## OVERVIEW

EPL-SSUP is building management software for monitoring and controlling all technical systems of a building on one screen. **EnergyPlus Worker** collects data from field devices, **Tags Editor** prepares the point definitions, and **EnergyPlus SCADA** is the operator interface — all in one package.

Air handling units, boiler rooms, chillers, fan coils and VAV units appear live on realistic 3D screens; power distribution on single-line diagrams, energy use on dashboards and tenants in the metering and billing module, and the energy, lifetime and maintenance of each piece of equipment in the equipment report. The interface is web based: the same screen in the control room, in the office or on a tablet. Developed in Türkiye.

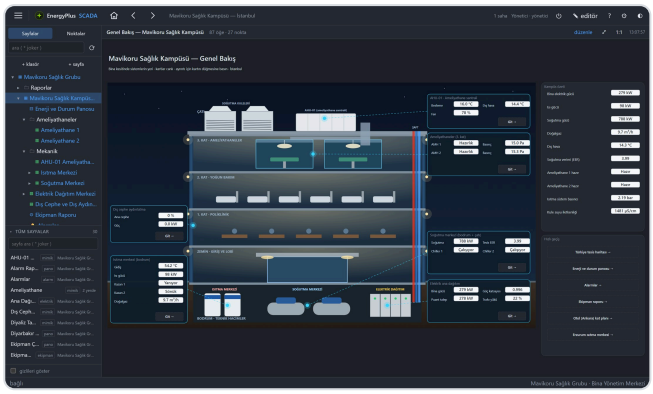



Figure 1 – EnergyPlus SCADA main screen: facility tree and the campus overview page

### Key Feature:

Live 3D plant screens built in minutes with the HVAC builder — no coding

## BENEFITS

### ◊ The Whole Building on One Screen

Graphics, dashboards, single-line diagrams, metering and billing and alarm pages share one page tree and one permission system. A central server brings many sites together in a single interface.

### ◊ Screens Ready in Minutes

The HVAC builder assembles an air handling unit section by section and generates the 3D drawing, the sensors and the point list. With 68 ready templates and a 572-piece 3D HVAC library, no drawing tool is needed.

### ◊ Speaks Every Protocol

Worker reads from and writes to field devices over Modbus TCP/RTU, BACnet/IP and MS/TP, KNXnet/IP, Sedona (SOX), M-Bus and MQTT, and also publishes values to the head end over MQTT. Tags Editor extracts the point list from site with scan and import tools.

### ◊ Continuous, Reliable Data

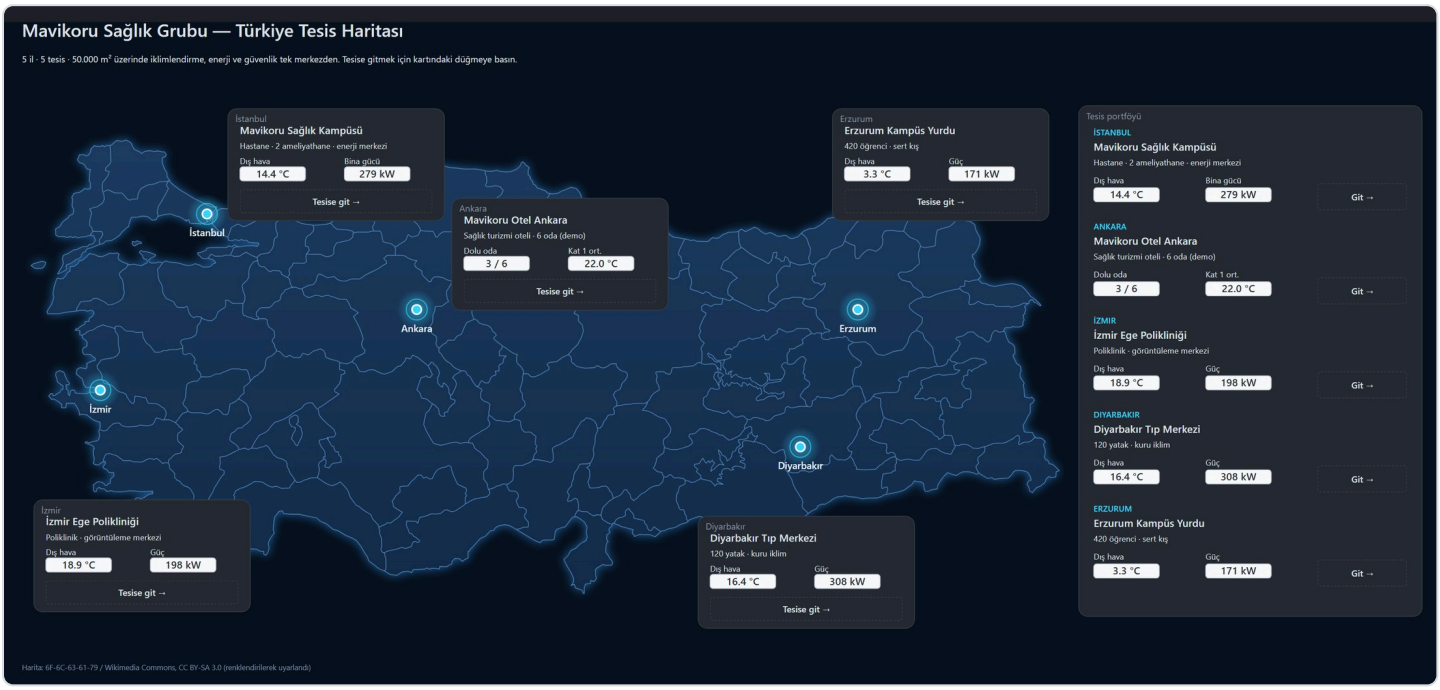
When the database is unreachable, readings are buffered and written once the connection returns. A failing point never stops the others from being read; every value is stored with its quality.

