

Advisory Committee on Energy Efficiency

ACEE presentation

Case study on low-voltage electrical installations

January 26, 2021

Jacques Peronnet & Philippe Vollet

IEC Young Professionals webinar on Energy Efficiency

Speakers



Jacques Peronnet
IEC TC64 Chairman

He has been working since more than 30 years in the Energy Sector and has built a comprehensive experience from energy generation up to end use thanks to various positions in Schneider Electric. He is very active in standardization at IEC level: chairman of IEC TC64 covering LV electrical installations and protection against electric shock, active member of the IEC ACEE, expert in the IEC SyC LVDC (System committee on LVDC current).



Philippe Vollet

IEC ACEE Chairman – IEC SC23K Secretary
He has been working for Schneider Electric since 1989, at several positions from Engineering , Business Development, Offer management and Strategy for both Low and Medium Voltage departments.
He has been involved in standards work since 2013, mainly in Energy Efficiency and Smart Building topics.

Content

- ü Learning objectives
- ü Introduction
- ü IEC ACEE
- ü IEC ACEE 03 Case Study: LV Electrical installation
- ü Conclusion



Learning Objectives

- Discover the Key role of ACEE
- Find out more about how ACEE can promote the standards relating to Energy Efficiency
- Learn more about the use-case of the energy efficiency for low-voltage electrical installations
- Leverage the Young Professionals' contribution to Energy Efficiency activities





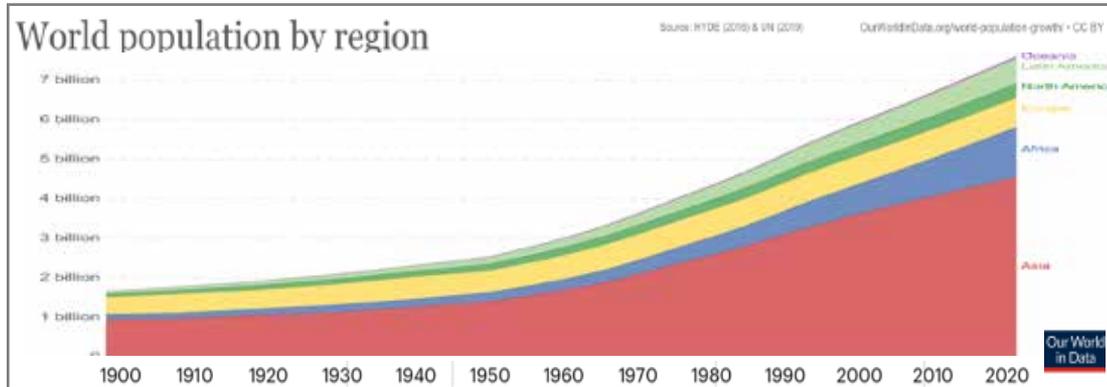
Introduction on Energy Efficiency

Presentation

Philippe Vollet

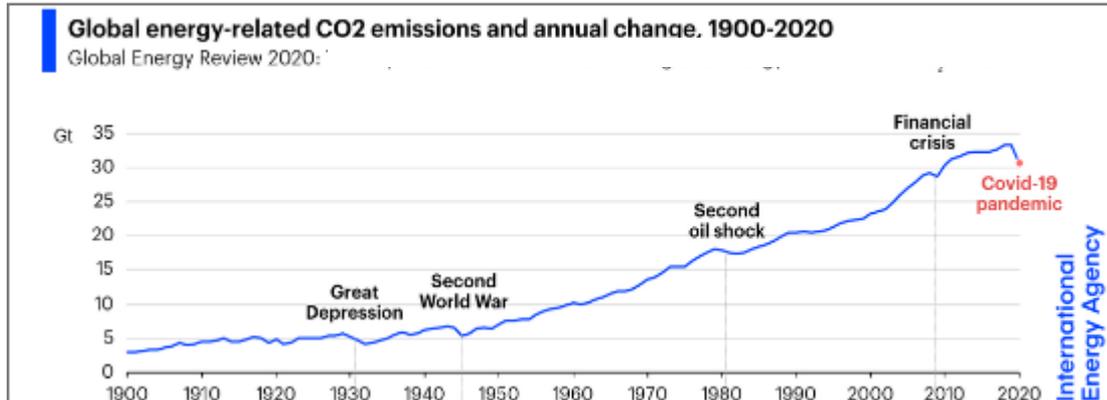


IEC Advisory Committee on Energy Efficiency CO₂, energy and World Population...today



