



DSO Regulation Impact on Clean Energy Transition in Finland



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We bring electricity to our customers through our two network companies

Caruna Oy

Central Uusimaa, Koillismaa, Western Uusimaa, Southwest Finland, Ostrobothnia, Satakunta

488,000

customers

80,400 km

network length
165 m / customer

61%

Cabling rate

6

customer / network km,
investments EUR 209 / customer

Caruna Espoo Oy

Espoo, Joensuu, Kauniainen, Kirkkonummi

238,000

customers

8,200 km

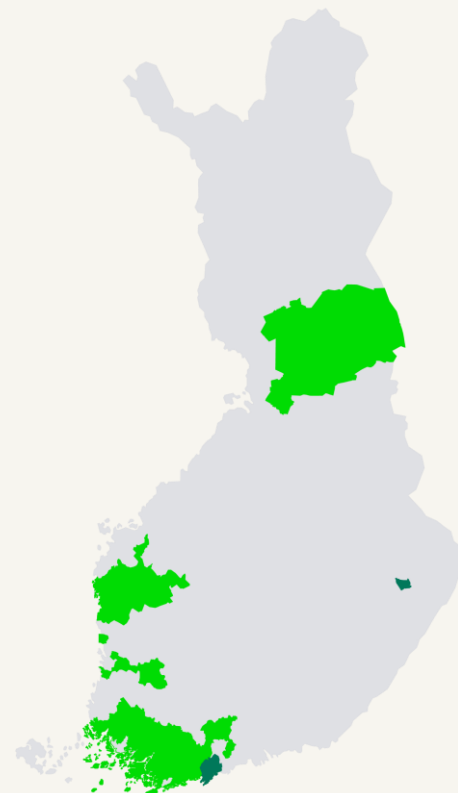
network length
35 m / customer

82%

Cabling rate

29

customer / network km,
investments EUR 134 / customer



Clean transition road map 2020-2040

2020

- Grid companies invested EUR 690 million in 2020, most of which was related to weather-proofing.
- 2,600 MW of wind power has been installed, annual production 8 TWh

- **45,000 electric cars**
- **290 MW of solar power has been installed, annual production 0.3 TWh**
- **1,100,000 heat pumps have been installed**



2025

System level

Customers



- Use of coal in energy production will end
- Investments in the distribution grid related to the energy transition, EUR 3,000 million

- **Energy communities have been established in housing companies**
- **Total number of ground source heat pumps is 270,000 and their electricity consumption 1.9 TWh**



2030

- Investments relating to weather-proofing (EUR 9.5 billion) largely completed
- There are more than 4,200 public charging stations across Finland
- EUR 15 billion has been invested in wind power, resulting in 7,000 MW being installed
- Electricity storages provide flexibility with 500 MW of power



2035



- **700,000 electric cars**
- **Solar power production has increased 7-fold to 2 TWh**
- **Energy communities participate in the electricity market**



2040

- Finland is carbon-negative
- Investments relating to the energy transition (EUR 14 billion) largely completed.
- 121 TWh of electricity is consumed, increase +50% compared to 2020

- **5 GW of solar power has been installed, which is 1.5 times the entire hydroelectric power capacity. Solar power produces 3 TWh of electricity**



- Finland will be carbon-neutral in 2035
- The hydrogen economy consumes 15 TWh of electricity, almost the same amount as the entire forest industry in 2020
- 11,000 MW of wind power installed, annual production 35 TWh
- The first small nuclear power plants produce district heating and electricity
- Fingrid's new transmission connections (1,700 MW) to Sweden and Estonia are in use

Clean energy pipeline is over 150 bn€ by 2030

– Onshore wind power	54 bn€
– Offshore wind power	58 bn€
– Power grid	8 bn€
– Consumption, storage and other	33 bn€
– Hydrogen	1,5 bn€
– Battery manufacturing	6 bn€
– Steel	6 bn€
– Energy storage	2,5 bn€
– Biorefinery	2,5 bn€
– Nuclear	1 bn€
– Solar	1 bn€
– Textile fibre	0,5 bn€
– Circular economy	0,5 bn€
– Biogas	0,35 bn
– Bio energy	0,25 bn€
– Heat pumps	0,2 bn€

Data centres and EV charging are missing!

