

GUIDE

SELECTION

ENERGY MANAGEMENT



In the modern context where environmental issues are now a priority, it is now necessary to **reduce our greenhouse gas emissions**.

Industrial, commercial buildings, or even residential housing, are subject to new **standards, directives or decrees** with a view to limiting their environmental impact by reducing their energy consumption in favor of **better energy performance**.

Computer equipment, lighting and temperature management (heating or air conditioning) are among the most energy-consuming appliances.

Reducing energy consumption means reducing the associated costs, which is why measurement is the basis of any diagnosis. Knowing your energy consumption is the first step towards **energy efficiency**. Monitoring and taking action are the next steps.

Legrand offers complete solutions to meet each of these needs. Whether through measuring units, energy meters or energy management systems, the solutions offered make it possible to display information on energy consumption, reactive power, harmonic disturbances, or any other electrical values... but also to monitor the various statuses, remotely control circuits and program actions such as alarms, plan corrective actions thanks to diagnostics... in a word: **«supervise»**.

LEGAL INFORMATION

Presentation pictures do not always include Personal Protective Equipment (PPE), but this is a legal and regulatory obligation that must be scrupulously respected.

In accordance with its continuous improvement policy, Legrand reserves the right to change the specifications and illustrations without notice. All illustrations, descriptions and technical information included in this document are provided as indications and cannot be held against Legrand.

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SAFETY

INSTRUCTIONS

General information

- Use only the products and accessories recommended by the Legrand Group in the catalogue, instructions, technical data sheets and all other documents provided by Legrand (hereinafter referred to as «the Documentation») in compliance with the installation rules.
- Improper installation and/or use may result in the risk of arcing in the enclosure, overheating or fire. The enclosures must be used under normal conditions, they must not be subjected to Voltage / Current / Temperature values other than those specified in the Documentation.
- Legrand declines all responsibility for any modification or repair of the equipment making up the enclosure that is not authorized by the Legrand Group, as well as any failure to comply with the rules and recommendations specified by Legrand in the Documentation. In addition, in the cases mentioned above, the warranty granted by Legrand will not be applicable.
- It is necessary to check that the characteristics of the products are appropriate for their environment and use during maintenance operations, and to refer to the Documentation. If you have any questions or require clarification, please contact Legrand Group.
- The installation, use and maintenance of the enclosures and their components must be carried out by qualified, trained and authorized personnel, in accordance with the regulations in force in each country.



RISK OF ELECTRIC SHOCK, BURNS AND EXPLOSION.

- People working on the installation must have the appropriate electrical authorizations for the work to be carried out.
- Wear the PPE (Personal Protective Equipment) necessary to work on live products.
- Respect the safety rules related to electrical work.
- Improper electrical and mechanical use of equipment can be dangerous and may result in personal injury or damage to property.
- Depending on the maintenance operations to be carried out, partial or total power cuts of the enclosure concerned should be planned before any work.
- When performing operations that involve access to the inside of the enclosure, be aware of the risk of burns before touching any products or metal parts.
- Before turning the power back on, make sure that there are no foreign bodies and that all physical protections have been put back in place (e.g.: screens, covers, shields).

Any failure to strictly apply the procedures and to respect these recommendations, could lead to serious risk of accident, endangering people and property (in particular, without limitation, risk of burns, electric shocks, etc.).



 The rules and recommendations in this document are based on our knowledge of the typical conditions of use of our products in the fields of application usually encountered. However, it is always the customer's responsibility to verify and validate that Legrand products are suitable for its installation and use.

The customer must ensure proper installation, maintenance and operation of the equipment to avoid any risk of injury to personnel or damage to property in the event of product failure, especially for applications that require a very high level of safety (e.g., those in which the failure of a component may endanger human life or health).

The rules for storage, handling, installation and maintenance and the appropriate precautions and warnings must be strictly observed and applied.

STANDARDS AND REGULATIONS

European directive 2012/27/UE

The obligation to carry out an energy audit for large-scale companies, provided for by the European directive 2012/27/EU relating to energy efficiency, was set by law no. 2013-619 of July 16, 2013 containing various provisions for adapting to European Union law in the field of sustainable development.

KEY DATES

Since **December 5, 2015**, all large-scale companies concerned must be able to justify, at any time, to have carried out an **energy audit** according to the requirements of the NF EN 16247 standards. This audit must be renewed every 4 years.

WHO

This directive concerns all companies that have:

- either a workforce of more than 250 employees,
- or annual sales exceeding 50 million euros and a balance sheet of more than 43 million euros,

Exception: ISO 50001 certified companies are exempt from this obligation.

REQUIREMENTS

This energy audit must be carried out on a perimeter representing at least 80% of the company's energy bills, failing which penalties of up to 2% of turnover may be imposed.

If the company is ISO 50001 certified, it must cover 80% of the energy bill. Otherwise, it will have to carry out an additional audit on the activities not covered.

Companies are then required to electronically submit the results of their audit to the energy audit collection platform operated by ADEME (French Environment and Energy Management Agency).

MEASUREMENT

The energy audit will be carried out on the basis of the energy performance of the building(s) concerned. This requires the identification of significant energy uses in order to determine opportunities for improvement.

An energy inventory will be carried out on the basis of an evaluation of consumption and identification of uses. The goal is to collect and analyze the field data needed for the energy review and the development of the energy management system.



ISO 50001 certification

ISO 50001 is a voluntary international standard developed by ISO (International Organization for Standardization). It defines the requirements for the implementation, operation, maintenance and improvement of an Energy Management System (EnMS) by an organization.

KEY DATES

- Effective **June 15, 2011**.
- The **second version** of ISO 50001, published on **August 21, 2018**, concerns the structure of the document, which is now similar to that of other management system standards in order to facilitate cross-referencing.

WHO

This certification **can be applied to all types and sizes of organizations**, regardless of their geographical, cultural or social location.

An ISO 50001-compliant company will be able to demonstrate the existence of a sustainable EnMS.

REQUIREMENTS

- a commitment to continuous improvement in terms of energy efficiency,
- appointment of a qualified energy management specialist,
- the development of a management plan,
- an assessment of the main energy applications,
- the setting up of energy performance indicators and targets,
- the setting up of action plan(s),
- all staff must undergo training in how best to improve energy efficiency,
- the results should be evaluated and sent out to all staff on a regular basis.

The European institutions have chosen ISO 50001 as a reference method to help achieve the EU's energy saving goals within companies and public organizations.