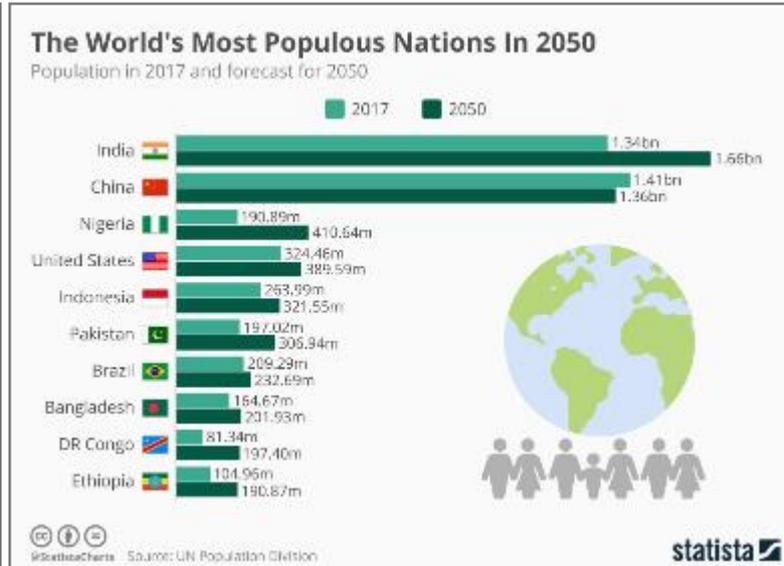
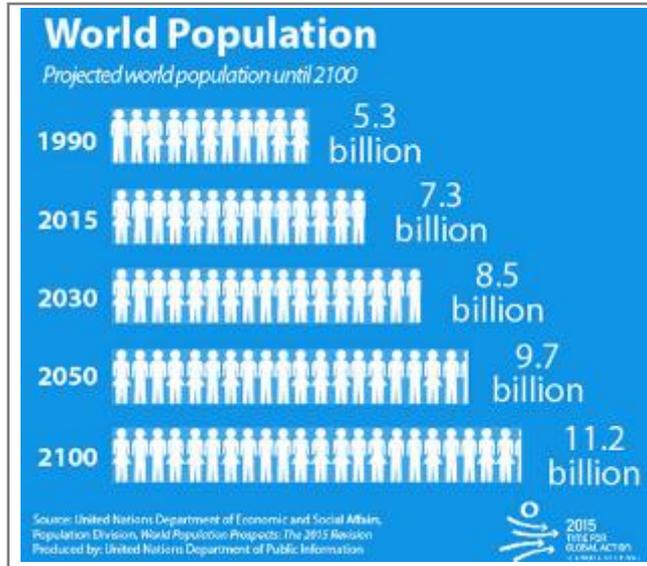
7.8 Billion people

