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Energy Solutions Newsletter

Top-up charging technology makes electric buses more efficient

The expert : After his thesis on induction melting of metals, Bernard Maestrali joined the EDF research and development centre in the microwaves and high frequencies team. Currently the head of Energy Optimisation & Industrial Procedures Expertise, he leads three teams: one develops industrial heat pumps, another creates tools to optimise the use of energy and materials on industrial sites, and the third works on original ideas to help spread electric mobility solutions, particularly this top-up charging project for buses.

What is top-up charging and what are its advantages compared with current charging techniques?

Biberonnage (top-up charging) is a French term referring to how babies are fed many times in a day, but the concept has been known around the world for three to four years now. This can be applied to an electric vehicle with a fixed route whose battery will be partially re-charged at each stop. At EDF, we are considering this solution for buses, but it could also work for shuttles used in airports or large university campuses. The idea is that it is not necessary to charge a battery 100% before the start of a service route. You can, for example, start with a 20% charge, knowing that you will top up on the way. There are several advantages. There are fewer spikes in demand on the power grid since there is no need to recharge entire bus fleets at night. In addition, the batteries do not have to be large enough to last a whole day. They can be smaller, which saves on weight and allows buses to take on more passengers. Also, top-up charging means a very low charge/discharge duration, and there is little variation in the voltage, which preserves the battery's service life. This is also good news in terms of investment since the batteries are less expensive and last longer. Further reading: The fully electric bus that charges itself Top-up charging of electric buses is the subject of several field experiments in France, including one at the Nice airport underway since November 2014. © PVI, Aéroport de Nice Côte d'Azur EDF has chosen to work on contactless inductive charging.



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Why this technique?

We think that induction is the smartest solution and the most flexible (editor's note: see inset). Unlike with other existing charging solutions (pantograph, articulated arm, ground contactor etc.), there is no physical contact. When the bus reaches the charging area its positioning does not have to be so precise. In addition, introducing the mechanism requires less significant roadworks since the slab containing the inductor can be level with the surface or buried just 5 millimetres under the road. How inductive top-up charging works The principle of the inductive charging system which EDF is working on is based on two inductors. One is fitted in the bus and the other is embedded in a large slab made of strong plastic material, which is inserted into the road surface at the level of the bus stop. When the vehicle reaches the zone, the inductors are face-to-face and the charge begins without physical contact, by inductive coupling, with a yield of 90-95%. There is no minimum duration for the battery charge since it is simply a question of increasing the level by a few percentage points. The time that a bus is stationary at a stop is about one to two minutes depending on the number of people, and the system injects on average 100 kW.

Are there already plans to roll this out in France or elsewhere the world?

There are experiments exploring various technical solutions, notably in Grenoble, Nice and Geneva, Switzerland. But for the moment, nothing has yet been rolled-out on a large scale. We should keep in mind that the pros and cons of each of these technologies have not yet been completely identified and tested over time. At EDF, we have been working on inductive charging in various forms, and we are in contact with municipal transport systems. No matter what, there will need to be a phase of harmonising all the technology. I think we will have to wait between five and ten years to see top-up charging technology for buses in our cities. Further reading: A garage for electric bicycles



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In the future, do you think it will be possible to top-up individuals' electric cars?

Absolutely. We have already carried out modelling studies on such a concept. In fact, our current work on static charging is in preparation for the advent of dynamic charging systems which could pave the way for electric motorways. This would involve placing inductors on stretches of road at regular intervals, enabling electric vehicles to constantly top-up. This level of autonomy would allow drivers to make long journeys without long stops. As with buses, car batteries would not have to be so large, which would reduce weight and cost, and would offer more design flexibility. But even if the technology exists, ways of thinking will have to evolve if we are to make the switch from thermal engines to electric ones. When it comes to cars, we are a bit set in our ways. So, it's also our job to change minds. On the same topic Battery energy just when you need it The future of electric buses Wireless electric buses are setting off in England ELLISUP, the fully electric bus that charges itself.



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Bring on the Smart revolution!



Smart meters are coming to revolutionise the energy industry – but what does this mean for your business?

WHO ARE THESE TWO?

That would be Gaz and Leccy. They are mischievous characters created by Smart Energy GB to show the British public that gas and electric consumption is out of control!

Imagine someone gives you £1000 and a shopping list of items your business needs but there are no prices for them, budgeting would be a struggle. You wouldn't be able to prioritise the things you needed and decide whether you were getting value for money or not.

