



THE **ULTIMATE** GUIDE TO **FUTURE PROOF INSTALLERS**



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CONTACT US

Tel: 0345 845 7222

Email: enquiries@logic4training.co.uk

Unit 2, 1 Rowdell Road, Northolt,
Middlesex, UB5 5QR

FUTURE-PROOF INSTALLER - A GUIDE TO A GREEN & PROFITABLE FUTURE

The UK is undergoing a period of change, with new targets to provide homes for our growing population, government commitments to lower emissions, and rapid technological developments that are challenging the way we've done things in the past. It's a great time to re-evaluate our working lives and embrace the opportunities that a greener future presents. Gas installers, plumbers and electricians are well positioned to build on their current skills and with a little training, take their careers in exciting and profitable new directions.

In this guide we examine the opportunities for installers looking to capitalise on the UK's low carbon aims, what those opportunities are and the training you might take to 'future-proof' your skills. When there are so many potential new markets ahead, it's more important than ever to make sure you're flexible and multi-skilled – ready to take on any challenge.



GOVERNMENT SUPPORT

Last autumn, the government launched its Clean Growth Strategy, a document that sets out its strategy for a low carbon future as well as substantial growth for the UK. The Clean Growth Strategy is spread across all sectors and promotes innovation – from low cost, low carbon power generation through to improved building practices and the retrofitting of our housing stock to make it more energy efficient. The new Boiler Plus legislation is one of the first concrete commitments to the Plan and offers opportunities for installers keen to embrace the changes.

The government believes that initiatives to lower emissions and protect the environment will also benefit our wider prosperity. Projected figures show that the low carbon economy could grow 11% per year between 2015 and 2030, which is four times faster than the projected growth of the economy as a whole.



WHAT'S HAPPENING NOW?

Domestic energy consumption and emissions from homes are both falling due to a gradual switch to low-carbon heating and greater energy efficiency. New technology is playing a large part in this, from renewables to plans for a hydrogen-based heat network. Our homes are becoming much smarter; able to adapt to changing climates and our busy lifestyles so as new developments come in, the pace of change is set to increase. Many technological advances are already in commercial production and beginning to affect our daily lives.



We live in an increasingly connected world and technologies we are more familiar with in the social context are now being used in our homes. New electronic devices and appliances can be linked to the internet to provide real-time data that makes it easier to understand - and lower - our energy use. These technologies are becoming far cheaper, so more of us will soon have access to automated controls for heating, cooling and lighting our homes, improving both comfort and efficiency. Flexibility is key and with the arrival of a new generation heating systems, it will be easier than ever to fine-tune heating and cooling room-by-room, driven forward by schemes like Boiler Plus.

Other technological developments have come on-stream over the last few years to help us create more comfortable living environments whilst saving both energy and money. LED lighting, for example, has done much to improve the performance of lighting and traditional incandescent bulbs are now largely a thing of the past. Insulation is improving too with the latest windows including sensors and microprocessors to automatically adjust shading based on the amount of available sunlight and the time of day.

It's not just in our homes, either. The take up of electric vehicles (EVs) is growing as more of us choose to move away from fossil fuels in all aspects of our lives. The number of hybrids and EVs on the road is expanding at an impressive rate and so is the demand for a reliable charging infrastructure.

AND FURTHER DOWN THE ROAD?

Other developments are further off, but give us an insight into what could be a very exciting future. For example, Dr. Henry Snaith, a scientist from Oxford University, has been exploring the potential of solar power. He's been working with minerals called perovskites to produce a see-through coating that could be applied to windows, vehicles and even clothing, to produce power at a more efficient rate than the silicon-based solar cells, currently used in most solar PV panels. One day we could be surrounded by a means of clean and efficient energy production that we can't even see!

Whether we're looking at the short or long term, this is all very positive and it's good to see that significant changes in technology are matched with changes in public attitude. A growing number of people are keen to adopt a greener way of life. Enterprising installers are perfectly placed to tap into this exciting new world and here's how:

Building Services Installer Essentials Renewables

This sector of the industry is firmly on the rise. The Paris based International Energy Agency (IEA), announced that in the last year, two-thirds of new power added to the world's grids, was produced by renewable energy sources. A recent study by Bloomberg New Energy Finance and Eaton predicts that solar power and other renewable energies will generate more than half of all electricity produced in the UK by the mid 2020's.

