TVILIGHT

EMPOWERING INTELLIGENCE

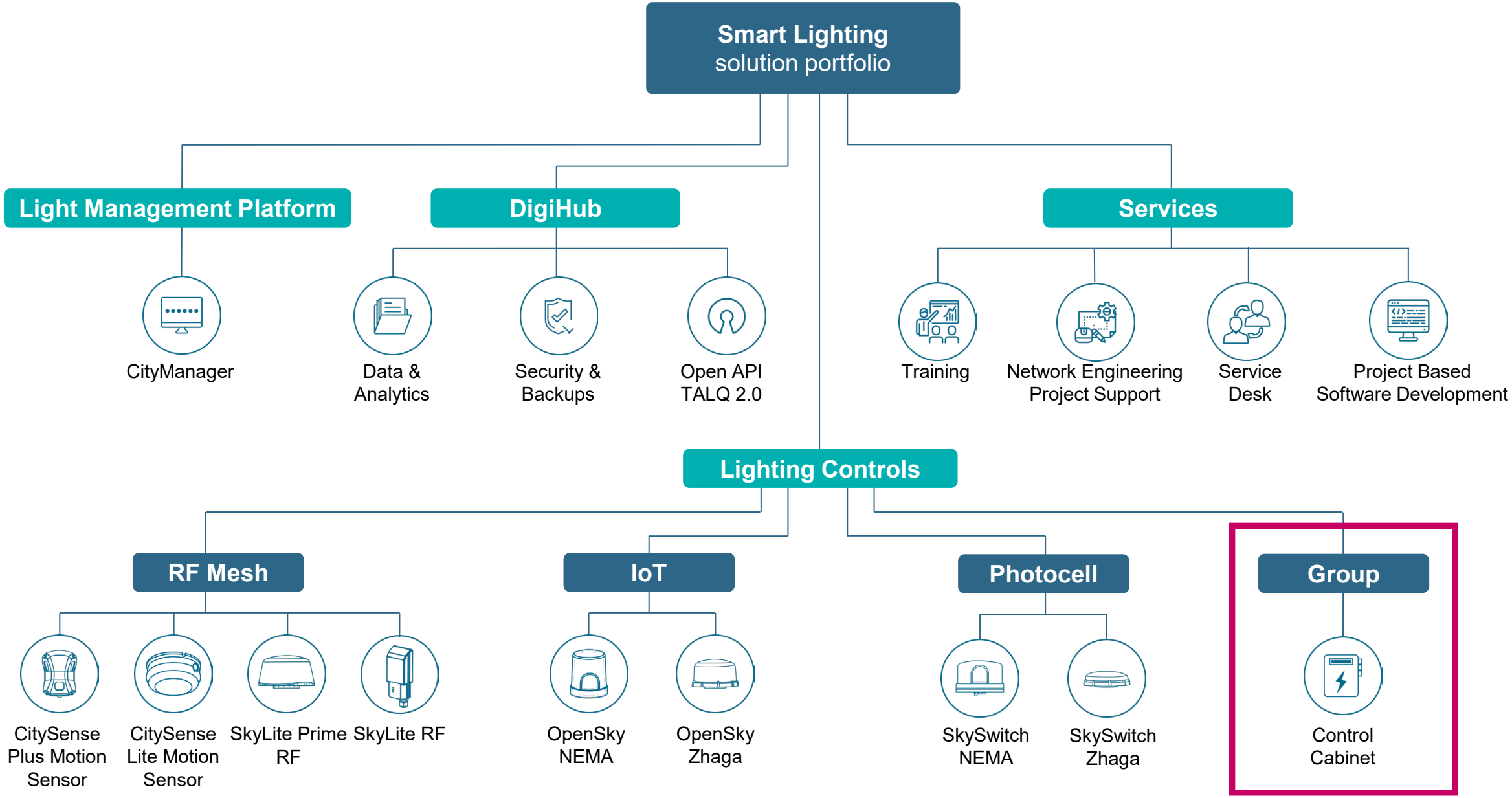
City Cabinet (Group Control solution)

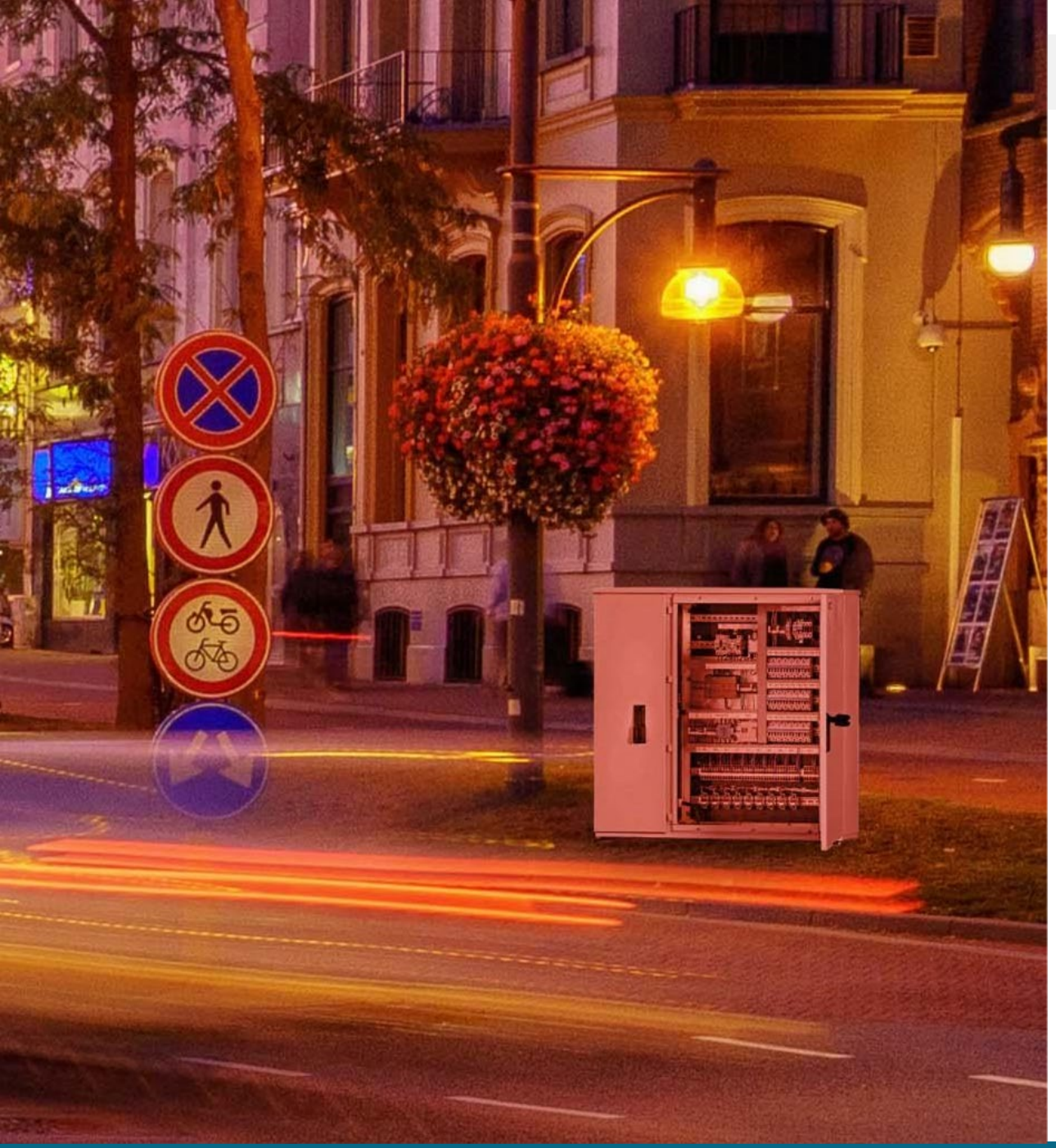
OCT 2021 v2.1.0

Who are we?

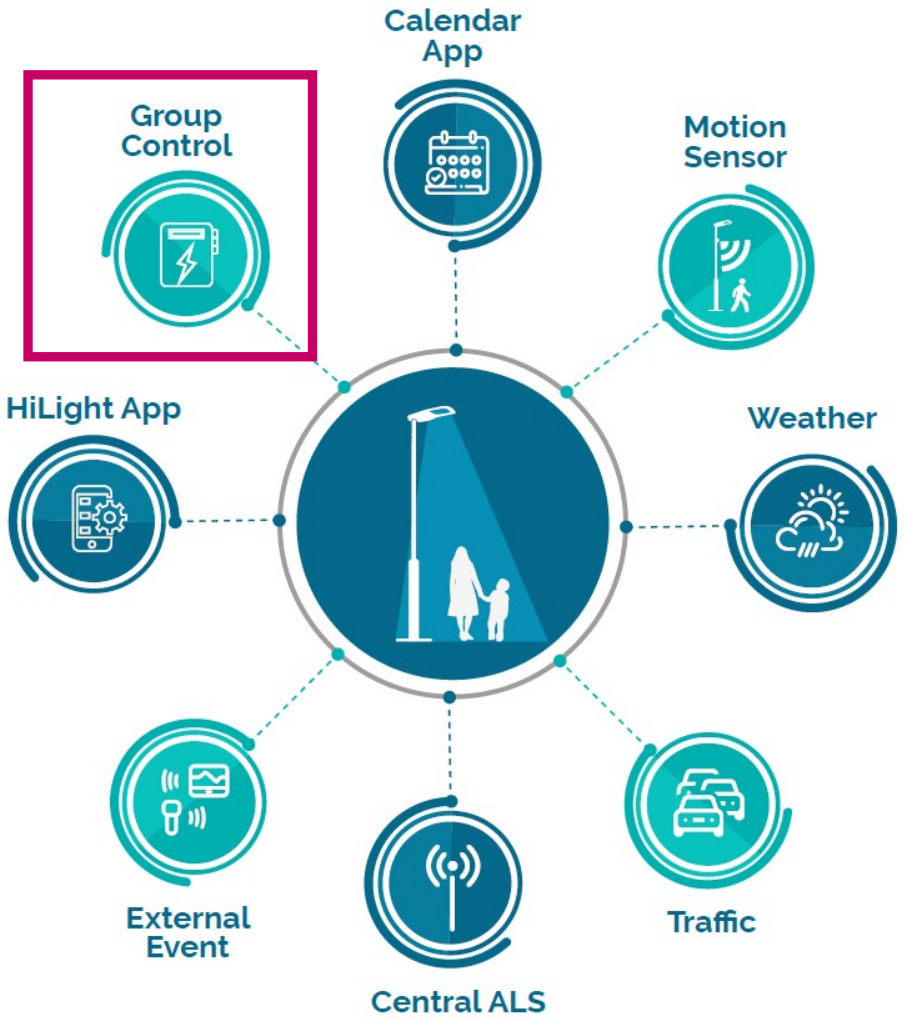
Specialist in Smart Outdoor Lighting

We enable cities to take full control of their Lighting Infrastructure based on Open Standards


Smart Lighting
solution portfolio
Light Management Platform
DigiHub
Services
CityManager
Data & Analytics
Security & Backups
Open API TALQ 2.0
Training
Network Engineering Project Support
Service Desk
Project Based Software Development
Lighting Controls
RF Mesh
IoT
Photocell
Group
CitySense Plus Motion Sensor
CitySense Lite Motion Sensor
SkyLite Prime RF
SkyLite RF
OpenSky NEMA
OpenSky Zhaga
SkySwitch NEMA
SkySwitch Zhaga
Control Cabinet



