SOLUTION

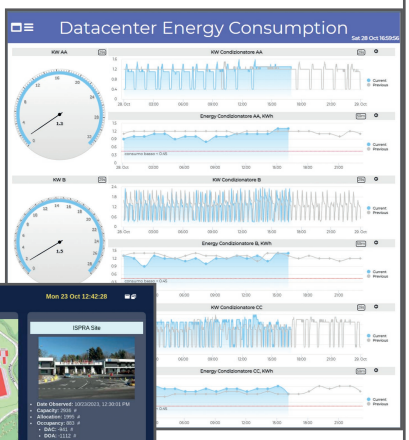
Energy Management and Control

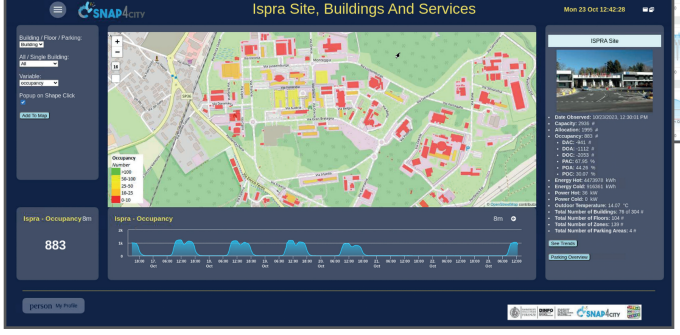
Energy management is a key aspect for many infrastructures of the city, such as city buildings and services, ICT services and data centres, road lights, smart buildings, water depuration, e-vehicles/ sharing, community of energy, recharging stations/poles, etc. From these services, the collection of energy consumption data may bring to compute Key Performance Indicators that may be useful for the Decision Makers.

Public lighting is moving towards the usage of LED lamps and thus a strong push towards smart light solutions has been registered. They allow to be finely regulated, so that to avoid the classic on/off approach, but controlling the percentage of light needed on the basis of the actual intensity of the natural lights and contextual conditions (for example, presence of people passing, car passing, the occurrence of critical situations). The infrastructure for public lighting, in most cases, may also bring connectivity wi-fi, provide environmental sensors or traffic sensors, etc.

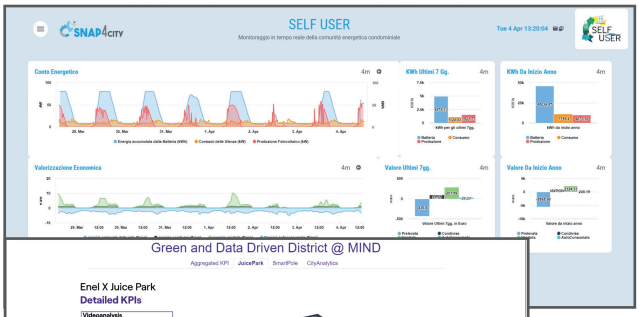
Residential and public buildings may be monitored via the smart meters that are progressively installed in most of the cities to enable the remote reading of the meters and also a deeper monitoring of the consumption over the single day/hour instead of getting a value reporting the global consumption in the month. This feature is particular relevant for energy providers that may be capable to regulate their offer on the basis of the actual/predicted consumption with a higher precision. In certain cases, some residential and/or industrial plants may also produce energy that may be provided to the network. See for example: Scenario: 5G Enabled Water Cleaning Control (smart city, industry 4.0). In that case, the energy consumed by each single pump in the water depuration infrastructure is monitored to control the efficiency. In those cases, predictive models can be activated.