On a more individual scale, you could be helping your customers generate their own power (and heat). Whilst the fortunes of incentive schemes like the Renewable Heat Incentive (RHI) and Feed in Tariffs (FiTs) fluctuate in their attractiveness, the cost of associated technologies is coming down and with fossil fuels being eventually phased out, it is not a question of 'if' renewables become commonplace, it's more 'when'.

FiTs and RHI are still open for applicants. To find out the latest rates & how to apply, [click here](#).

MCS Installer

The Competent Persons Scheme for the renewables sector is the Microgeneration Certification Scheme (MCS). Designed to ensure quality and protect the consumer, MCS registered installers can self-certify their work and help consumers meet the eligibility for FiTs and the RHI.

Make sure that any renewable training you do is recognised by MCS. See [here](#) for more information.

Solar

Although China and India are seen as the main producers of solar energy, on a smaller scale, the UK market is growing nicely. This is due, primarily, to a fall in the cost of the hardware. The Chinese government has encouraged rapid expansion of solar panel manufacturing, which means it now produces about half of the world's solar panels, according to the IEA. In 2010, the solar industry in the UK was virtually non-existent. Today, it has the capacity to power up to 3 million UK homes.

There are two types of solar energy production.

- Solar Photovoltaic (PV) technology which converts sunlight into electricity
- Solar Thermal technology, which harnesses the sun's heat

Cuts in FiTs in 2016 saw a dramatic fall in the take-up rate of Solar PV, particularly in the domestic market, but thanks to a reduction in the cost of the technology, solar energy production is once again on a confident footing, becoming a practical option for homeowners and commercial enterprises alike. Dr Fatih Birol, the executive director of the IEA, said: "What we are witnessing is the birth of a new era in solar photovoltaics [PV]. We expect that solar PV capacity growth will be higher than any other renewable technology up to 2022."

Which installers?

Solar panels can be fitted on any roof in good condition, ideally south facing to harness the maximum amount of energy, making solar (thermal or PV) an option for installers in any part of the country.

Solar PV is an ideal choice for existing electricians, with qualifications available to top-up existing skills. Solar thermal is best suited to heating and plumbing installers.



Heat Pumps

The use of heat pumps (both air source and ground source) for hot water and heating is well-established in many countries in Central and Northern Europe, as well as in the United States and Canada, but less so here because they are relatively costly to install. They work best in modern, well insulated homes and therefore not suited to Britain's older housing stock.

In the right home, however, heat pumps offer lower running costs compared to gas and oil. They are very efficient - three to four times more effective at heating than simple electrical resistance heaters using the same amount of electricity – and also require minimal maintenance.

Air source heat pumps (ASHPs) absorb heat from the outside air; they work a bit like a fridge, but backwards. Heat from the air is absorbed at low temperature into a fluid. This fluid then passes through a compressor where

it is heated and the heat is then transferred to the heating and hot water circuits of the house which power radiators, under-floor heating systems, or warm air convectors as well as water.



Ground source heat pumps (GSHPs) use buried pipes to extract heat from the ground. A GSHP circulates a mixture of water and antifreeze around a loop of pipe, called a ground loop. Heat from the earth is absorbed into the fluid and then passes through a heat exchanger into the heat pump. Because the ground stays at a fairly constant temperature under the surface, the heat pump can be used throughout the year to successfully heat the home and hot water.



The government is behind this technology, promoting heat pumps as part of its strategy to cut emissions through renewable energy sources and experts in the energy field agree that the installation of heat pumps will experience a rapid growth over the next few years – particularly as more

new homes are built. This will be driven by Renewable Heat Incentive (RHI) tariffs and an expansion in the heat pump industry in the UK, including the relaxing of rules on third party ownership of renewable technologies. Soon developers will in effect be able to 'own' the heat pumps they install and receive the RHI tariff of 10.18p/kWh for a seven-year period, thereby offsetting the initial cost of the installation.

