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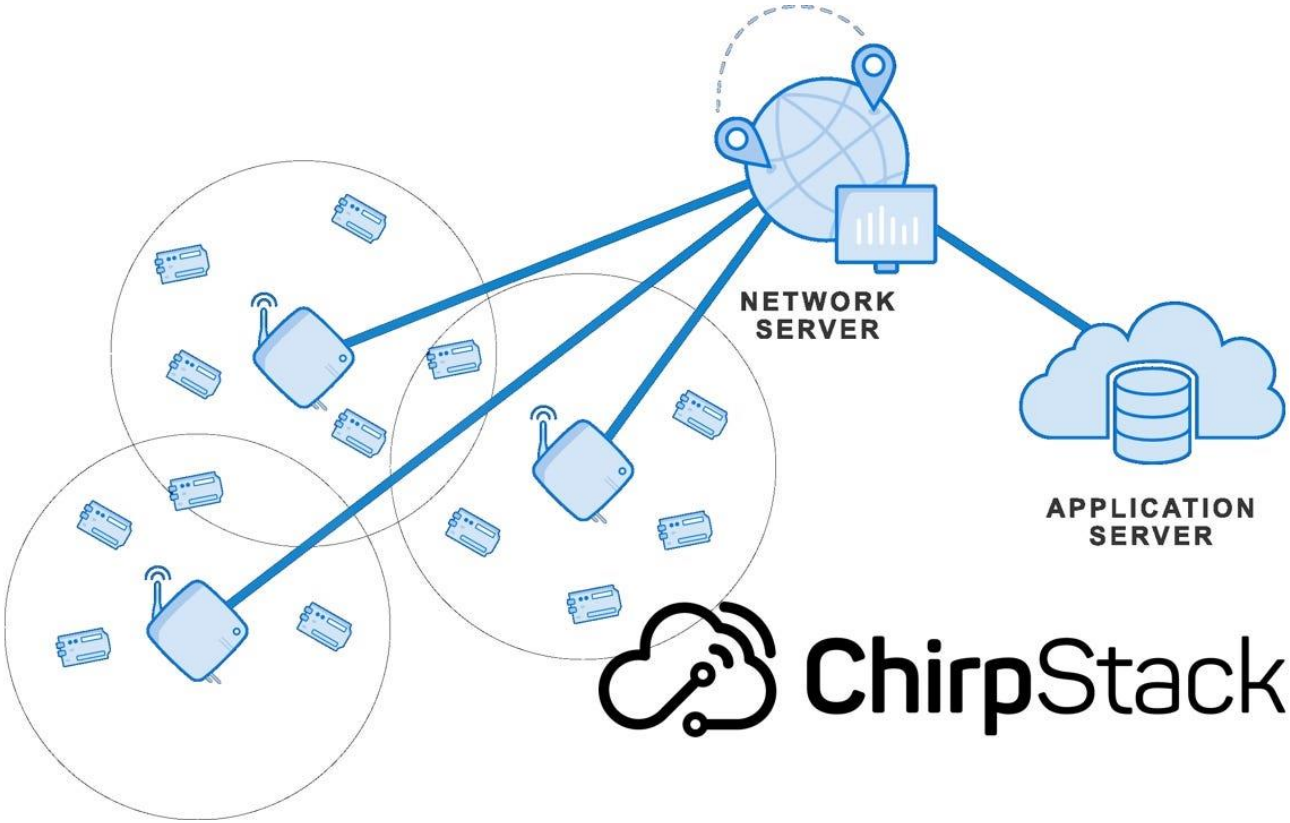
# **Stadtwerke Meran –** Lorawan Use Cases




ChirpStack

LoRaWAN®

Stefan Mutschlechner - Stadtwerke Meran

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# WHY OPEN SOURCE

- The public administration must make a technical and economic comparative analysis for choosing software products
- Art. 68  CAD. – Codice amministrazione digitale
- Public administration can only use proprietary software if it’s impossible to find an open-source solution
- Stadtwerke Meran is using and creating open-source software
- Theoretically, other cities should use the same solutions

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# DEMYSTIFYING LORAWAN

- Creating a LoRaWAN infrastructure is relatively simple and possible also for smaller cities

- It is possible to create a LoRaWAN network by using open-source software

- Use cases realized in Merano
  1. Smart Lighting
  2. Smart Metering, water counter
  3. Temperature and humidity measuring
  4. GPS-Tracking of Waste  containers