Many ways to Control Streetlights with Tvilight



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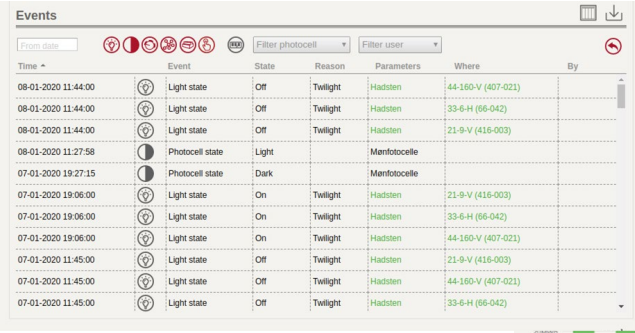
City Cabinet (feeder pillar control) // Key Features & Benefits

Features

- Complete burn hour reports, fault monitoring and load balancing functions
- Wireless (e.g. GSM/ GPRS) and wired (e.g. fiber optics) communication options
- Simplified maintenance – through automation, remote control and advanced field tools
- In-built real-time clock to send alarm in case of power failure
- Compatible to existing cabinets (feeder pillar) without new cabling
- A-bus interface (RS-485) to auto-discover all connected optional modules and meters
- Additional functions, via optional modules, include alarm notifications, power metering, and switching external relays
- MODBUS connectivity for authorised smart meters; S0 interface for traditional pulse meters
- Detecting power failures, cable breakages, leakages, theft detection, etc. using optional modules
- Switch 3 Phases independently per Phase (via intermediate breaker)

Benefits

- Excellent return-on-investment
- Complement the 'tone frequency' system to switch the streetlights on or off
- Easily scalable from small single cabinet to citywide all street cabinets
- Simplify maintenance through automated alarm notifications via email



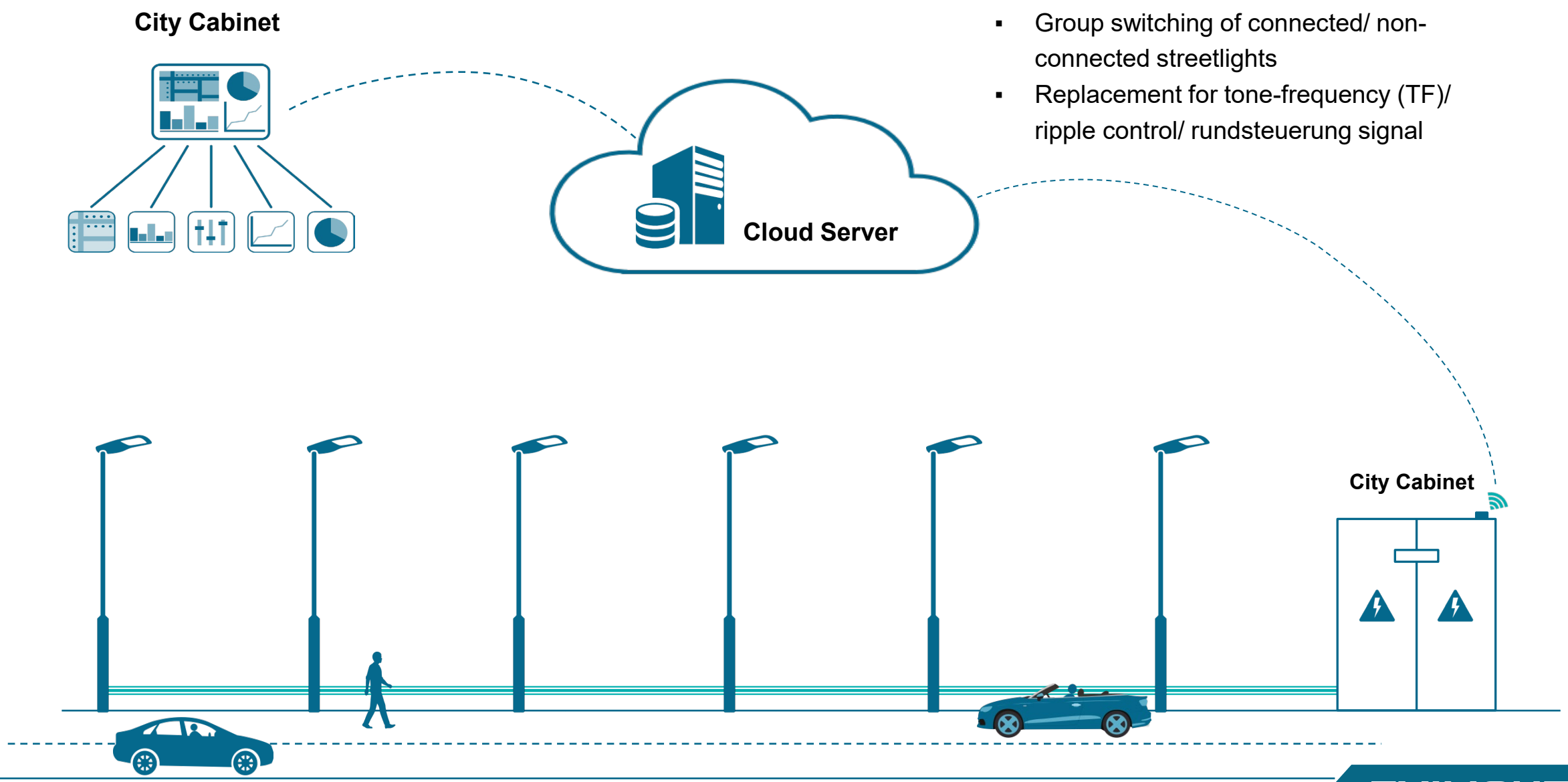
City Cabinet (feeder pillar control)

- Group control solution to safeguard your LED street lighting investment
- Offers advanced grid monitoring and outdoor group lighting control functions
- Easily used to complement (or replace) the tone-frequency based lamp switching
- Can be upgraded by adding optional modules such as:
  - earth leakage detector,
  - 3-phase current sensor,
  - connector for authorised energy meter
  - analogue photocell
  - overvoltage protector
  - external relays
- Monitor and control all the streetlight cabinets in your city through our centralised streetlight management (CMS)

Over 1.000.000 light points connected today

City Cabinet

System architecture



- Group switching of connected/ non-connected streetlights
- Replacement for tone-frequency (TF)/ ripple control/ rundsteuerung signal

Segment Controller (central CPU for controlling the feeder pillar)

Optional features; monitoring and alarm notifications on:

- Breaker/contactor error - no current on all segments
- Burn time exceeded
- Cabinet door open
- Leakage detected
- Light on, manually on or contactor hanging
- Main power failure
- Maintenance (alarm system disabled)
- Outgoing per phase L1/L2/L3: current error - above threshold
- Outgoing per phase L1/L2/L3: current error - below threshold
- Overvoltage error per phase L1/L2/L3
- Undervoltage error phase L1/L2/L3
- Battery Mode
- Battery Shutdown

Optional hardware

					
Current Module, Earth Leakage detecting	CPU Guard, overvoltage protection module	Battery module, backup UPS.	RS485 module, connection to Power Meter	Analog Light Sensor	Three Phase Current Sensor

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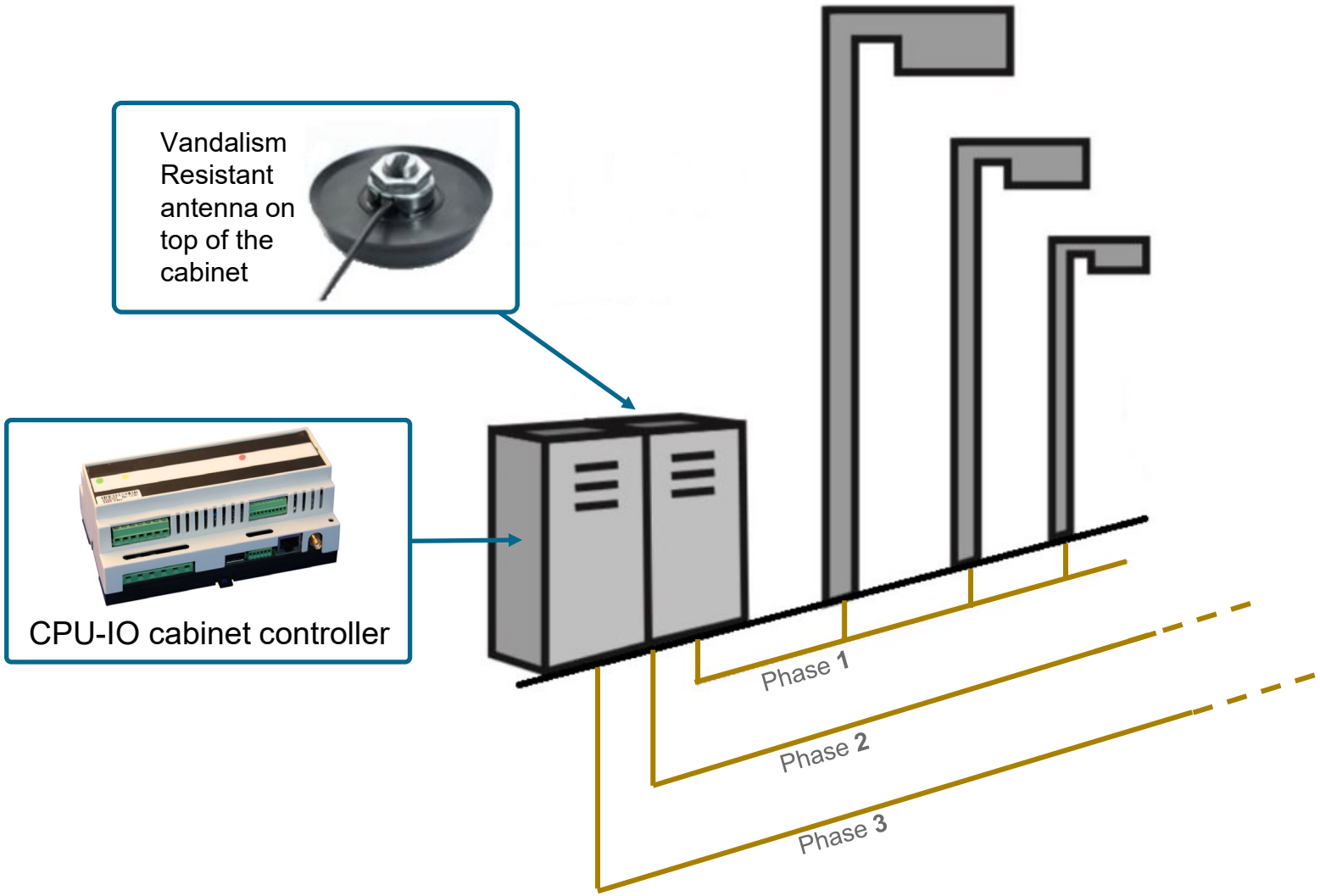
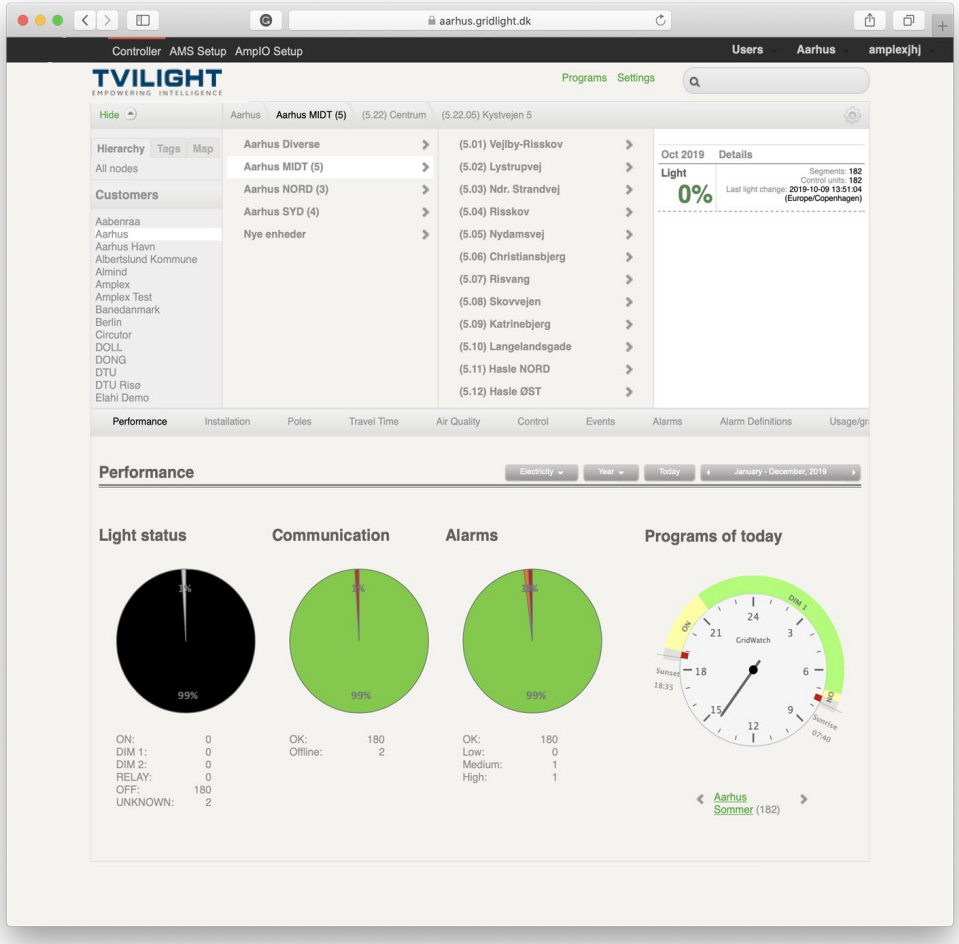
Switching capability