Then if at the end of the month, you were given an estimated bill which said you've spent round about £900 but you may have spent more, maybe less, your accountant would be pulling out their hair.

This will sound familiar to many business owners when it comes to their energy bills, as the majority are unaware of how much energy they are using until the bill actually arrives. It's always been possible to calculate your energy usage for yourself, but this can be tricky – not to mention time-consuming – and while there are other devices to help show the amount of energy being used, these have not been part of a comprehensive rollout, so it's been down to individuals to request them.



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Thankfully, this is changing, smart meters are coming! A recent survey found that 2/3 of businesses who currently don't have a smart meter want one, but only 55% know what a smart meter is*. Here we explain what smart meters are and how they'll help you in running your business.

WHAT IS A SMART METER?

Smart meters are a new generation of electricity and gas meters which sends data to your energy company. It automatically allows accurate meter readings to be sent to your supplier, meaning estimated bills will be a thing of the past and all customers will benefit from accurate bills.

WHY DOES THIS NEED TO HAPPEN?

The way we measure and pay for gas and electricity simply hasn't kept up to speed with the improvements that technology advances have brought to almost every other area of our lives. 91% of adults have their phone within arms' reach 24/7 so almost all of us are always connected to the wider world, but we still write down meter readings with a pen and paper and read them out over the phone to our energy suppliers several times each year!

Smart meters will give all kinds of consumers more visibility over their energy use, and enable a more efficient, greener, smarter energy system. The smart meter rollout is the first step towards a whole new way of running our energy networks.

By 2020 all homes and businesses should have a smart meter installed which means 53 million smart meters will be installed in 30 million premises. This is one of the ways the government and energy industry are working together to tackle climate change and make the UK more energy efficient.

WHAT ARE THE BENEFITS OF SMART METERS?

The biggest benefit is no more estimated bills, making it easier to budget for energy spend in your business as well as plan for the future.

You'll be able to see how much energy you have used month on month so you can set targets to reduce your energy consumption, resulting in smaller bills. It has been predicted that



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energy bills can be reduced by 2.8% for electricity and 4.5% for gas; and less energy used = less money spent on bills.

Everyone loves a freebie, which is another reason to love smart meters- there is absolutely no cost for a smart meter or its installation. You will go from tech-amateur to tech-savvy in the space of a couple of hours, without spending a penny!

WHAT DO SMART METERS DO?

By using wireless systems, smart meters send meter readings straight to your energy company. There will be no need for engineers to make regular visits to collect meter readings. An engineer will still have to come occasionally, to check that the smart meter is working safely in your business., and you'll no longer have to record your own, giving you more time to manage your business.

As the technology develops, energy companies will be able to tell you when the cheapest time to use energy is and you'll be able to track your daily energy consumption. Smart meters will soon be able to tell you when you are using the most energy, making it easy to spot the scenarios when you could reduce energy consumption to make the most savings.

ARE THERE ANY HEALTH RISKS ASSOCIATED WITH SMART METERS?

The smart meters used in Britain have undergone one of the most rigorous safety testing regimes in the world and exceed every UK and EU safety standard.

The exposure to radio waves from smart meters is well within guideline levels, and is many times lower than the exposure from other everyday items, like microwaves and TVs. As such, Public Health England sees no risk to health from smart meters.

WILL MY DATA BE SECURE?

Your name, address and bank details are never stored on the meter, only the energy you use. And even this data is transmitted safely, using a secure wireless network (not the internet).



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Smart meters have their own closed, dedicated communications system that employs the same level of encryption that is used in the banking industry, to keep your energy data as secure as possible.

No third parties will be able to access your energy usage data without your consent.

You can read more about the law that protects your data [here](#).

Although smart meters are not guaranteed to help you save money, they can highlight where and when you can reduce energy consumption, leading to cheaper energy bills. It is predicted that smart meters will save £6 billion overall between now and 2030, so make sure you get your share of the savings and become one in 53 million with a new smart meter to help you track, reduce and save your energy!!

For more information about smart meters visit <http://www.smartenergygb.org>

The majority of UK energy suppliers will have their smart meter roll out plan underway by the end of this year. To find out more information and register your interest, speak to your energy provider today.



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Speech: Andrea Leadsom speech to Utility Week Energy Summit

Posted on July 5, 2016 by Nick Grogan

By HM Government

Good afternoon. It's a pleasure to address such a well-attended meeting of people from all parts of the energy system.