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# WHAT IS LORAWAN

- Stands for: Long Range Wide Area Network
- Long Range: It can transmit up to 15 km in rural areas
- Low Power: Devices can operate for up to 10 years on battery power
- Low Data Rate: LoRaWAN can only transmit small amounts of data
- Low Cost:  Once the infrastructure is installed, there are no additional costs

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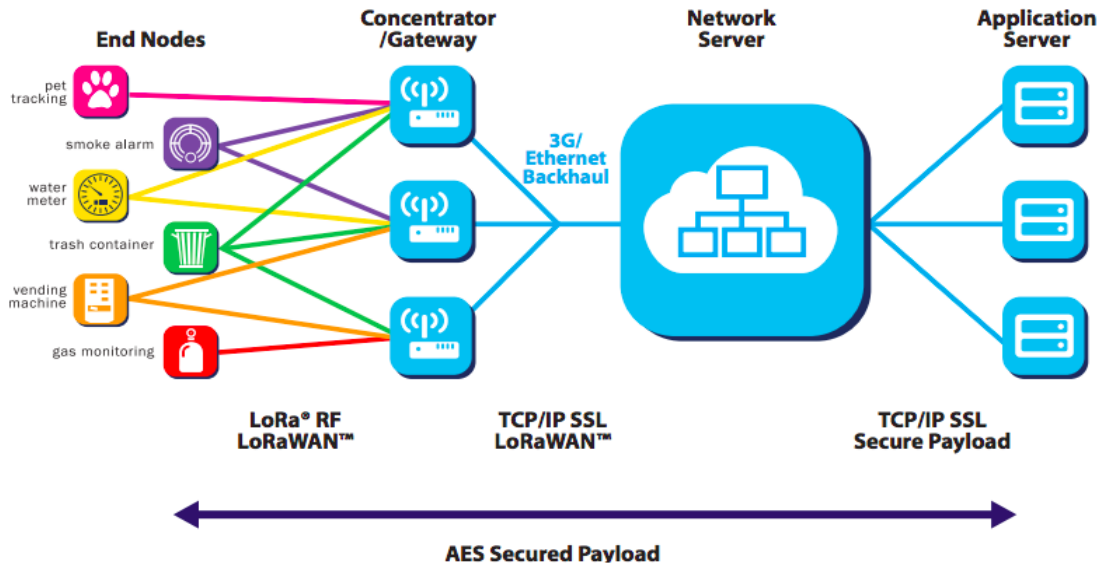
# LORAWAN INFRASTRUCTURE




- LoRaWAN devices are sending payloads that can be received by multiple gateways
- Gateways are forwarding the information to the network server.
- The application server receives data from the network server using the MQTT protocol

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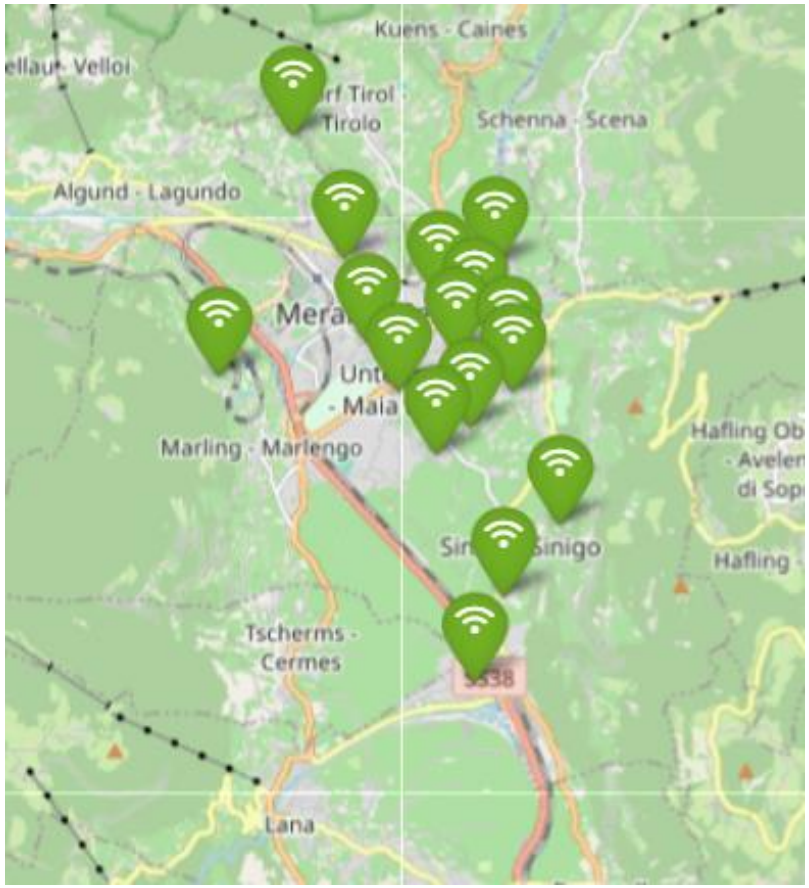
# OUR LORAWAN NETWORK