In France, several regulatory texts refer to ISO 50001 compliance certification, including the Energy Code, which provides for an exemption from the mandatory energy audit for large certified companies.

MEASUREMENT

As for the 2012/27 directive, ISO 50001 does not require specific measurements by type of use or circuit.

However, in order to construct the energy management system for buildings, it is important to know which are the most energy-consuming items in order to identify potential sources of improvement.

Use of a measurement and supervision system ensures continuous improvement in the company's energy performance.

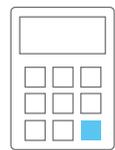


ENERGY MANAGEMENT

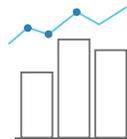
Overview

Maximized functions and actions = minimized interventions and consumption.

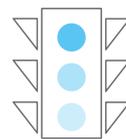
Indeed, in an electrical infrastructure, a greater number of functions and actions reduces the number of human interventions and considerably optimises final consumption.



METERING



MAESUREMENT



SIGNALLING



CONTROL



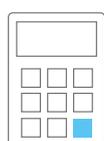
SUPERVISION

SHOPS & COLLECTIVITES	RESIDENTIAL	Standard ecometer						
		Connected solutions ⁽¹⁾						
		EMDX ³ energy meters						
	INDUSTRIAL / COMMERCIAL	EMDX ³ measuring units						
		CX ³ EMS						
		DMX ³ /DPX ³ ACBs/MCCBs						
							WEB SERVER	

(1) Connected outlets, connected cable outlet, connected latching relay, connected contactor, connected energy meter, connected eco-meter (launching in 2021) and connected load shedder (launching in 2021)

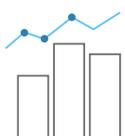


Definitions



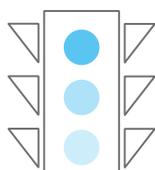
METERING

Recording the electricity consumed by a circuit. This is the basic function which is available on all metering devices.



MEASUREMENT

Measuring electrical values (current, voltage, power, harmonic distortion, etc) or **analogue values** (temperature) to check the installation is working properly.



SIGNALLING

Checking locally (LEDs, display unit, touch screen, etc) or remotely (LEDs, display unit, PLC, PC, tablet, smartphone, etc):

- the on/off status of one or more devices and/or circuits
- any faults such as circuit breaker tripping, min. or max. threshold overrun, etc ...



CONTROL

Managing control devices such as relays, contactors, circuit breaker motorised controls, load shedding/restoration, etc following a manual or automatic command, fault, etc.



SUPERVISION

Supervision is a **computerised control and monitoring technique** for processes. In the measurement field, it is used as an umbrella term for all the aforementioned functions (display, monitor, control, set parameters, program).

Supervision concerns acquisition of data (measurements, alarms, status feedback, etc) and process control (circuit breaker remote control, etc). A supervision system helps control and optimise energy consumption at any time on the whole of the electrical network. It monitors all the equipment with respect to safety, control, speed of intervention and continuity of service.

Data retrieved concerning the equipment operating status, distributed power measurements and consumption can be exploited in order to set up a technical energy management solution.

SOLUTIONS FOR EVERY PROJECT

As a user
I would like to



Main distribution board / Head of the electrical installation

Industrial / Service sector



DMX³ / DPX³



EMDX³ ENERGY METERS



EMDX³ MEASURING UNITS

METERING AND MEASUREMENT

Energies	+	✓ OK	✓
Double tariff		✓ OK	✓
Rebilling		✓ OK	+
Basic electrical values	✓ OK	✓	✓ OK
Critical electrical data (harmonics ...)	+		✓ OK
Power quality	+		✓ OK

SIGNALLING

Device status	✓ OK		+
Measurement threshold			+
Temperature			+

CONTROL

Devices	+		+
Load shedding			+
Remotely	+		
Automatic actions			

COMMUNICATION

RS485 Modbus	+	✓	✓
Smartphone App	✓ OK		
IP (LAN/WiFi)			

Electrical panel (housing)		
Residential		
 CX ³ EMS	 ECOMETER	 CONNECTED SOLUTIONS ⁽¹⁾
METERING AND MEASUREMENT		
✓	✓ OK	✓ OK
	✓ OK	✓ OK only with the smart Ecometer
✓	✓	✓
✓		
SIGNALLING		
✓ OK		✓ OK via App.
✓ OK		✓ OK notifications
		+
CONTROL		
✓ OK		✓ OK
✓ OK		✓ OK with the smart load shedder
+ OK		✓ OK
✓ OK		✓ OK planning
SUPERVISION		
✓		
		✓ OK
		✓ OK

+ Option or via other devices
 ✓ Product feature
 OK Recommended product for this function
 * Only with integrated measure version

(1) Connected outlets, connected cable outlet, connected latching relay, connected contactor, connected energy meter, connected eco-meter (launching in 2021) and connected load shedder (launching in 2021).



SOLUTIONS FOR EVERY PROJECT

As a user
I would like to



		STANDARD SOLUTION	
		Products	Product benefits
Private homes	<p>Comply with regulations</p> <p>To better know my consumptions in order to optimise them</p> <p>To be able to control circuits remotely</p>	 Ecometer	<ul style="list-style-type: none"> • Measurement of 5 circuits • Consumption display • Direct reading on product
Small office buildings	<p>Comply with regulations</p> <p>To better know my consumptions in order to optimise them</p>	 EMDX ³ energy meter	<ul style="list-style-type: none"> • No programming • Direct reading on product • Installation cost < profitable from 6 measuring points • MID certification for rebilling
Collective housing / small office buildings	<p>Track my consumption for optimisation purposes</p> <p>Charge back some consumption (EVSE, rental ...)</p> <p>Control critical data (reactive, max power)</p>	 EMDX ³ measuring unit EMDX ³ energy meter	<ul style="list-style-type: none"> • Easy programming • Direct reading on product • Centralization of other measurements (water and gas) • Cost-effective installation from 6 pts of measurement
Commercial / Service sector	<p>Supervise all consumption</p> <p>Control critical data (reactive, max power)</p> <p>Know the status of my high-priority circuits</p> <p>To be able to control certain circuits remotely</p>	 EMDX ³ measuring unit Web server EMDX ³ energy meter	<ul style="list-style-type: none"> • Control via Modbus • Remote access to consumption data • Power quality measurement
Industrial and service sector	<p>Supervise all consumption</p> <p>To control the quality of energy of my installation</p> <p>Know the status of my high-priority circuits</p> <p>To be able to control remotely</p> <p>Act automatically to reduce my consumption and avoid power overruns</p> <p>To be able to notify me of dysfunctions</p> <p>Be autonomous in the energy management of my building</p>	 CX ³ EMS DMX ³ ACBs DPX ³ MCCBs EMDX ³ measuring unit	