Heat Pump Hybrids

Some boiler manufacturers, including Worcester, Valiant and Daikin have developed heat pump hybrids that combine ASHP technology with a gas condensing boiler. The result is a highly-efficient appliance which, with smart programming, can help to save up to 35% more energy than a traditional condensing boiler. The hybrid automatically determines the most economically and energy efficient heat production based on energy prices, outdoor temperatures and indoor heat capacity.

These systems are viable replacements for gas boilers as they integrate with pipework and radiators in existing heating systems, offering a practical and economical solution for many.

Which installers?

Heat pumps work best in modern, well-insulated homes. Ground source heat pumps are the more expensive choice and require a lot of outside space, making them suitable for larger houses, usually in the countryside.

Gas installers are well-positioned to embrace the future of these innovative technologies. Building on existing skills and experience, they should be at the forefront of a heating revolution. We offer a four-day Level 3 Heat Pump course designed for engineers looking to up-skill into this area, covering both air and ground source varieties.

Find out more about our heat pump course [here](#).

Biomass

Biomass produces energy from the burning of wood, and other organic matter. Burning such matter releases carbon emissions, but these organic fuels have been classed as a renewable energy source because plant stocks can be replaced with new growth.

The most readily available source of biomass for the domestic market is wood. A biomass boiler burns logs, pellets or chips and is connected to a central heating and hot water system. It's an effective way to heat a home and according to the Energy Saving Trust, could save up to £800 a year when compared to electric heating. Better still, some biomass heating systems are eligible for RHI.

Biomass has been most widely taken up in rural communities, as it offers a good alternative for odd grid customers relying on oil or LPG.

The type of boiler and fuel chosen will depend on the customer. For example, end users with their own managed woodland can effectively grow 'free' fuel, making log or chip boilers a good option. Pellets are cleaner and easier to store, with small pellet boilers providing solutions for more urban locations.

Most biomass customers will have a reasonable amount of space. There needs to be adequate room to store the boiler, a thermal store and fuel. Wood logs, for example, need to be kept in a dry and well-ventilated area; they should be 'seasoned' (left to dry) for at least 18 months.



Which installer?

Biomass customers are usually off-grid and located in the countryside, making a move into wood heating ideal for rural installers. HETAS upskilling courses are available for existing heating installers; an ideal fit for oil engineers in particular who are likely to have the right types of customer in their area.

For more information about HETAS biomass courses, see [here](#) for their website.

A bit about wood burning stoves...

In an open-plan, well-insulated home a modern wood burning stove can make a real contribution to reducing fuel bills. And, with changes to Document L of the Building Regulations stipulating that all new-builds need to include some form of secondary heating, the role and popularity of wood-burning stoves has seen a dramatic increase over the last few years.

Thanks to new European legislation coming in 2022 tougher emission limits are being placed on all wood burners. Eco labelling was extended to wood burners at the start of 2018 grading them on a scale from A - G for energy efficiency, in the same way as fridges and other energy using household appliances. Most modern wood burning stoves are expected to come in at the A and A+ level, with pellet-burning stoves achieving A++.

Some wood burning stoves can provide hot water heating too, with a few of the most efficient models eligible for the RHI.

There are specific HETAS courses for wood burning stove installation.



Micro wind turbines

Micro wind turbines are probably the least common home renewable solution, but as 40 per cent of all wind energy in Europe blows over the UK, we are an ideal country for their take-up. A typical system in an exposed site can easily generate more power than your lights and electrical appliances use.

There are two types of domestic-sized wind turbine:

- Pole mounted: these are free standing and are erected in a suitably exposed position, often about 5kW to 6kW.
- Building mounted: these are smaller than mast mounted systems and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size.

Which installers?

Wind turbines work best in windy places, so are often found on the tops of hills, or in very exposed locations; obstacles to air flow will decrease their performance, making wind turbines less suited to inner-cities. There may be some scope to install domestic wind turbines on the tops of tall buildings, however.

As they generate electricity, this is a good fit for existing electricians.

Battery storage - locking in the power

In order to make green energy viable on a widespread scale, we need to be able to store it and use it at as and when we need it. At the moment, renewable energy's potential is somewhat limited by the fact that it can't be reliably stored. The level of energy produced by renewables isn't constant - solar and wind rely on certain weather conditions - so there's a race to come up with a viable way to store the power they produce in batteries, particularly for the domestic market.