Theme

- Batteries
- Biochar
- Bioenergy
- Biogas
- Bioproducts
- Biorefinery
- Carbon capture
- Circular economy
- Electric mobility
- Energy storage
- Heat pumps
- Heating
- Hydrogen
- Hydropower
- Nuclear Power
- Offshore wind
- Onshore wind
- Other

Phase

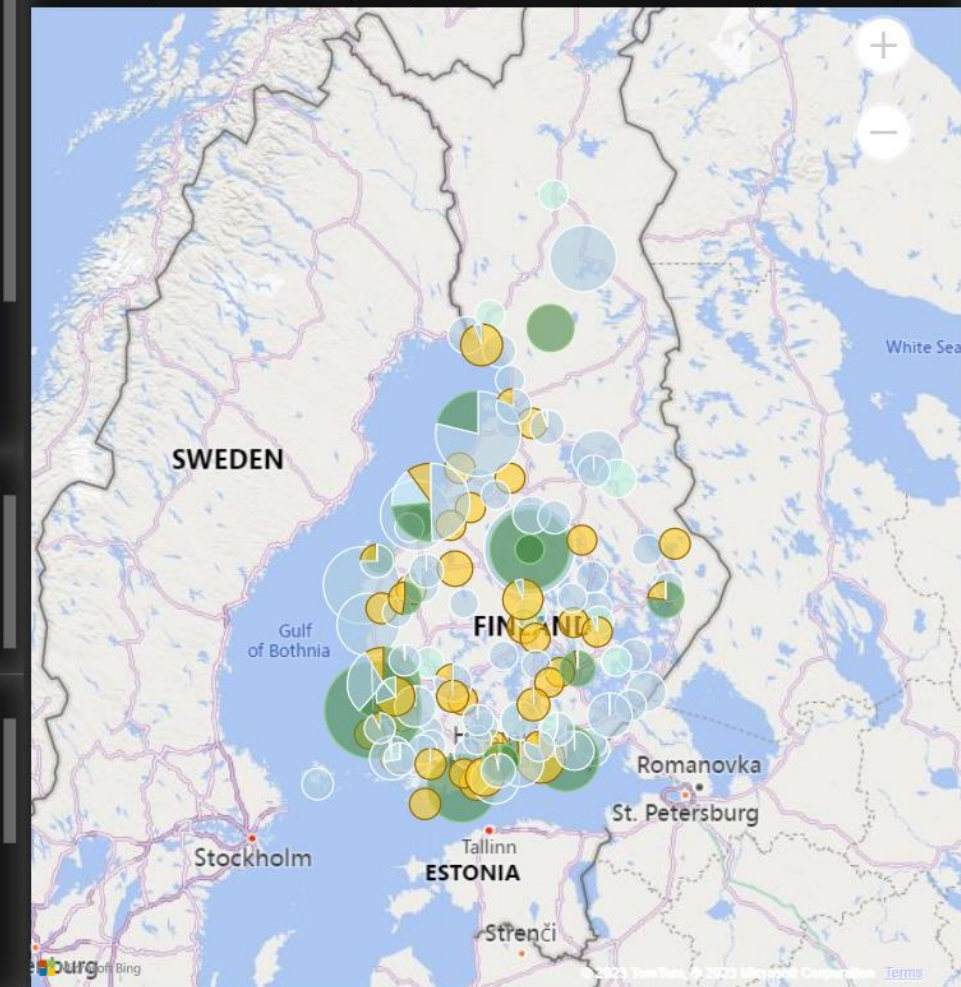
- Expansion
- Feasibility study
- Investment decision
- Planning
- Start of operations

County

- Select all
- Åland
- Central Finland
- Central Ostrobothnia
- Kainuu
- Kanta-Häme
- Kymenlaakso
- Lapland
- North Karelia

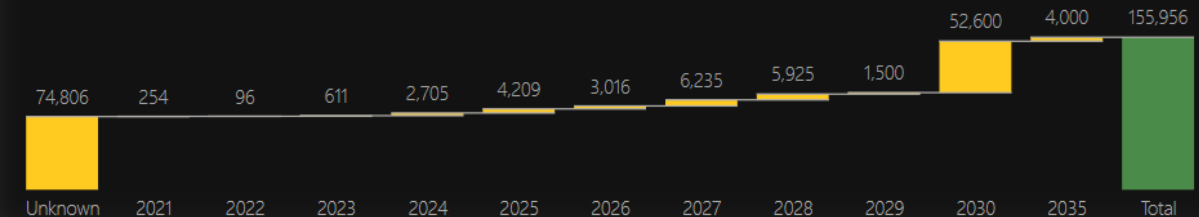
Investments by municipalities

Phase ● Expansion ● Feasibility study ● Investment deci... ● Planning ● Start of ope...