### ◊ Secure and Auditable

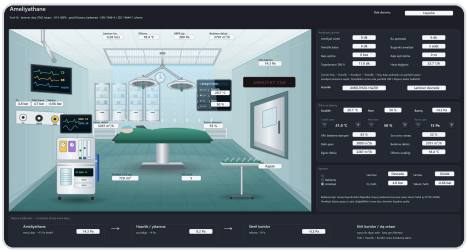
Role and page based permissions, audit trail, TLS encryption, scheduled encrypted backups and updates verified with SHA-256.

# APPLICATION EXAMPLE — FIVE FACILITIES, ONE CONTROL CENTRE

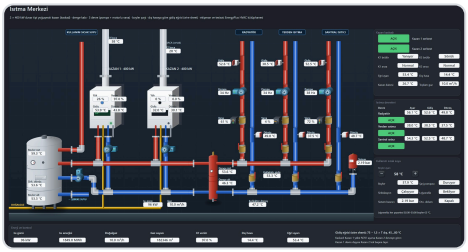
The screens on this page are not drawings: they were captured, with live values, from an end-to-end running EPL-SSUP demonstration system. A fictional healthcare group's hospital campus, hotel, outpatient clinic, medical centre and student residence; field devices are brought to life by a simulator with physical models, the data flows through EnergyPlus Worker, and the screens are the product's own. Five facilities, 820 live points and 30 pages come together in a single SCADA.



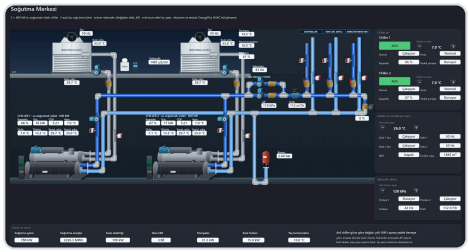

Facility map — outdoor temperature and live power of every site; each card opens that site's screens



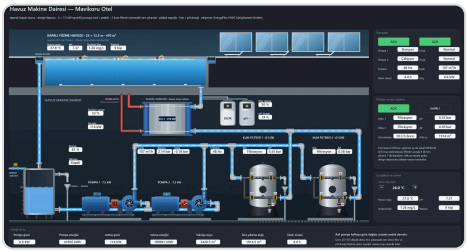
Operating theatre — laminar flow, room pressure, particles, ISO class



