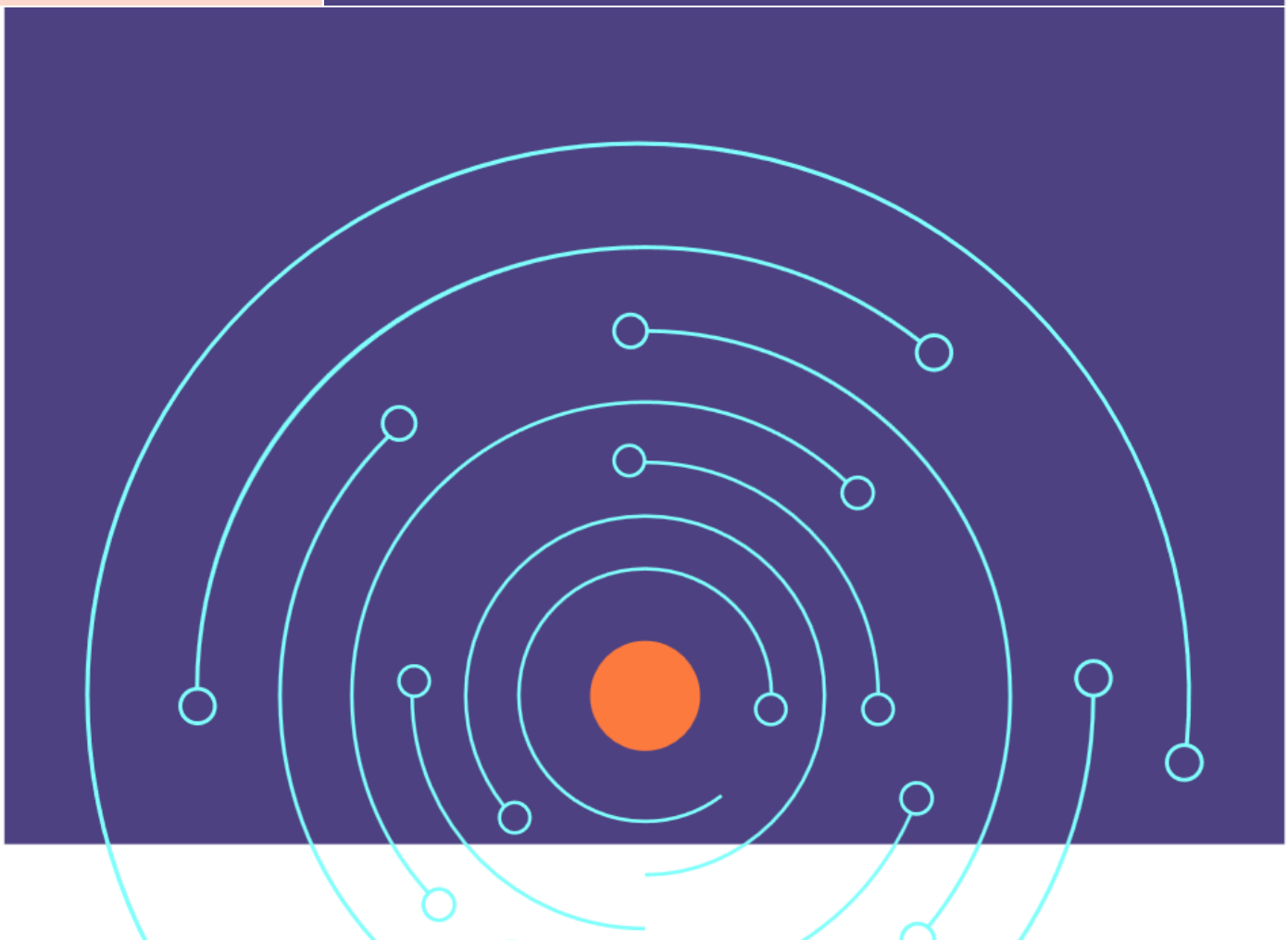
RE4DY

MANUFACTURING DATA NETWORKS

RE4DY TOOLKIT

Name of the Tool	SIMATIC Energy Manager with Insights Hub
Tool Owner	Industry Commons Foundation
Version	1.0
Date	Nov 2025
Version	V1.0



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1. Component Description

Insights Hub is the leading industrial IoT as a service solution. With Insights Hub users can ingest and visualize immediate real-time data and analytic results in one centralized location with no development required to unleash digital potential.