Investment amount by Completion year

Amount (mio. €)



Plan the optimal solution with limited resources

A SPLENDID GAME WHICH TAKES ABOUT 20MIN. HIGH RECOMMENDATION. 😊 [HTTPS://WWW.GAME.ENERGY/](https://www.game.energy/)

BALANCE OF POWER

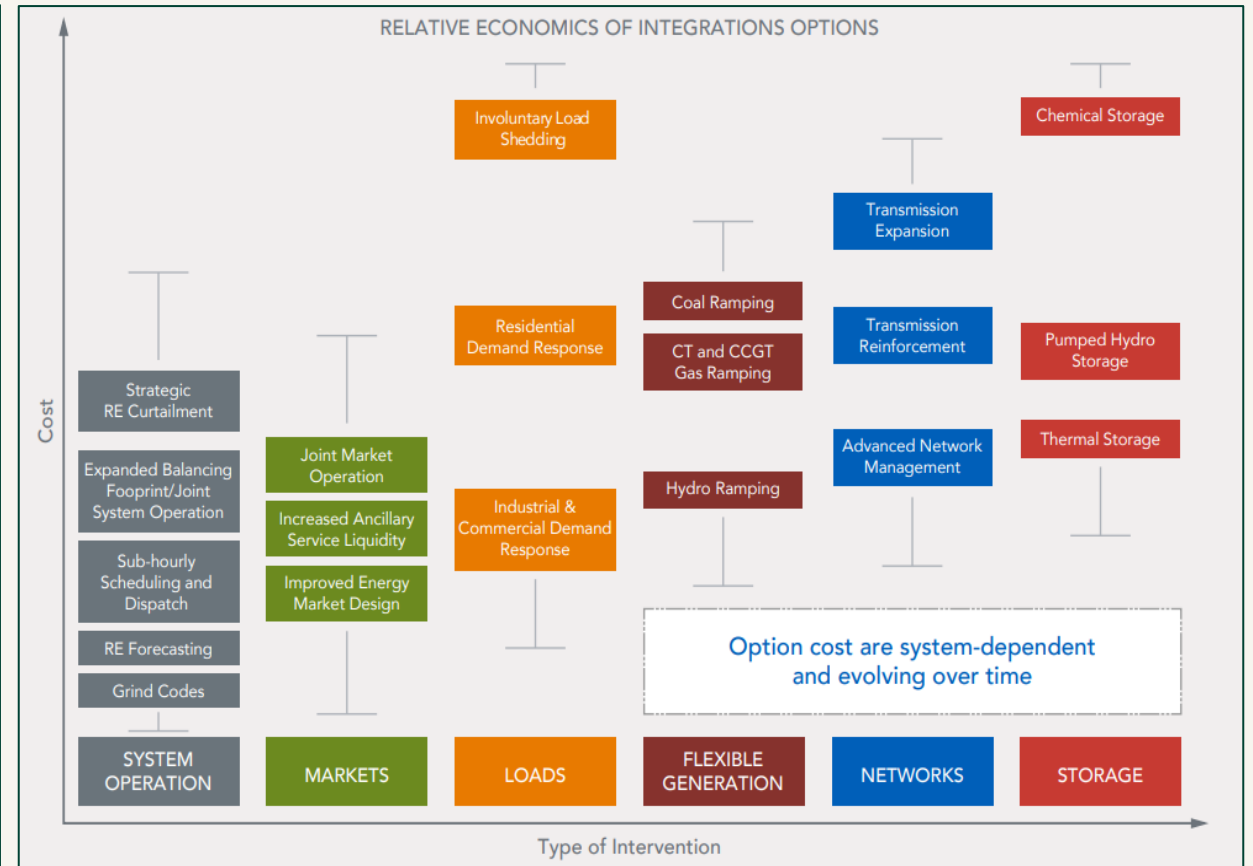
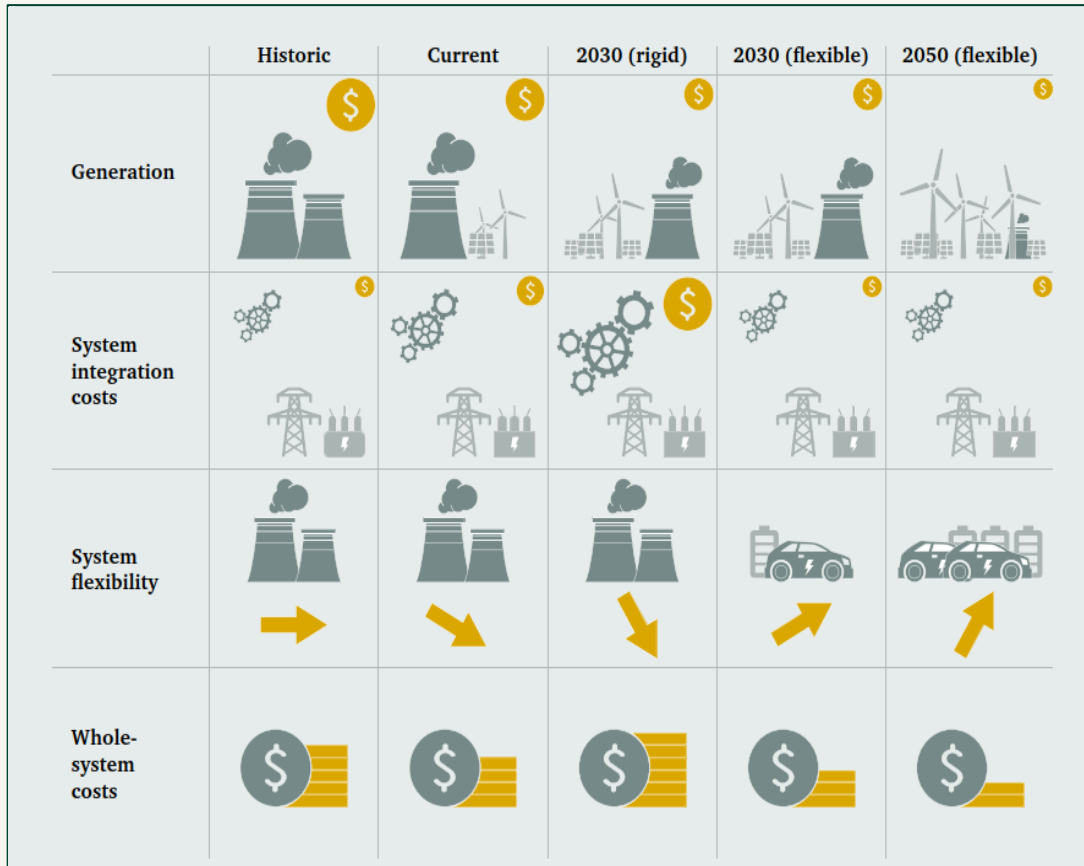
A GAME BY