- Total Gateways: 18
- **High-Position Gateways:**
  - 5 gateways with their own firewall and 4G modem
  - Installed at high positions around the city
- **Urban Area Gateways:**
  - 13 gateways located in urban areas
  - Connected to the firewall of a light control cabinet
  - Installed on light poles

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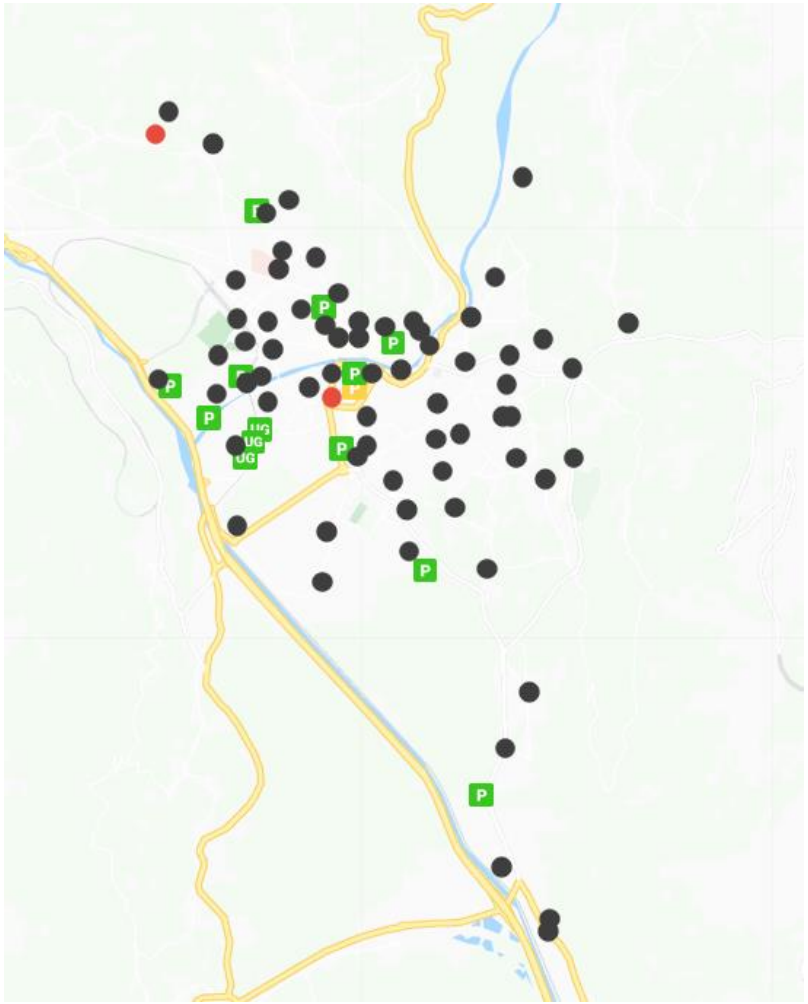
# OUR LORAWAN NETWORK



- It´s very easy to install additional gateways, if necessary
- We have 71 control cabinets equipped with 4G modems.
- We will install a PoE injector in the control cabinet
- Run a network cable to the nearest light pole, and install the LoRaWAN gateway there