The Simatic Energy Manager App is a cloud-based Application in the Siemens Cloud “Insights Hub” to visualize energy data from any kind of energy source. The app offers the possibility to see when, where, and how much energy was consumed online at any time:

- Users have access to the consumption data of machines and plants worldwide.
- With individual KPI types and user-specific dashboards, a user can create a complete overview of the energy consumption of his machines, plants, or entire production facilities from which the user can subsequently derive measures for energy efficiency.
- Users can create a KPI instance directly at the asset in the Energy Manager without having defined a KPI type beforehand.
- In the detail view of the widgets, it is possible to create quick media analyses.
- Transparent listing of energy costs, energy consumption and CO2 emissions of individual machines and all production facilities around the globe. (Energy media analysis)
- Users obtain valuable information on peaks in energy consumption, for example, to make informed decisions regarding optimization of energy efficiency and reducing energy costs.
- The Energy Manager is certified in accordance with ISO 50001.

Within the RE4DY project, SIMATIC Energy Manager with Insights Hub, will be implemented at the Swiss Smart Factory. By including this component into the Swiss Smart Factory energy related data can be generated.

2. Input

With the wide range of different energy meters, users can collect and evaluate energy consumptions, such as power or gas and increase energy efficiency, among other things. The SIMATIC Energy Manager App provides predefined acquisition categories:

- Process values (e.g., m^3/h)
- Power values (Power)
- Consumption values (Energy)
- Count values (Counter)

MindConnect offers numerous possibilities and open standards for connecting energy meters, e.g., Modbus TCP or OPC UA. It's also possible to get data from existing SCADA systems like PCS7 or directly from as PLC via OPCUA/S7 protocol.

3. Output

After successful integration of the energy meters, users have the following options for further processing the synchronized data:

- Long-term archiving of the data
- Preparation of the data and visualization in a dashboard or reports
- Analysis of the data as well as KPI calculations

Dashboards are free to configure with many kinds of widgets (Gauge, Pie, Line and more). The dashboards contain a graphical representation of variables or KPI types. Widgets are used for graphical representation.

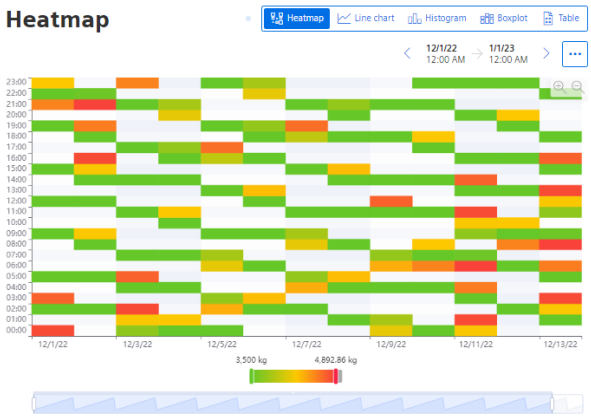


Figure 1 Dashboard - Heatmap

Reports are a central component of the app. Reports are generated to complement the visualization of KPIs and variables on the dashboards. The reports provide selected information on productivity, energy consumption and costs at regular intervals without the recipient of the reports having to have access to the app. Users can also generate a one-off immediate report whose configuration is not saved. Reports are configured individually and are generated as an Excel spreadsheet.

KPI Calculation is used for indication and analysis of the consumptions. A KPI type is a formula made up of operands, constants and operators. The definition and calculation of KPI types are plant-specific.

