



Smart metering in district heating systems

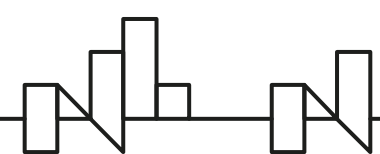
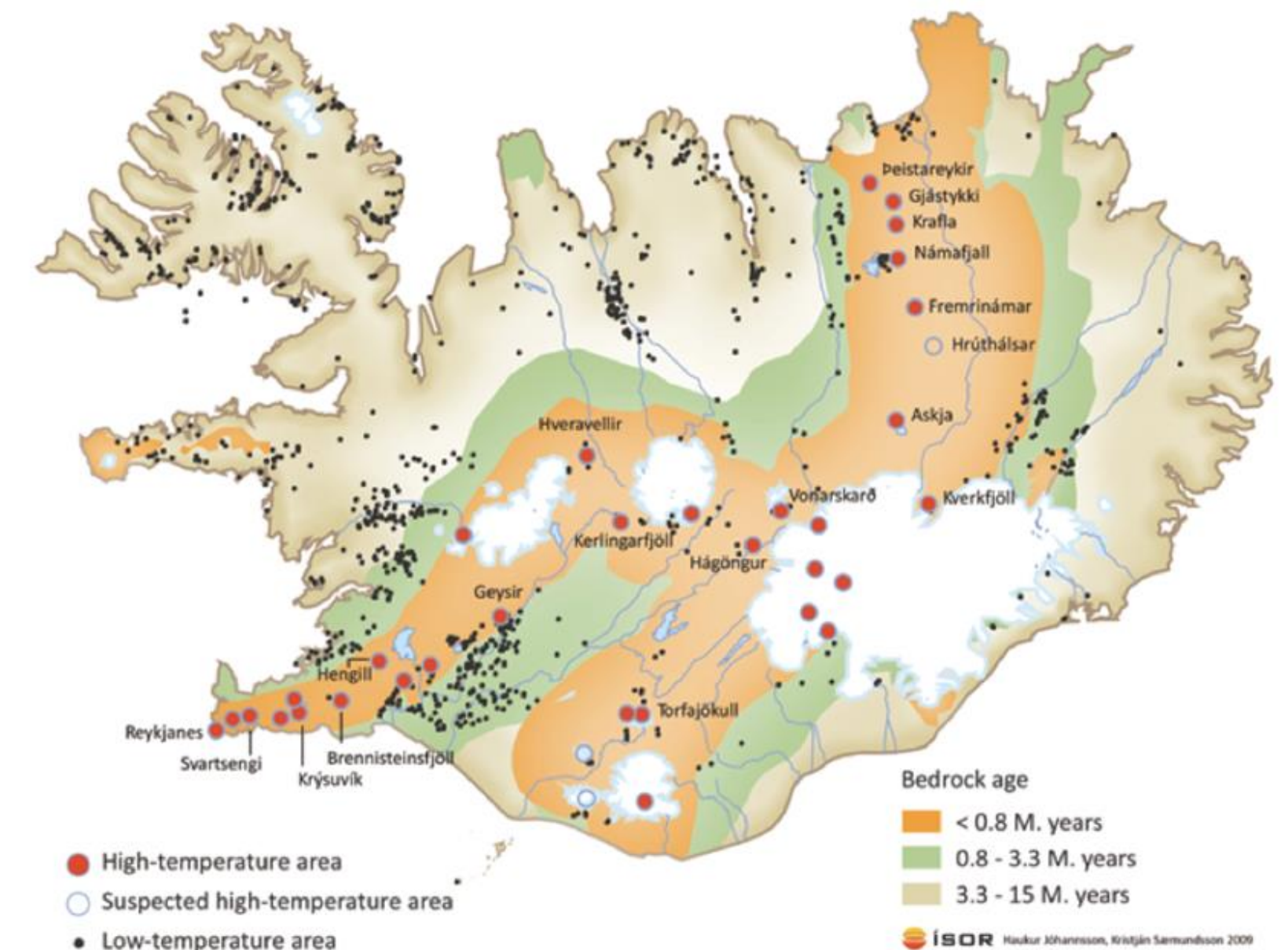
Current billing system and future expectation