ADVANCED OR SMART SOLUTION		APPLICATION EXAMPLE
Products	Product benefits	
 <p>Connected solutions⁽¹⁾</p>	<ul style="list-style-type: none"> • Measurement and display of circuit consumption and/or loads via the Home + Control App • Remote control • Scalable and smart solution • New or existing installation 	 <p>Private housing</p>
 <p>CX³ EMS</p>	<ul style="list-style-type: none"> • Centralised visualisation • Installation cost > cost-effective from 6 measuring points • Scalable solution • Existing installation 	 <p>Small business</p>
 <p>CX³ EMS EMDX³ energy meter</p>	<ul style="list-style-type: none"> • Centralised visualisation • Installation cost > cost-effective from 6 measuring points • Scalable solution • Centralisation other measures (water and gas) • Optimisation of consumption per control (load shedding) 	 <p>Town hall, school</p>
 <p>CX³ EMS Web server</p>	<ul style="list-style-type: none"> • Complete system for new and existing • Remote data access • Scalable solution • Remote status and control of circuits possible from the same interface 	 <p>Collective housing</p>
 <p>Web server EMDX³ energy meter</p>	<ul style="list-style-type: none"> • Remote data access • Open to third party SCADA* • Scalable solution • Remote status and control of circuits possible from the same interface • Power quality measurement <p>*Supervisory Control And Data Acquisition</p>	 <p>Shopping mall /Office</p>  <p>Industry</p>

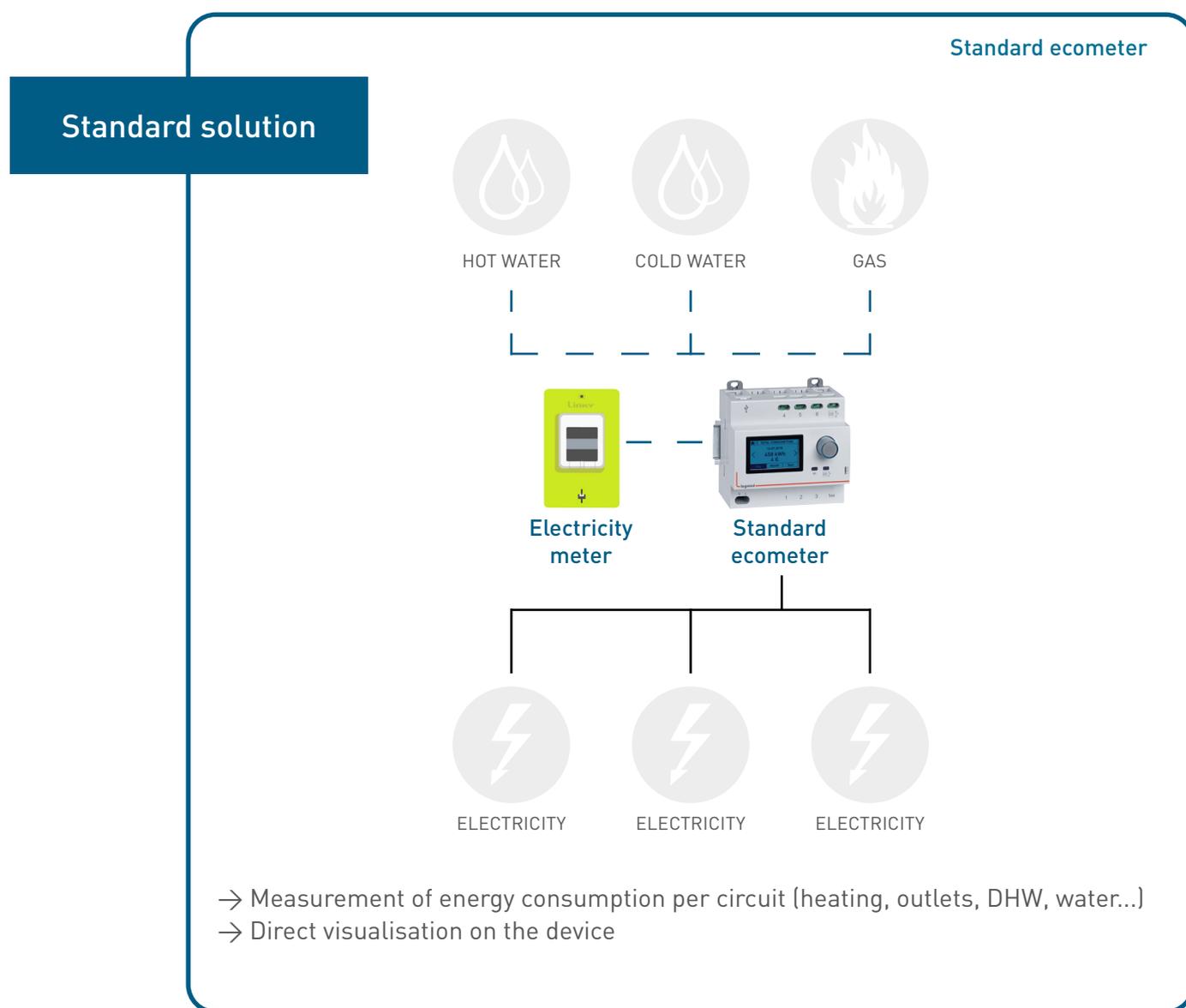
(1) Connected outlets, connected cable outlet, connected latching relay, connected contactor, connected energy meter, connected eco-meter (launching in 2021) and connected load shedder (launching in 2021)



WHAT DO YOU WANT TO CARRY OUT AS A **HOME** OR **SMALL BUSINESS** OWNER?

«I want to comply with the regulations and better understand my consumption in order to optimise it.»

