Module 12

Smart Controls and Meters

Energy Efficiency for Construction
To equip the learner with the basic knowledge required to understand Smart Controls and Smart Metering.
Smart Controls and Meters | Objectives

- Outline how an occupant and/or energy provider can be controlled efficiently using **smart electrical appliances**
- Outline the benefits on how **Smart Controls** can support the construction of nZEB building.
- Outline how a **smart meter** imports and exports electrical energy from the home.
- Identify emerging **technologies** in the smart metering, smart appliance sectors
Adapting to Climate | Contents

Topic 1 – Smart Controls and Sensors

Topic 2 – Smart Meters
1. Smart Controls and Sensors
A smart home can include the following:

- control panel
- heating controls
- smart locks
- video doorbell
- garage door control
- smoke & CO₂ alarms
- motion sensor with camera
- temp humidity sensor/water meters
- video cameras
- video cameras
- window sensors
- lighting controls
5.3.3 Services Checks

Smart buildings can be controlled remotely, either by Wi-Fi or cellular connection ensuring the system will not go down.

Smart buildings are growing in popularity due to their many advantages.

They also include security making it easier to monitor a building or home whether you’re inside or away.

Energy management is also a main feature of smart controls, which include adjusting the thermostat, turning on and off lights and monitoring water usage.
Traditional controller is replaced with wifi enabled **remotely accessible controller**

**On-line control** of heating and hot water enabled from anywhere

Most systems have an App which enables **control on your smartphone**

Most systems enable **storage of energy use data** which can educate homeowners about usage patterns
**Edit** desired times/days and zones

**Boost** - switch on heating instantly in the areas of the house you choose.

**Holiday mode** - suspend heating schedules without cancelling them

**User reports** - up-to-date data on home heating usage

Manage, create and add different 7 day **heating schedules**
Providing Internet Access and Wifi in the Home

Physical connection to mains via telephone cable or optic fibre

Internet speeds via telephone cable can be poor

Alternative – wireless connection to local tower using a satellite mounted on the exterior of the house

Signal provided via a modem

Boosters around the house will improve internet speeds throughout
Use of traditional landline technology is reducing significantly in Ireland (*in 2018, just 50% of homes have a landline - RTE*)

Ireland has the highest rate of mobile phone use in EU, 90% of adults (*Deloitte*)

Alarms and TV increasingly being connected via wifi or GSM (either with cable connection or using satellite / modem)

Typical house alarms and Wifi modem, each use approximately 6 Watts.
2. Smart Meters
Smart Meters

Use digital technology & mobile phone network to provide accurate **information on energy use**.

Records details of your electricity **consumption** and any electricity **exported** onto the grid, through use of photovoltaic panels.

Record the amount of electricity consumed during the:
- Day (8.00hrs to 17.00hrs and 19.00hrs to 23.00hrs),
- Peak (17.00hrs to 19.00hrs) and
- Night 23.00hrs to 8.00hrs.

Will allow home/building owners to **change their energy use** to a time when the grid is not under pressure, or supplied mostly with renewable energy and therefore have a lower electricity tariff and cleaner energy.

**Remote metering** – no more estimated bills.
Smart Household Appliances

- A ‘Smart Appliance’ includes the intelligence and communications to enable **automatic or remote control** based on user preferences or external signals from a utility or third party energy service provider.

- Two modes: (a) **modification of the starting time** of an appliance cycle (for example, a washing machine or dishwasher) and b) **interruption of regular operation** (for example, heating system).

- Example: washing machines and dishwashers can shift their demand to **hours of high solar** electricity production.

- Alternatively, appliances **operate during off-peak**, when electricity costs are lower.
An example installation schematic for EV charging is provided below

![Installation diagram principle (recommendation)](image_url)

- **A** Grid
- **B** Fuse box
- **C** Lightning protection (optional)
- **D** Main/back-up fuse
- **E** Meter
- **F** Residual current device: type A RCD, type B RCD or alternatively type A RCD with EV direct current detection
- **G** Circuit breaker: tripping characteristics C
- **H** Own electric circuit
- **I** Charging unit (according to VDE 722)
Consider the customer’s **preferred parking direction**
Charging cable should not present a **trip hazard** when plugged in
Every charging point must be connected with appropriate **circuit breaker**
Circuit breaker value depends on **cable’s load capacity**, charging station’s charging power and length
Recommended to **future-proof** load capacity for 22kW charging power (5-core cable)
Use **flexible cables** to enable easier handling
Install **data connection** so that charging station can be linked to smart metre to enable photovoltaic charging (some chargers have this facility built-in)
Electric Vehicle Charging Case Study

- Compatible with all plug-in vehicle brands
- Power ratings 3.6kW, 7kW, 11kW, 22kW
- Untethered or tethered
- Works with solar PV or wind turbine systems
- Dynamic load management system (eco modes)
- Possibility to add remote monitoring via App
- Lockable by pin for added security
Battery Electricity Storage

- **Capacity:** 5 kWh is the most common size for residential use, but 7.5 kWh and 10 kWh also possible (additional batteries can be added to extend the capacity)

- **Size:** brand supplied by Electric Ireland – 5 kWh = 88cm x 67cm x 23 cm, weighing 81 kg

- Require **internet connection** for system monitoring

- Most battery systems come with **Apps and web portal interface**

- **Warranty** – Electric Ireland system has 10 year warranty or 10,000 charge cycles (battery will have at least 70% of installed capacity after 10,000 cycles)

You may be able to get a grant for solar PV systems > 2 kWp, but only if you have a battery
Assessment

Energy Efficiency for Construction: Smart Controls and Meters

QUIZ!
Thank You