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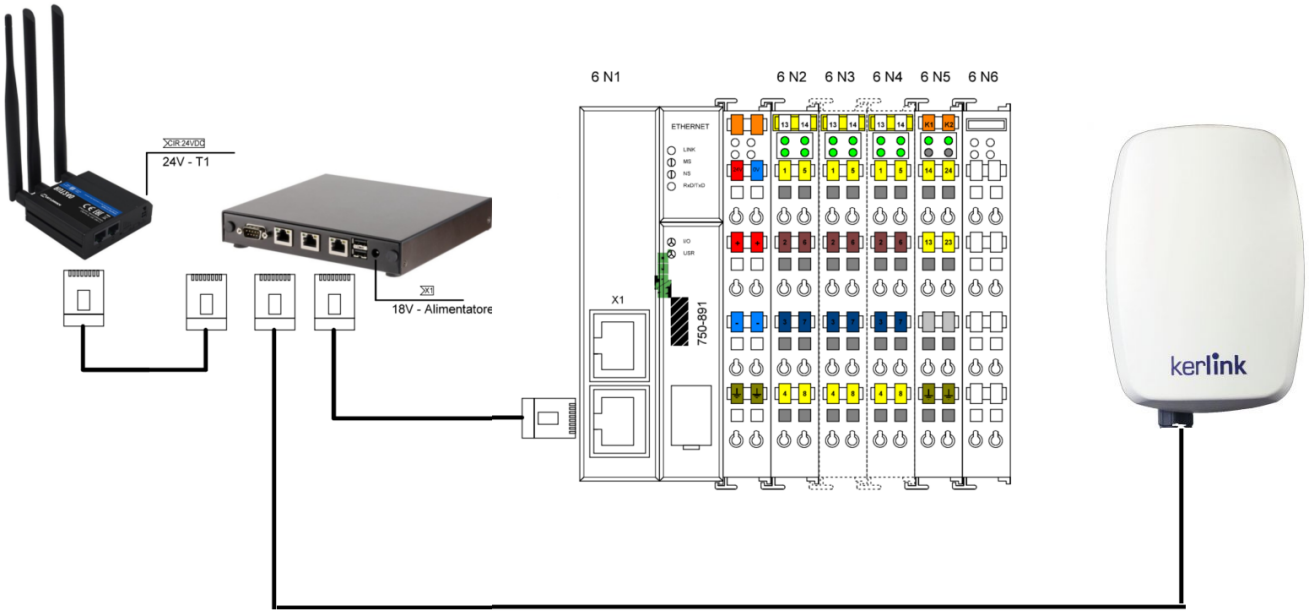
# OUR LORAWAN NETWORK

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# WHAT IS CHIRPSTACK

- ChirpStack is an open-source LoRaWAN network server
- Receives uplink packets from the gateways
- Sends downlink messages by selecting the most suitable gateway for transmission
- Data is made available via MQTT or API