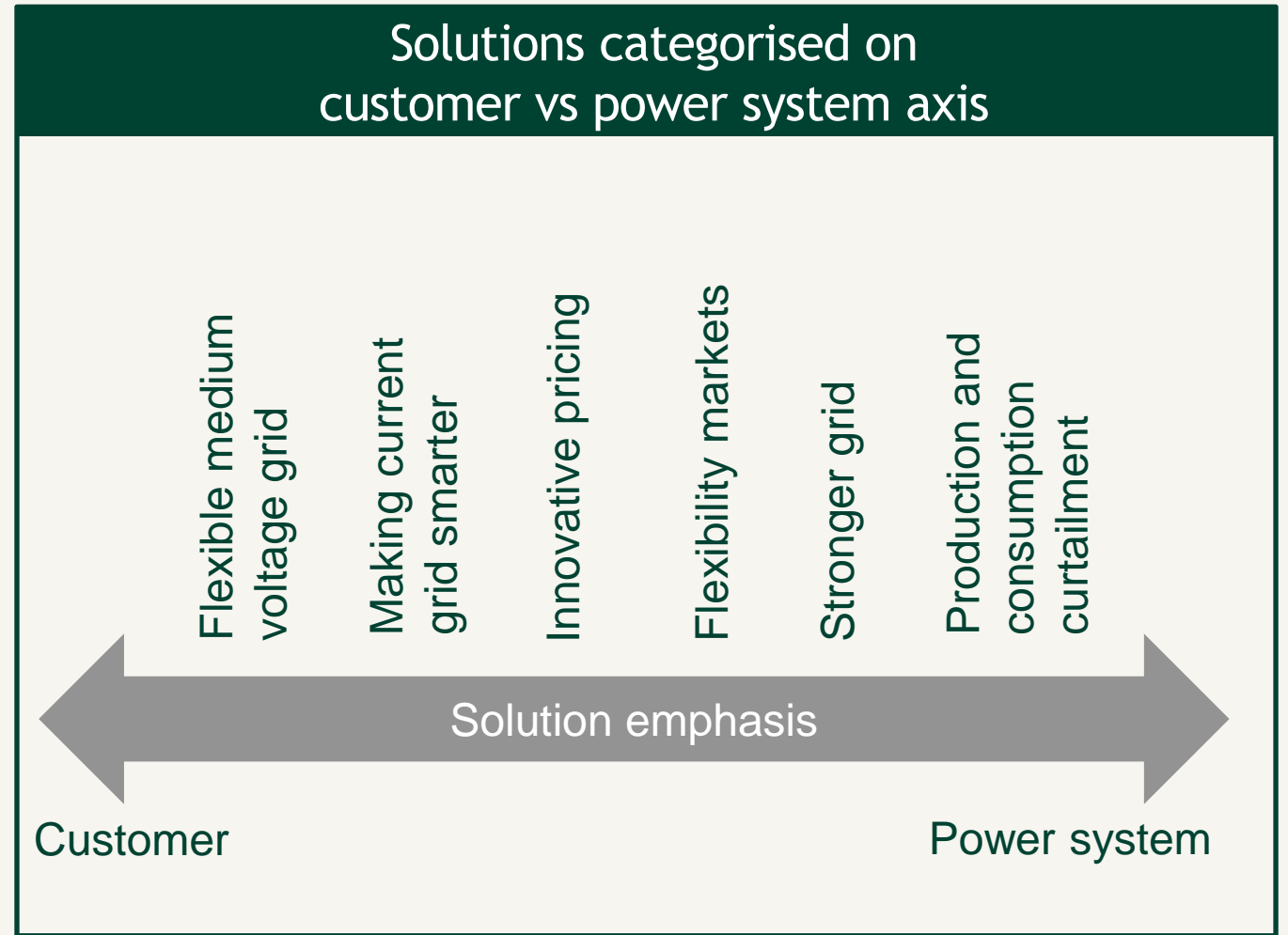
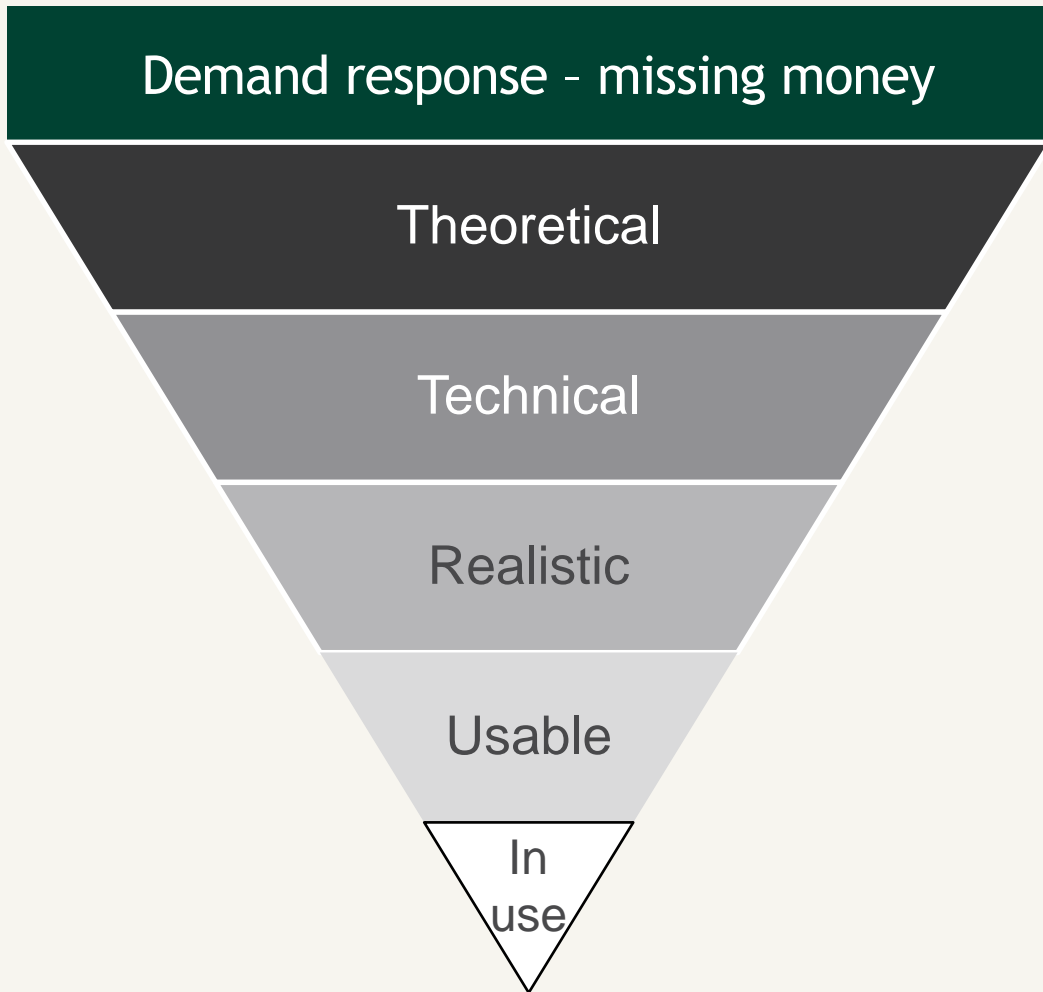
UNIVERSAL SMART ENERGY FRAMEWORK

