INCASE MISSION

Within the world of Industry 4.0, we develop test set-ups and demonstrators for sustainable technologies to prove the viability and applications of this technology. We introduce the technology to the industry by means of workshops and lectures based on own research and experience.

Interreg 2 Seas Mers Zeeën
INCASE
European Regional Development Fund

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Project

Power Line Communications (PLC)

Data communications via the electricity grid: a lot of potential, but also potential for interferences

What

Communications always involve three players, namely a transmitter, a receiver, and a medium. The medium may be wireless (Bluetooth, Wi-Fi) or wired (Ethernet) but can also be the electricity grid (Power Line Communications or PLC). PLC is an alternative method of data communication via the electricity grid. It allows smart meters, electric cars, and household appliances to be connected and communicate with each other.

There are two types of PLC, namely narrow band (NB-PLC) with frequencies in the range of 2 to 150 kHz and broadband (BB-PLC) with frequencies above 1.6 MHz. The lower the frequency, the less data can be sent per second. Narrow band is ideal for transmitting measurement data, whereas broadband is necessary for transmitting internet data or video.

We examined the feasibility of PLC, focusing on outages and electromagnetic interference (EMI). Interference arises because each electronic product emits electromagnetic fields, desired or otherwise, or transmits them via the cabling. Other products may receive these fields, causing undesirable effects in the operations of those products.

We strive for electromagnetic compatibility (EMC). The two commandments of EMC are that you must not cause interference, and you should not suffer from interference.

In the project, we investigated the impact on PLC communications of new technologies such as solar panels with inverters or laptop chargers. These devices all contain power electronics which happen to work in the same frequency range of 2 to 150 kHz. This means that they create many problems or interference for those narrow-band communications. We also attempted to develop standardised measurements and examined the communications' robustness. In particular in the narrow-band range, we experienced many problems because many devices cause 'interference' in that low-frequency range. After all, once a device is connected, the mains impedance drops, making it easier for interference currents to flow.

Pilots (applications)

We created four demonstrators for one-to-one communications: two narrow-band cases and two broadband cases, including lighting controls with dimmers and measuring ports. These cases can be connected to any socket. The measuring ports enable direct measurement of the signal quality.

At the Kortrijk campus, we also have a grid representing 18 houses. We can choose the configuration or supply of that grid (house 1 will have phase 1, house 2 will have three-phase, house 3 will have solar panels, house 4 will have a wind energy generator, and so on). Again, we created such cases for communications and energy measurements. This configurable network, combined with the measuring cases, will pave the way for in-depth research.

Conclusion

PLC is growing in importance because everything communicates with each other, and often wirelessly, which has significant implications. The risk of outages or interference is increasing in any case. BB-PLC is a robust communications method, albeit with a more limited range. NB-PLC spreads easily in the grid but is more prone to interference.

Number of companies reached through workshops and lectures

We delivered various workshops and lectures during which we reached 243 unique companies and 428 participants.

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