



BUILDING UNDER PRESSURE: HOW PLUGGABLE ELECTRICAL INSTALLATION IS CHANGING CONSTRUCTION ACROSS EUROPE

For M&E Consultants, Specifiers and
Electrical Contractors



Construction across Europe is under pressure. The industry must build more homes, schools, hospitals and commercial buildings. It must do this faster, at lower cost and to a higher environmental standard. At the same time, the number of skilled workers is falling and the cost of mistakes is rising. This paper looks at five key pressures on the construction industry across Europe. It also explains how a new approach to electrical installation can help contractors and specifiers respond to these pressures.

The State of Construction in Europe

Construction is one of Europe's most important industries. It is also one of its most challenged.

The construction industry employs nearly 25 million people across the EU. It represents approximately 5.5% of total economic output. Yet the industry is facing a set of challenges that are becoming more serious each year. The number of available workers is falling. Projects must be completed more quickly. Regulations are becoming stricter. And the amount of construction required, from new homes to hospitals to data centres, continues to grow.

The European Commission estimates that more than two million new homes per year will be needed across Europe to meet demand by 2035. That is approximately 650,000 more homes per year than are currently being built.

This is a major challenge. Traditional construction methods are struggling to meet this level of demand. The industry needs to find new and better ways of working.¹

25M

people employed in EU construction

5.5%

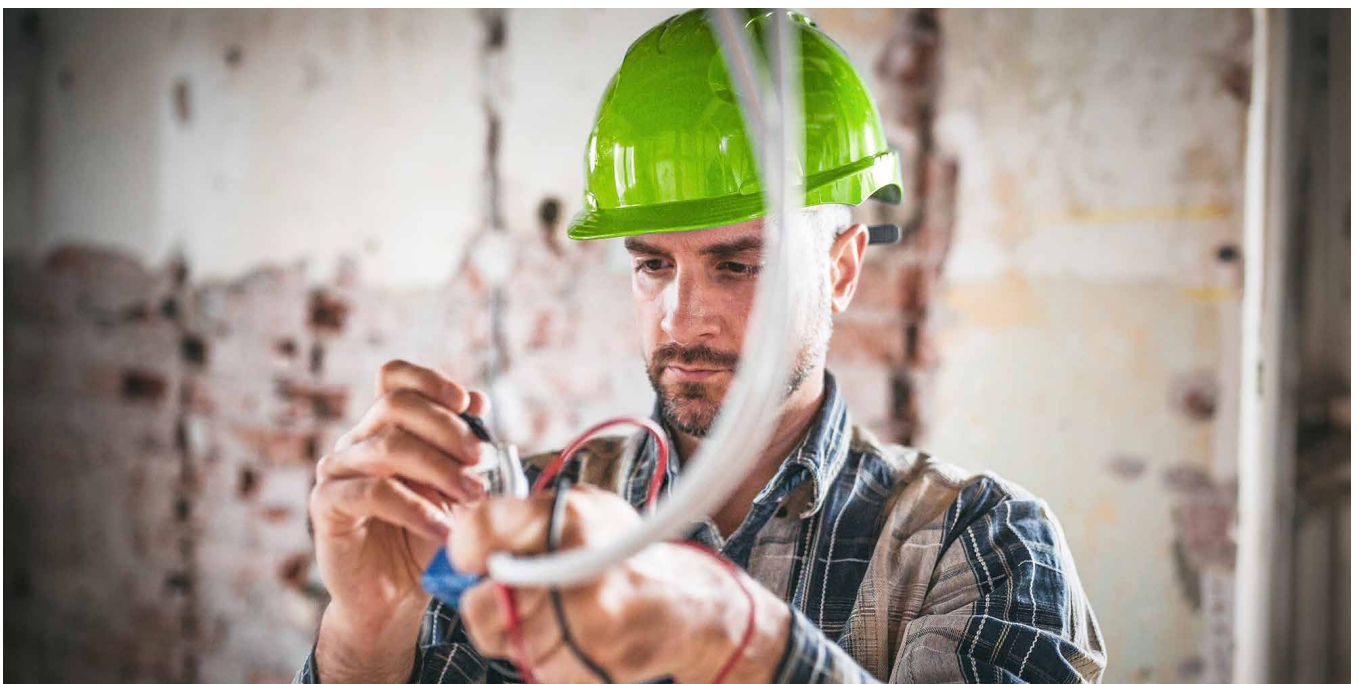
of EU GDP generated by
construction

2M+

new homes per year needed by 2035