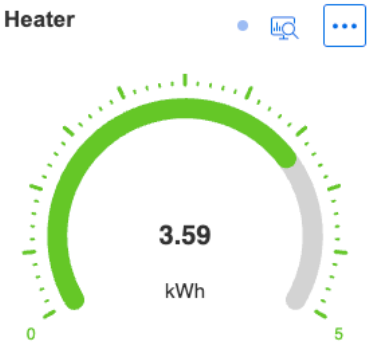


Figure 2 – Heater (KPI calculation)

Visualizations using the Sankey diagram, can display the energy flows as arrows whose width is proportional to the flow rate. This makes it easy for users to recognize, for example, how energy is flowing through a plant.

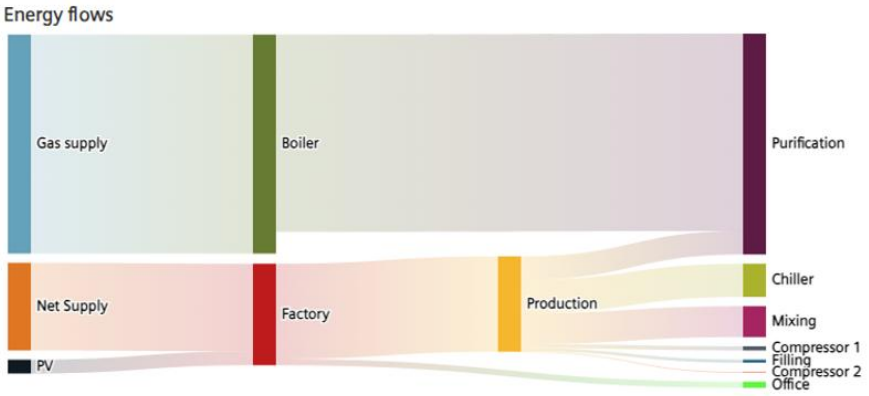


Figure 3 – Energy flows (Visualization Sankey diagram)

4. Information Flow

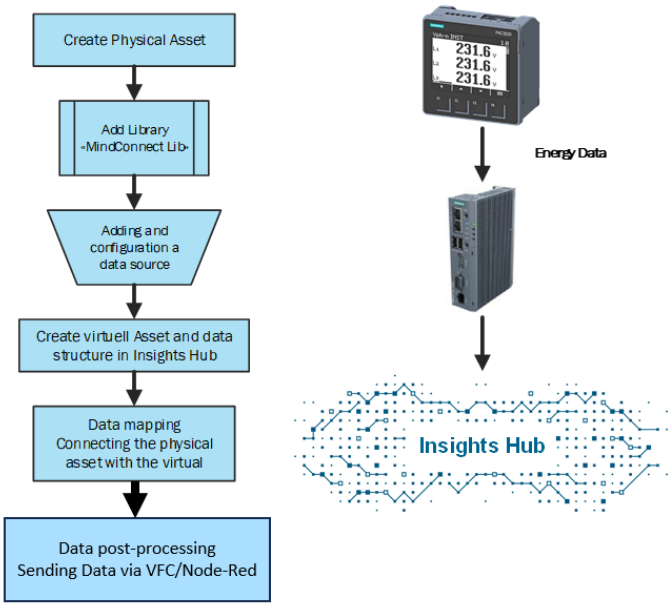


Figure 4 – Data mapping

In the so-called data mapping, users assign the data points of their physical asset (data source in MindConnect Lib) to those of the virtual asset (data structure in the asset manager). Only after the asset is mapped with a real (physical) asset, the data is stored in the Insights Hub cloud.