There are some battery storage systems already available, to be used alongside solar pv and wind turbines. By storing any unused electricity generated, customers can have a constant source of free power.

Ranging in size from a microwave to small fridge, these batteries store between 1kWh to 14kWh and cost between £1,500 and £6,000, depending on the size and specification. At the moment, batteries are quite expensive, they can be large and its likely they'll need replacing throughout the life of a renewable system. As the technology becomes more affordable and functional, however, their take-up will increase, allowing more people to be truly 'off-grid'. We are looking into developing courses to meet this demand.



IMPROVING WHAT WE HAVE

Boiler Plus

Boiler Plus legislation was introduced last autumn, as part of the government's Clean Growth Plan. Its aim is to improve standards of the 1.2 million new boilers installed in England every year.

Out-dated central heating systems are wasteful of both energy and money, and the Government is asking installers to take more responsibility for the systems they choose and fit. Since April 2018 all new boilers must have an ErP rating of at least 92% and be fitted with timers and thermostats so that homeowners can control them and waste less fuel. All new combi-boilers will require additional energy saving measures, depending on their site and scale. Options include flue gas heat recovery, smart controls, load and/or weather compensation; whichever is most appropriate.

Logic4training's Energy Efficiency for Domestic Heating course has recently been revised to include the new requirements for Boiler Plus, visit [here](#) for more information.

Hydrogen – the 'gas' of the future

The gas industry is getting very excited about Hydrogen, which is more environmentally friendly than natural gas because it produces only water and heat when burnt. If we replaced natural gas with hydrogen or a hydrogen/gas mix, we could utilise the existing gas network and still use our current heating systems which would only require minor

updates. Potentially, hydrogen offers a practical and cost-efficient solution to cutting emissions.

The engineering and design company, Arup, is currently leading a UK government study, called the Hydrogen for Heat Programme which is expected to run until March 2021. Commissioned by the Department for Business, Energy and Industrial Strategy (BEIS) and with the involvement of Kiwa Gastec, the project will explore the practicalities of using zero-carbon gas in both domestic and commercial environments and cover the development and manufacture of new technologies for heating and cooking. It will explore public attitudes towards changing to hydrogen and lead ultimately, it is hoped, to a pilot project in a village or small town.

There are further studies and test in the north of England which are being funded by boiler manufacturers and those in the gas supply chain. These are to assess the potential of integrating hydrogen within the existing gas systems. Assuming feasibility and safety studies at Keele University are positive, Liverpool and Manchester will be the testbed for an ambitious £600m project by Cadent, which currently runs gas connections to half of the homes in the UK.

In the 2020s hydrogen will replace a percentage of the methane in pipelines leading to homes across the region with no major adjustment to current boiler equipment or stoves necessary. David Parkin, Engineering Director at Cadent said: "We want to help demonstrate a pathway to the de-carbonisation of heat that is not only lowest cost to UK plc but is minimally invasive to customers. Any government policy which requires customers making different choices is very difficult."

Cadent believes Hydrogen has real potential and an advantage over alternatives such as local heat networks or heat pumps, which run off electricity. The existing gas network infrastructure means there's a ready-made storage system as well as an efficient means to distribute it.

To fully switch to hydrogen, the 26m gas boilers in the UK would need to be swapped for hydrogen-compatible models, so there would be a significant investment to be made and a potential opportunity for installers.

A similar scheme is planned for Leeds where Hydrogen would be made in a series of 'steam methane reformer' plants around the city. Essentially, carbon would be removed from methane and disposed of using carbon capture and storage technology. An estimated £2 billion is required to make Leeds a "hydrogen city" by 2025-30.

Electric heating

Many householders whose homes rely on electricity for heating and hot water will be glad to hear that an increasing number of energy companies in the UK are using renewable sources to produce this power. They're also investing in the technology for the future; for instance UK-based Good Energy has developed eight solar farms across the country since 2015 and E.ON, one of the big-six energy suppliers, has set up a dedicated new electric car tariff which is supplied with 100% renewable power. It's good to know that nearly a third of the electricity generated between April and June last year was from renewable sources, so we're moving in the right direction.