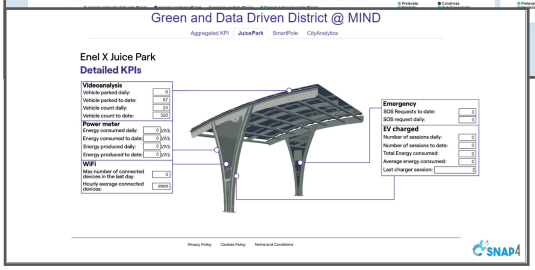
ICT infrastructures are surely a source of energy consumption, while it is strongly limited with respect to the above mentioned. A single ICT infrastructure may have an equivalent consumption of a large public building, for example. So that, the demand of energy monitoring may be very similar. The monitoring of energy consumption is also used to control the service since eventual disfunctions (over consumption, as well as strong reductions) can be the alarm of the inception of a critical event, thus provoking an early warning to the operators. In the Dashboard reported on right, the monitoring of the energy consumed by the DISIT Data center is depicted. It includes air conditioners and a number of UPS devices. In this case, Snap4City has also developed the IoT devices/sensors for measuring energy consumption in real time.

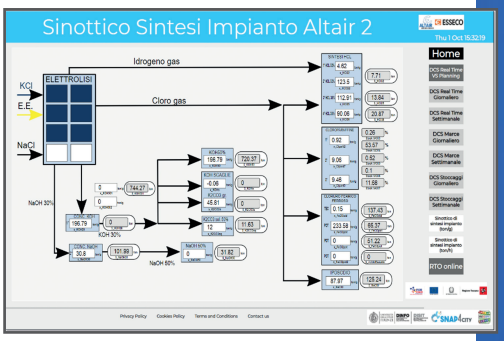




Recharging stations in city are rapidly growing in number and performance. Private city users are installing their own solutions according to the vehicles they are taking, while cities are providing on the streets (in agreement with energy providers) a number of solutions for regular ad fast recharge of vehicles. This activity is performed as incentives to the city users to pass at the e-vehicles, and thus to reduce the emission of NOX. The first consumers of those solutions should be the public means (busses and cars), taxies and the commuters.







Snap4City has developed a large range of solutions for the **Energy Management and Control** by monitoring services and conditions, cost reduction, increment of efficiency, improve accessibility, production of early warning, production prescriptions and what-if analysis.

Monitoring reporting them on control room, estimating KPI and
- Building, floors, rooms, recharging poles, cabinets, Community of Energy, Data centers, Energy for Hot / cold, air condition, energy vs temperature and usage, etc.

Computing:
- Predictions, early warning, identification of critical conditions
- **KPI: Energy consumption, efficiency, pros/cons**
  - Light profiling and adaptation
  - Autoclave industrial plants simulation, Photovoltaic plant simulation
  - consumption / usage, energy vs temperature

Solutions:
- **Smart Light Management**: LED/mixt, cabinets, lights vs traffic, lights vs security, energy saving, luminaries profiling, group management.
- **Smart Building Management**: consumption (cold and heat), number of people, etc.
- **Communities of Energy**, Photovoltaic plants, sustainability
- **Mobile App**: monitoring, info-recharge, eSharing, booking, ..
- **Participatory**: problem reporting, ticketing, etc.

Providing immediate visual AI tools for:
- **Rendering** conditions and forecasts
- **Providing suggestions** for the reduction of emissions
- **What-If analysis** on the effective impact of changes
- **Optimisation tools** for the computation of changes to be performed
- **Integration of any kind**

Mobile App: final users services/informing and operators, Information about energy consumption and critical levels.
Participatory: problem reporting, ticketing, etc.

To get more of the several solutions you can go on
- Smart Light Control and Light Adaptive for Traffic Density (the actual case of Merano)
  - https://www.snap4city.org/968
- Snap4Building: monitoring, managing, controlling infrastructures
  - https://www.snap4city.org/970
- Snap4PVenergy: Online Photovoltaic System Simulator
  - https://www.snap4city.org/940
- SCENARIO: Energy Community, CER, SELFUSER
  - https://www.snap4city.org/826
- Scenario: Energy Monitoring
  - https://www.snap4city.org/555
- Scenario: Firenze Smart City Control Room
  - https://www.snap4city.org/531
- Scenario: 5G Enabled Water Cleaning Control (smart city, industry 4.0)
  - https://www.snap4city.org/547
- List of all scenarious: https://www.snap4city.org/4

Extended version accessible from: https://www.snap4city.org/1038
Contact: https://www.snap4city.org
Partners: Snap4City, DISIT Lab

SOLUTION