Application installation

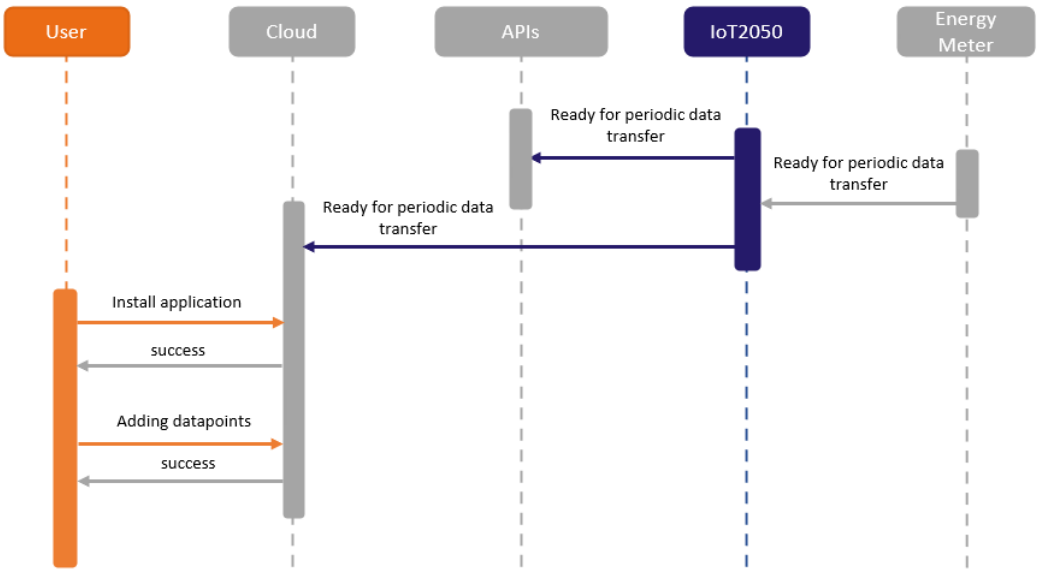


Figure 5 Application installation

A user can install the Energy Manager application within the Insights Hub cloud platform. Within the application the user can add all data points needed. During operation the Energy Meter will generate data that can be transferred and submitted by a gateway such as the IoT2050. The data can be accessed for example within the Insights Hub cloud platform.

Operation visualization

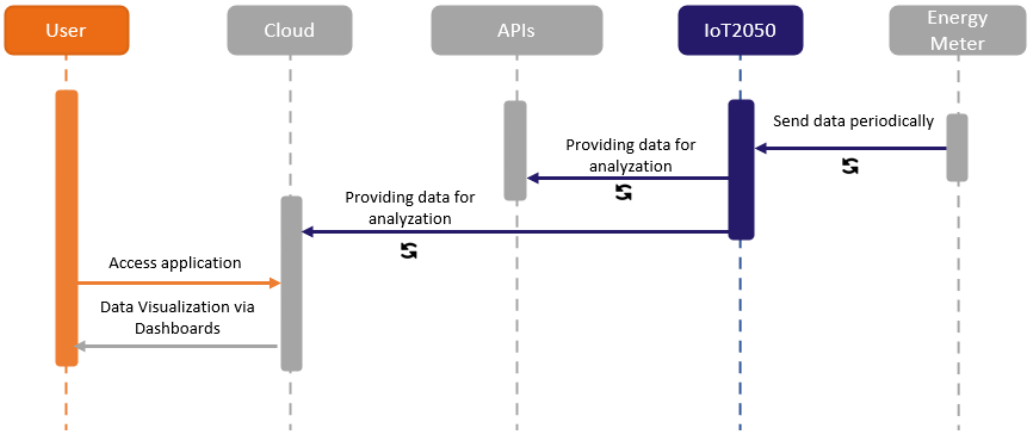


Figure 6 Operation visualization

The data, generated by the Energy Meter, can be made available by using a gateway such as the IoT2050. Within the Insights Hub cloud platform, a user can visualize the data by using the possibility of creating dashboards. This allows users to analyze and optimize the operation of the connected asset.