- CPU can switch 3 phases ON/ OFF independently per phase (via intermediate breaker) *
  - Three relays that are galvanically isolated can switch minor loads on/ off directly. Three-phases for larger loads via an intermediate breaker.
  - One of the three relays can provide both NO and NC functionality.
  - Max switching voltage: 250 V AC/30 V DC (resistive). Max switching load: 3A
- Connected to CMS via GSM/GPRS or Ethernet (WiFi optional)



City Cabinet Software – Intuitive Web Interface



Benefits

- Accessible from anywhere, at any time
- Easy-to-understand and easy-to-use application
- Offers complete control over your lighting assets

Features

- Manage nodes
- Locate customers and nodes
- See light status, alarms and communication status
- Apply and change lighting states of a particular node or a group of nodes
- Access various analytics
- And more…

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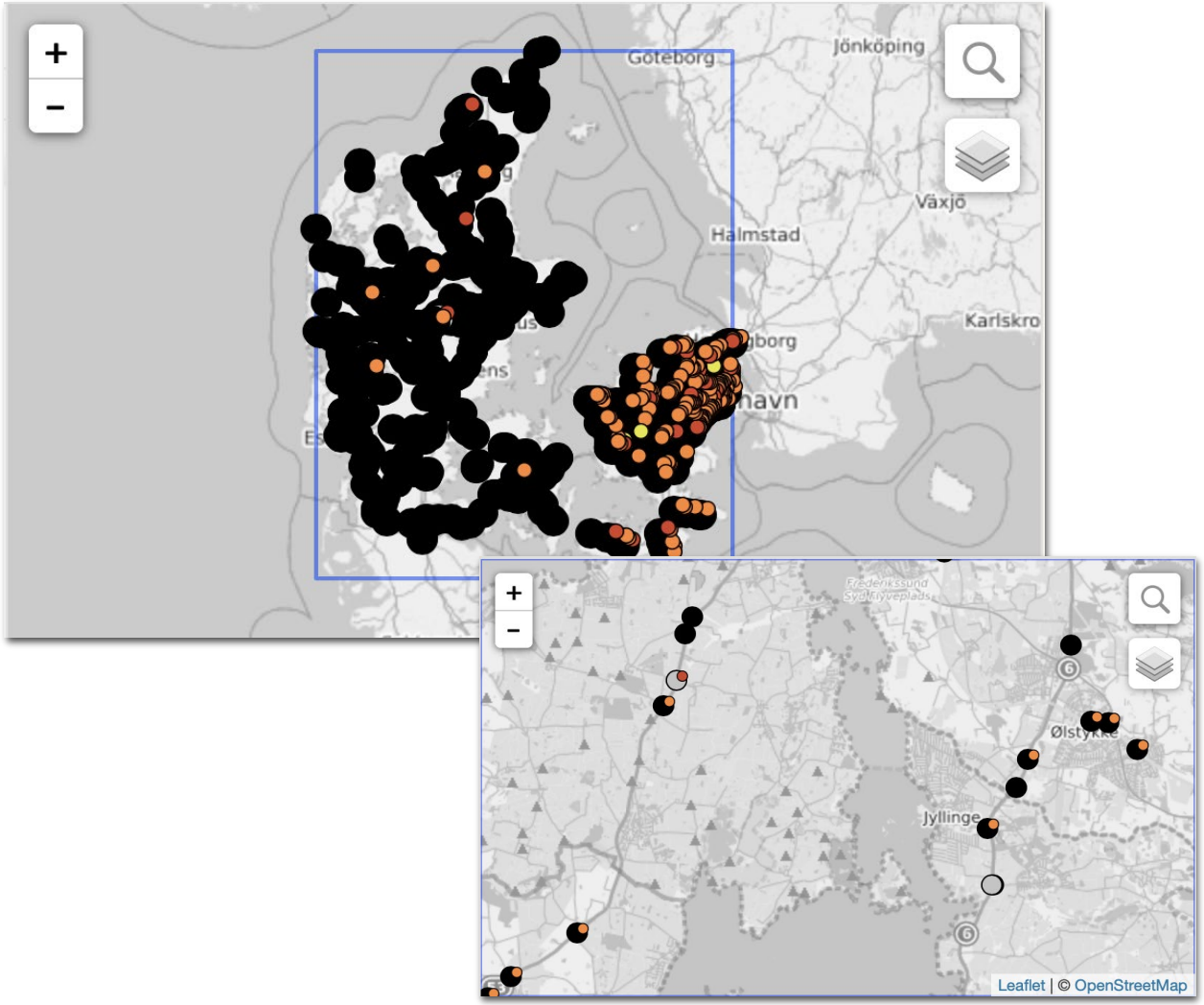
City Cabinet Software – Map Navigation



Geographic overview of Cabinets enable optimised maintenance

Features

- Add/ remove cabinets
- Accurately locate all cabinets in a single view
- See status of each cabinet geographically
- Animated alarms and lamp status to facilitate proactive actions

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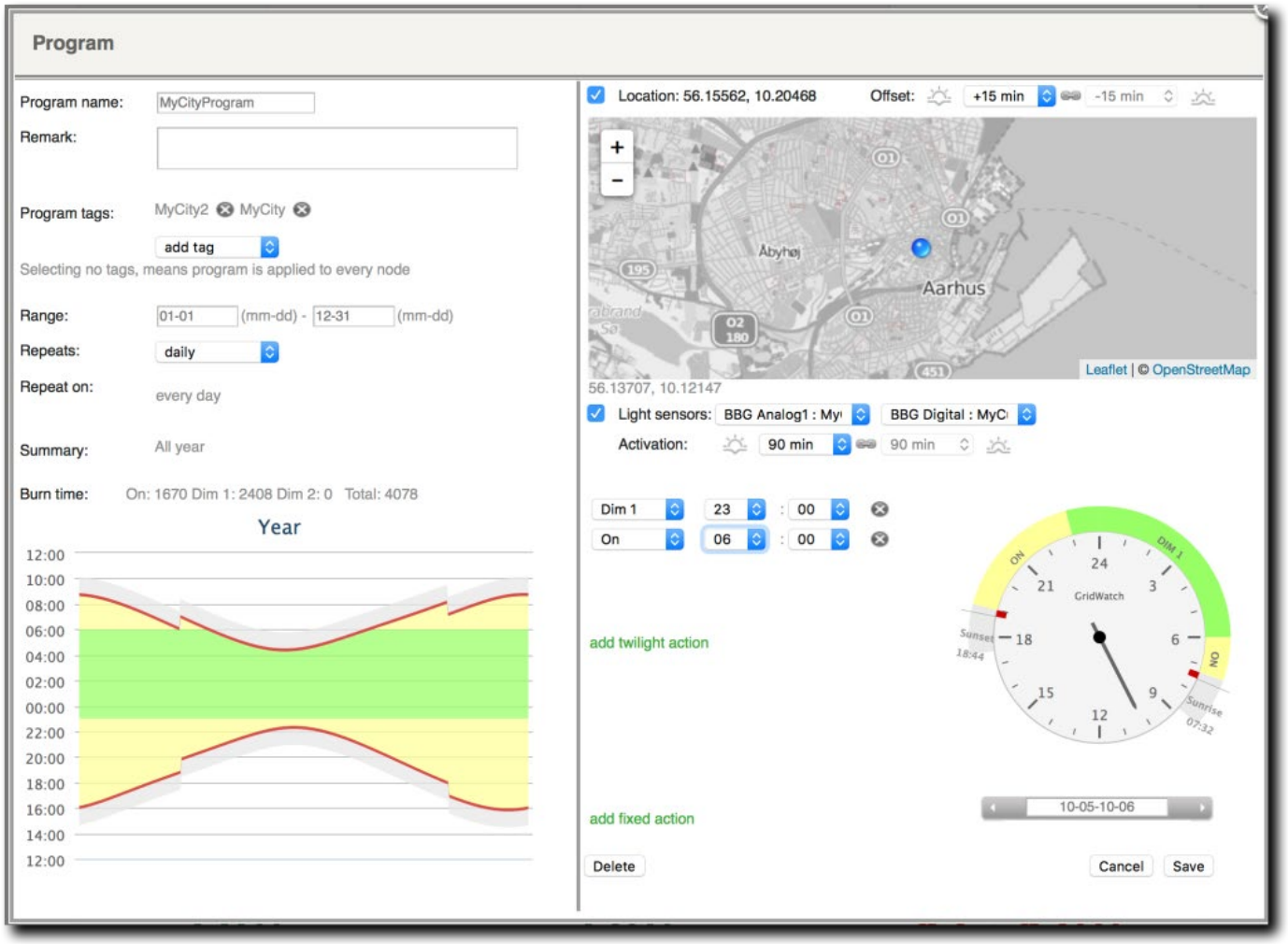
City Cabinet Software – Advanced Light Programs (incl. burn-hour calculator)