I have been asked to speak about the future of energy in the UK. Now is an exciting time to discuss this subject. In the last few years, we have seen rapid progress in new energy technologies, dramatic reductions in costs, and a multitude of new suppliers entering the electricity market.

And just in the last few months, we have seen periods when the contribution of coal-fired power to the national grid fell to zero, for the first time in more than 130 years. Unquestionably, we have entered a period of transition.

The physicist Niels Bohr famously said that 'prediction is very difficult, especially about the future'. He could have added, 'and especially when things are changing very rapidly'. So I am not going to make any predictions.

Instead, I will describe what I see as our direction of travel, and I will set out the principles of energy policy to which this Government is committed.

The EU

As many of you know, I have spent much of the last two months campaigning for change. With the people of Britain now having voted to leave the European Union, a change of great national significance is ahead of us.

But when it comes to our energy policy, I would like to start by emphasising what will stay the same.



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As my friend the Secretary of State for Energy and Climate Change said last week, there is no change to the challenges we face. As a Government, we remain fully committed to providing families and businesses with energy that is secure, affordable and clean.

There is no change to our commitment to work with other countries in pursuit of these goals. Our relationships with the United States, China, India, Japan and our European friends will remain central to our efforts to attract investment, to spur innovation, and to counter the threat of climate change.

And there is no change to our commitment to a clear energy policy framework and a strong, investment-friendly economy – making the UK one of the best places in the world to live and do business.

So we have a continuity of aims, and of principles.

As we consider the future of energy in the UK, I'd like to set out how these principles will guide our approach to each part of the energy trilemma.

Security

First, security. Energy security is non-negotiable, and is our top priority.

In the electricity sector, security of supply still requires baseload power. We know that the make-up of this baseload cannot go unchanged. Within the next two decades, virtually all of our existing nuclear fleet is due to retire. And within the next ten years, our goal is to phase out entirely the use of unabated coal.

Put together, that means at least a third of our current electricity generation comes from plants that will need to be replaced.

This Government will not duck the difficult decisions about investment in our energy infrastructure. We have been clear that we expect to bring on power generation from both new nuclear and new gas plants.



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That's why we are commissioning the first new nuclear power station in a generation, and working with developers, who have set out proposals to develop 18GW of new nuclear power stations at six sites across the UK.

At the same time, we have announced plans to use the Capacity Market to buy more capacity and to buy it earlier, to ensure there is adequate incentive for investment in new gas and other forms of generation.

In the long-term, while the security of our electricity supply is likely to remain as essential as it is now, I expect us to achieve it through increasingly diverse means.

The National Grid's 'Future Energy Scenarios', published today, estimates that the maximum potential by 2040 of electricity storage and interconnectors could be 15 GW and 23 GW respectively. I have seen similarly impressive estimates for the potential of demand-side response.

The shift in this direction is already beginning. Electricity storage technology is seeing some dramatic reductions in cost: for example, the cost of lithium-ion technology has fallen by 14% per year between 2007 and 2014.

And on top of the 4GW of interconnectors already operating, we have nearly 8GW of additional capacity in the pipeline for which Ofgem has given regulatory approval.

I know that experts disagree about what is the right energy mix for the future, almost as much as politicians do. As the Government, we cannot simply wait and see, and yet neither can we plan the future in every detail.

Our approach has to be to make some strategic investments, and to put in place a system that will deliver a rational result.

The Capacity Market – our insurance policy for security of electricity supply – is such a system. The auctions we hold under this system will decide how much we rely in future on gas, storage, and demand side response.



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I cannot tell you what those proportions will be. But I can tell you, with confidence, that we will be guaranteeing security of supply at the lowest available cost.

Affordability

That brings me to the second objective: affordability.

This Government is committed to keeping bills low for families and businesses – and to acting as a consumer champion. I fully expect that to remain an objective of energy policy in this country for years to come.

What makes this a challenge is that our energy bills depend more than anything on wholesale prices, set in the global markets, which are largely outside any government's control.

So our priority is to ensure a competitive UK energy market that benefits all consumers. In that respect, we are seeing real progress.

There are now 33 independent suppliers in the domestic retail energy market, up from just 7 in 2010. Independent suppliers now have over 15% of the dual fuel market, up from only 1% in 2010. I hope and expect that this trend will continue.

Working together with Ofgem, we are also making it easier and quicker to switch suppliers. Between January and March this year, 2 million energy accounts were switched, and more than half of those moved to newer suppliers.

With more suppliers in the market, and consumers better able to switch between them, we are starting to see cost reductions in the global markets being more reliably passed on to consumers.