2020



> 30 Gt energy-related
CO₂ emissions

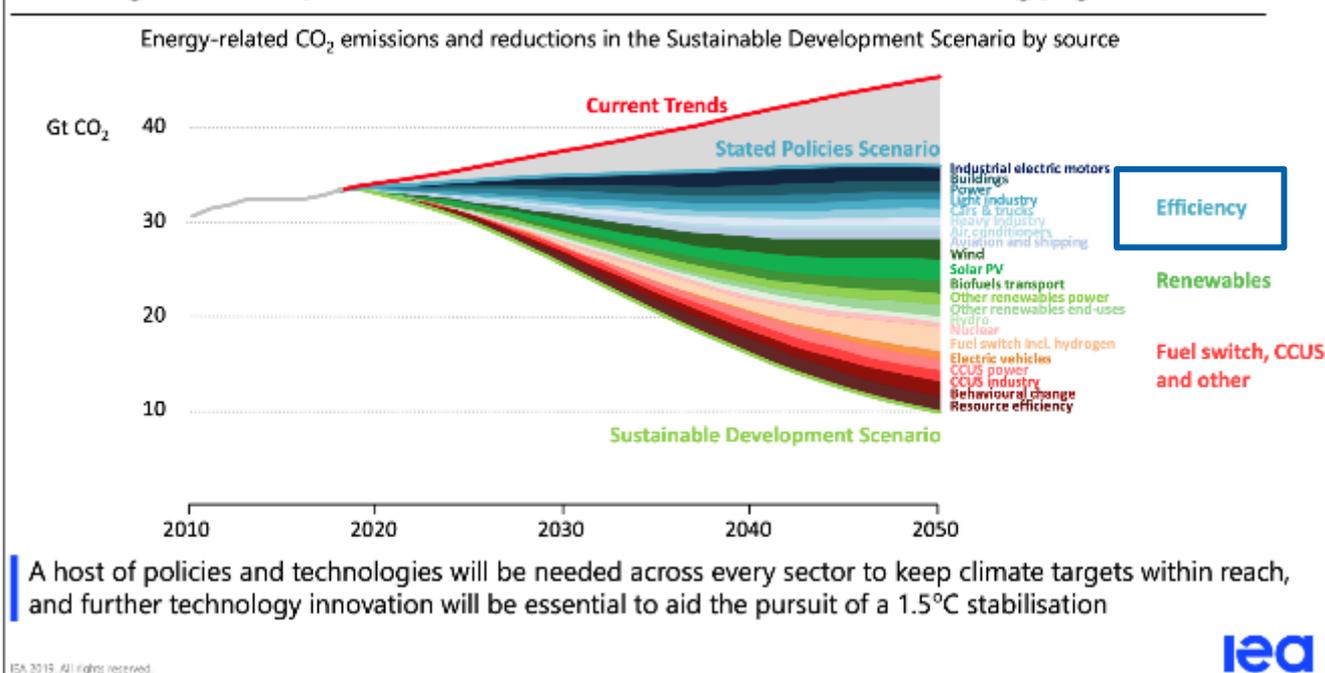
IEC Advisory Committee on Energy Efficiency CO₂, energy and World Population...tomorrow..



2050: + 2.5 Billion vs 2020, + 68% in Cities vs 2018
with close to 90% of this increase taking place in Asia and Africa

IEC Advisory Committee on Energy Efficiency CO₂, energy and World Population...tomorrow..

No single or simple solutions to reach sustainable energy goals



Neither approach will keep pace with the growing demand.

We need to eliminate every element of waste

The solution is a combination of:
cleaner generation,
greater efficiency
and a smarter grid

IEC Advisory Committee on Energy Efficiency CO₂, energy and World Population...tomorrow..

üEnergy efficiency is key to addressing the challenge to support energy policies while preserving the environment.

üMany energy efficient technologies and solutions are already available and **cost-effective**; nevertheless, a variety of barriers inhibits the deployment of these technologies and impedes harvesting their energy efficiency potential.

üStandardization can play an important role for:

üAgreements on performance between manufacturers, users and operations

üDissemination and promotion of energy efficient technologies, solutions and services.

üSetting of minimum energy performance standards

ü...

IEC Advisory Committee on Energy Efficiency

Definition of energy efficiency (IEC ACEE Guide 118)

Ratio: **output of performance** vs. **input of energy**

Same performance



Better performance



Less waste



Less energy used



Same energy use



More usable energy





IEC ACEE

Presentation

Philippe Vollet



Why ACEE ?

Despite the many identified benefits of energy efficiency, **many barriers to its wide adoption remain**. These include:

- ü Lack of awareness of savings potential
- ü Focus on devices instead of systems = lower ROI
- ü Focus on Low initial cost vs. life-cycle gains
- ü



ACEE – ID Card

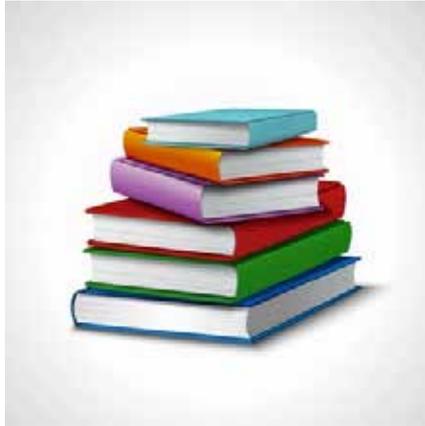
IEC has set up an **Advisory Committee on Energy Efficiency (ACEE)** to **coordinate** its activities in this domain



- ü ACEE provides **guidance for implementation in TCs SyCs**.
- ü It encourages a **systems perspective**.
- ü ACEE deals with energy efficiency matters **which are not specific to one single technical committee** of the IEC.