Technical visit and workshop of the User4GeoEnergy Project, 7 - 8 December 2022



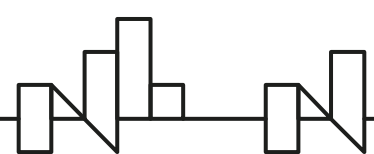
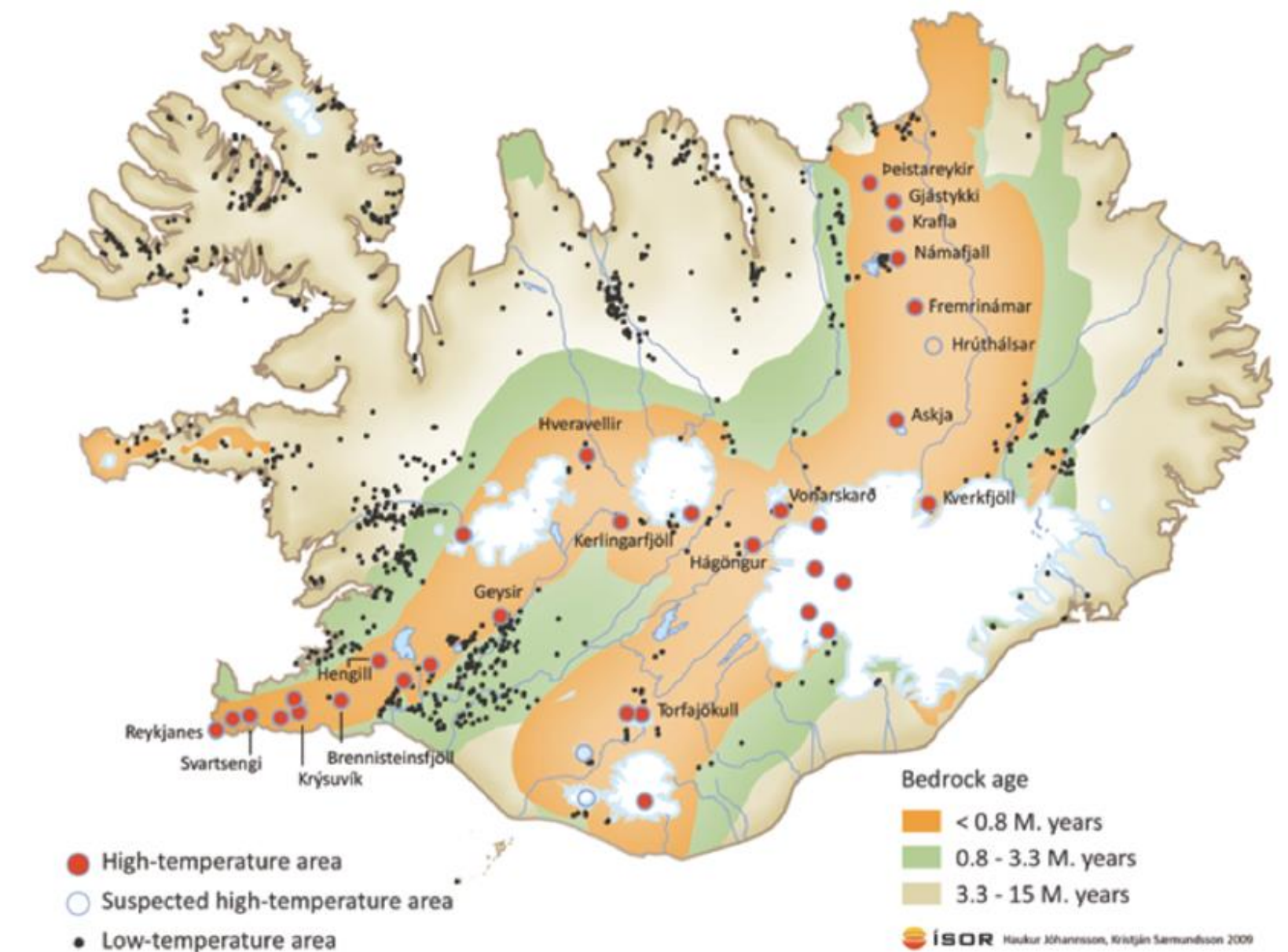
DH systems in Iceland

- Geothermal District heating provides over 90% of energy used for house heating – was already 80% in the 80's
- Geothermal DH systems in Iceland are most commonly **open loop** systems
 - Geothermal fluid is pumped directly to the user – for use as tap water as well as for heating
 - Supply (resource) temperature 60 – 98°C
- Water is **disregarded** after use, typically @ 25-30°C
- House owners' responsibility
- Return water is collected in some systems, used mainly for snow melting, cooling of the supply flow.
- Closed loop geothermal systems only operated where technically needed
 - Return water needed to re-inject back to the reservoir to maintain pressure
 - Geothermal resource is above boiling point



