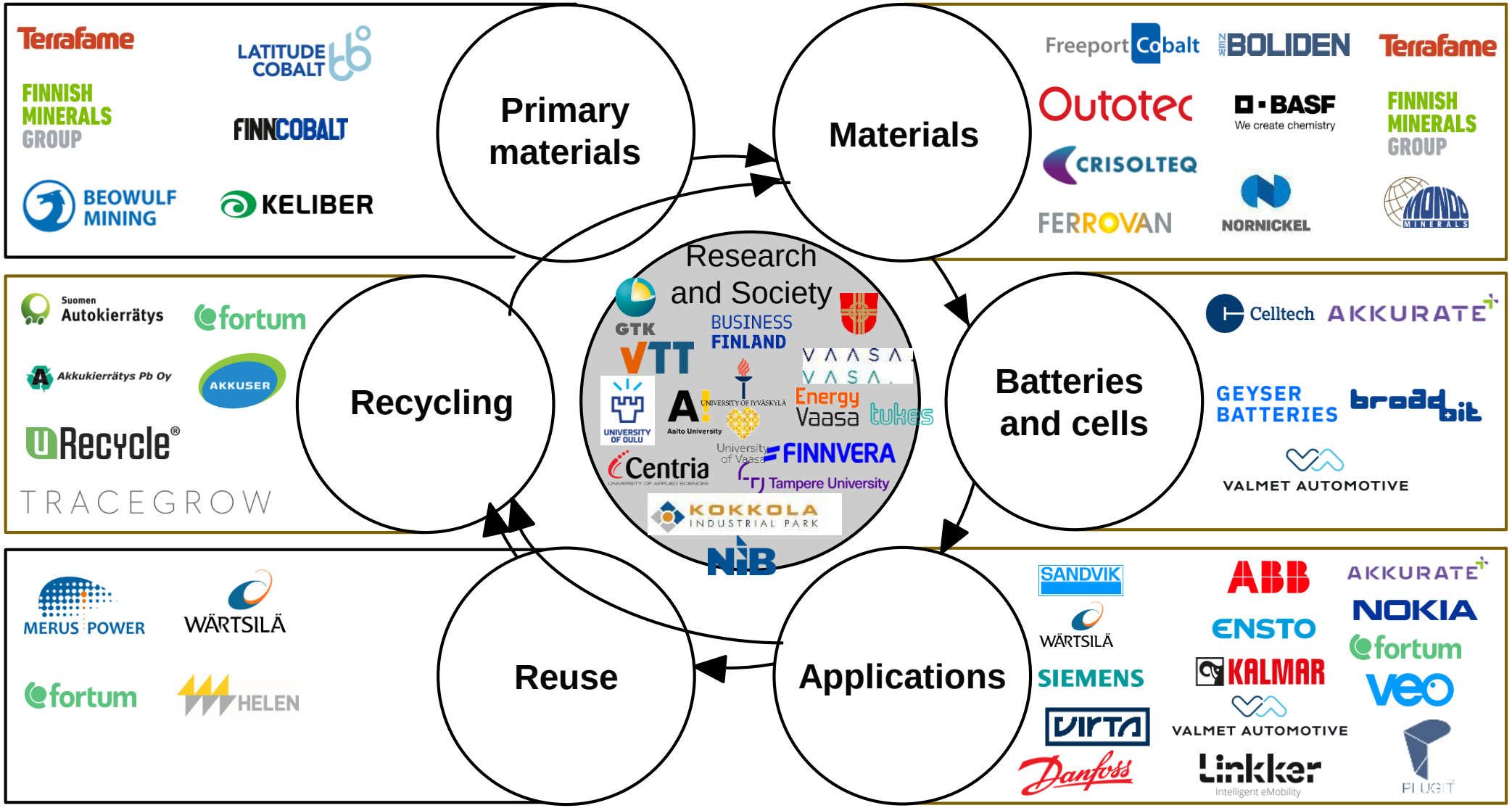
INNOVATIVE APPLICATIONS AND WIDE ECOSYSTEMS

Finland is globally known for its innovation and low carbon solutions for energy sectors.

FORERUNNER ON RECYCLING

As proof point of our competences EU has given Finland leading role on battery recycling research.

BATTERY VALUE CHAIN




Thank you!