- ü **8 Members nominated by NCs:**
CA, CH, CN, IT, JP, KR, NL, US
- ü **9 Members nominated by Entities:**
TC 9, TC 14, TC 22, TC 23, TC 27, TC 59, TC 64, TC 66, TC 121
- ü **1 Internal IEC Liaison:**
IECEE

ACEE – ID Card

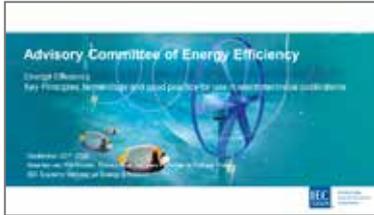


- ü **IEC Guide 118:2017** - Inclusion of energy efficiency aspects in electrotechnical publications:
- ü **IEC Guide 119:2017** - Preparation of energy efficiency publications and the use of basic energy efficiency publications and group energy efficiency publications:
- ü **Energy Efficiency Functions**
TC64 :
SC 22G:



ACEE – Recent activity

Conferences



ü 2 IEC Academy Webinars:

- ü 2020-06-23: **Energy Efficiency - Part 1: Key Principles, terminology and good practice for use in electrotechnical publications**
- ü 2020-09-22: **Energy Efficiency - Part 2: Presentation of 2 case studies on how to implement Guide 118 in IEC publications**

ü IEA Workshop for Southeast Asia:

Super-efficient Equipment Appliance Deployment Initiative

- ü 2020-11-12: **IEC ACEE Presentation**

ü IEC ACEE Presentation kit for TCs/SCs

- ü 2019-10-17 **Tool kit used by any ACEE member for TC/SCs presentations.**

ACEE – Recent activity Publications

ACEE Supporting Documents	
Title, description	Downloads
Case study: low-voltage electrical installations This case study is provided to illustrate a practical example (in practice) on how IEC Guide 118 concepts can be applied found in low-voltage electrical installations and in product standards and, more generally, on how International Standards can support the energy efficiency market and national energy efficiency policies.	900 kB
Introduction to ACEE work This document provides an Introduction to ACEE work.	1368 kB
Case study: electric motors This case study is provided to illustrate a practical example (in practice) on how IEC Guide 118 concepts can be applied found in electric motors standards and, more generally, on how International Standards can support the energy efficiency market and national energy efficiency policies.	1412 kB



	Apply energy efficiency concepts to electric motors and electrical installations 14 October 2020 by Maroufa Mezgal ...through their standards. According to ACEE Chair Philippe Vollet, "our first mission is to coordinate activities ..."
	IEC approach to energy efficiency 30 July 2020 by Maroufa Mezgal ... Energy Efficiency (ACEE) in 2013. Currently chaired by Philippe Vollet, ACEE seeks to coordinate standardization activities ... limiting greenhouse gas emissions. As noted by Vollet, "energy efficiency is key to addressing the ..."

- ü 3 supporting documents:
 - ü Two Case Studies to illustrate practical examples on how IEC Guide 118 can be applied
 - ü Jan 2020: **Case study 1: low-voltage electrical installations**
 - ü July 2018: **Case study 2: electric motors**
 - ü July 2018: **Introduction to ACEE work**
- ü SMB Newsletter
 - ü May 2019: **ACEE, Advisory Committee on Energy Efficiency**

- ü 2  Articles:
 - ü 14 October 2020 : **Apply energy efficiency concepts to electric motors and electrical installations**
 - ü 30 July 2020 : **IEC approach to energy efficiency**