SINGLE-PHASE SOLUTION



— Measurement
 - - Gathering



SINGLE-PHASE SOLUTION

Connected solution Measurement only



Home + Control



HOT WATER



COLD WATER



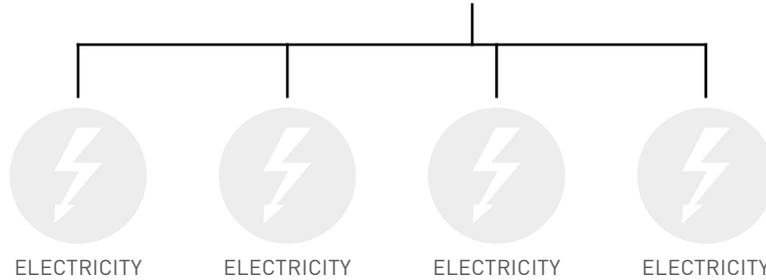
GAS



Electricity
meter



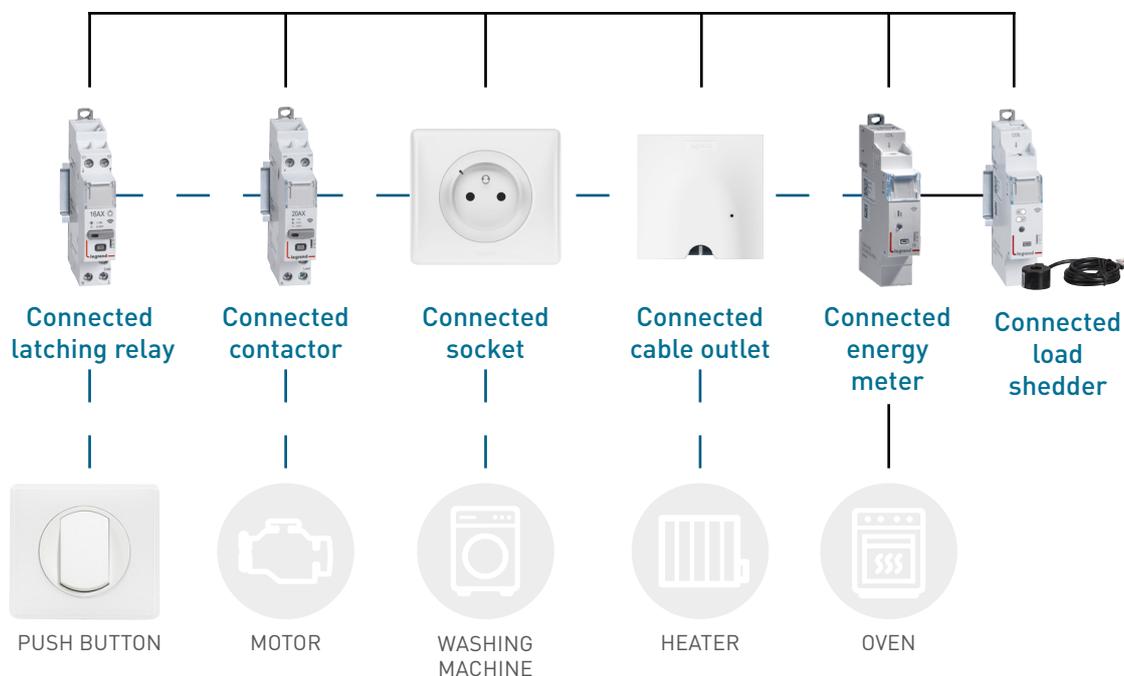
Connected
ecometer



- Scalable system (can be integrated into the smart ecosystem)
- Measurement of energy consumption per circuit (heating, outlets, DHW, ...)
- Visualisation and display of consumption by the Home + Control App

— Measurement
- Gathering

Connected solution Complete system



- Smart system
- Instantaneous power measurement and daily and monthly consumption monitoring through the Home + Control App (notifications)
- Remote circuit control and supervision