Operation analyzation

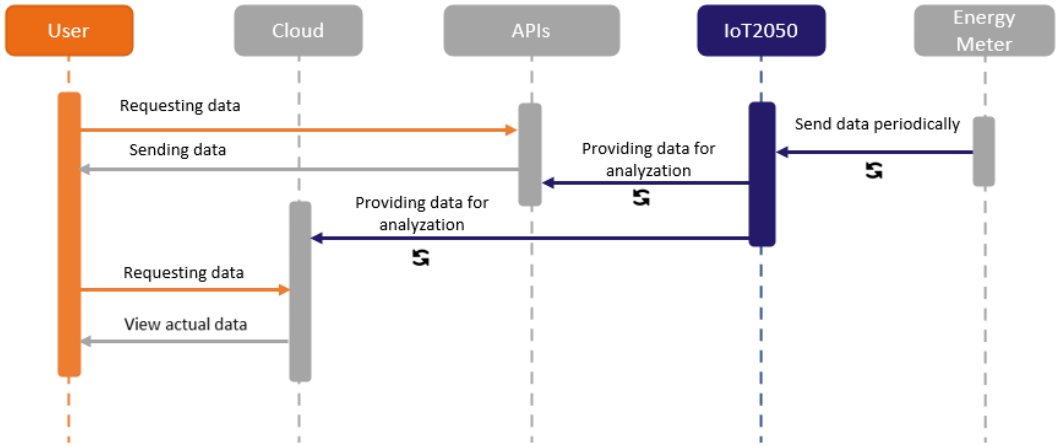


Figure 7 Operation analyzation

The data, generated by the Energy Meter, can be made available by using a gateway such as the IoT2050. Within the Insights Hub cloud platform, a user can analyze the data. This allows to optimize the operation of the connected asset.

5. Internal Architecture

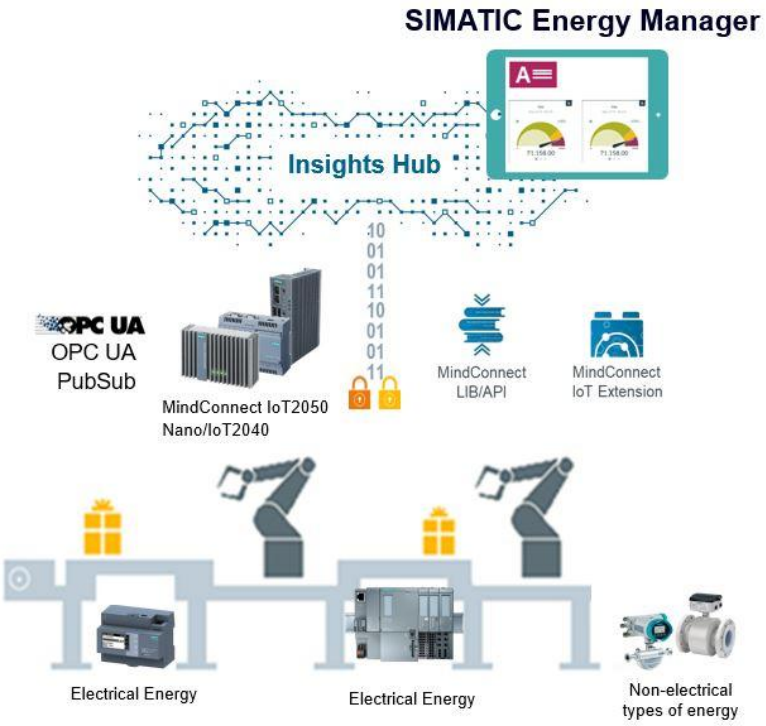


Figure 8 Internal Architecture

At factory level various assets can be connected to the Energy Manger. By using gateways such as MindConnect IoT2050 data can be transferred to further applications. The available data can be analyzed and visualized at cloud level or user preferred applications.

Scalability

By simply adding more assets and connecting them to Insights Hub, energy data can be monitored on different sites. This brings the advantage of fast and easy scalability.