IEC ACEE 03 Case Study: LV Electrical installation



Presentation

Jacques Peronnet



Case Study: Low Voltage Electrical Installation

- This case study is provided to illustrate a practical example
 - on how IEC Guide 118 concepts can be applied:
 - in low-voltage electrical installations; and
 - in product standards; and,
 - on how International Standards can support the energy efficiency market and national energy efficiency policies
- It is based on IEC 60364-8-1



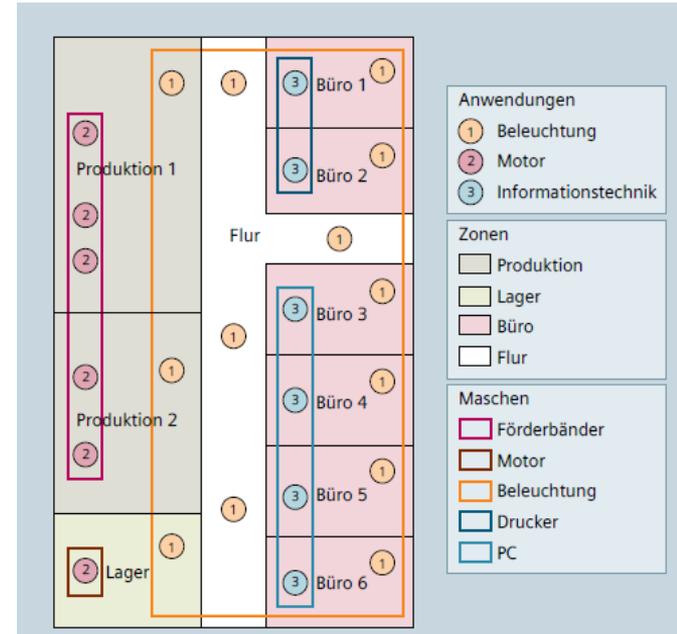
IEC 60364-8-1: a Group Energy Efficiency Publication

- Buildings represent 40 % of the global energy demand. A significant part of this energy is supplied by electricity. Therefore, the overall efficiency of the low-voltage electrical installation is key.
- IEC 60364-8-1 is based on the concepts of IEC Guide 118
- IEC 60364-8-1 is also a group energy efficiency publication (GEEP) according to IEC Guide 119. Therefore, it can be used by other IEC Technical Committees in order to design the functions to be implemented in their product to contribute to the implementation of energy efficiency measures in low-voltage electrical installations



Energy efficiency of Low Voltage Electrical Installation: boundaries

- Boundaries are key elements to define in order to make the relevant optimization of the usage of energy
- Circuits designed for optimizing the use of electrical energy are called meshes, usually referring to a zone (e.g. a room, a floor) and a usage (e.g. lighting, HVAC)
- Meshes are used to get the lowest electrical energy consumption and/or cost with regards to a solution for a service which is, and can be, compared to another solution



IEC Guide 118 > Energy efficiency aspects

This Guide:

- helps in harmonizing the approach to energy efficiency by promoting a system approach
- helps technical committees to identify energy efficiency aspects that contribute to energy efficiency improvement of the product itself and of the entire application;

5 EEAs to be considered when developing a standard

Energy efficiency aspect	Examples of inclusion in standards
Define energy efficiency	<ul style="list-style-type: none">▪ Define system boundaries▪ Define (establish) KPIs (energy efficiency indicators)▪ Define (establish) energy baseline▪ Define (establish) driving parameters (adjustment factors, static factors)▪ Define (establish) reference applications▪ [...]
Measure energy efficiency	<ul style="list-style-type: none">▪ Define test methods▪ Define measurements methods▪ Define measurements plans▪ [...]
Assess energy efficiency	<ul style="list-style-type: none">▪ Energy audits▪ Benchmarking methods▪ Energy efficiency investment evaluation
Improve energy efficiency	<ul style="list-style-type: none">▪ Energy management system▪ Design criteria guidelines▪ Application guidelines▪ [...]
Enable energy efficiency	<ul style="list-style-type: none">▪ Interoperability▪ Communication▪ [...]