— Measurement
- - Control/Gathering

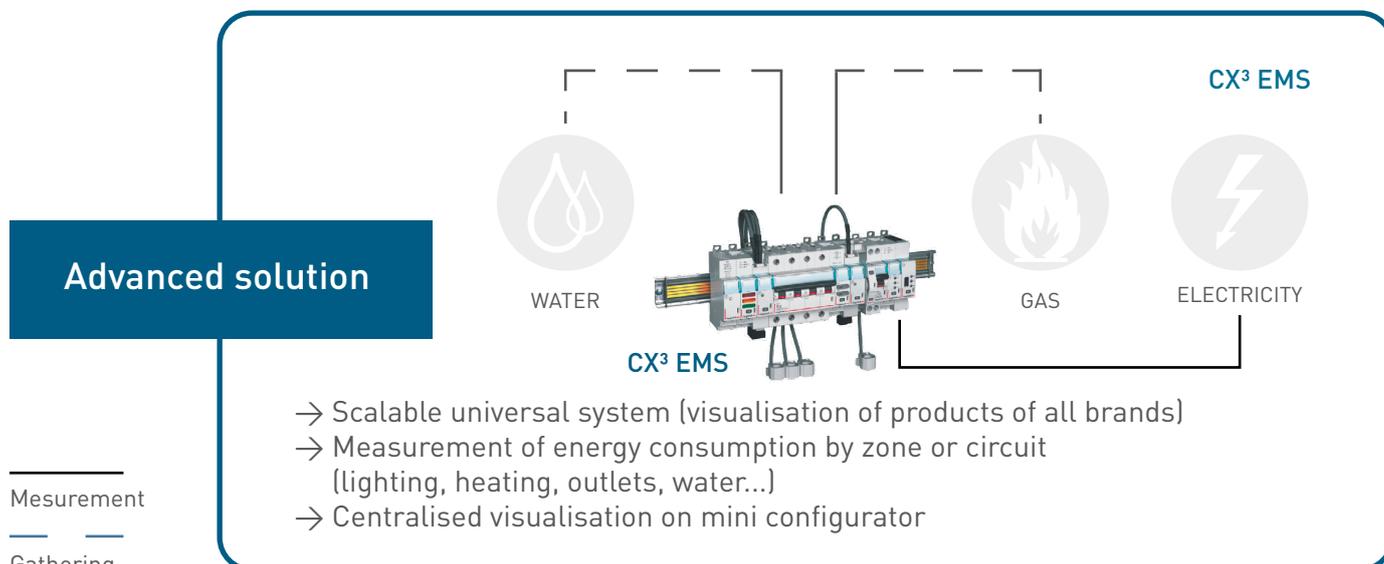
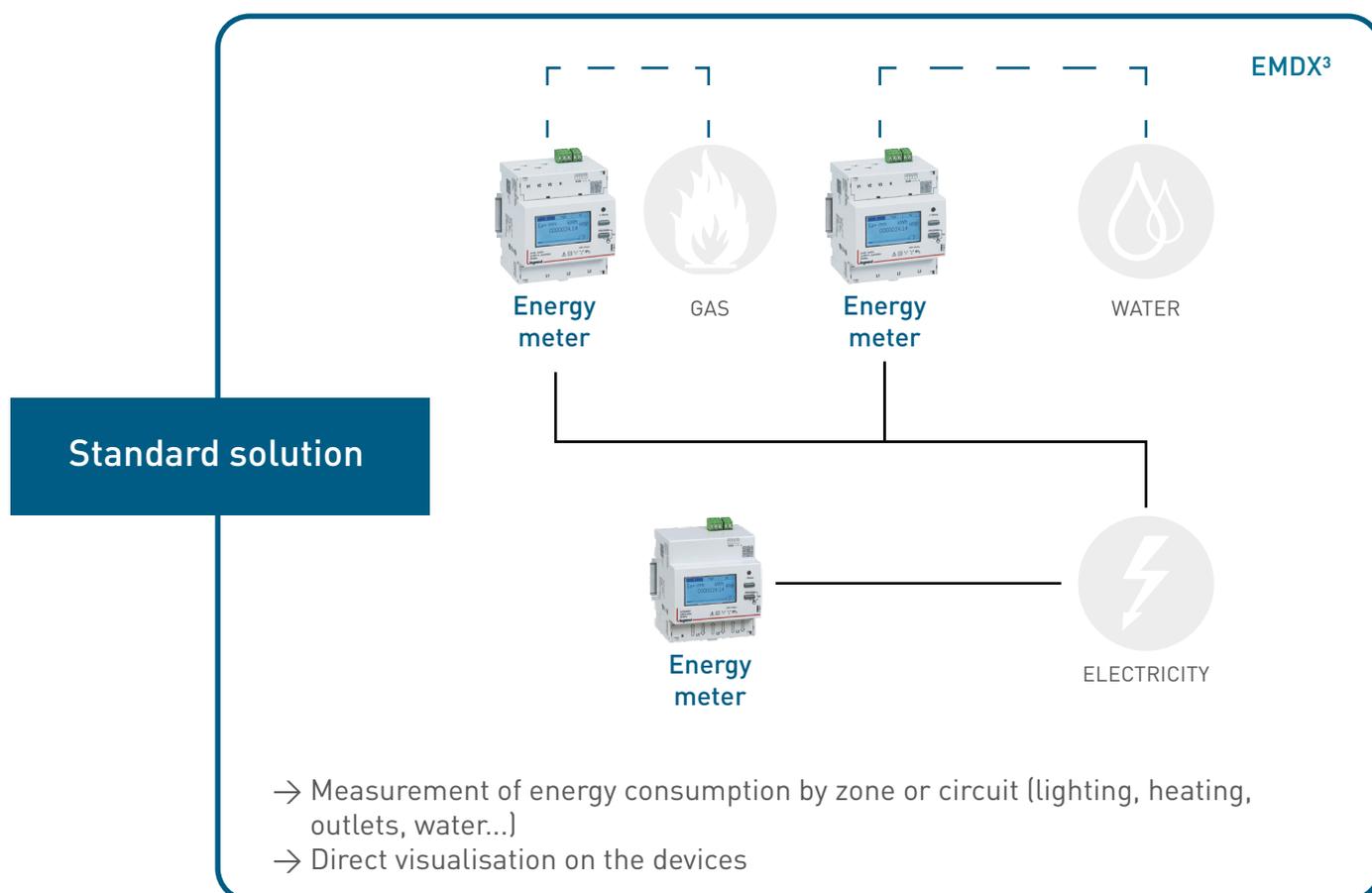




WHAT WOULD YOU LIKE TO CARRY OUT IN A **TOWN HALL**, A **SCHOOL** OR A **SMALL SHOP**?

«I want to comply with the regulations and better understand my consumption in order to optimise it.»

THREE-PHASE SOLUTION



— Measurement

- - - Gathering





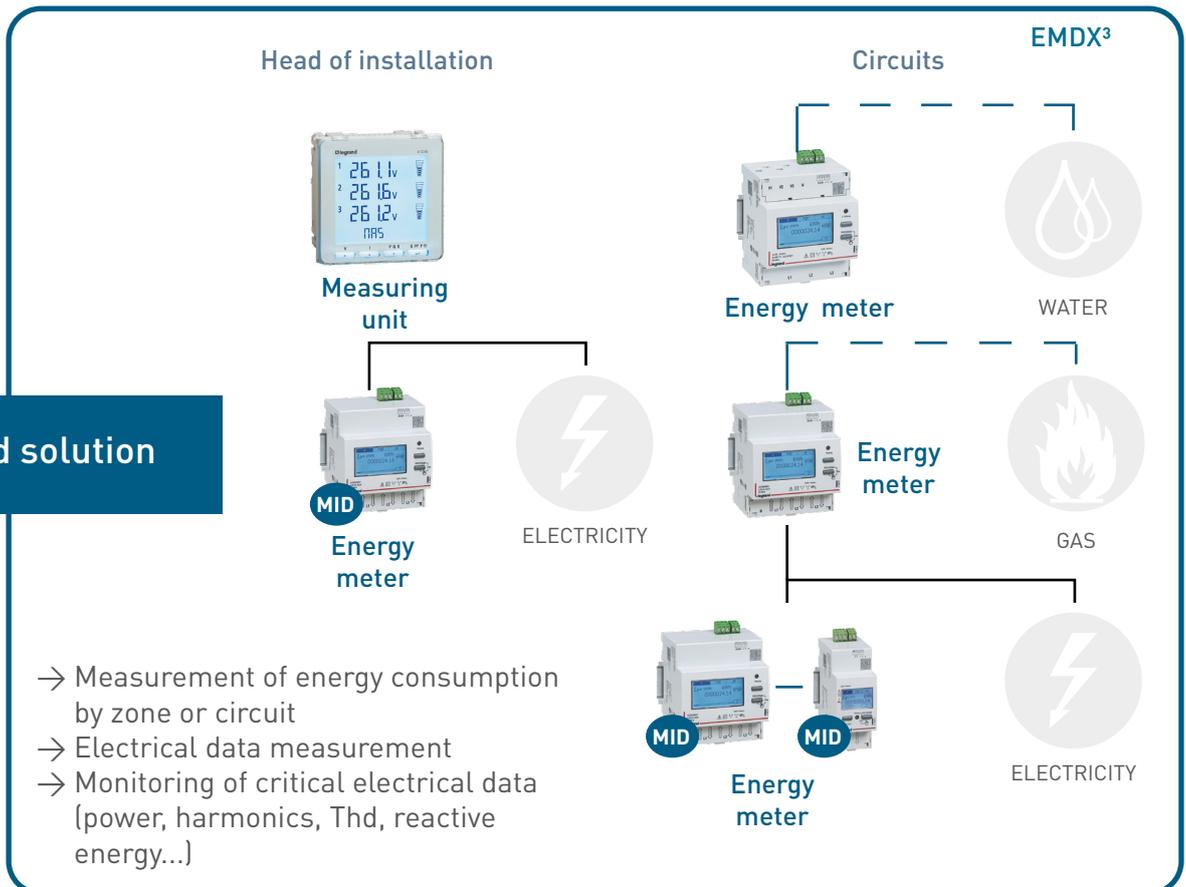
WHAT WOULD YOU LIKE TO CARRY OUT IN A **COLLECTIVE HOUSING** OR A **SUPERMARKET**?

