DAJIE LTD

Internet & Energy Distribution for the Third Industrial Revolution

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1   A Paradigm Change

Taking a look back at the last 30 years, I think we can say that the passage to the 21st Century can be seen as the dawn of a new revolution, where socio-political and economic changes combined with the huge leap done in technological evolution are leading Humanity to the next step. And I see this as the most important step for humanity on planet earth in the last 3 Centuries, because it will be the step into a new way of living in the Biosphere, recognizing that we are all part of a BIGGER SYSTEM, no more no less.

I call this step the "TRI", like the number **3**, like the **TRI**angle, or **T**erza **R**ivoluzione **I**ndustriale, the Third Industrial Revolution. I do it for convenience, and I say it not only because we share the view proposed in Rifkin's Books [1] [2], but because after the number 2 it comes the 3 and I think that those who talk about the 4th Industrial Revolution, they do it just because they are too proud to admit that someone else had already a clear view 30 years before.

Beside the numbers, although this is a matter of numbers — like, how many might profit and take advantage of this revolution — the point is that this one, like any other industrial revolution, is happening because the 2 basic pillars are mutating: the technology putting in communication all the lines of the industries has changed and it is no more only a scarce resource or commodity, but a necessary **common** accessible for everyone, the same is true for the process of collecting and distributing Energy. This is already happening since the Internet Revolution and since the production of energy from Renewable Sources has become cheaper and more efficient than standard fossil fuels.

2   Key Trends

Soon, Governmental Incentives are going to expire while production of Energy from Renewable Sources will keep growing at exponential rate of adoption taking over that part of the Energy Market that others are not tackling because of a too heavy centralised business and economic model yet, Utilities keep loosing revenues and ESCOs [1] are taking over the management of Energy Services with Municipalities and local govenments.

> "Currently 50 million EU citizens are living in energy poverty. Many citizens are being kept on outdated energy contracts, also known as 'sleeping' contracts, which often require large termination fees when switching to a cheaper supplier. I want energy companies to provide consumers with information on the cheapest tariffs and scrap costly fees for changing suppliers. In 2016, throughout Europe, nobody should have to choose between heating, cooling or eating"

(. . .) [2].

This is happening in Europe while we are witnessing the so called "Developing Countries" taking the path to a more sustainable and democratic energy regime and investing in technologies which will provide them a faster growth in their economy and wealth [3].

At the same time, Europe is considering the fact that we have to change approach toward energy production and consumption to better sustain a future of Distributed Energy Production/Consumption by taking into account the ones who will be the gateways to a more sustainable energy exchange, the **Prosumers** [4]. The **Prosumers** are the same passive actors who are at the moment producing energy and simply giving it back to the main "AC-Grid" while at the same time big Corporations make profit by using "BIG DATA" related to users of new services which are being undisclosed with what is called the **IoT** [5], making of everything a gateway from the private and local sphere to the public one [3]. And this is opening space to a new kind of problems that arise when the balance between privacy, transparency and freedom is absent or forgotten for a limited, somehow better User Experience [6].

Instead, the distributed and interconnected nature of the Internet of Things can strengthen the collaborative relationships in the social economy because the democratization of communication, energy and transport finally empowers billions of people individually to produce and share their own creations and values.

To encourage consumers to play an active role on the energy market, we need to approach the issue not only from a "Technological Point of View" but from a wider perspective. It is not the technology in itself the one fueling the change but the combination of different factors that make possible for the renewables and the opensource softwares to take over the fossil fuels and the pyramidic communication system. A system that has reached its limits of production efficiency already in the previous century. The limits have been reached and it is not possible

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[1]ESCO = Energy Service COmpanies
[2]as expressed by rapporteur Theresa Griffin (S&D, UK) at the European Parliament
[3]The Renewable Energy Revolution in faster growing countries
[4]as stated in the IEA Prosumer Report
[5]the IoT is finally giving everyone and everything the possibility to be directly and constantly interconnected
[6]...never mind the privacy disaster

to go beyond them without a waste of energy and resources and without impoverishing the working class.