Heating plant — cascaded boilers, three circuits, cylinder



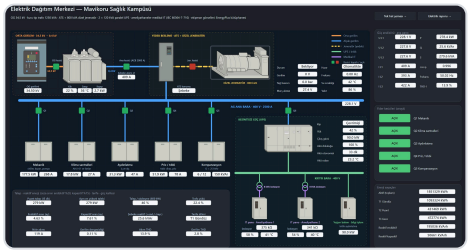
Cooling plant — chillers, towers, pumps



Pool — pumps, sand filters, heat exchanger, dosing



Hotel floor plan — room temperature, occupancy, badges



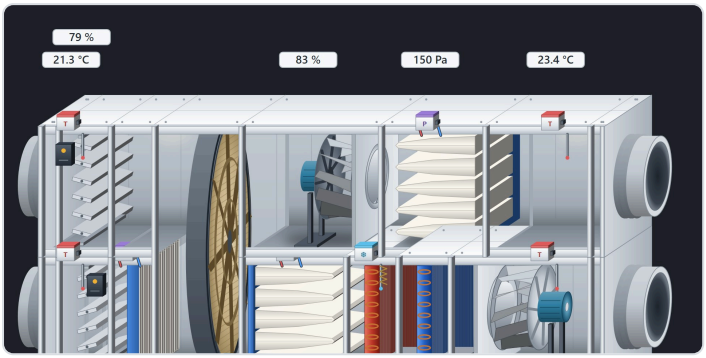
Power distribution — transformer, generator, UPS, analyser

- **Hygienic areas:** pressure cascade, particle count, surgery cycle and recovery time after cleaning in the operating theatre
- **Mechanical plant:** weather-compensated supply water, boiler and chiller staging, duty/standby pumps, automatic backwash in the pool
- **Energy:** comparison across facilities (electricity, gas and water per $m^2$), demand tracking, reactive ratios, three-rate meters
- **Comfort:** key card, window and fan coil in hotel rooms; $CO_2$ by zone and an indoor air quality report

"Mavikoru Sağlık Grubu" is fictional. Base map: Wikimedia Commons, CC BY-SA 3.0.

# ENERGYPLUS SCADA — PAGE TYPES

The right screen for every job. Pages hang in folders; one graphics page serves many devices, so a single AHU screen shows every unit.



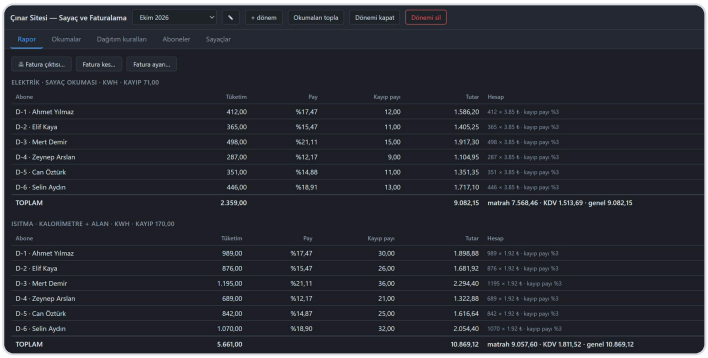

Graphics — live 3D plant screen



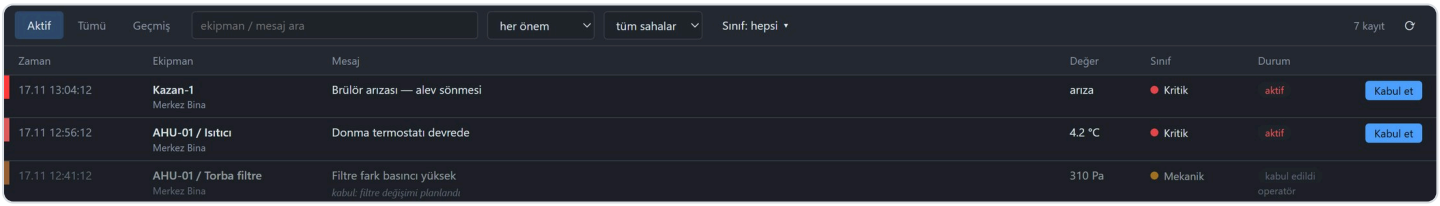

Dashboard — energy and comfort panel with 23 card types




Single-line — diagram drawn from structure, power analyser values



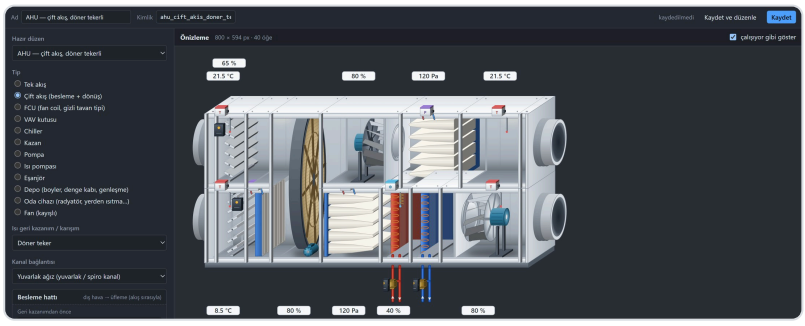

Metering and billing — tenants, periods, allocation, VAT and invoices




Alarms — class, severity, acknowledge and close; e-mail, WhatsApp, Mattermost notifications

