

Small. The new big?

*“Life is just heaven in the sun
From small things, mama
Big things one day come”*

FROM SMALL THINGS, BRUCE SPRINGSTEEN

ENERGY CROSSROADS

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Private households that undertake the decentralised generation of power and heat now represent 22% of the total energy production in Europe. All of those small contributions have now grown into something much bigger and those producers should now share some of the responsibilities of the major players in our energy supply, says Marga Edens, Vice President Corporate Responsibility of RWE AG.

I didn't know the young man standing at the threshold of my front door. He'd just rang the doorbell and was now busy explaining how I could form an energy collective together with other homeowners in my district. "We're going to generate energy together. Using solar panels. If 100 households take part we'll be able to buy those panels cheaper and start generating a return immediately." If we generate energy ourselves, he summarised, we'll no longer be dependent on an energy company, we'll no longer have to pay energy prices that keep rising and rising and we'll be reducing our CO₂ emissions. He handed me a bright orange leaflet and looked at me full of expectation. As an employee of an energy firm with large-scale, fossil-based energy production, I listened with increasing interest. So, this was the competition and he knew how to convey his message well.

Our energy supply is not something we contemplate every day. Electricity is something we've become accustomed to, it's something we take for granted. We've organised our existence, our society, in such a way that we can no longer do without electricity. It has become one of our vital necessities.

The utility firms that laid down the foundations more than a hundred years ago for our current energy supply and who have since

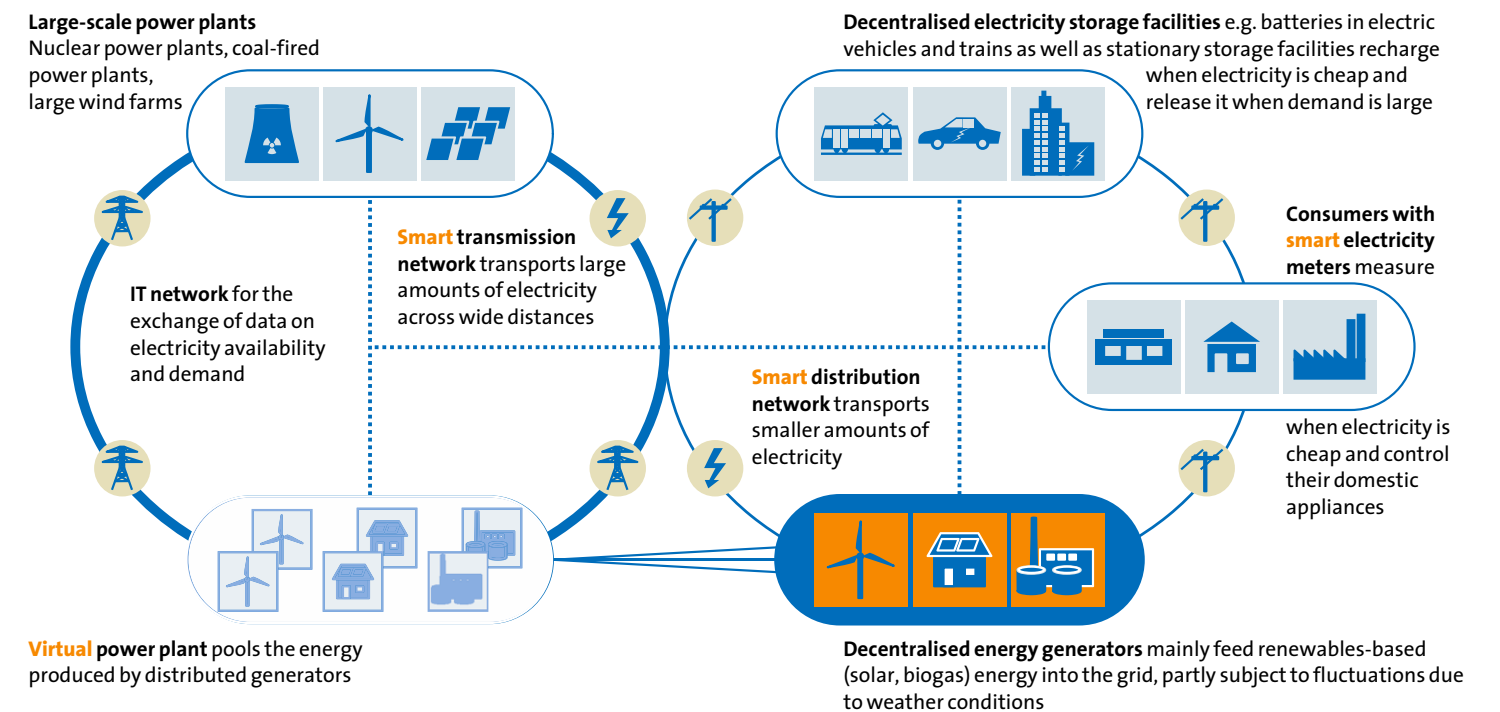
taken responsibility for its operation, are very aware of the importance of electricity for our prosperity and welfare. They actually define that importance in terms of availability; however, they also translate it into two other necessary conditions, namely affordability and sustainability. Combined, these three criteria (availability, affordability and sustainability) form what is known as the Trias Energetica. The energy firms try to keep that in balance as much as possible. There are disadvantages associated with an energy supply that is mainly affordable but which (as a result of that affordability) is not sustainable and not sufficiently available. The same applies to an energy supply that is geared completely towards availability or sustainability. It is therefore important that the correct balance is maintained between these three dimensions. How is that achieved in practice?