The report of the Competition and Markets Authority, published last week, contains a strong set of recommendations designed to further improve consumer engagement, and to protect those least able to benefit from competition.



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The Secretary of State and I are keen to see these measures implemented as quickly as possible, and to work with industry to rebuild trust in an energy market that delivers a fair deal to all consumers.

Decarbonisation

The third corner of the energy trilemma is of course decarbonisation.

And it's here that I'd like to be especially clear, to correct any misperceptions people may have about the implications of the EU referendum result.

Decarbonising our energy system is not some abstract regulatory requirement; it is an essential responsibility that we hold towards our children and grandchildren, as the only way to effectively counter the threat of climate change.

However we choose to leave the EU, let me be clear: we remain committed to dealing with climate change.

The UK's Climate Change Act was passed by a majority of 463 votes to three. That is really quite extraordinary. The will of Parliament has rarely been expressed so strongly and unambiguously.

This Government has got on with the job. We have achieved record levels of investment in renewable energy: in 2014, 30% of all Europe's renewable energy investment took place in the UK.

We have surpassed our own expectations: solar power capacity has now reached over 10GW, with 99% of that having been installed since 2010.

We are on track for 35% of our electricity to come from renewables by 2020, and our overall emissions have fallen by a third since 1990.

This is a fantastic success story, of which industry and government can both be proud.



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In this context, I make no apology for the fact that we have had to take some steps to reduce costs. Our responsibility is to manage public spending carefully and sensibly.

When the costs of renewables falls dramatically, it cannot be in our interests to pay generators above the odds, while the public foots the bill. Even with the steps we have taken, we still expect our spending on clean energy to double during the course of this Parliament. With the announcement last week of our intention to legislate for a 57% reduction in emissions for the Fifth Carbon Budget, our expectations for the future are clear. This is a further step towards our 2050 target of an 80% reduction, which implies the large-scale decarbonisation not only of the power sector, but also of heating and transport.

Just as with security of supply, so also with decarbonisation: we cannot and should not plan every detail.

We see a strategic case for the UK to build more offshore wind power, and so we have committed to support up to 10GW of new projects in the 2020s, provided the costs continue to come down. At the Budget earlier this year, we announced funding of up to £730m a year, for three auctions during the course of this Parliament in which offshore wind projects can compete.

But in the long-term, it is the market that will decide the contributions of the different technologies – first through auctions, and then directly as clean energy begins to deploy without subsidy.

This approach will give us confidence that we are decarbonising at the least cost.

And I believe that it is in all of our interests to reach the point where clean energy can deploy without subsidy, and the government can remove itself from the market, as soon as possible

Jobs and Skills

Before I conclude, I would like to mention one more priority, which complements the other three. That is the creation of high-quality UK jobs, throughout the energy sector.



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For many years, oil and gas has been our largest industrial sector, contributing £19bn to the economy and supporting 375,000 jobs. In the last year, we have seen over 8,000 jobs lost from this sector, and we know that more are at risk.

We have responded to the difficult conditions facing the industry by providing tax measures worth £2.3bn, to ensure the UK has one of the most competitive tax regimes for oil and gas in the world, safeguarding jobs and investment.

We have published a new strategy for maximising economic recovery from the UK continental shelf. And we have established the Oil and Gas Authority, which is already helping industry to drive down costs and improve efficiencies.

At the same time, the investments in new energy generation that I have described today will create new opportunities.

The new nuclear supply chain could support 30,000 jobs over the coming years, and the shale gas industry to create more than double that number.

Firms related to low carbon goods and services were estimated to employ over 460,000 people in the UK in 2013, and there are already reports of oil and gas fabricators using their expertise to develop offshore wind projects.

As we navigate the transition of our energy system, we must continue to invest in our skills, so that our workforce can successfully adapt to whatever new conditions arise.

Conclusion

To conclude: As we consider the future of energy in the UK, it is worth sparing a thought for the past.

The UK has a rich history of leadership in energy innovation. The world's first coal-fired power station was built by Thomas Edison in London, in 1882. The world's first commercial nuclear power station was opened by the Queen in Cumbria in 1956.



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When those plants fired up for the first time, their builders could have little idea of the future scale of the new energy industries they were opening up. But we have benefitted from their pioneering efforts throughout the decades since.

Our job now is not to predict the future, but to create the conditions for innovation.

That will give us the best chance of ensuring that a system of secure, affordable and clean energy is our lasting legacy. Thank you.