Program streetlights to turn on and off precisely when they should

Features

- Date selector
- Burn hours
- Sunset/ sunrise astro-clock (incl. smart offset to save energy)
- Light sensor integration
- Twilight actions
- Fixed actions/ light schedule and light scenes
- Grid monitoring

Smart burn-hour calculator

Know in advance on how much time the streetlights will remain ON during the year with the defined light settings

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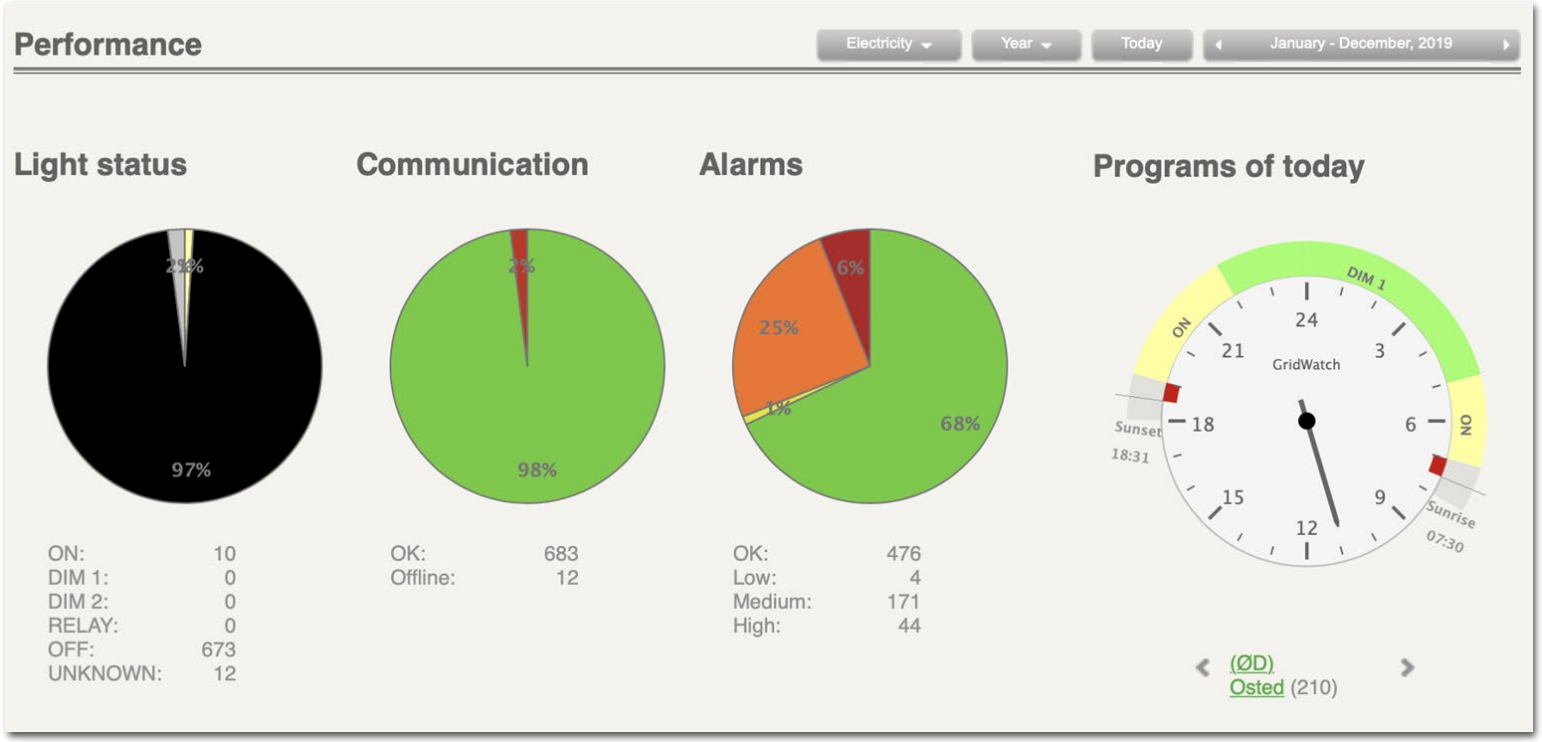
City Cabinet Software – Performance View



Watch overall operative status of citywide Cabinets using four smart KPIs

KPIs

1. Light status: see different operating state of each cabinet
2. Communication: see how many cabinets are currently communicating to the server
3. Alarms: see how many cabinets have an active alarm and the severity of the alarms
4. Programs of today: see the active light-controlling setting (programme) for today visualized in the 24-hour clock

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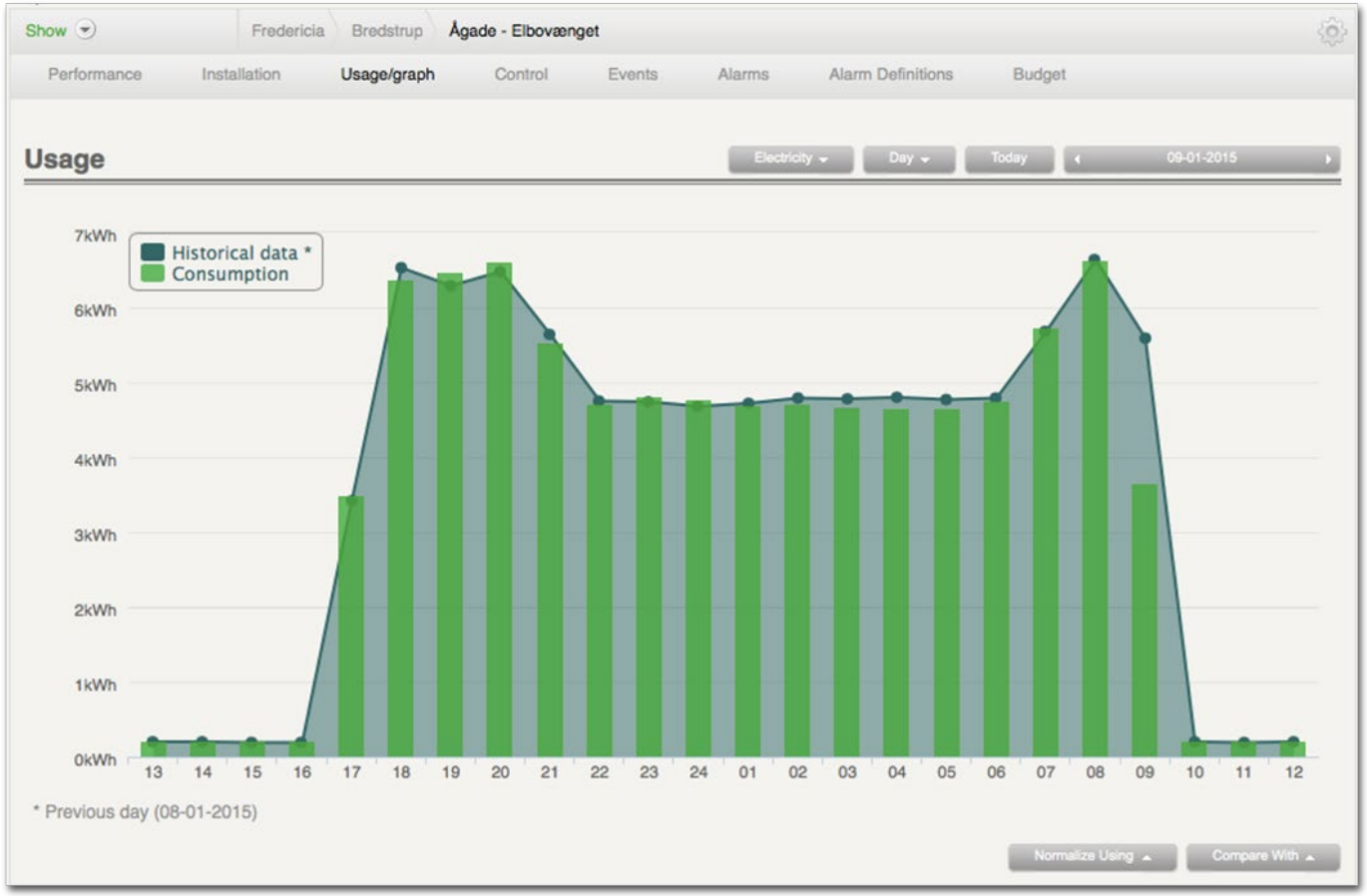
City Cabinet Software – Usage/ Graph



View the consumption and budget for any selected period (or) Compare data from different periods to understand actual savings, as well as plan future lighting requirements

Features

- Historical Benchmarking
- Comparison
- Normalisation

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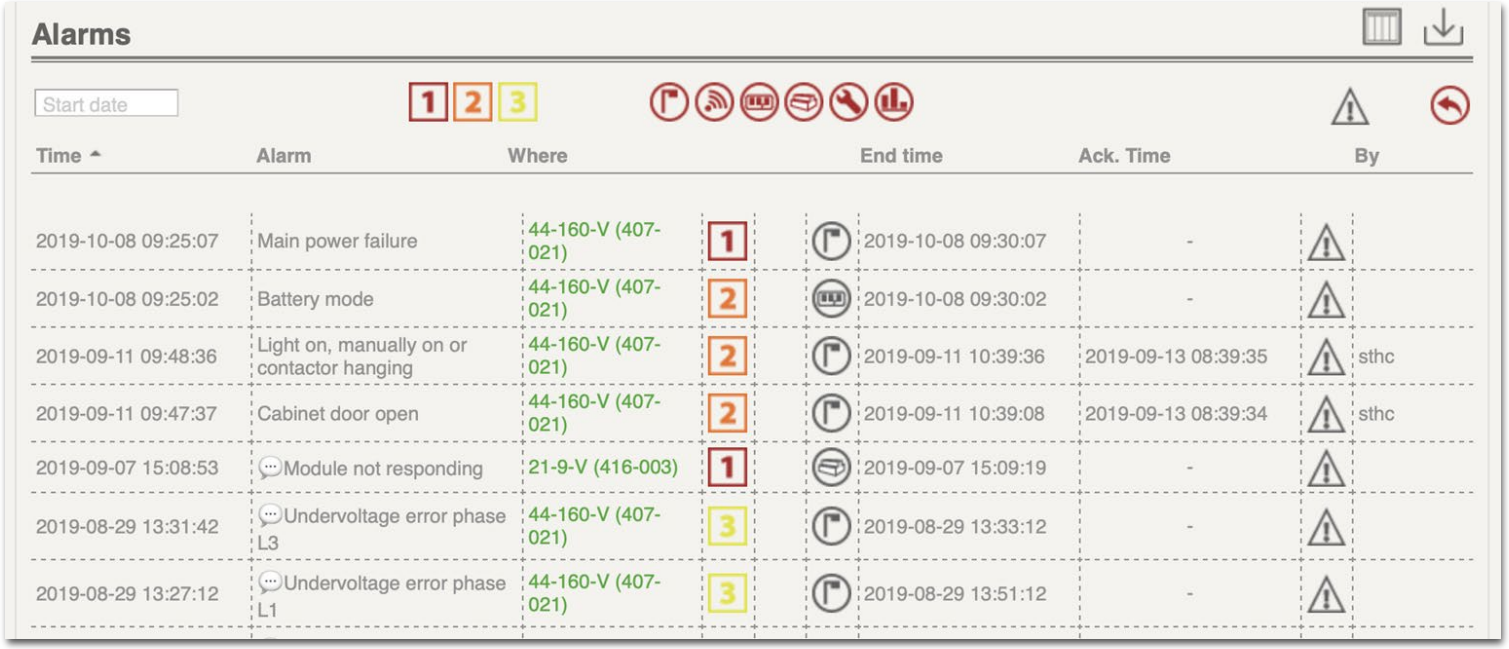
City Cabinet Software – Alarms