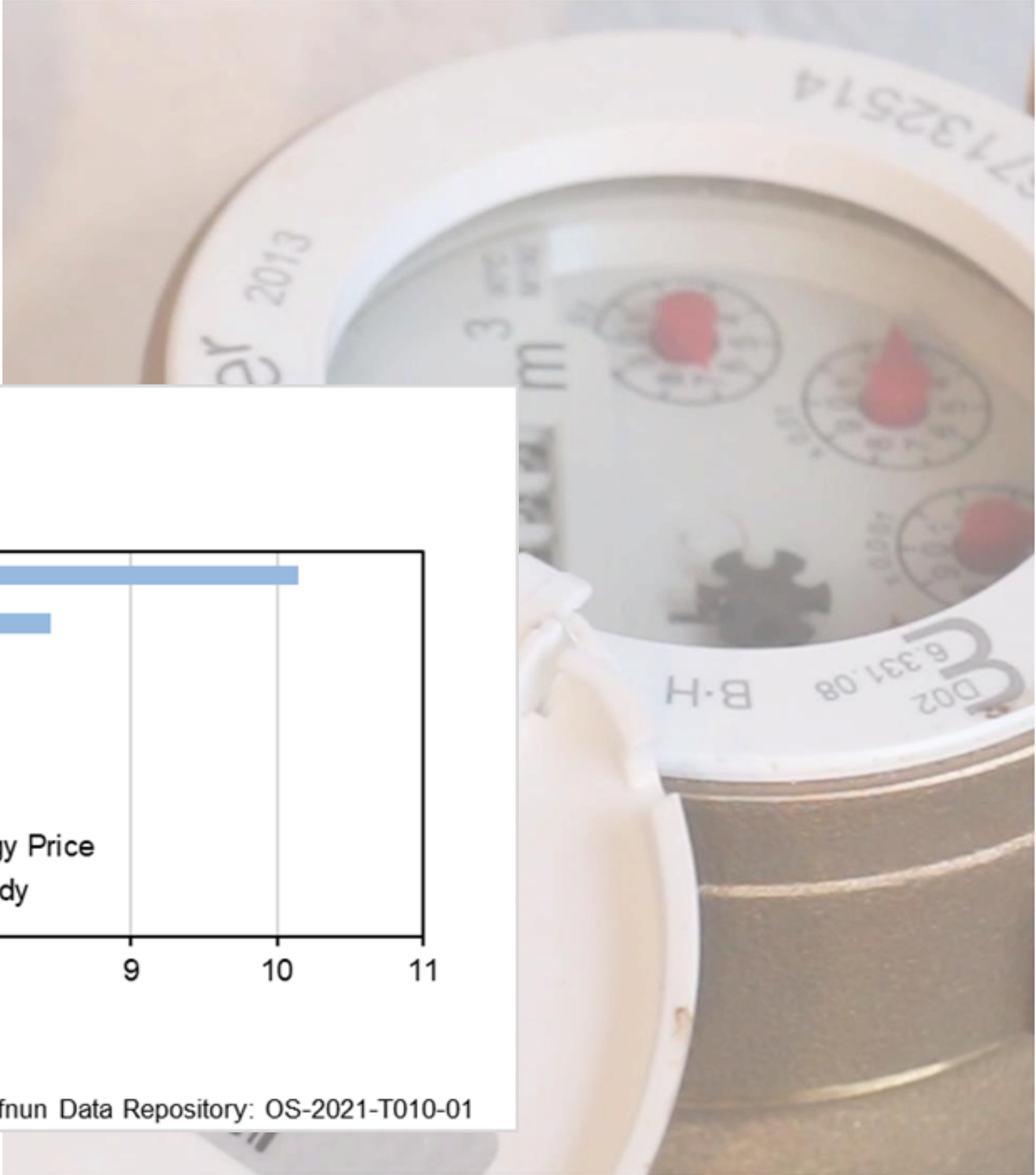
DH systems in Iceland

- Number of DH systems in rural areas
 - Stretching +30 km serving ~100 users.
 - High supply temp - temperature drop
 - Operators try to keep temp min 50°C
 - Heavy end-users help
- Flow limiters/restrictors still in use in some systems
 - Daily rates for l/min
 - Set to **max** flow rate (ca 3-6 l/min per user)
 - Often used in systems where usage fluctuates – (example summer houses with heavy use around weekends)
 - Prevention of frost-damage