ChirpStack

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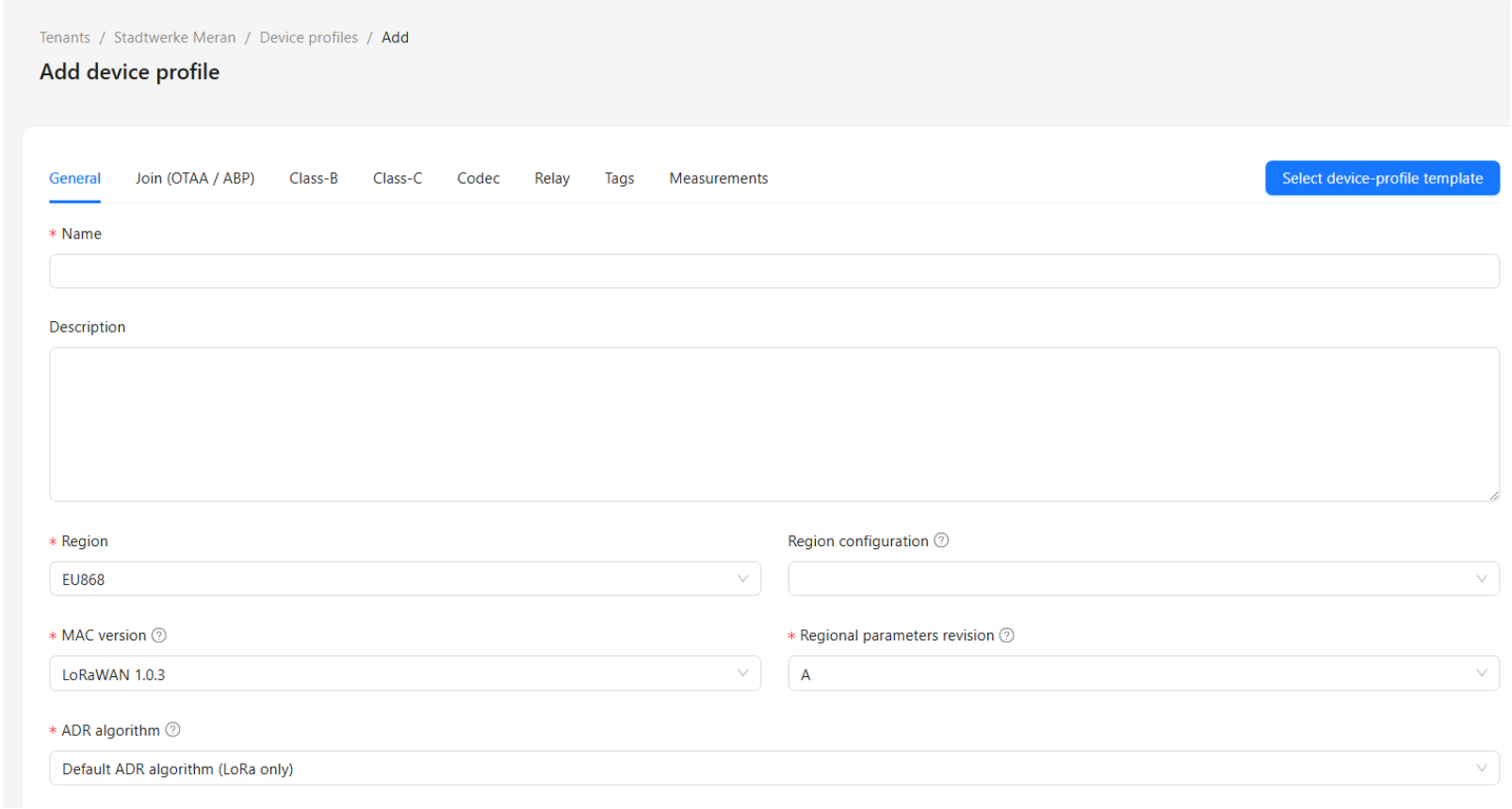
# CHIRPSTACK - CONFIGURATION

- Configure device profiles for new devices



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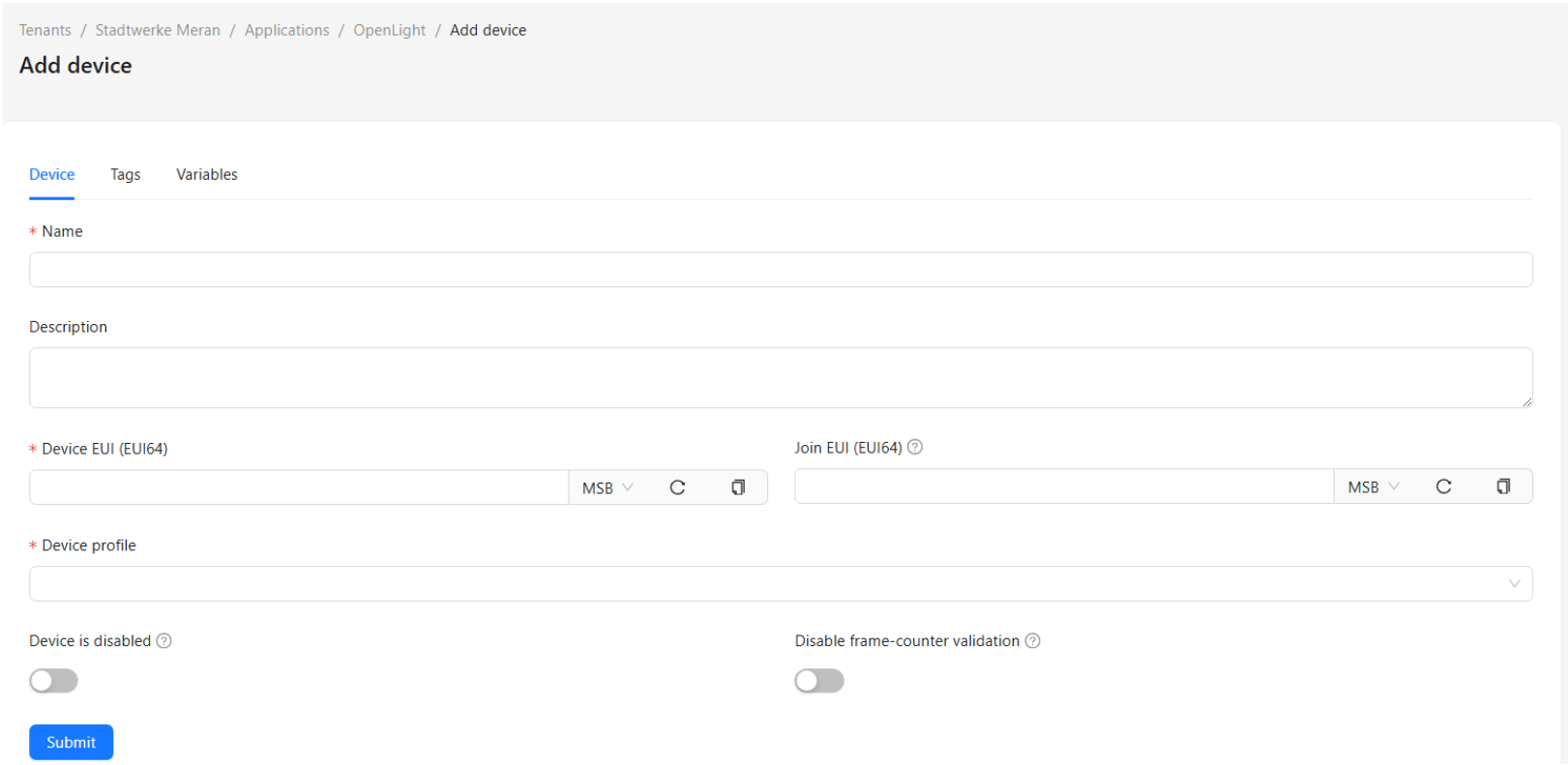
# CHIRPSTACK - CONFIGURATION