See list of alarms and the reason for alarm in a single page to quickly resolve the issue

Alarm information

- Time (with date)
- Alarm (description)
- Where (device location)
- Severity (high[1], medium [2], low [3])
- Type (alarm type categories)
- End time (when the alarm was solved)
- Ack. Time (when the issue was acknowledged as an authorized action by an authorized person)
- By (authorized person who can acknowledge an act)

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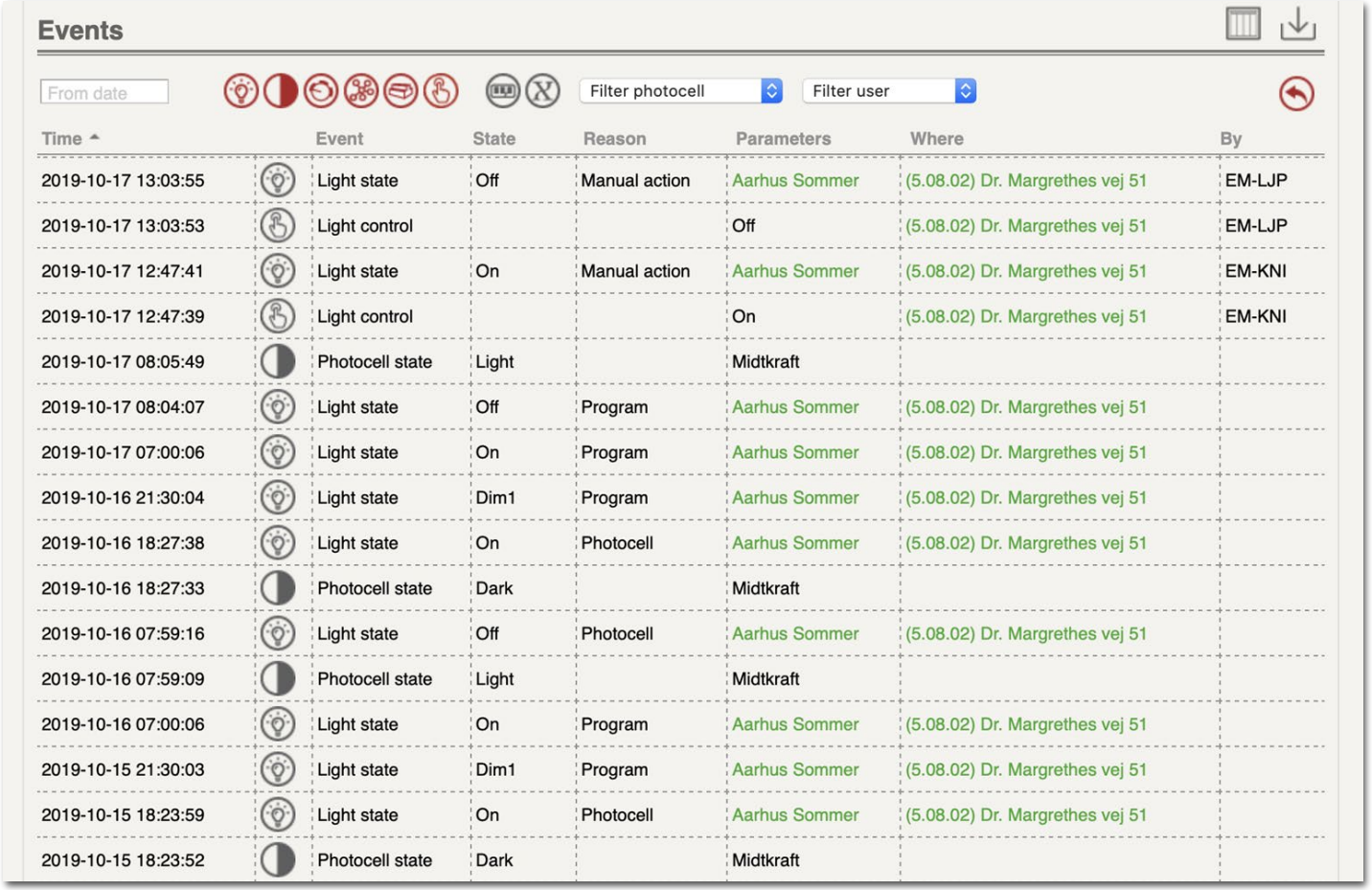
City Cabinet Software – Alarms, Events and Notifications (incl. advance filters)



Events

From date | Filter photocell | Filter user

Time	Event	State	Reason	Parameters	Where	By
2019-10-17 13:03:55	Light state	Off	Manual action	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	EM-LJP
2019-10-17 13:03:53	Light control			Off	(5.08.02) Dr. Margrethes vej 51	EM-LJP
2019-10-17 12:47:41	Light state	On	Manual action	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	EM-KNI
2019-10-17 12:47:39	Light control			On	(5.08.02) Dr. Margrethes vej 51	EM-KNI
2019-10-17 08:05:49	Photocell state	Light		Midtkraft		
2019-10-17 08:04:07	Light state	Off	Program	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	
2019-10-17 07:00:06	Light state	On	Program	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	
2019-10-16 21:30:04	Light state	Dim1	Program	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	
2019-10-16 18:27:38	Light state	On	Photocell	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	
2019-10-16 18:27:33	Photocell state	Dark		Midtkraft		
2019-10-16 07:59:16	Light state	Off	Photocell	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	
2019-10-16 07:59:09	Photocell state	Light		Midtkraft		
2019-10-16 07:00:06	Light state	On	Program	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	
2019-10-15 21:30:03	Light state	Dim1	Program	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	
2019-10-15 18:23:59	Light state	On	Photocell	Aarhus Sommer	(5.08.02) Dr. Margrethes vej 51	
2019-10-15 18:23:52	Photocell state	Dark		Midtkraft		

View all logged system events, such as

- **Who manually turned on the lights**
- **How programs have been altered and by whom**
- **Recent on/ off activation time for the streetlights**
- **And more …**

Features

- Time (when an event occurred)
- Icon (defines the type of event)
- Event (description of the event)
- State (description of the state, and what has been done to trigger the Event)
- Reason (what has caused the change)
- Parameters (which program initiated the state)
- Where (cabinet location)
- By (user who requested the event)

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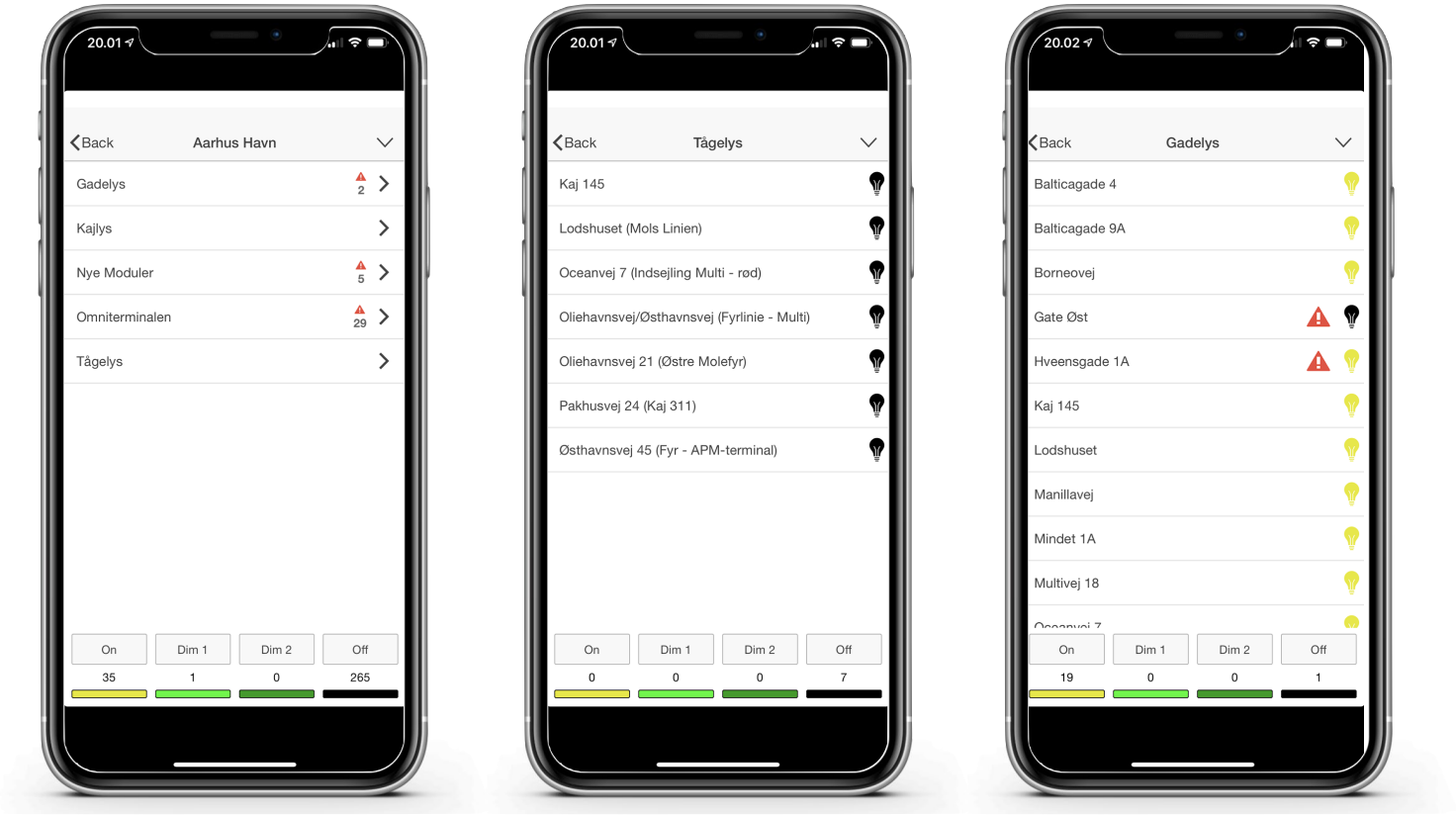
City Cabinet Mobile App – For Employees & Clients