«I want to monitor my consumption in order to optimise it and to bill back some of it (EVSE, rental ...).

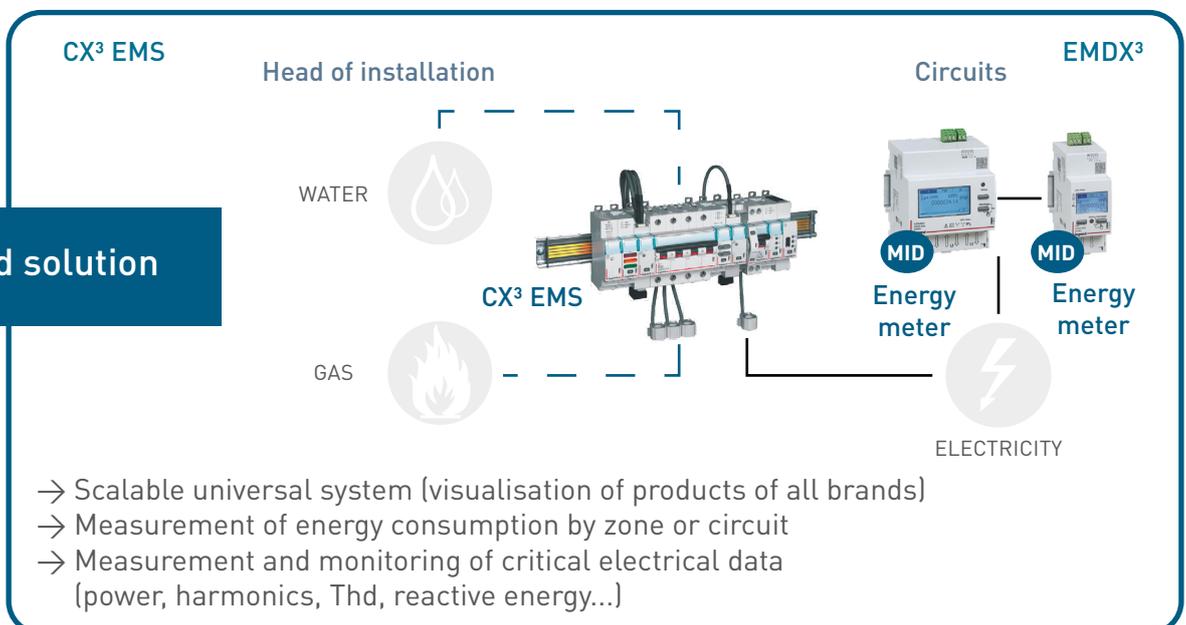
I also want to control critical data (reactive and maximum power).»