IEC 60364-8-1 applies Guide 118 concept to:

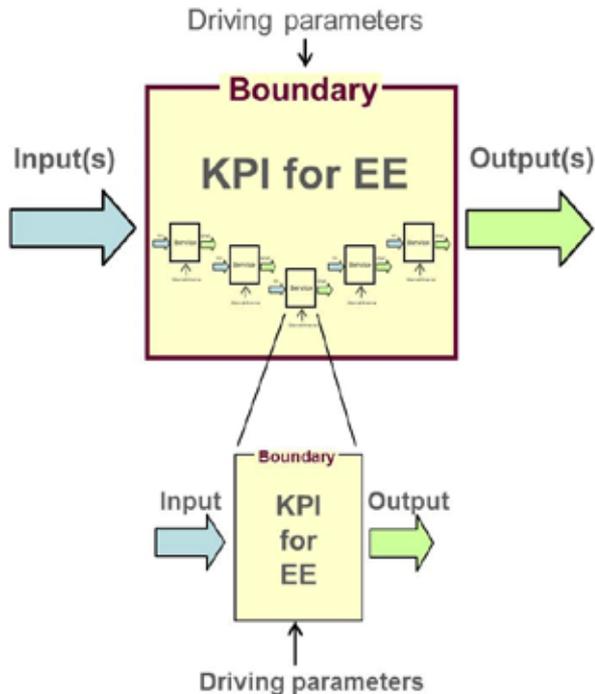
- improve by design the efficiency of the installation;
- control the usage of equipment;
- benefit from the tariff of the supplied electricity;
- measure the consumption of relevant loads;
- maintain the energy performance of the installation;
- assess the efficiency of the installation.



Energy efficiency of Low Voltage Electrical Installation: design principles

- The design principles take into account the following aspects:
 - load energy profile;
 - availability of local generation (PV, wind turbine, generator, etc.) and storage;
 - reduction of energy losses in the electrical installation;
 - the arrangement of the circuits with regard to energy efficiency (meshes);
 - the customer's power use distribution over time;
 - the tariff structure offered by the supplier of the electrical energy;
 - maintaining the quality of service and the performance of the electrical installation.
- In order to verify the achievement of electrical energy efficiency measures, an overall energy efficiency assessment should be made