Locate Alarms/ Incidents (incl. location) right from your smartphone

Available for iPhone and Android

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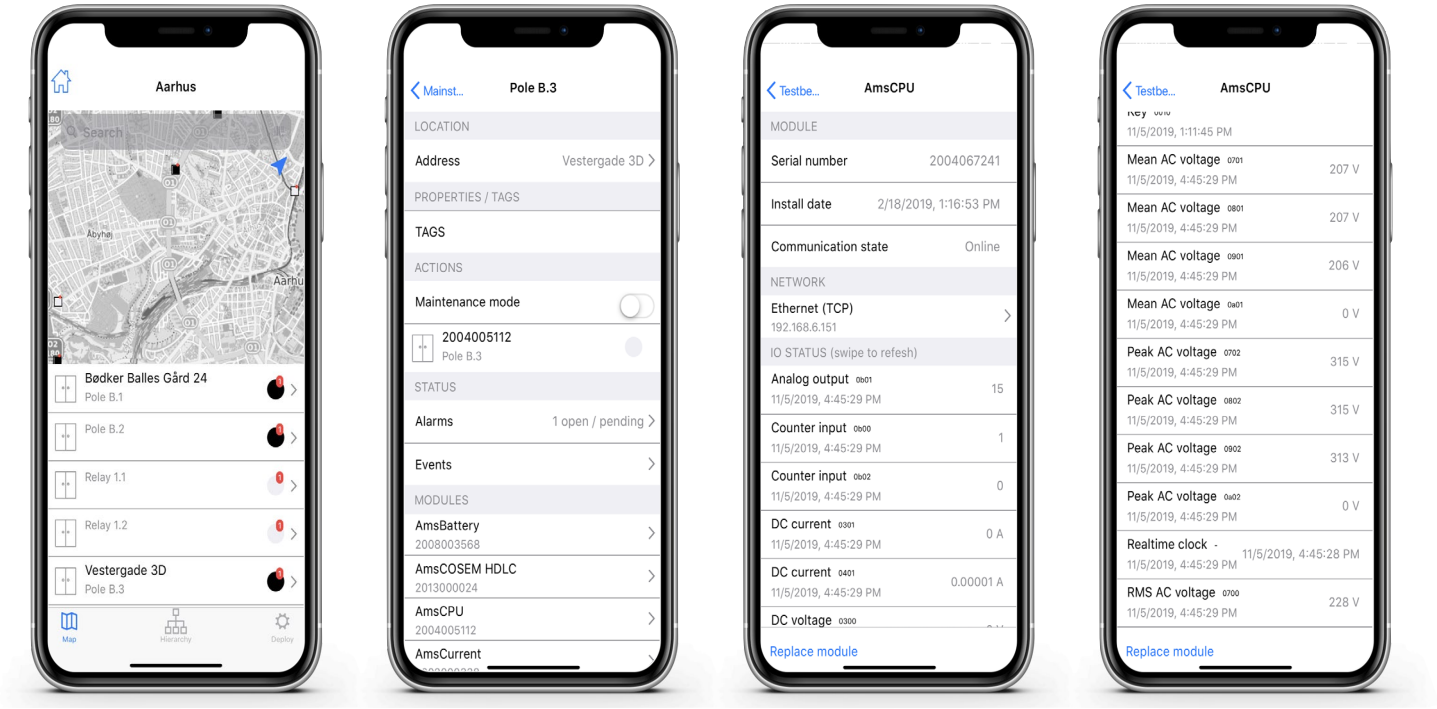
City Cabinet Mobile App – For Field Work



Field crew can easily enter new installations, extend existing ones by adding wiring diagrams, or take photos of installations and make them available in the City Cabinet Software

Available for iPhone and Android

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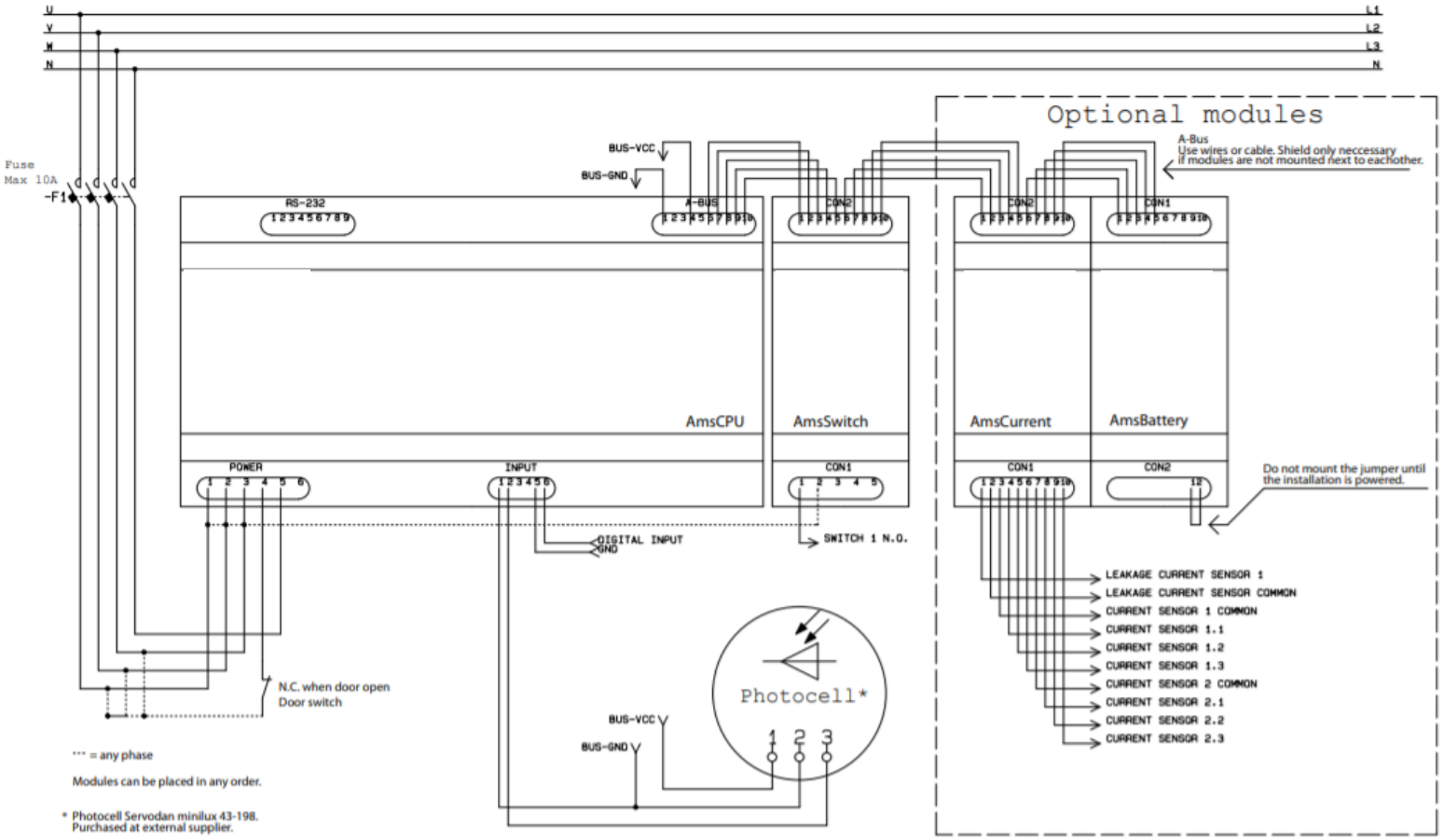
Installation example

Installation example



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City Cabinet Options

#	Modules	1. Basic	2. Energy Saving Mode	3. Monitoring	4. Energy Saving Mode & Monitoring	5. Intelligent Energy Saving Mode & Monitoring*
a.	CPU	✓	✓	✓	✓	✓
b.	Switch	✓	✓	✓	✓	✓
c.	Battery**	(✓)	(✓)	(✓)	(✓)	(✓)
d.	Dim Transformer		✓		✓	✓
e.	Current			✓	✓	✓

*The difference between “Intelligent Energy Saving Mode and Monitoring” and “Energy Saving Mode and Monitoring” is the software and the number of switches needed.
**Optional

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Key Features (1/2)

#	Features	1. Basic	2. Energy Saving Mode	3. Monitoring	4. Energy Saving Mode & Monitoring	5. Intelligent Energy Saving Mode & Monitoring
1.	Burn-hour registration	✓	✓	✓	✓	✓
2.	Instantaneous voltage request over/under voltage supply	✓	✓	✓	✓	✓
3.	Remote programming of control cabinets	✓	✓	✓	✓	✓
4.	Main power failure detection – requires Battery	✓	✓	✓	✓	✓
5.	Internal self testing	✓	✓	✓	✓	✓
6.	Open door detection	✓	✓	✓	✓	✓
7.	Individual programming	✓	✓	✓	✓	✓
8.	Data storage	✓	✓	✓	✓	✓
9.	Automate electrical meter reading	✓	✓	✓	✓	✓

Key Features (2/2)

#	Features	1. Basic	2. Energy Saving Mode	3. Monitoring	4. Energy Saving Mode & Monitoring	5. Intelligent Energy Saving Mode & Monitoring
10.	Burn-out blub alarm			✓	✓	✓
11.	Leakage detection			✓	✓	✓
12.	Flashing blubs			✓	✓	✓
13.	Theft detection			✓	✓	✓
14.	Light ‘off’ alarm			✓	✓	✓
15.	Light ‘on’ alarm			✓	✓	✓
16.	Two-step energy saving mode		✓		✓	
17.	Voltage stabilization					✓
18.	Intelligent energy saving mode					✓

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Solution Overview (Intelligent Energy Saving Mode & Monitoring)

	Features	Advantages	Benefits
1.	Burn-hour registration	Ability to perform proactive bulb replacement / Just-in-time inventory	Reduces the cost of maintenance / inventory
2.	Instantaneous voltage request – over / undervoltage supply	Ability to detect when the bulbs are supplied with too high/low voltage which shorten the lifespan of the bulbs or decreases the light level	Prolongs the lifespan of the bulbs and the electrical equipment in the control cabinet / Improves the quality of the streetlight
3.	Remote programming of control cabinets	No man-hours spent on visiting each control cabinet to re-program the streetlight	Reduces the costs associated with reprogramming the streetlight
4.	Main power failure detection (requires Battery)	Alarm in case of instant main power failure	Contributes to improved and faster reaction to faults, and improves the streetlight quality
5.	Internal self testing	Alarm if modules are stolen or not are functioning in order to ensure streetlight functionality	Improves the streetlight quality and contributes to a better network overview
6.	Open door detection	Alarm if cabinet door has been opened	Contributes to a safer streetlight network
7.	Individual programming	Ability to differentiate programming geographically	Optimizes / reduces the energy consumption
8.	Data storage	Enables storage of relevant data for reports	Ensures that reports are available to analyse the streetlights for cost/quality improvements
9.	Automated electrical meter reading	Ability to automatically read the electrical meter installed	Minimises the costs associated with collecting the electrical meter data, and ensures that customers solely pay for actual energy consumption

Solution Overview (Intelligent Energy Saving Mode & Monitoring)