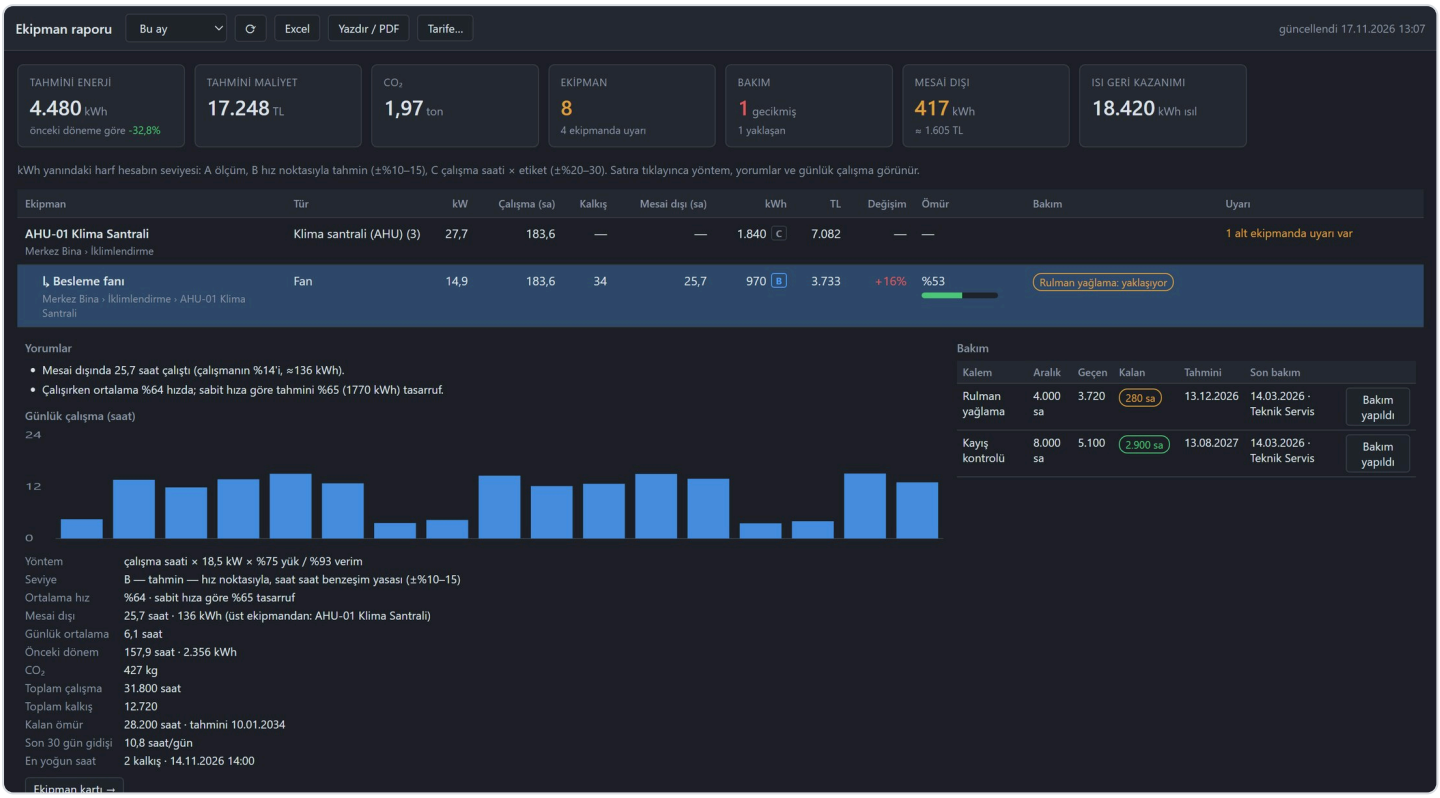
# HVAC BUILDER

- 12 equipment types: single and dual duct AHU, FCU, VAV, chiller, boiler, pump, heat pump, heat exchanger, storage tanks, room units, fans
- Sections in airflow order: damper, filter, coils, humidifier, fan, silencer; heat recovery as rotary wheel, plate exchanger, mixing damper or adiabatic wheel
- The point list writes itself; bind by name matches device points in one click
- Boilers with 2–4 circuit headers; FCU and VAV with a room panel (setpoint, mode, fan, dimmers, blinds)



# EQUIPMENT MANAGEMENT — ENERGY, LIFETIME AND MAINTENANCE

Enter nameplate values for fans, pumps, air handling units, heat recovery units and compressors; SCADA combines them with the run hours measured by Worker to estimate energy, cost and $CO_2$, tracks lifetime and maintenance, and explains the results. It is not a separate module — it is part of the base package.