Energy efficiency of Low Voltage Electrical Installation: Driving parameters

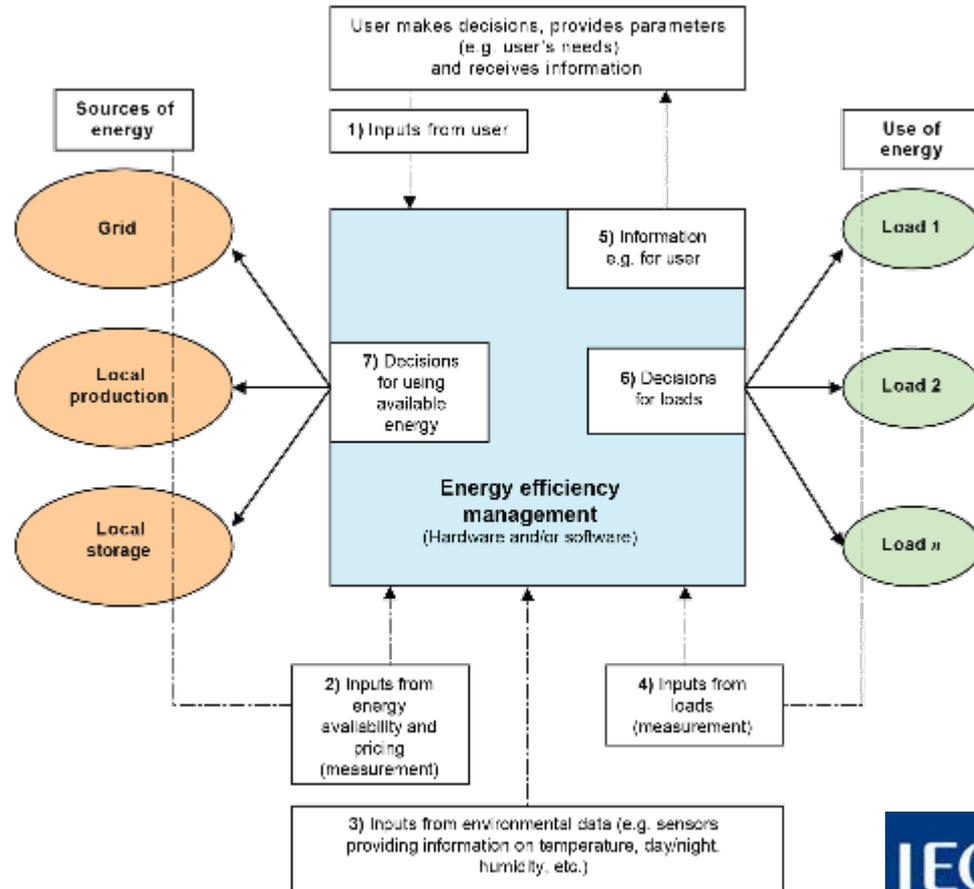


- Driving parameters having the most influence on energy efficiency shall be identified.
- Driving parameters should be assessed to evaluate their relative influence on the overall consumption of the installation.
- Usually, at least the following driving parameters are considered:
 - occupancy;
 - operating time;
 - environmental conditions;
 - cost of the electricity.

Energy efficiency and load Management System

- An energy efficiency and load management system provides guidance on how to optimize the usage of the energy consumed, taking into account the loads, local production and storage and user requirements.
- Building Automation Control System or House Energy Management System can lead to savings from 20% to 47%*

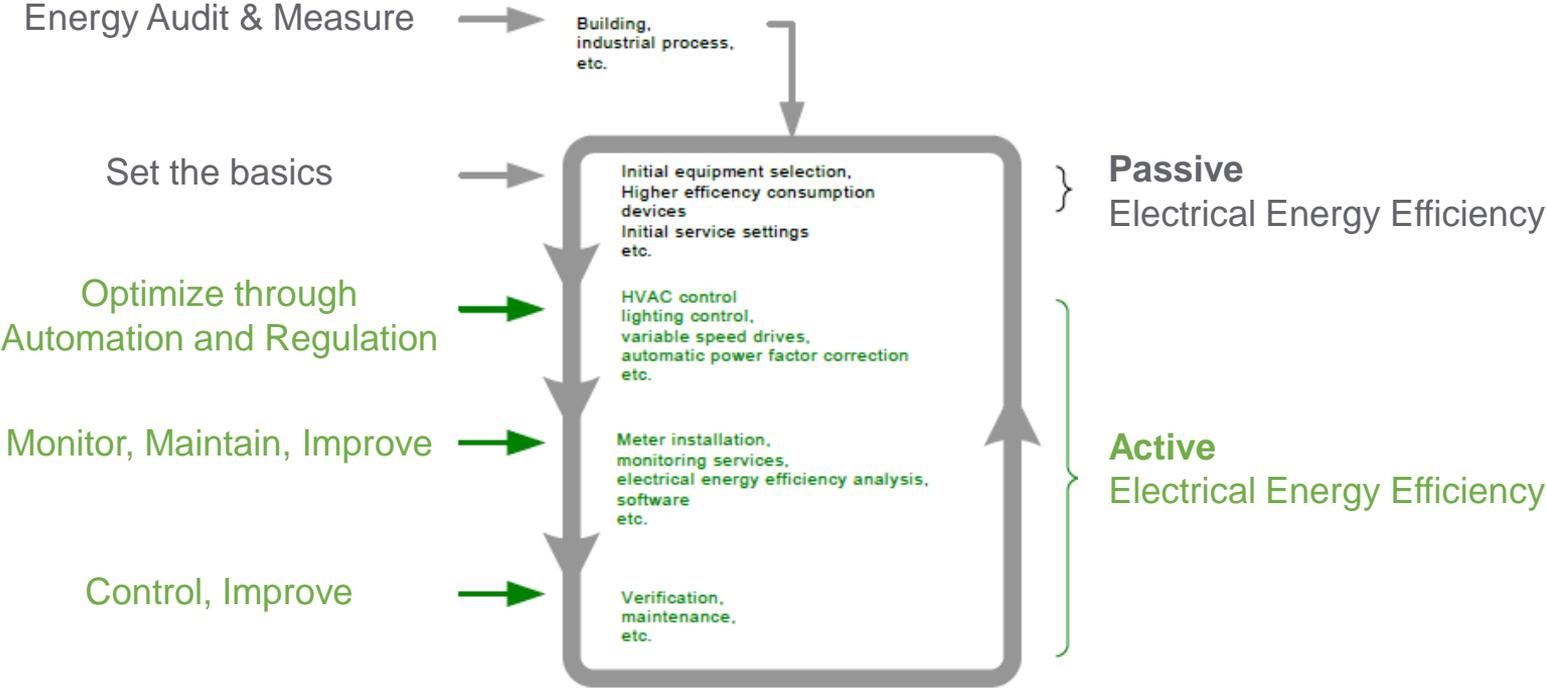
*according to European Standard EN 15232