	Features	Advantages	Benefits
10.	Burn-out bulb alarm	Ability to measure drops in the current load on each of the outgoing phases	Contributes to improved light quality and faster service response
11.	Leakage measuring	Alarm if leak current is present	Contributes to a safer streetlight network and reduces the service/safety costs
12.	Flashing bulbs	Ability to show peaks in the current load, which is an indication of flashing bulbs	Contributes to improved streetlight quality
13.	Theft detection	Alarm if the current load on each phase is higher than threshold settings	Reduces fraud and unbilled electrical consumption
14.	Light ‘off’ alarm	Ability to measure the current load on all of the outgoing phases - alarms if there is no load when the streetlight is turned ‘on’	Reduces streetlight downtime
15.	Light ‘on’ alarm	Ability to measure the current load on all of the outgoing phases - alarms if there is a load when the streetlight is turned ‘off’	Reduces the electrical consumption
16.	Voltage stabilisation	Ability to switch between several voltage output levels when the current is unstable in order to stabilise the voltage output	Prolongs the life span of bulbs and reduces maintenance cost
17.	Intelligent energy saving mode	Ability to switch between several voltage output levels when the current is unstable in order to stabilise the lower voltage output	Reduces streetlight electricity consumption by 25-35%

Supported Smart Meters

Power	Water	Gas	Other
Elster	Elster	FastForward	FastForward
Actaris	Actaris		Ikea
Echelon	Severn Trent		
Iskraemeco	Kamstrup		
Kamstrup	Diehl		
Larsen & Toubro	Sensus		
Landis+Gyr	FastForward		
Carlo Gavazzi			
Circutor			
DEIF			
ZheLiang Yongtailong Electric			
FastForward			
Hager			

* For more details, please contact sales@tvilight.com

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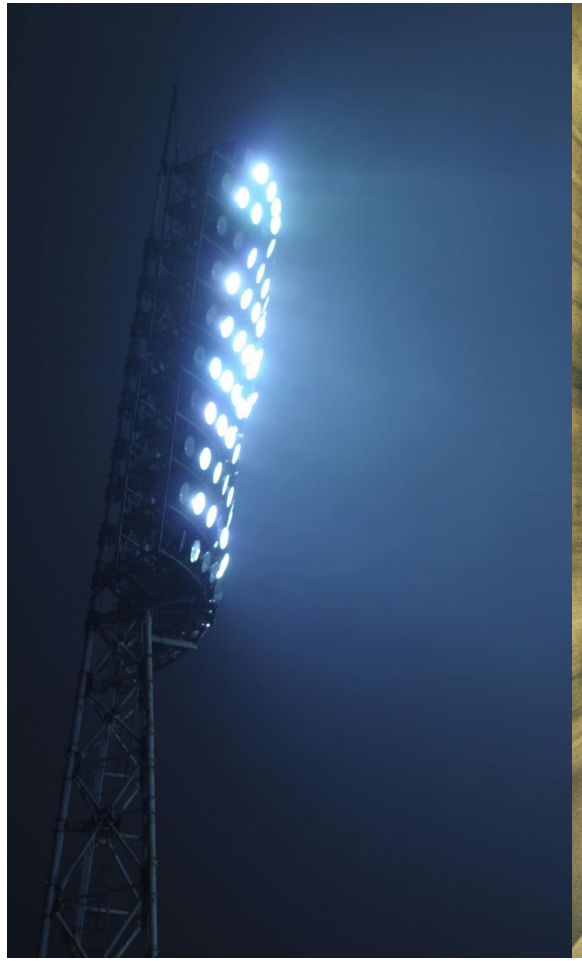
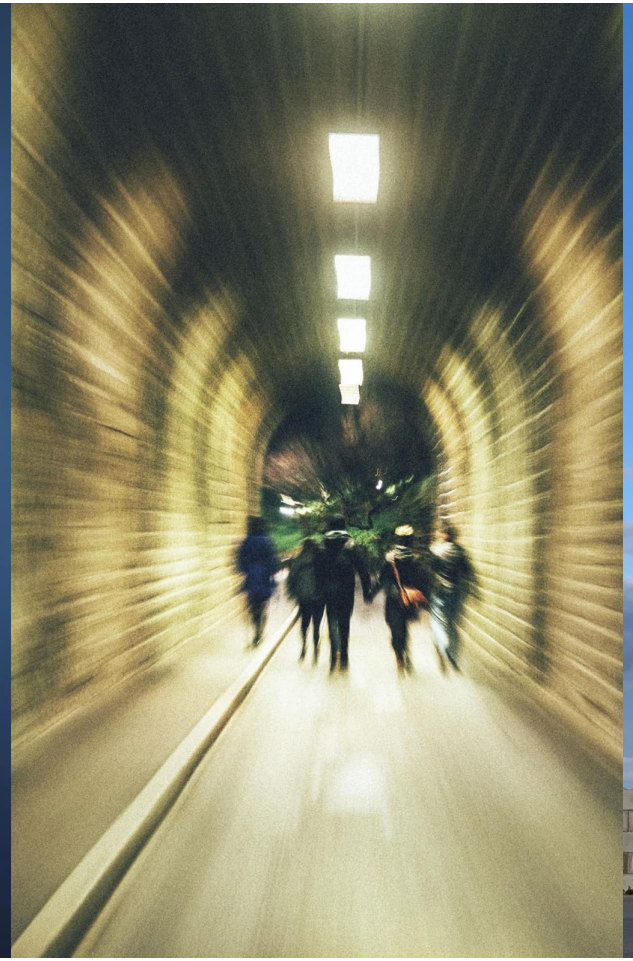
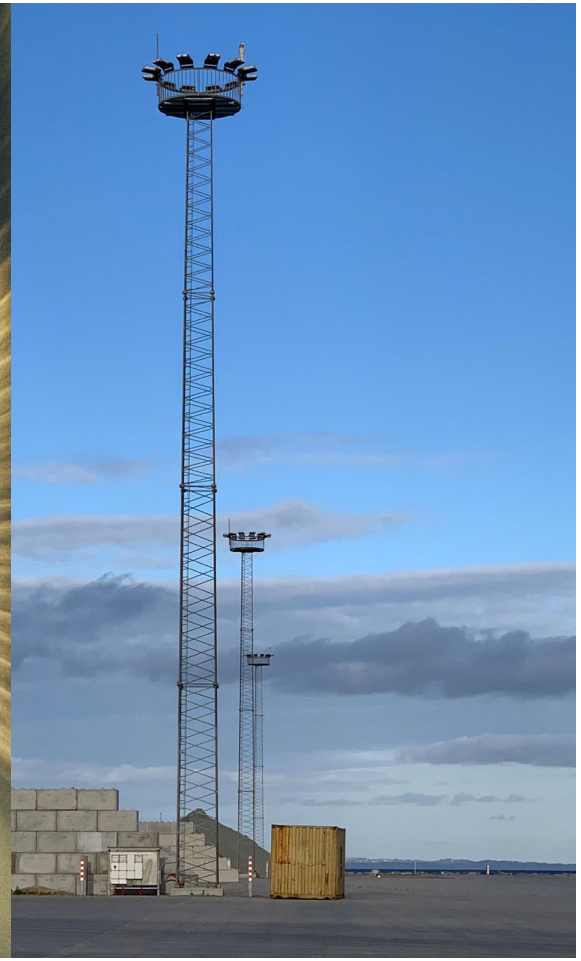
Custom light scenes to meet different functions



Sports



Tunnels



Harbours

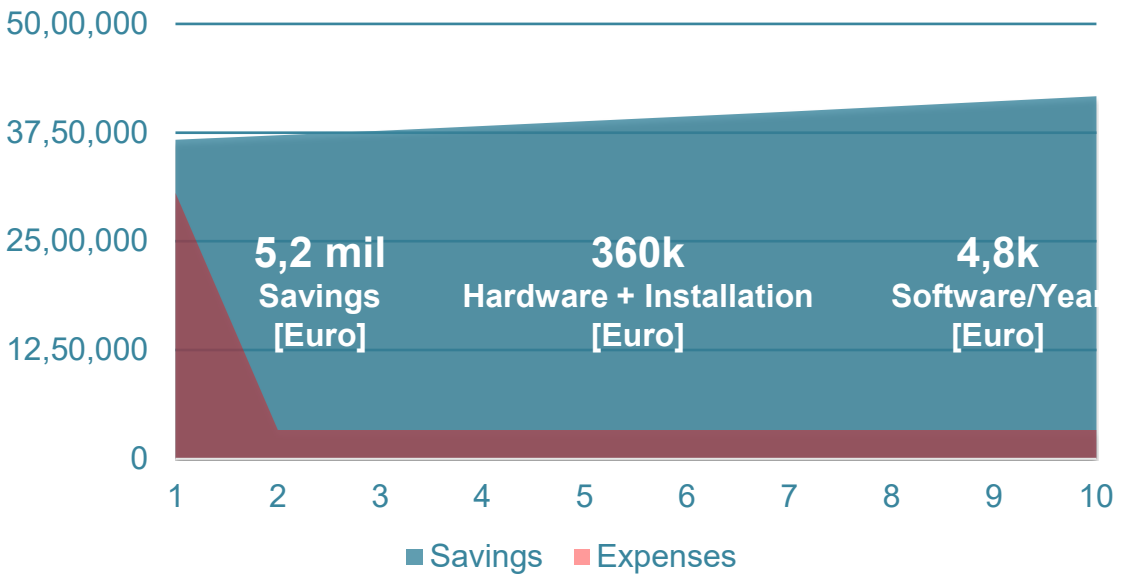
Project Reference Port of Aarhus, Denmark

ROI 1-3 Y

Energy Savings 45%

Service Savings 25%

Case: City of Aarhus, Denmark - 59k fixtures, 350k citizens



Advanced Zone-based Light and Power Control

- Individually controlled and monitored luminaires via DALI interface
- 59.000 streetlights
- Very positive outcome:
  - Energy savings of 45%
  - Maintenance / operational savings of 25%
  - ROI 1-3 years

REASONS TO INVEST IN INTELLIGENT LIGHTING

- Minimise energy wastage
- Reduce CO_2 emissions
- Curb light pollution
- Optimise maintenance
- Offer lighting as per the specific needs of different areas

AARHUS HAVN
PORT OF AARHUS

11. april 2018
Side 1 af 1

To whom it may concern

Experince certificate

This is to certify that Ampiax Denmark ApS has supplied their streetlight control management system Ondlight controlling 543 cabinets to the city of Aarhus, Denmark. The cabinets control a total of 55.000 lumineres.

This certificate has been issued without prejudice to the terms and conditions of our contract and on the request of Mr Jann Mosgaard, Ampiax Denmark ApS."

Peter Ryberg Noess
Lighting and Traffic Management
Aarhus Municipality

TEKNIK OG MILJØ
Center for Byens Anvendelse
Aarhus Kommune

CBA Lys og Trafikladelse
Kalkværksvej 10
8000 Aarhus C

Telefon: 89 40 44 00
Direkte telefon: 89 40 44 85

Direkte e-mail:
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www.aarhus.dk

Sagsbehandler:
Peter Ryberg Noess

AARHUS KOMMUNE
Center for Byens Anvendelse
Lys og Trafikledelse
Kalkværksvej 10
8000 Aarhus C
EAN: 5798000278967

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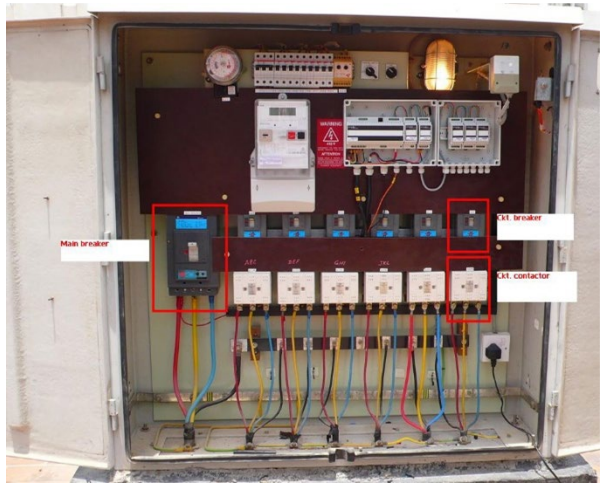
Project Reference ADWEA, Abu Dhabi

The solution is an efficient upgrade for streamlining maintenance operations. And of course, it generates savings in energy by accurately turning on and off the lights at appropriate pre-programmed times.