Total energy system costs will rise in midterm

BATTLE AGAINST CLIMATE CHANGE HAS A COST



A primer on grid edge flexibility



DSO operating environment drivers

INCENTIVES FOR EFFICIENT GRID INVESTMENT SECURE CLEAN ENERGY TRANSITION

Challenge: Costs and regulation

- Substantial cost hike especially in construction and operations
- Weak investment environment has already postponed grid development [Regulation update 2022]
- Finance costs have risen tenfold within few years [app. 0,5 % => app. 5,0 %]
- Regulation guidelines for 2024 – 2031
 - No incentive for efficient investments
 - Negative investment profitability
 - High general efficiency demand for operations

Opportunity: Clean energy transition

- Finnish advantage
 - Empty space
 - Good existing infrastructure
 - Predictable and stable regulation
 - Finance
 - Strong and smart power grid is in demand
 - Significant grid investments by 2030
 - Higher national energy security of supply
 - New massive industrial investments app. 150 billion euros
- ⇒ Basis to finance current and future welfare state

DSO regulation in 2016 - 2023



Regulation model 2024 - 2031

SNATCHING DEFEAT FROM JAWS OF VICTORY

An inefficiency incentive

- Proposal to share annual capex efficiency 50 % / 50 % and every four years 100 %
- Current model shares efficiency only every four years 100 %
- Investment incentive cost sharing model leads to clear welfare loss for customers and companies

⇒ Higher customer prices and lower investment efficiency

Cost cutting to the bone

- General efficiency demand of 2% per year
- New initiatives
- Regulation charges