Housing is not the only challenge. Commercial buildings, hospitals, schools and industrial facilities are all changing. Buildings are using more technology. They need to be more flexible and more energy efficient. The electrical systems inside these buildings are becoming more complex. At the same time, the people who install these systems are often less experienced than in the past.

This paper explains why this is happening and what the industry can do about it. It is written for specifiers, M&E consultants and electrical contractors across Europe.



Five Pressures Reshaping the Industry

The construction industry across Europe faces five key pressures. These pressures are not new. But they are becoming more serious and harder to ignore.

Each pressure has a direct impact on how electrical installation is planned, carried out and maintained. Together, they show why the industry needs to change how it works.

1

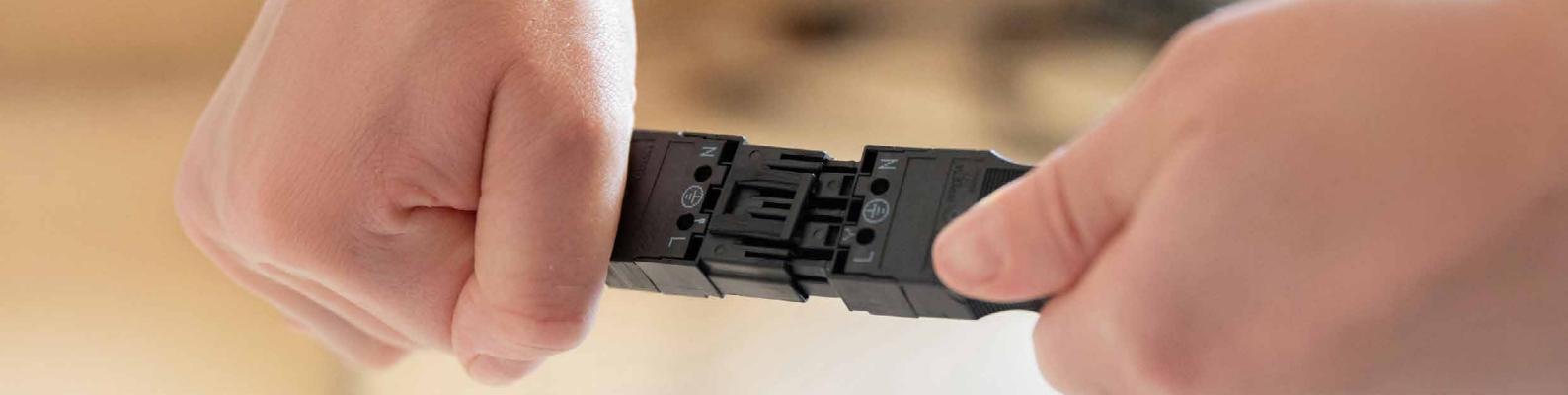
Fewer Skilled Workers: Electricians are one of the most in-demand trades in Europe. The 2024 EURES report from the European Labour Authority found that electricians are in shortage in at least three out of four countries surveyed. This is a long-term problem: 4.1 million construction workers in the EU are expected to retire between 2022 and 2035. In Belgium alone, 20,000 skilled workers are expected to leave the industry by 2027. Across the EU, labour shortages limit growth in 31% of construction companies. When experienced workers are replaced by less experienced workers, quality falls. More work is done incorrectly the first time. This means more time spent on corrections, checks and supervision. On projects with tight schedules, this extra time and cost cannot be absorbed. **Failure Costs and Risk Transfer:** Modern construction sees increasing risk down the supply chain onto installers and subcontractors. Installers operate under constant pressure where one mistake can eliminate profit on an entire job.