- Create new applications
- Add new devices



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# FROM THE FIELD TO THE CLOUD

We can independently:

- **Install Sensors**: Deploy sensors as needed
- **Configure in ChirpStack**: Set up and configure them within the ChirpStack Network Server
- **Make Data Available**: Provide access to the data via MQTT/API

**We successfully bring data from the field to the cloud!**

External software developers integrate this data into our Smart City platform.

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# SMART LIGHTING

- Installed 1.009 LoRaWAN controllers on streetlights
- Configuration of dimming profiles
- The Lamp controller are class C- Devices, continuous listening, powered by the lamp driver (24 V)

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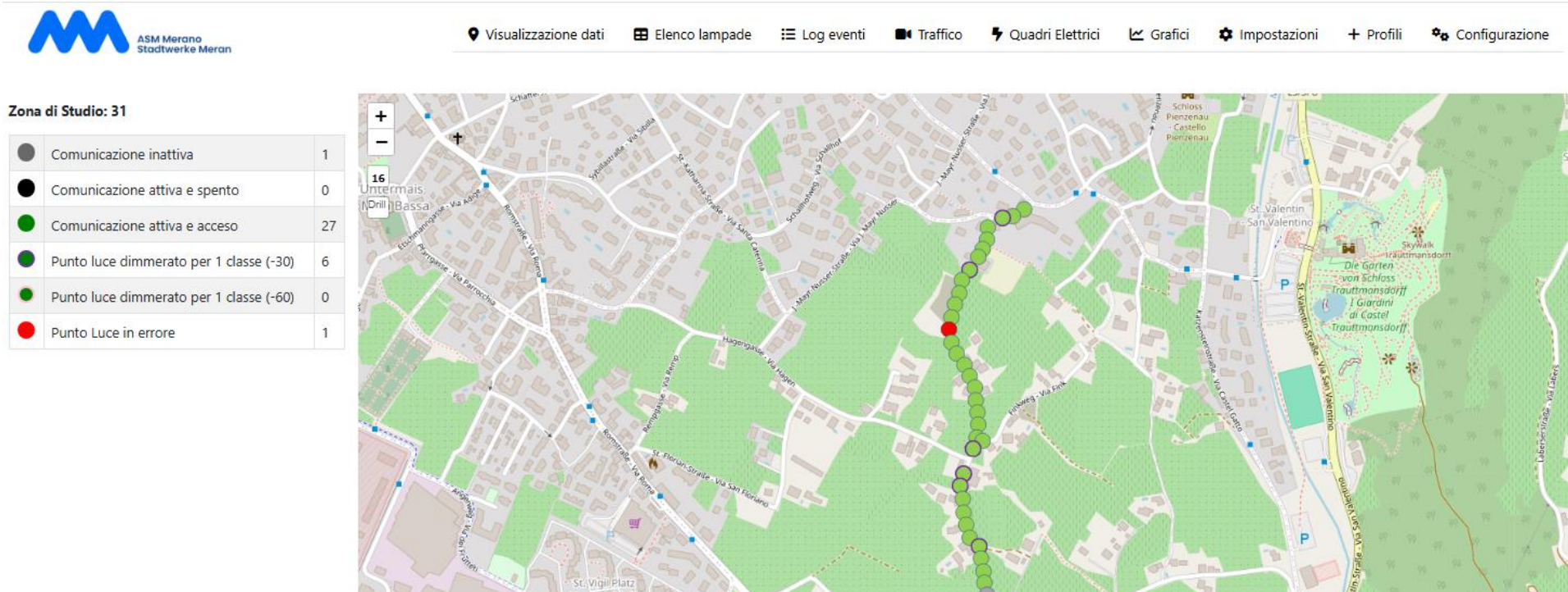
# SMART LIGHTING