New developments in the design of electric storage heaters has improved the efficiency of electric heating, making it a viable option for off-grid customers. Better heat retention and improved controls are the most significant improvements to modern storage heaters, wasting less heat throughout the day so more available when it is needed; usually in the evening. A growing number of storage heaters come with controls that monitor temperatures in all rooms and automatically control the release of heat in different areas – more like thermostats in a centrally heated home.

Bio-oil

Bio-oil, made from organic material such as vegetable oils, is being tipped as an alternative to traditional heating oil. Apart from being more sustainable, it's energy density is significantly higher, and transporting and handling is easier and more cost-efficient. Bio-oil is suitable for use in burners and can directly replace fossil fuel oils in energy production.

At the moment, bio oil is more common in America and rest of Europe, but not widely used in the UK. This situation may change, however. OFTEC is working with some of the industry's leading manufacturers to field-test blends of bio-fuel mixed with kerosene. These trials have proven that blended fuels work well in existing oil boilers with relatively few modifications. They have much lower greenhouse gas emissions than pure fossil fuels and one of the blends (30% bio-fuel and 70% kerosene) is recognised as a domestic heating fuel option.

Bio-fuel supplies are currently limited but OFTEC is working with distributors to expand its availability. A heating system comprising a condensing oil boiler running bio-liquid, combined with other renewable technologies would provide an excellent way for rural homes to dramatically reduce carbon emissions from heating, whilst retaining their oil boiler system.

With minimal modifications required, existing oil installers should easily be able to offer bio-oil to their customers once it becomes readily available. For more information about our OFTEC oil courses, [click here](#).

Smart Meters

To help customers understand their electricity and heat usage, however its delivered, Smart Meters are being rolled out across the country, with all householders given the option to have one by 2020.

Smart Meters are designed to iron out industry-wide billing errors, eliminate the need for manual meter reading and help households reduce energy consumption with 24/7 access to usage levels. The second generation of SMART meters (SMETS2) are coming on-stream this year, including a range of innovative features, such as time-of-use tariffs and peer-to-peer energy trading so that customers will be able to track and record their energy usage.

Smart data will be used to harness household solar power, battery packs and electric vehicle charging, creating more efficient holistic energy systems. Households will find themselves in a position to feed supply back into the grid, as well as draw from it.

The smart meter roll-out is being handled by the big six energy providers, and it's through them that jobs are being advertised and installers are being trained. We've been recognised by Energy & Utility Skills as a Platinum smart meter training Provider, helping the likes of EDF, Ganymede and Lowri Beck train up Smart Meter engineers. For more information, [click here](#).



Heating controls

Heating controls can improve comfort and reduce energy consumption, by ensuring your heating system works exactly when and how you want it, in the spaces you need it. At the basic level, this includes room thermostats and Thermostatic Radiator Valves (TRVs). The new Boiler Plus legislation makes controllable heating a required standard.

Modern smart heating controls can be operated remotely by any internet enabled device, including your phone. These new systems learn from your previous choices, make adjustments and ensure your home is exactly the right temperature when you walk in, without wasting heat unnecessarily when you're out. If used properly, these controls could reduce CO emissions and help customers save money on their heating bills.

Apart from customer controls, the latest combi-boilers also come with their own weather compensation controls, allowing heating to adjust to what's going on outside. When it's very cold, for example, the boiler thermostat will set itself to a higher level so your house gets warm quicker, when it's milder, this level will reduce, making the system more efficient. A weather compensator does this for you automatically by measuring the outside temperature and adjusting the boiler thermostat temperature as required.

To understand how to get the best out of domestic heating systems, we deliver an Energy Efficiency in Domestic Heating course, a requirement of Part L of the Building Regulations. [See here](#)



Tel: 0345 845 7222

Email: enquiries@logic4training.co.uk

Northolt: Unit 2, 1 Rowdell Road, Northolt, Middlesex, UB5 5QR

Basildon: Victoria House, Hemmells, Laindon North, Basildon, Essex, SS15 6ED

Luton: Unit 2, Sundon Business Park, Dencora Way, Luton, Bedfordshire, LU3 3HP

www.logic4training.co.uk