2

The High Cost of Mistakes: In modern construction contracts, financial risk is increasingly passed down to installers and subcontractors. These businesses work with small profit margins. A single mistake or defect can remove all profit from a project. Industry research estimates that rework costs between 5% and 8% of the total project cost. Errors made during installation can add up to 3% of project value on their own. Electrical mistakes are particularly costly because they are often not discovered until the final stages of a project, when fixing them is much more expensive. The financial and reputational damage from delays caused by defects falls most heavily on subcontractors.

3

Faster Project Schedules: Construction projects across Europe are being completed more quickly than before. Developers, public sector clients and investors all want faster results. But faster schedules do not always mean better planning. Installers are often required to make decisions on site, at the same time as other trades, under time pressure. This increases the risk of errors. The EU's Renovation Wave initiative, part of the European Green Deal, aims to double the annual rate of building renovation across the EU. This will add even more work to an industry that is already stretched.



4

High Demand for Affordable Housing: Europe faces a serious housing shortage. In 2024, the estimated shortfall was approximately 9.6 million homes, or around 3.5% of the current housing stock. This shortage is expected to grow as fewer building permits are issued while demand continues to increase. The European Commission estimates that resolving the shortfall would require investment of around €153 billion per year. Governments across Europe are accelerating affordable housing programmes. This means the industry must build more homes, more quickly and with tighter budgets. A survey of European cities found that 71% identify rising construction costs as a major barrier to affordable housing delivery.

5

New Environmental Rules and Standards: Construction regulations in Europe are changing quickly. The revised Energy Performance of Buildings Directive (EPBD), which came into force in May 2024, sets new minimum standards for energy efficiency. New public buildings must produce zero emissions by 2028. All new buildings must meet this standard by 2030. Buildings currently account for around 40% of EU energy use and 36% of greenhouse gas emissions. For contractors, this means learning new methods and using new materials. There is also a growing focus on circularity — the idea that building components should be designed to be removed, reused and reconfigured at the end of their working life. This affects how installers think about every connection they make.

These five pressures combine to create a difficult situation. Electrical installers are being asked to do more, faster, with less experienced workers, at higher financial risk and to a stricter environmental standard. The question for the industry is whether the traditional method of installation is still suitable.

The Case for a Different Approach

Traditional electrical installation requires skilled workers to carry out complex tasks on site. This creates risks that the industry can no longer afford.

In conventional electrical installation, workers cut, strip and connect cables by hand at the point of installation. This process requires technical knowledge and careful judgement. Every connection is made by an individual person, in a different context, under time pressure. The chance of error is significant. The effects of that error may not become visible until the building is switched on for the first time.

A pluggable installation system takes a fundamentally different approach. Instead of creating electrical connections manually on site, installers assemble pre-made, pre-tested components in a defined sequence. The most complex and risk-sensitive work is moved off site into a controlled factory environment, where quality can be consistently verified, documented and measured.

What this looks like in practice is a significant shift in both time and labour requirements.

On a typical commercial building project (~10,000 m²), traditional electrical installation may require 10–12 electricians over a period of 12–16 weeks. By contrast, a pluggable installation approach can reduce on-site labour requirements by up to 50% and shorten installation time by several weeks, while significantly reducing defect risk at commissioning.

How a Pluggable Installation System Works

In a pluggable installation system, power is distributed through a network of pre-assembled cables, connectors and distribution devices. These components are designed to work together as a complete system. Each component is manufactured to a fixed standard. Connectors are shaped so that incorrect connections are not physically possible. On site, the installation process becomes a series of simple connect operations.

This changes the skills needed on site. Instead of requiring deep technical expertise at every connection point, workers follow a clear and repeatable process. Incorrect connections are prevented by the design of the system. A connection either fits correctly or it does not fit at all.

70%

Faster installation vs. traditional methods

30%

Reduction in installation costs

100%

Mis-mating protection by design

What This Means for Contractors

The benefits for contractors and specifiers are practical and direct. With a pluggable system, a larger part of the installation work can be completed by less experienced workers, supervised by a smaller number of qualified electricians. This directly addresses the skills shortage problem described in Section 2, without reducing the quality of the finished installation.