Abdul G. Onsi, ADWEA, Abu Dhabi



Control & Management for all of Abu Dhabi

- 275.000 streetlights and 7.700 control cabinets
- Integration with relevant GIS and SCADA systems
- Happy with the results:
  - Easy and inexpensive installation
  - Substantial energy savings
  - Streamlined maintenance operations
  - Fast reaction to fault conditions

REASONS TO INVEST IN INTELLIGENT LIGHTING

- Streamline maintenance operations
- Improve energy savings
- Address CO_2 emissions
- Easy integration with other systems

هيئة مياه وكهرباء أبوظبي
Abu Dhabi Water & Electricity Authority

Ref. : ITC4/09/CGT/SNT/1109
Date : 19 July 2009

Ampius Emirates L.L.c
P.O. Box 38403
Abu Dhabi
United Arab Emirates
Tel: 02 - 6667781
Fax: 02 - 6667784

Attn : Mr. Claus Rabenhat
President & CEO

Sub. : PAC for AMPLIGHT G-4204

Dear Mr. Claus,

With reference to the above mentioned subject, PAC for AMPLIGHT is attached along with this letter. As agreed, you are requested to complete the pending tasks, detailed in Page No 3 & 7 of PAC document, by October 2009.

Best Regards,

Saeed Nasseri
ICT Project Manager

20 AUG 2009

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Project Reference Beijing Highway, China

Compared to other products installed, this system is clearly superior in its technology and energy savings. In the future, it will be our first choice for streetlight projects

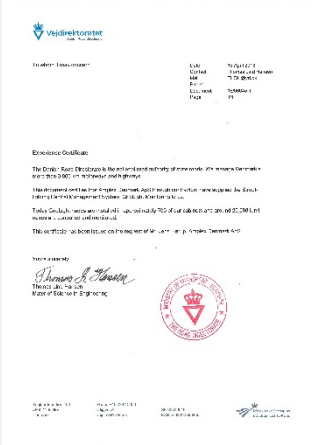
Wang Desen, Project Manager,
Beijing Capital Highway Development Company

Improving Streetlight Quality and Reducing Energy Consumption

- Pilot began to realise energy savings
- Extended to 48 control cabinets and 5.500 streetlights
- Positive results:
  - Energy savings of 28%
  - Complete visibility and control of 5.500 streetlights from one centralised location
  - Lower maintenance costs

REASONS TO INVEST IN INTELLIGENT LIGHTING

- Energy savings
- Full streetlight status visibility
- Ease maintenance operations
- Lower carbon emissions


Vejdirektoratet

Excellence Certificate

TVILIGHT

We manage over 1.000.000 streetlights

Aarhus
59.000 lights

Växjö
24.000 lights

Morsø
4.500 lights

Halsnæs
6.100 lights

Hedensted
11.000 lights

Abu Dhabi
275.000 lights

Beijing
5.500 lights

Nordfyn
6.000 lights

Vordingborg
6.500 lights

Odense
44.000 lights

Göteborg
47.500 lights

Billund
8.000 lights

Smart City

Streetlight

+

Energy Management

+

Traffic Monitoring

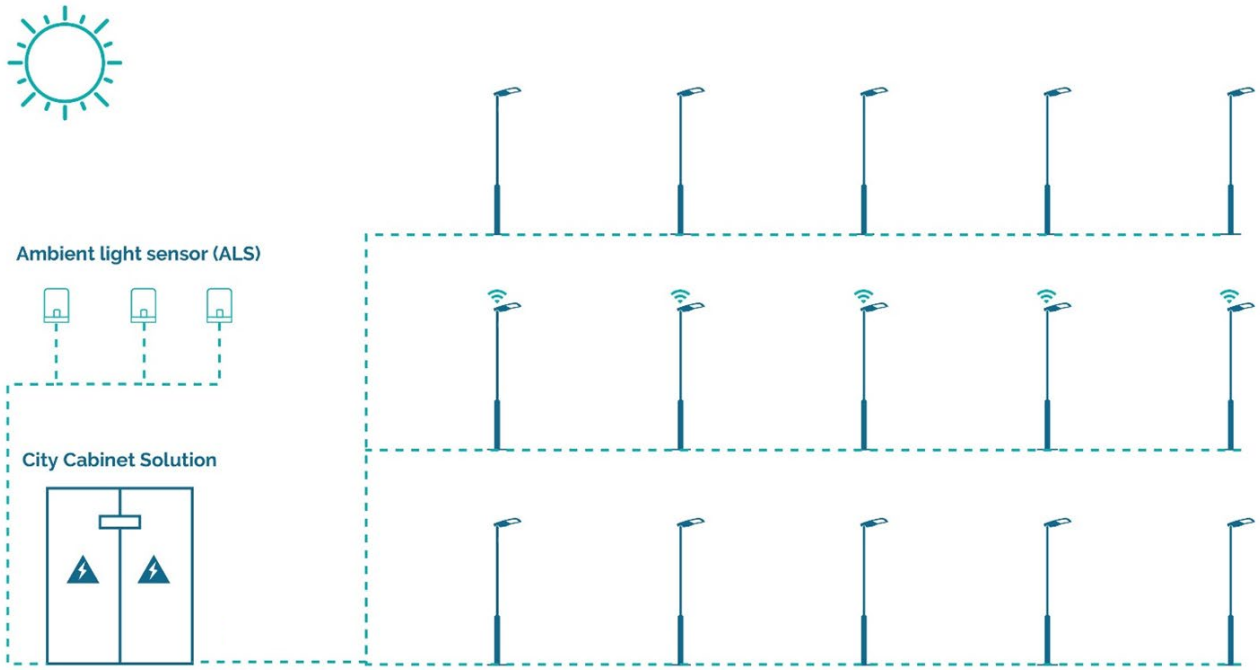
+

Air Quality

=

Smart City

Smart City optional module: Ambient Light Sensor integration



Place light sensors at selected strategic locations to control citywide lighting

- Citywide lamp switching based on average ambient light level value calculated from selected locations
- Automatic lamp switching under extreme weather conditions e.g. when visibility falls below pre-defined level. This includes situations such as sandstorm, extreme rain or extreme mist

Benefits

- Replaces astro-clock with real ambient light conditions
- Protects road users during extreme weather conditions

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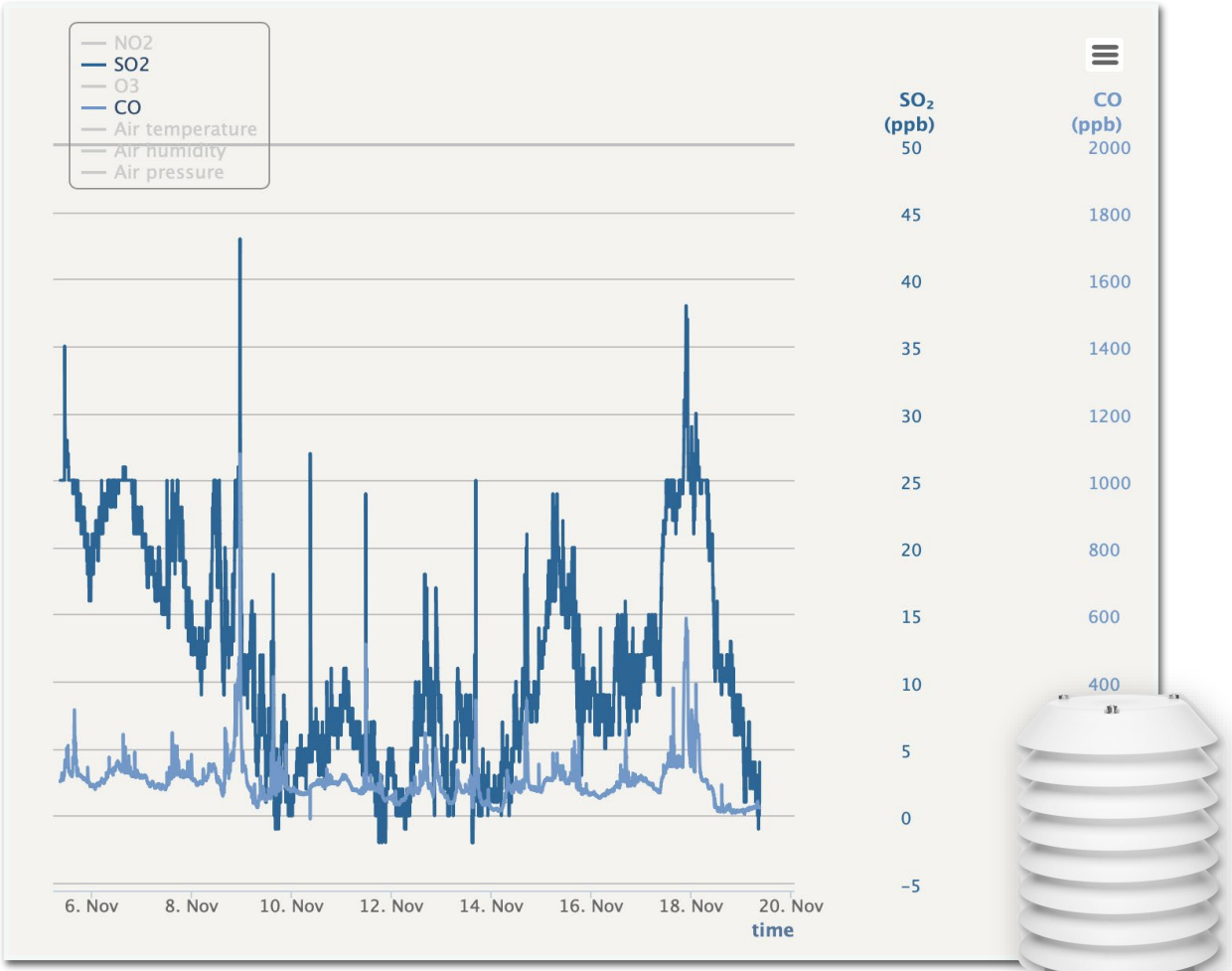
Smart City optional module: Air Quality & Road temperature



Measure and track air-quality at strategic locations in the city (both real-time and historic data)

- Temperature
- **Humidity**
- **Air pressure**
- **Nitrogen dioxide**
- **Sulphur dioxide**
- **Carbon monoxide**
- **Ozone**
- **Road temperature through add-on thermal sensor**

Benefits

- Economical environment sensing solution
- Quick installation
- Monitoring for citizen safety
- Measures both weather and environment
- Automatic alarm notifications

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