Energy efficiency of Low Voltage Electrical Installation: measurement

- Making measurements is key to determine and assess the efficiency of a building.
- The measurement of electrical parameters is required in determining the electrical consumption and needs to be supplemented by the measurement of relevant driving parameters such as the presence of people, temperature, quality of air, daylight, operating time, cost of energy.
- Measurement applications are:
 - Billing
 - Energy usage analysis
 - Power monitoring
 - Energy estimation

Energy Efficiency Life cycle method in order to maintain the building performance:

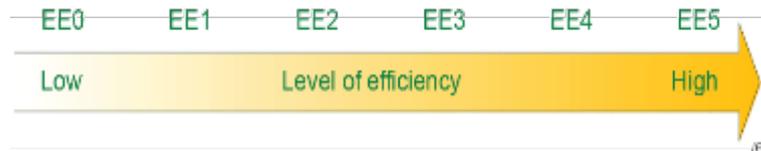


Energy Efficiency Assessment method

IEC 60364-8-1 provides a **method to assess** the EE of an electrical installation based on the level of implementation of the energy efficiency measures describes in the standard for:

- Initial installation
- Energy management
- Performance maintenance
- Power monitoring
- Bonus

For each parameter, some points are given depending on the level of implementation



Case Study: LV electrical installation

- Is an example on how to apply the principles of IEC Guide 118 and Guide 119
- Introduce how the GEEP IEC 60364-8-1 helps TCs to understand how their products are used in a system within some boundaries and therefore develop:
 - Products
 - Features in their products
- Enable and/or contribute to the efficient use of energy in the electrical installation





Conclusion

Take Aways

Jacques Peronnet

Philippe Vollet



Take aways

- **Energy efficiency aspects: understand TC's role in promoting energy efficient technologies**
- **Importance of holistic approach: from component to system**
- **Sets of standards help regulators for energy efficiency regulation**

ACEE expectations

How to Leverage the Young Professionals' contribution to Energy Efficiency activities ?

- ü Promotion in your NC & Mirrors TCS ?
- ü Communication deployment ? Webinars, Articles, ...?
- ü ... ?

Please visit our IEC ACEE WebSite @ www.iec.ch/acee

ACEE Advisory Committee on Energy Efficiency

Scope Structure Documents Guides/Projects Meetings / Workshops

Working Documents

Supporting Documents

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ACEE Supporting Documents

Table search:



Title, description	Downloads	Created	Publication reference
Case study: low-voltage electrical installations This case study is provided to illustrate a practical example (in practice) on how IEC Guide 118 concepts can be applied/found in low-voltage electrical installations and in product standards and, more generally, on how International Standards can support the energy efficiency market and national energy efficiency policies.	906 kB	2020-01-20	IEC GUIDE 118:2017
Introduction to ACEE work This document provides an introduction to ACEE work.	1369 kB	2019-10-01	IEC GUIDE 118:2017
Case study: electric motors This case study is provided to illustrate a practical example (in practice) on how IEC Guide 118 concepts can be applied/found in electric motors standards and, more generally, on how International Standards can support the energy efficiency market and national energy efficiency policies.	1412 kB	2019-10-01	IEC GUIDE 118:2017

Thank you for your attention !



Any Questions and/or Remarks ?

Thank you!

Jacques Peronnet, Philippe Vollet
IEC ACEE

ACEE Webinar for Young
Professionals
26 January , 2021