Because cables are pre-made to exact lengths, there is less waste on site. Workers do not need to cut, strip or join cables. Delivering materials to the right location on site is simpler. This is especially useful on large, multi-floor buildings or projects with tight deadlines.

For refurbishment and retrofit projects, the ability to disconnect and reconnect parts of the installation without specialist tools is a major advantage. An office floor can be changed, a shop unit rewired, or a school classroom updated in hours rather than days. There is less disruption to the people using the building. There is less risk of damaging existing structures.

Environmental Benefits

A pluggable installation approach supports both the circular economy and the requirements of the

revised EPBD. Because connections can be undone and components can be reused, electrical infrastructure does not need to be thrown away when a building is changed or demolished. This reduces embodied carbon and waste. It also supports whole-life carbon assessments, which are becoming more important in building procurement.

Buildings with pluggable electrical systems can also be adapted more easily in the future. Building uses change over time. A pluggable system means the electrical infrastructure can change with the building, without needing a complete replacement.

Modular and Offsite Construction

The growth of modular and offsite construction across Europe is directly relevant to pluggable installation. The European modular construction market was valued at approximately USD 32 billion in 2024. It is projected to grow at close to 10% per year through 2030, driven by the same housing shortages and skills challenges described in this paper.

Modular construction means electrical installation is completed in a factory. This is where pluggable systems offer the clearest advantages. Cable systems can be installed, tested and approved before the module leaves the factory. Final connection on site requires no specialist electrical skill and can be completed in minutes per unit. This is a significant benefit on housing projects where many modules must be connected within a short time.

Research by McKinsey indicates that modular construction, combined with efficient installation methods, can reduce costs by up to 20%. Pluggable electrical systems are an important part of achieving these savings .

The Cost of Traditional Installation Methods

Continuing with conventional wiring approaches can result in:

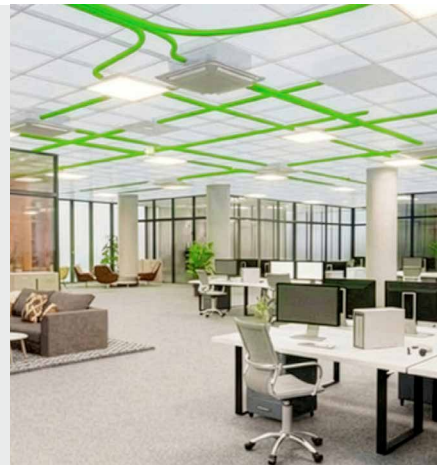
- Increased dependency on scarce skilled electricians.
- Higher rework rates (typically 5–8% of project cost).
- Longer installation timelines and programme risk.
- Greater exposure to defects identified late in the project lifecycle.



Applications Across Six Key Sectors

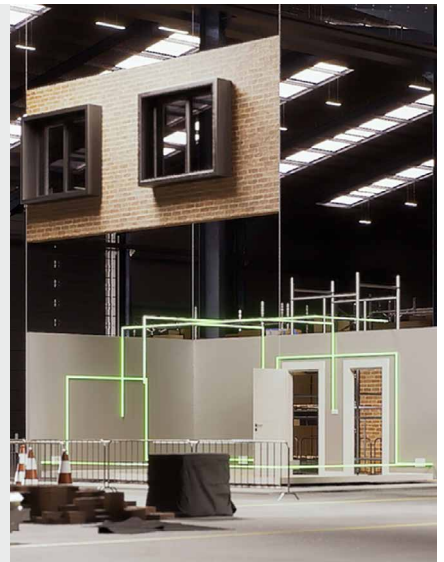
Commercial Lighting

Offices, hotels and retail buildings all require high-quality, flexible lighting. Modern lighting systems are increasingly complex, with DALI controls, adjustable colour temperature and sensor integration. At the same time, clients want faster installation and the ability to change lighting layouts in the future. In buildings such as schools and hospitals, work must often be done without disrupting the people inside. Pluggable lighting connections allow light fittings to be replaced, moved or upgraded without switching off circuits or cutting cables. This reduces the risk of errors and simplifies the ceiling installation.