Equipment report — energy, out-of-hours running, lifetime, maintenance and comments; Excel and PDF

- **Three accuracy levels:** metered energy or power when available; hour-by-hour affinity laws from the VFD speed point; otherwise run hours × nameplate. The method is shown next to every figure.
- **Out-of-hours running:** from a weekly schedule table or a schedule point; wasted kWh and cost.
- **Lifetime and maintenance:** design life, maintenance items and forecast dates; speed-weighted life for VFD drives; overdue maintenance raises an alarm.
- **Comments:** short cycling, continuous running, VFD savings, uneven wear of duty/standby pumps, heat recovery.
- **Sharing:** Excel, print / PDF; daily, weekly or monthly report e-mail (summary + Excel).
- **Shortcut:** right-click a symbol on a graphics page › Equipment info.




Dashboard cards — equipment energy, top consumers, equipment status, maintenance list

## 3D EQUIPMENT LIBRARY

The 572-piece EnergyPlus HVAC library is drawn in one consistent cut-away style, so operators see what is inside the equipment. Fans spin, burners fire, valves open; an unbound point never leaves an empty box. Pipes, ducts, valves and diffusers snap end to end. 4,988 symbols in total.



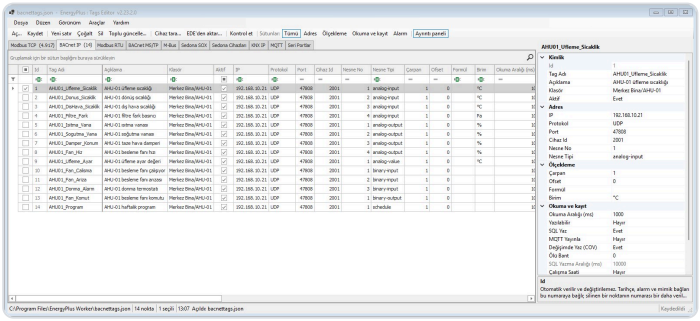

## ENERGYPLUS WORKER

Runs as a Windows service on the site gateway; reads devices, writes commands and stores history and alarms in a SQL Server database.

- Modbus TCP / RTU, BACnet/IP and MS/TP, KNXnet/IP, Sedona (SOX), M-Bus, MQTT
- MQTT: read from a broker (including JSON fields), publish to a broker and accept commands; TLS
- BACnet COV subscriptions, multiple-property reads and BBMD (behind routers); scales to tens of thousands of points
- Block based control engine (Sedona compatible wire sheet)
- Weekly schedules and exception days, written to BACnet and Sedona devices
- Alarm generation and notification: e-mail, WhatsApp, Mattermost
- Buffering during database outages; lossless write-back on reconnect

### Tags Editor

- Points of every protocol in one grid; Excel import and export
- Network scans: BACnet, Modbus TCP/RTU, M-Bus, Sedona, MQTT topics; BACnet EDE and KNX import
- Detail panel with field help, bulk update, formula editor, alarm classes and thresholds
- Pre-save checks: empty or duplicate addresses, incomplete alarms; wrong-file protection



Tags Editor — point grid

# TECHNICAL SPECIFICATIONS

## GENERAL

| | |
|---|---|
| Product Code | EPL-SSUP |
| Components | EnergyPlus SCADA 1.48.7 · EnergyPlus Worker 4.15.2 · Tags Editor 2.23.2 |
| Origin | Türkiye |
| License | Bound to the machine; by features and point count |
| User Interface Language | Turkish |

## SYSTEM REQUIREMENTS

| | |
|---|---|
| Operating System | Windows 10 / 11 or Windows Server 2016 and later, 64-bit |
| Runtime | .NET embedded in the package; no separate installation |
| SCADA Desktop Shell | Microsoft Edge WebView2 Runtime (installed by the setup from the internet if missing) |
| Client | A current web browser (Edge, Chrome) or the desktop shell |
| Database | Microsoft SQL Server; SQL Server 2022 Express optional with the installer |
| Installation | Administrator rights |