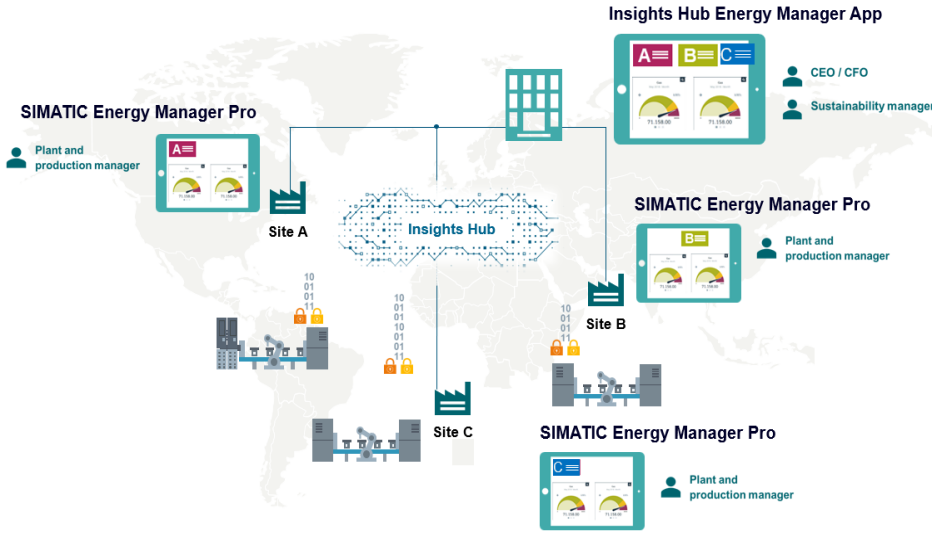


Figure 9 Scalability

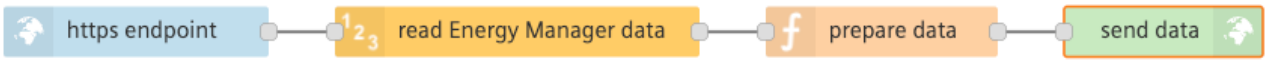
Energy Manager can be connected and configured to various number of assets. Assets from different locations and sites can be connected to collect data simultaneously. This allows users to gain insight into various plants for making decisions.

6. API

Various interfaces are available for the SIMATIC Energy Manager to exchange data. The following options are possible via another App in “Insights Hub” called “Visual Flow Creator”:

- REST API to get data from an https-endpoint; opposite is providing data by our request.
- REST API to get data via an https-endpoint on our site; opposite site is sending data actively.
- MQTT broker to provide data (opposite site must subscribe or can publish data).
- Data exchange form/to a POSTGRES database located on opposite site.

This is an example for an https-endpoint in Visual Flow Creator to provide data for a cloud2cloud solution:



Further information:

https://documentation.mindsphere.io/resources/pdf/visual-flow-creator-en.pdf

7. Implementation Technology

Licenses:

SIMATIC Energy Manager

The SIMATIC Energy Manager is provided as a cloud-based Application, which we have implemented in Insights Hub. The main goal is to visualize energy data from any kind of energy source.

Figure 10 SIMATIC Energy Manager

As a Gateway, for example Mindconnect IoT2050, is used for the connectivity to the Insights Hub. The IoT2050 collects the data from smart meters or any other system with a previously described interface and sends it to the cloud (Insights Hub). For the application a smart meter with Modbus TCP is used to provide the energy data to the gateway. Due to the easy integration of the devices, no programming skills are needed. We used the MindConnect Library to connect the physical asset with the virtual asset in the cloud.

Insights Hub provides additional Apps, like VisualFlowCreator (Node Red) to consolidate the data before the visualization with Energy Manager is done. After integration of the energy data in the cloud, we have implemented different dashboards to visualize the consumption.

8. Comments

None.