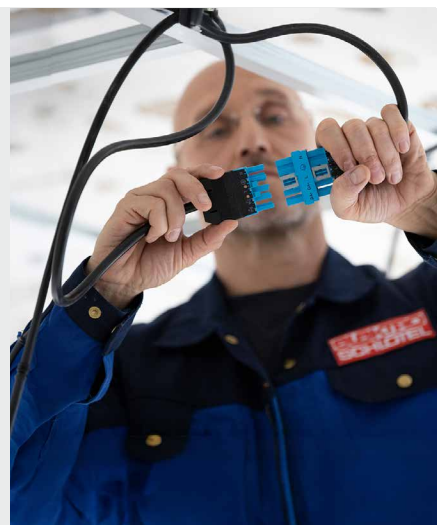
Modular and Prefab

Prefabricated and modular construction is one of the fastest-growing parts of the European market. For manufacturers who build sections of a building in a factory before delivery to site, pluggable electrical systems offer clear benefits. All electrical connections can be made, tested and checked in the factory before the section is transported. On site, the final connection requires no specialist electrician and takes only a few minutes per unit. As governments across Europe increase their use of modular construction to address housing shortages, the electrical installation method becomes a key factor in programme delivery



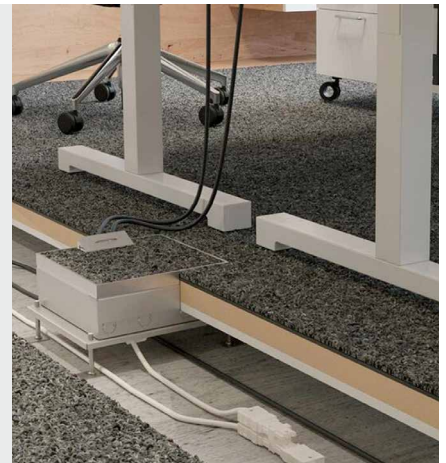
Reverb and Retrofit

Refurbishment makes up a growing share of construction activity across Europe, driven by EU energy renovation targets and ongoing demand for office and retail fit-out. Rewiring an occupied building using traditional methods is time-consuming, disruptive and carries a risk of damage. A pluggable approach allows sections of the existing electrical installation to be removed and replaced in sequence, without switching off the whole building. New cables can be pre-made to the required specification and connected quickly on site. This results in a shorter, more predictable project with fewer defects at handover.



Power Distribution HVAC & Services

Plant rooms and vertical distribution risers are among the most technically demanding environments for electrical installation. The number of services in a small space, the need for accurate connections, and the requirements for future access all make quality of connection very important. A pluggable distribution system creates a clear, organised structure in the plant room. Individual circuits can be isolated, extended or replaced without affecting other parts of the system. Over a 25-year building life, the ability for less specialised maintenance staff to safely access and service the installation has a significant impact on total operating cost.



OEM and Industrial

Machine builders, panel builders and manufacturers in transport, rail, marine, offshore and lighting technology all need electrical connections that are reliable, repeatable and consistent in production. For these applications, pluggable connector systems replace custom hardwired assemblies with standard, interchangeable components. These components can be assembled more quickly, tested more reliably and serviced more easily in the field. In marine and offshore environments, where access for maintenance is limited and the consequences of electrical failure are serious, shaped connectors with spring-pressure connections provide a level of reliability that traditional installation cannot match. In rail and transport, where vibration and temperature change are constant factors, connector-based installation offers measurable performance benefits.