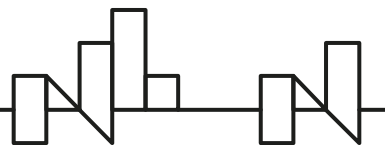
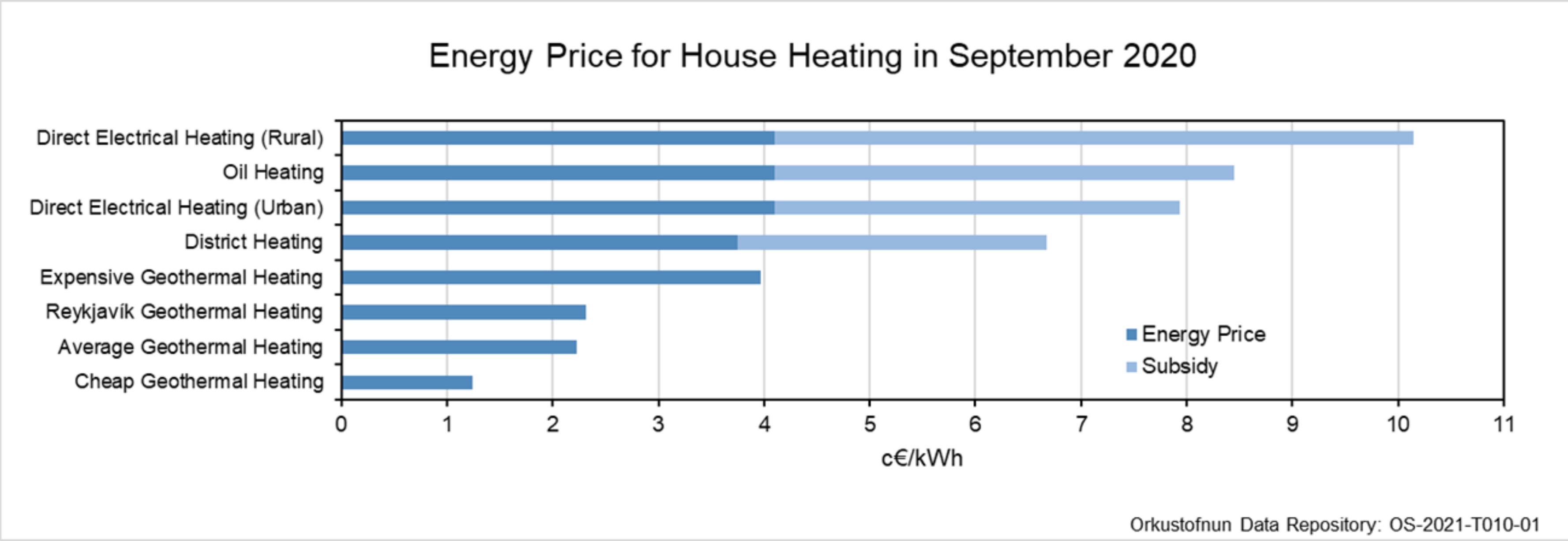


The current energy bill

- Fixed connection fees and **rates per volume**
- Examples from Veitur Utilities heating prices (Reykjavík) (excl. 2% energy tax and 11% VAT)
 - **Connection-fee** (10.1 €/month) – higher for rural areas
 - Use in **volume**, charged monthly (1.02 €/m³)