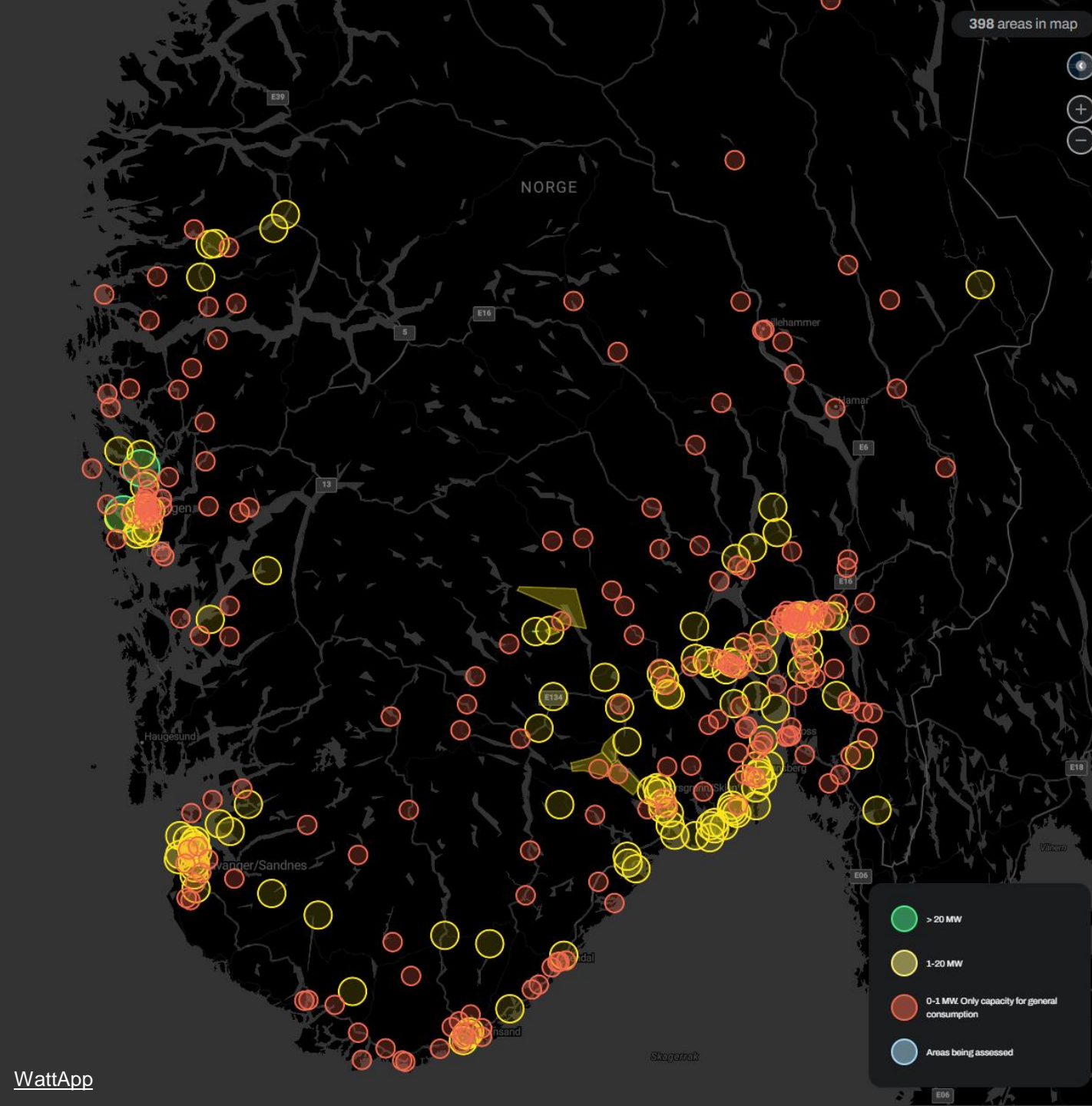
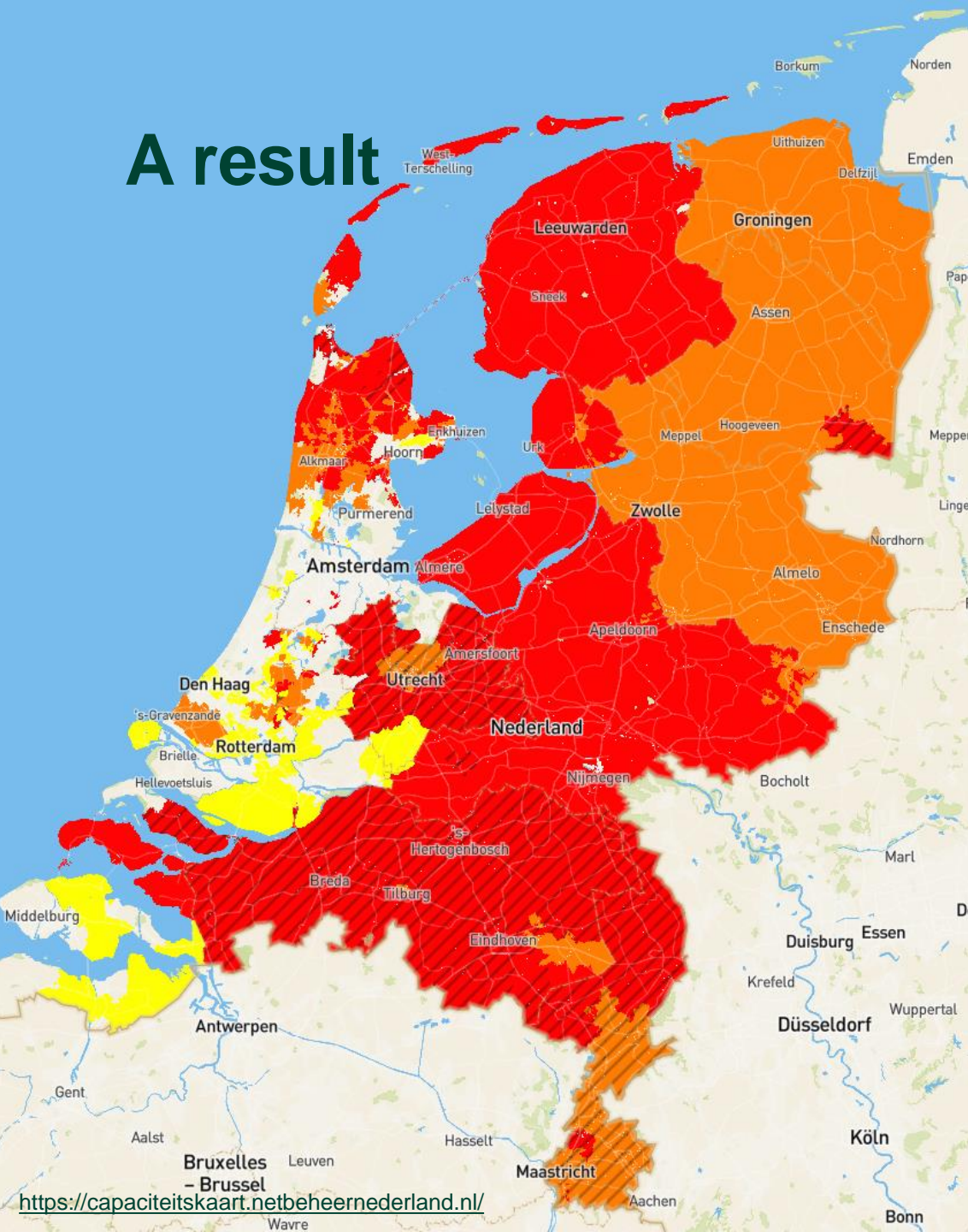
⇒ Focus on maintaining operations

Investment halt

- 1) Non-market regulation unit prices
- 2) Deferred tax from cumulative depreciation difference
- 3) Demolition depreciation removal