Residential New Build

Europe needs more than two million new homes per year by 2035. The estimated current shortfall is 9.6 million homes. Residential developers working at scale need construction methods that are fast, reliable and not dependent on a large number of skilled trades. Pluggable electrical systems reduce the dependency on specialist electricians, shorten the time needed for electrical installation and reduce the risk of defects when the home is handed over. Pre-made cable assemblies can be delivered to each property and connected by site workers following a simple, coded process. For affordable and social housing programmes where budget control is essential, a pluggable system provides greater certainty of both cost and programme



Conclusion: Building Smarter

The pressures facing Europe's construction industry are not short-term problems. They are long-term changes that will continue to shape the industry for years to come.

The number of skilled workers is falling. The housing shortage is growing. Environmental regulations are becoming stricter. Project schedules are getting shorter. And the financial risk of poor-quality work has never been higher. All these pressures come together at one point: the moment when an installer makes a connection.

The industry does not have to accept this situation. Factory-made, plug-and-connect installation systems offer a different way of working. They address the root causes of many of the defects, delays and cost overruns that are common in traditional electrical installation.

When the complex work is done in a factory rather than on a construction site, the responsibility for quality moves from the individual installer to the system itself. This is not a small improvement. It is a fundamental change in how quality is managed and risk is controlled.

For M&E consultants and specifiers, the message is clear. The choice of installation method is not a minor technical decision. It directly affects project risk, defect liability, maintenance cost and compliance with EU regulations. It deserves to be considered at the start of every project.

For electrical contractors, the opportunity is equally clear. The businesses that will be most successful in the coming years will be those that adopt methods which reduce their exposure to skills shortages, reduce time on site and deliver consistent, documented quality to clients.

In Summary

- The European construction sector faces five key pressures: fewer skilled workers, high cost of mistakes, faster schedules, housing demand, and new environmental regulations.
- Traditional electrical installation depends on skilled workers carrying out complex tasks on site. This creates a high risk of errors.
- Pluggable installation systems move the complex work to the factory. This makes connections faster, more reliable and protected against incorrect assembly.
- This approach works across six key sectors: commercial lighting, modular and prefab construction, refurbishment and retrofit, power distribution and services, OEM and industrial, and residential new build.
- Pluggable installation supports the circular economy, meets the requirements of the revised EPBD and aligns with the growing use of modular construction across Europe.



Looking for more information?

The Cost Calculator:

Calculate time and cost savings using the pluggable installation calculator

[> Find Out More](#)



Contact a WAGO representative:

Speak with a specialist about your next project.

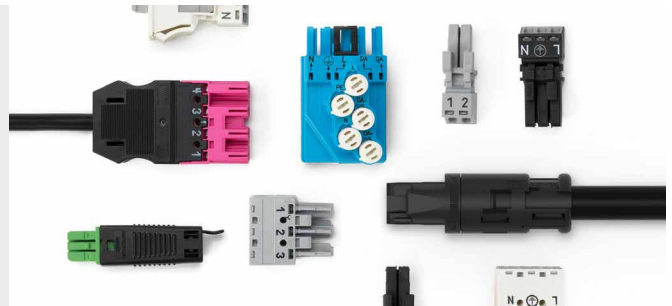
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WAGO's Installations:

Download the pluggable installation brochure.

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If you are an M&E consultant, specifier or electrical contractor and would like to learn more about how pluggable electrical installation can be applied to your projects, including planning tools, technical documents and application guides, you can find further information at: www.wago.com/pluggable-electrical-installation

Sources

1. EURES Report on Labour Shortages and Surpluses 2024, European Labour Authority.
2. EFBWW/ITUC: 'Skills and Quality Jobs in Construction', 2023.
3. European Federation of Engineering Consultancy Associations (EFCA), cited in Construction Digital, October 2024.
4. PlanRadar: 'Cost of Rework in Construction', 2025.
5. European Commission Joint Research Centre: 'Housing in the EU — More Than 2 Million New Homes Per Year Needed by 2035', December 2025.
6. CBRE European Real Estate Market Outlook 2025: Living.
7. Eurocities Housing Affordability Monitor 2025.
8. Energy Performance of Buildings Directive (EU) 2024/1275.
9. McKinsey & Company: 'Modular Construction: From Projects to Products', 2019.
10. Intelmarket Research: Europe Modular Construction Market Outlook, 2025.

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