

# Borneoiland Prosumer Community: towards more energy independent neighbourhoods in Amsterdam

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**Abstract** In residential areas, electricity production of Photovoltaic (PV) installations mismatch consumption peaks. The PARENT project focuses on prosumers generating data and information to improve the use of locally

produced energy; making residents more aware of their production and consumption patterns; and providing interventions, optimizing the use of local surplus electricity generated during the day.



Figure 1: The district of Borneoiland, placed in the eastern part of Amsterdam

**Data collection** The energy production (Figure 2) and consumption (Figure 3) data from six households is made real-time accessible and is aggregated (Figure 4). This provides detailed insight in the electricity flows. For the solar production this can be upscaled to the whole Borneoiland. For electricity consumption this is more difficult, both at household level and for the EV-charging. Accessing PV, household and EV data, the whole electricity flow in this area is known and visualised. This is a mayor support for policies on optimised growth of renewable energy and clean mobility.

**Electric vehicles and storage** Electricity storage can significantly improve energy independence. This is included in this monitoring and modelling tool (figure 5). Besides stationary storage, the integration of electric vehicles in the energy flows is studied. EVs are considered as batteries, which presence can be predicted with reasonable accuracy.

**Weather forecast and electricity prices** Further system improvement consists in integrating advanced logic into the energy management system simulation (Figure 6).

Examples of economically oriented rules:

- If the battery is expected to get filled during the next hours and electricity prices are high, then release (sell) energy automatically.
- If the battery is expected to get empty and electricity prices are low, then charge the battery automatically regardless of other factors.

**Conclusion and further steps** Data shows that in a typical week of summer, a household's energy production can double its consumption and that a household produces enough energy to charge various electric vehicles.

These insights pave the way for the development of a detailed energy strategy at district level, optimizing the energy flows and grid development through the use of demand side management and storage technologies, both in the form of EVs and stationary batteries.

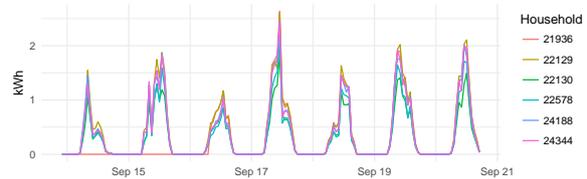


Figure 2: Electricity production of six households. Note how the installations perform in a similar way.

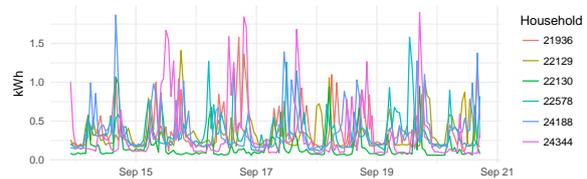


Figure 3: Electricity consumption of six households. Note how the behaviour of one household cannot be deduced from how the rest of the users behave.

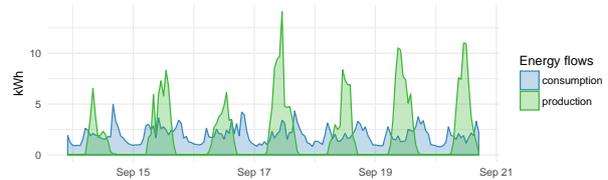


Figure 4: Production and consumption aggregated by household and overlapped.

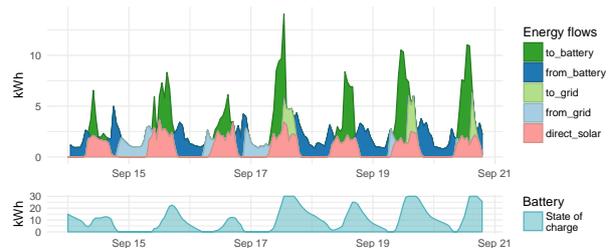


Figure 5: Energy model showing how the energy flows Borneoiland Prosumer Community (above) would behave with a 30 kWh battery (below).

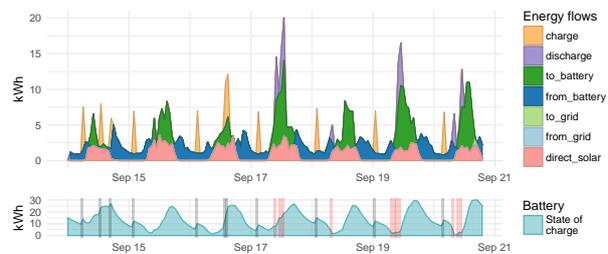


Figure 6: Advanced energy balancing model. The charge and discharge flows (colored in gray and red in the battery graph) indicate when the battery should interact with the grid, taking into account weather forecast and energy prices.

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