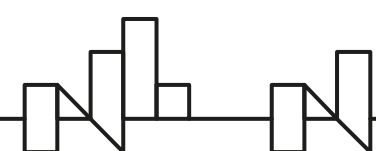
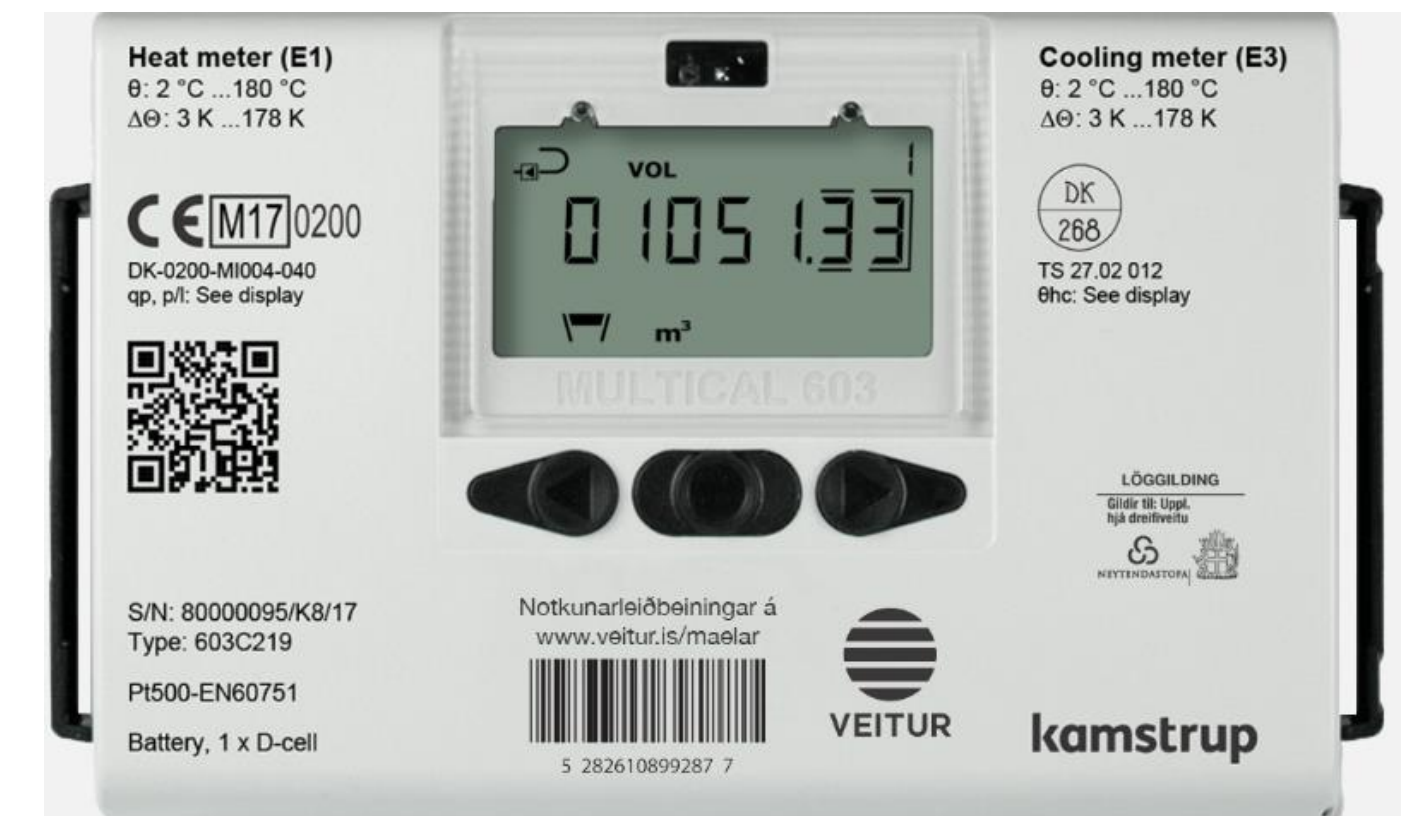


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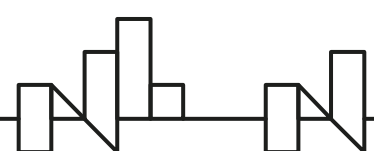
Smart energy meters

- All the larger DH companies are installing smart energy meters – replacing mechanical flow meters
 - Veitur Utilities LLC (Reykjavík) will finish in 2025
- Some few companies have started charging according to energy use – where **supply** temp. varies
 - Veitur expected to start by 2024
 - Period allowed for measuring supply temp. at users
 - Risk of **inflation**
- **Equivalent energy** calculated assuming a fixed return temperature (30°C) – might need to allow variation
- The method is described in Icelandic regulations.
- The motivation is to avoid inefficient use, as the water is largely disregarded after use



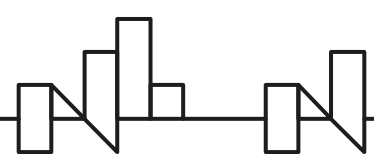
Tariffs as a tool to influence user behavior

- Varying energy rates
 - Depending on time of year
 - Depending on time of day
 - Useful for evening out spikes in usage
- The incentive is to minimize waste
- Limited quantity at lower price – (quota)
 - Enough for house heating
- Energy companies are already calculating **guidelines** for users average estimated use
 - Accounting for floor-area of house, year built, number of people living
 - Is not mandatory – need information from centralized source
- Rates need to be simple and transparent to be useful to influence usage



Benefits of smart metering

- Fairness for users with varying inlet temperature in the same system
- More precise billing – bills reflect **current** use – no need for estimates
- User **awareness** of energy use and possible savings
- Automatic reading/submittal
- Use of measurements in the operation of the systems
 - Veitur Utilities working on a Digital twin – DH system modelled “real time” conditions
 - Systems can identify “leaks” and operators can investigate
- Vary the supply temperature in closed/open loop systems
- Lower supply temperature
 - Minimize transportation losses
 - Better efficiency in electrical production (Geothermal power plants)
- Elevated supply temperatures in extreme cold periods



Iceland
Liechtenstein
Norway grants

Norway
grants

Thank you!