SINGLE/THREE-PHASE SOLUTION

Standard solution



Advanced solution



— Measurement
 - - Gathering



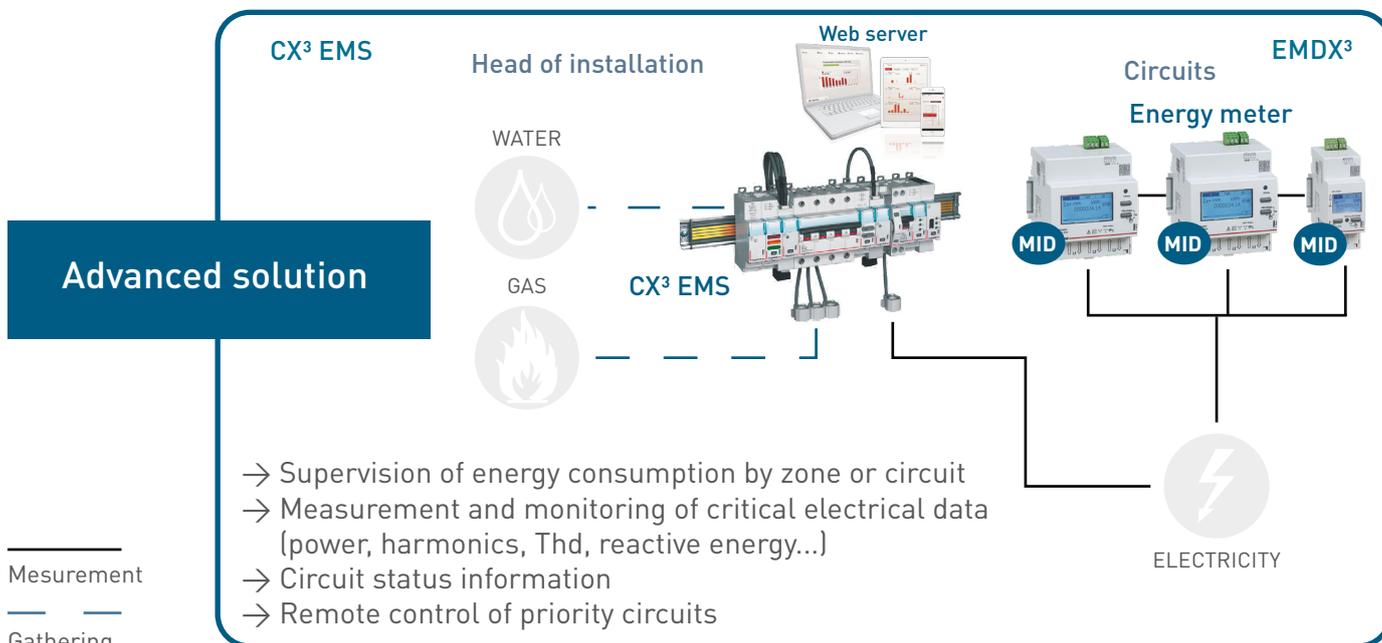
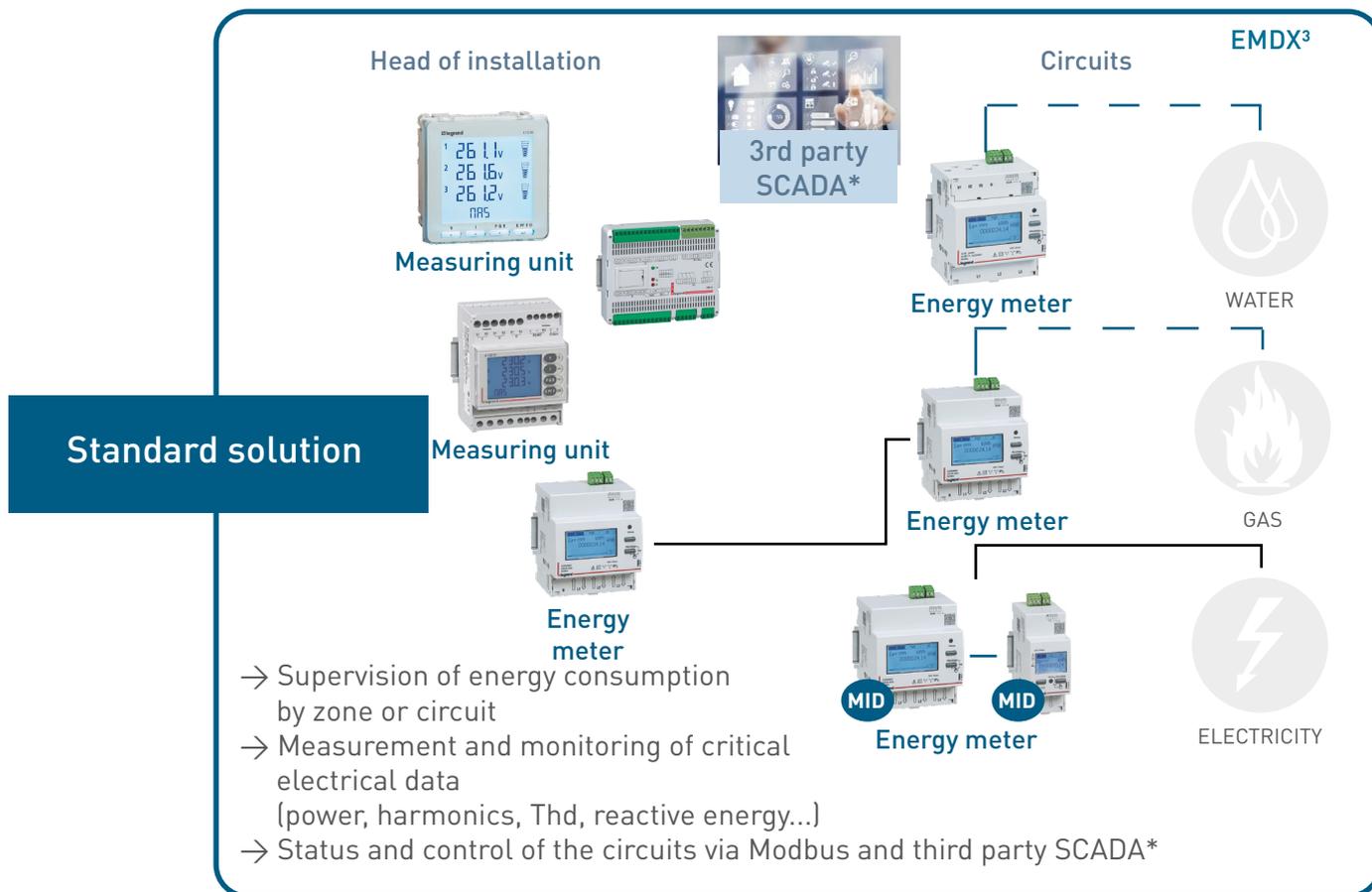


WHAT DO YOU WANT TO CARRY OUT WITHIN A **SHOPPING CENTER** OR **OFFICES**?

«I would like to supervise all consumption and control critical data (reactive and maximum power).

I also want to know the status of my high-priority circuits and be able to remotely control some of them.»