- The LoraWan devices are sending the lamp status every 2 hours
- Our electricians can check in the morning which lamps have problems and organize maintenance



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# SMART METERING


- The smart meters are Class A devices, battery powered
- Installed 50 Smart meters in Gratsch
- Smart Meters are sending the counter values 2 times a day
- Water meters are often installed in manholes or basements
- 45 of 50 smart meters are responding
- In 2025 first customers will receive their water bills based on data read via LoRaWAN

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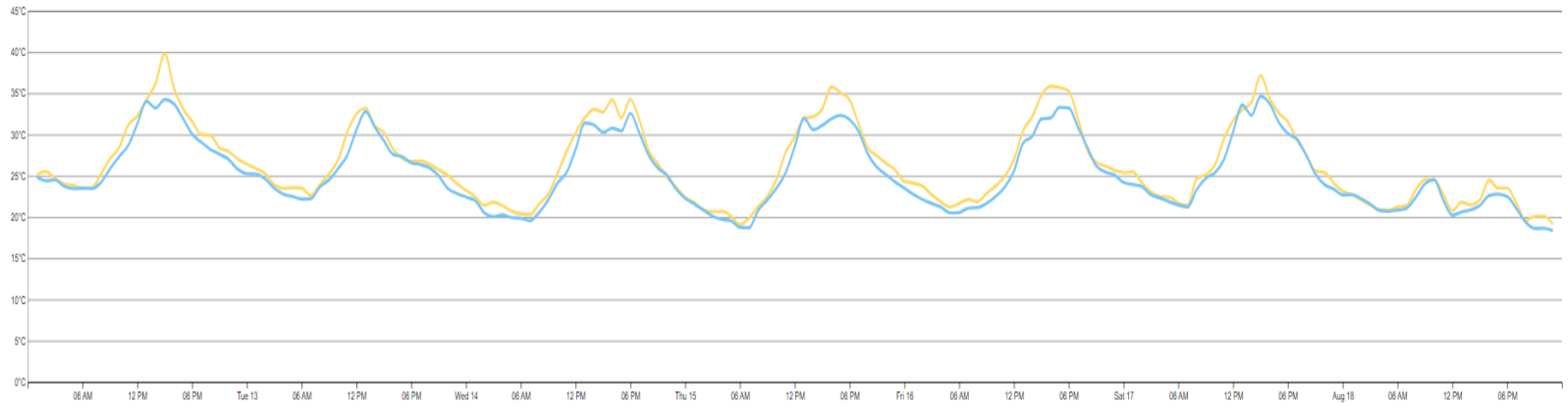
# OUTDOOR MICROCLIMATE SENSOR

- Just Nature Project:  36 outdoor microclimate sensors in Merano
- Measuring temperature, relative humidity and air pressure
- Battery powered Class A device
- The sensors are used to analyze the correlation between vegetation and air temperature
- The finding: Trees decrease air temperature

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# USE CASES GPS-TRACKING WASTE CONTAINER

- 40 waste press containers are used for large customers, such as supermarkets
- These waste presses can be delivered by our trucks to many different customers
- For regular maintenance, we must know where the presses are located
- For this reason, we have installed GPS-Tracker
- Battery powered class A- Devices
- Sending data 1 time a day or when the container is moved

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# THANK YOU FOR YOUR ATTENTION!