In the majority of European countries energy is produced by multinationals with large-scale and, therefore, cost-efficient power stations. These are often conventional or hybrid power stations (running on gas, coal or a combination of coal and biomass), however, there are also increasing numbers of installations that only use renewable sources of energy such as large-scale on-shore and off-shore wind farms. In 2012, 27.7% of the large-scale energy genera-

tion in the European Union was derived from renewable sources (wind, solar, hydro, biomass). The average consumer price was 20.02 eurocents per kWh, with a rising trend. The average duration of power cuts caused by electricity network failures was approximately 50 minutes, with a declining trend. Is that good or not? According to many European energy customers that is, in any event, not good enough. The combination of their growing concern for climate change as well as increasing energy bills and the availability of new technology have led them to take control themselves. Consumers are becoming 'prosumers': producing consumers. Until recently energy firms had the 'power', both literally and figuratively, but now they have to share that with others. In the EU around 22% of all energy is now generated in decentralised systems by prosumers. This means that nearly a quarter of the total production of electricity is undertaken without utilising the large-scale production capacity of the incumbent energy firms. What does that do to the Trias Energetica and the necessary balance between availability, affordability and sustainability?

The trend towards decentralised generation has given an enormous boost to renewables. Prosumers generally opt for small-scale renewable solutions that use solar, wind or

The energy system of the future



geothermal power. For them personally that (in due course) generally improves the affordability. The result of this is actually that the costs of existing large-scale facilities have to be passed on to a smaller group of energy consumers. However, the greatest impact of decentralisation is on availability, for which there are two causes. Decentralised energy production is less predictable because dependency on the weather increases. On sunny, windy days a lot (in fact too much) energy is produced but on cloudy, calm days insufficient energy is produced. The large number of small suppliers also results in fragmentation of the energy supply and lack of clarity about responsibilities. How do we manage surpluses and shortfalls? How do we link up all of those solar panels and micro-CHP units? How do we integrate all of these small, private systems to facilitate a large supply of power that is available 24/7? We achieve this by organising the energy supply differently: see the diagram.

Two principles form the key to this: smart and virtual. The energy supply in the future is all about smart meters, smart grids and virtual power plants. Smart meters provide consumers with decision-making information (level of consumption, time-of-use pricing, etc.). Combined with being able to control their heating, lighting and other energy-consuming devices

remotely, that information allows them to undertake their own active energy management. One way of allowing the many small, decentralised generating systems to play a central role in the future energy supply is to regard them as a single entity, as a virtual power plant. Many small units form one big unit. As an initial step, the decentralised power that they produce individually can be combined together and offered centrally on the power market. Ultimately, those decentralised units will also have to be linked up physically and managed centrally if they want to be able to make their essential contribution towards maintaining the availability, affordability and sustainability of our energy supply. That requires smart grids – the physical connection between all individual links in the energy supply chain. By utilising innovative information and management technology, the smart grids are able to link all of this (decentralised) energy production and decentralised energy storage together with consumers and their smart meters, thus creating a coherent and collaborative entity. It is not just down to the energy firms to turn this future vision into reality. It is necessary that carefree, passive energy consumers change into conscious, active energy generators and energy savers and start to act like partners of energy firms. Individual, small prosumers also



In June 2012, Marga Edens took over as Head of Corporate Responsibility, incl. Environmental Protection, Diversity and RWE Stiftung (RWE Foundation) in the Group Center of the RWE Group.

have to be accountable for the major interests that are at stake. Because "with the power comes the responsibility". In the meantime, I'm still at my front door threshold holding that orange leaflet in my hand. Shall I throw it in the old-paper bin or shall I read it? And is that the sun I see coming out...? ■