SINGLE/THREE-PHASE SOLUTION



— Measurement

— Gathering

*Supervisory Control And Data Acquisition

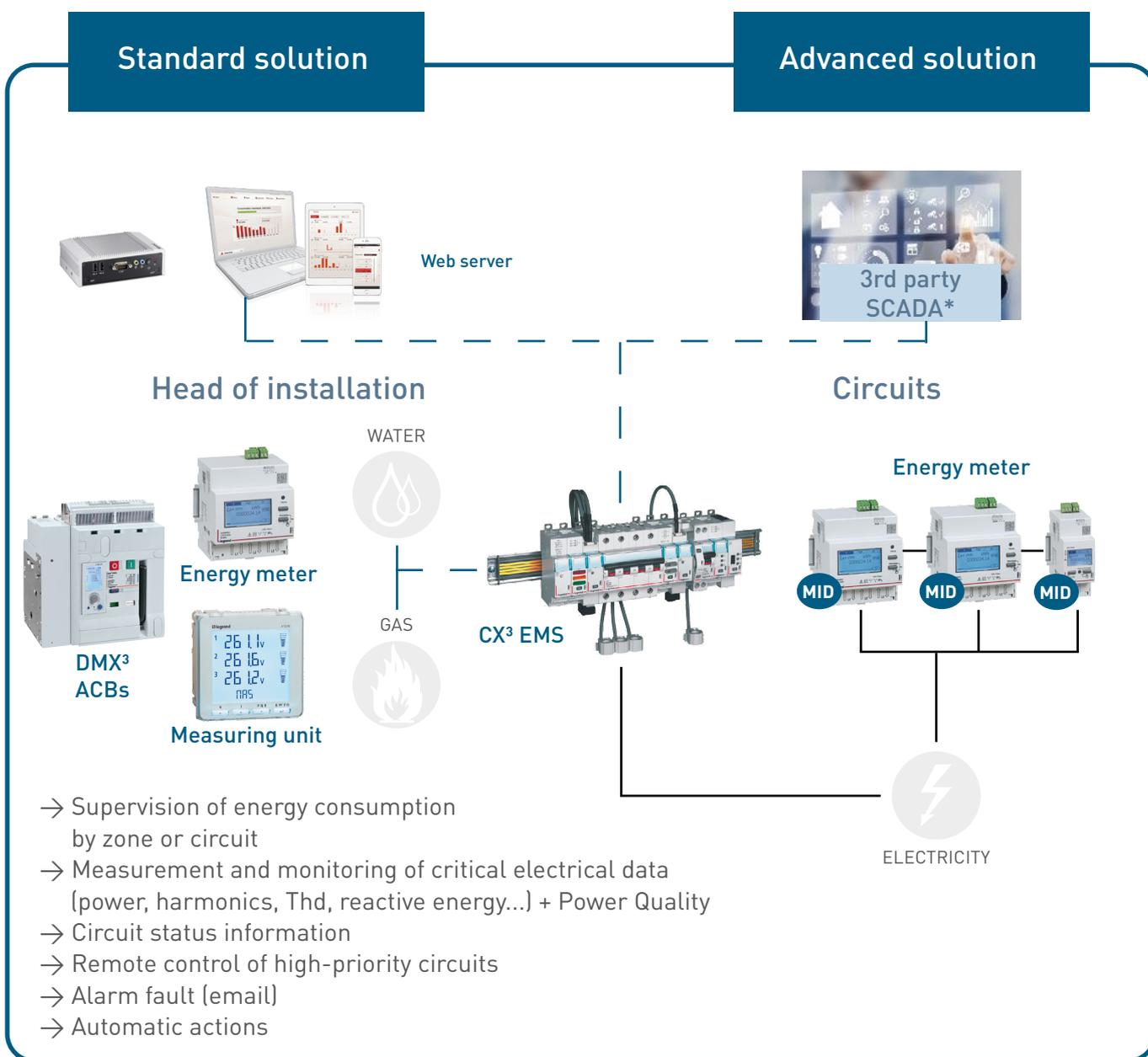


WHAT WOULD YOU LIKE TO CARRY OUT WITHIN AN **AQUATIC CENTER** OR AN **INDUSTRY**?

« I want to supervise all consumption, control the quality of energy in my installation, know the status of my high-priority circuits and remotely control them, as well as being able to be alerted to any faults.

I also want to automatically reduce my consumption and avoid power overruns by being alerted.»

SINGLE/THREE-PHASE SOLUTION



*Supervisory Control And Data Acquisition

— Measurement
 - - - Control/Gathering



PRODUCT OVERVIEW

PROTECTION

MESUREMENT

CONTROL AND SIGNALLING

RESIDENTIAL

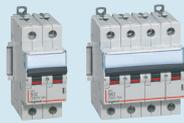


DX³ Ph+N
MCBs

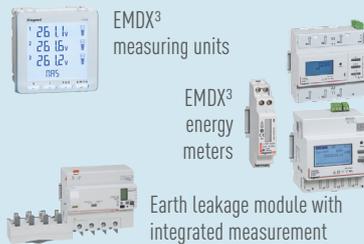


Ecometer

COLLECTIVE HOUSING
AND SMALL OFFICE BUILDINGS



DX³
MCBs



EMDX³
measuring units

EMDX³
energy
meters

Earth leakage module with
integrated measurement

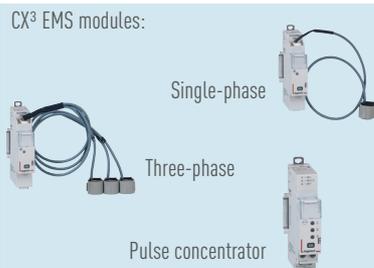


Auxiliaries and motorised control

I/O interface



CX³ + DX³
MCBs



CX³ EMS modules:

Single-phase

Three-phase

Pulse concentrator



CX³ EMS signalling and
control modules



CX³ EMS state reporting and control
module

COMMERCIAL AND INDUSTRIAL



DPX³
MCCBs



EMDX³ measuring units

EMDX³
energy
meters



DMX³
ACBs



CX³ EMS measurement module



DMX³ with electronic protection unit

Electronic DPX³ with integrated
measurement



Auxiliaries and motorised controls

I/O interface



Auxiliaries
and motorised controls

CX³ EMS signalling
and control modules



COMMUNICATION

REMOTE

Live connection to the IP network (https web pages)



RS485 outputs integrated in EMDX³ devices and interface



Interface for each earth leakage module



CX³ EMS/RS485 interface

RS485 outputs integrated in EMDX³ devices and interface



CX³ EMS/RS485 interface for each DMX³



RS485 interface for each DPX³

Modbus RS485 network



RS485/IP interface

OR



Energy web server Integrated RS485/IP interface

IP Network

(https web pages)



Touch screen

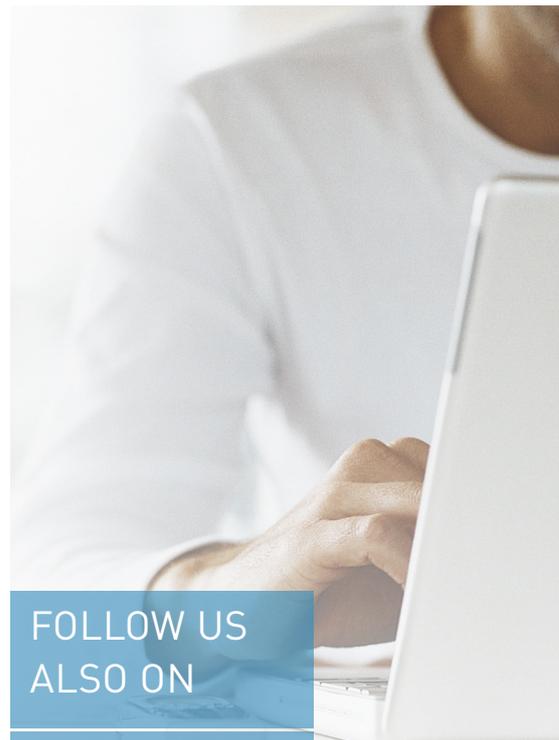


Energy Management software (licence key) for local viewing and control on a workstation



Energy Web Server for local or remote viewing and control on various media





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