## COMMUNICATION

| | |
|---|---|
| Field Protocols | Modbus TCP, Modbus RTU (RS-485), BACnet/IP, BACnet MS/TP, KNXnet/IP, Sedona (SOX), M-Bus, MQTT |
| MQTT | Read from a broker (plain value or JSON field), publish values, accept commands; TLS, user/password, QoS 0/1 |
| SCADA Web Server | HTTP / HTTPS, default port 7180 (configurable) |
| Worker Local API | Default port 7171 (configurable), key based access |
| Database | Microsoft SQL Server; SQL Server 2022 Express optional with the installer |

## ENERGYPLUS SCADA

| | |
|---|---|
| Page Types | Graphics, Dashboard, Single-line, Metering and billing, Alarms, Equipment report |
| Equipment Management | Estimated energy, cost and $CO_2$ from nameplate + run hours (metered, speed point or nameplate), out-of-hours running, lifetime and maintenance, maintenance alarms, scheduled report e-mail |
| Graphics Background | Colour, floor plan or photo; transparency and placement (fit, fill, tile) |
| Symbol Library | 4,988 symbols (572 3D HVAC), plus your own SVG symbols |
| Ready Templates | 68 equipment and room control templates |
| Dashboard Cards | 23 card types |
| Single-line Examples | 13 ready single-line diagrams |
| Metering and Billing | Move-in / move-out dates; tenant and meter definitions frozen with the period; losses per main meter; VAT and invoices |
| Editing | Tabbed editor, copy and paste between pages, element tree, templates and instances |
| Live Refresh | 250 ms (default) |
| User Roles | Administrator, Engineer, Operator; page and folder permissions |
| Access | Web browser or desktop shell (kiosk mode) |

# TECHNICAL SPECIFICATIONS

## HARDWARE

| Installation | Minimum | Recommended (comfortable) |
|---|---|---|
| Worker + SQL Express (site gateway, up to ~2,000 points) | 2 cores x64 · 4 GB RAM · 40 GB SSD | 4 cores · 8 GB RAM · 128 GB SSD |
| SCADA server (browser clients separate) | 2 cores · 4 GB RAM · 20 GB free disk | 4 cores · 8 GB RAM · 64 GB SSD |
| Single computer: Worker + SCADA + SQL (small/medium building) | 4 cores · 8 GB RAM · 128 GB SSD | 4–6 cores · 16 GB RAM · 256 GB SSD |
| Large site (10,000–20,000 points) | 8 cores · 16 GB RAM · 256 GB SSD | 8+ cores · 32 GB RAM · 512 GB SSD, SQL Server Standard |
| Panel / operator PC (shell) | 2 cores · 4 GB RAM · 1920×1080 | 4 cores · 8 GB RAM · 1920×1080 or higher, touch |

Network: 100 Mbit Ethernet, static IP on the field network. SQL Server Express limits the database to 10 GB; for long history or more than 5,000 points SQL Server Standard is recommended. Disk: SSD is not mandatory but makes a clear difference for history writes and backups.

## SECURITY AND MAINTENANCE

| | |
|---|---|
| Encryption | TLS; self-signed or corporate certificate, fingerprint pinning |
| Remote Access | Throttled sign-in attempts; passwords never sent to the browser; real client address behind a reverse proxy |
| Audit Trail | Who wrote what to which point, and when — in the database |
| Backup | Scheduled and encrypted; pages, symbols, templates, permissions, settings |
| Updates | From inside the application; nothing installs until verified with SHA-256 |

## LICENSING

| | |
|---|---|
| License Type | License file bound to the machine code; both products share one license |
| Features | Modbus, BACnet, M-Bus, Sedona (SOX), KNX, MQTT, SCADA, wire sheet control engine and editing from SCADA |
| Point Limit | Licensed point count per protocol |
| License Installation | Download from server, load from file or from clipboard |

## DELIVERY

| | |
|---|---|
| Installation Packages | EnergyPlus SCADA installer; EnergyPlus Worker installer (includes Tags Editor and optional SQL Server 2022 Express) |
| Documents | Product information and installation guide (Turkish, English); built-in installation and user guide in every product (F1) |
| Updates | From inside the application, over a secure update channel |

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