⇒ Investments conditions are not equal in infra-business

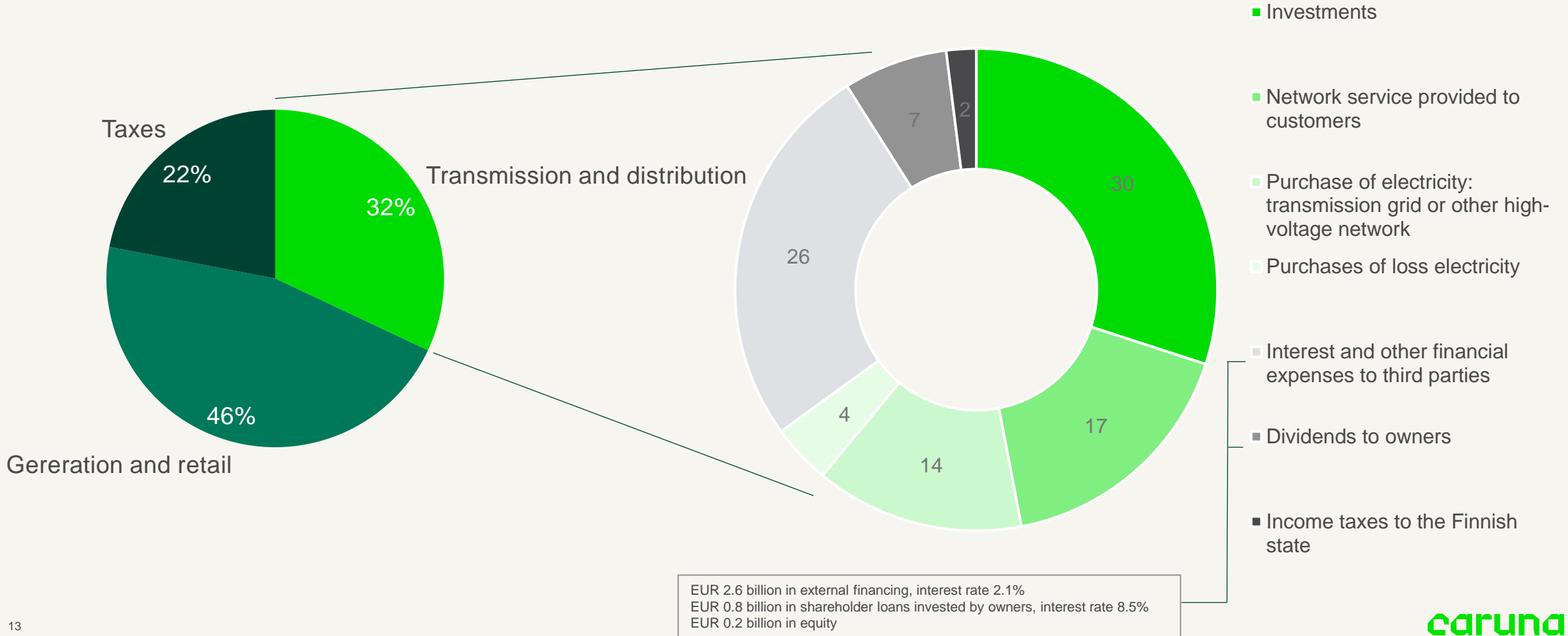
A result



A typical Finnish household with electric heating

LEFT: TOTAL INVOICE

RIGHT: CARUNA DIVISION OF DISTRIBUTION COSTS



A Strategy for

trading in stock market



Margin Call, 2011

DSO business



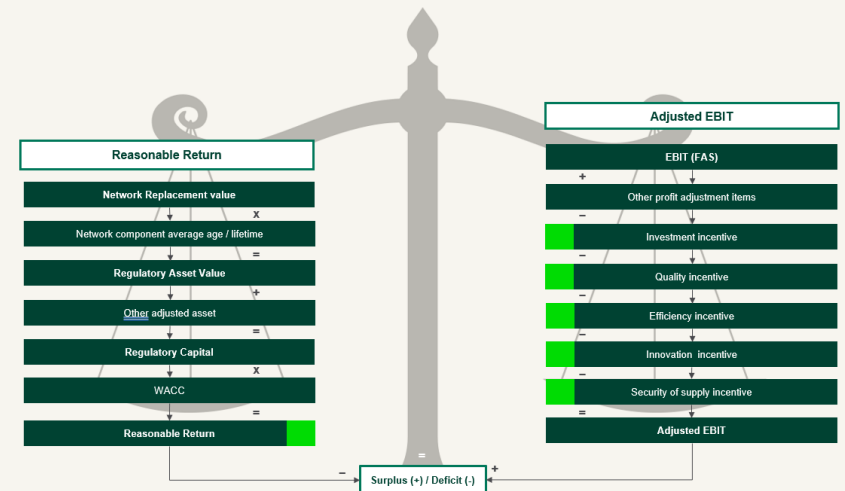
Pain & Gain, 2013

A Brave bureaucrat is in need

AN INTERSECTION FOR WELFARE STATE.

Clean energy transition = DSO regulation model enables profitable business with an incentive to invest efficiently from social welfare point of view

- a) Regulatory unit prices are in line within construction market prices that is start of the regulatory period at 1.1.2024
- b) Investment incentive encourages efficient investments
- c) Tax and demolition handling is equal with other infrastructure business



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We bring
electricity to you.

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