Here, the **DLT** (Distributed Ledger Technologies) applied to the Internet of Energy are coming in help and in this regard we are seeing a lot of discussions, talks and articles about the argument each and every day which are helping to raise attention towards the new Blockchain Technology [7]. But, what happens is somehow similar to what we have seen happening within other industries where new "Technology Platforms" are becoming the new providers of services which were once provided by locals or at least were having a relapse in the local communities. Those new providers are centralising again everything, going against the principles of the Sharing Economy they pretend to be proponents of. While these platforms do simplify and unite under the same hood many functionalities and services users need, they are also helping them abandon the human nature for something transhumanic, giving away their freedom and building a tight dependency from technology providers.

A combination of decentralised network management, localized energy market and distributed Ledger databases, distributed around where the gateways of Internet and Energy are present, can leverage Municipalities and Providers from the burden of administering the infrastructures while making them more resilient [8]. At the same time it can help society becoming "smarter", when applied to the infrastructures, by providing to Communities tools to regain ownership, collect resources and build trust amongst the peers, thus finding new models which are inclusive and participatory and not only self sufficient. To achieve this, we also need a mind switch towards a "Community Based Model", a jump back to the future where local Communities administer local resources in **common pools** to provide a greater autonomy and indipendence.

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[7]Since 2015 the Blockchain became the new hype and we are seing many projects flourishing based on this software, also applied to energy

[8]market settlement solution for decentralised Energy Communities

3 The Prosumer Age

Prosumers have the potential to transform the current electricity generation model and accelerate the transition to a more decentralized and interactive electricity system. The potential for commercial prosumers — with their large and unused rooftops and parking space near densely populated areas for example — is widely seen as a serious game changer, but also the residential prosumers and any area where we find in place an isolated infrastructure that requires an higher grid stability and a more affordable energy source, can widely profit from a different model of collecting and sharing energy.

The energy market is getting more diversified as consumers shift their habits by producing more electricity autonomously, while increasing environmental regulation is impacting the main grid. An always increasing number of people producing their own renewable power are already forming their own community grids. Smart Grids and Micro-grids that use technology to economize consumption are starting to change the way many people think about energy, while also providing for a more symbiotic relationship with centralized national grids. A new market for energy where people can buy directly from their neighbors at discount pricing is demanding for a better control of energy flows, a more affordable energy sharing model, an easily accessible procedure to enable exchange of valuable data and resources while preserving security in the communication and trustability amongst the peers involved in the local communities.

Distributed-ledger technology refers to the use of an electronic ledger that has no central repository; the ledger is distributed among multiple nodes on a network providing an electronic transaction record of integrity without need for a central authority. The project DAJIE acts on the infrastructure level trying to demonstrate that it is feasible to implement these technologies [9], architectures [10] and the process needed to retrieve the value of energy produced by a single unit and by the whole local community [3]. Not only, it becomes even more advisable and profitable once the services are connected to a Smart Grid which serves as a distribution infrastructure for the energy produced and consumed in the territory. whereby, the services are distributed amongst the peers in an attempt to establish a "Circular Economy" model and regain what normally gets lost, wasted or sold out for too less. We call this value **PC**, **Prosumer Credit**, which represents the value of production of the single stakeholder. Thus, the sum of the prosumers in a Community will produce a **CC**, **Community Credit** [4]. The same model applies to any other "service" or "solution" produced and shared in the community.

DAJIE aims at producing a standardized solution to address energy and value exchange between peers in a "*Community Micro-Grid*" by acting as a middleware between said consumers (prosumer) and the utilities, without invading consumer privacy while preserving reliability of the grid operators and enabling direct **peer-to-peer** communication and exchange of data. Thus producing a **win-win-win** situation for all the partners involved, the prosumer, the grid operator and the opposite peer.

This change is happening right now, and while in Europe [5] the discussion about the prosumer model is going on only since the last 3 years [11], technology is ready and it can be immediatelly applied when Communities take the path of indipendence, autonomy and

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[9] The Blockchain applied on IoT

[10] A proper Reference Architecture to provide best practices and guidance for interoperability

[11] A new deal for Energy Consumers

sustainability. This is true specially in those locations where an energy indipendence would make the respective Countries leapfrog and reach the next level, without loosing time waiting in vain for a top down approach from Governments and Industries. They could simply start the process and drag the neighbours with, in a movement that will have a snowball effect on all the layers of a circular economy.
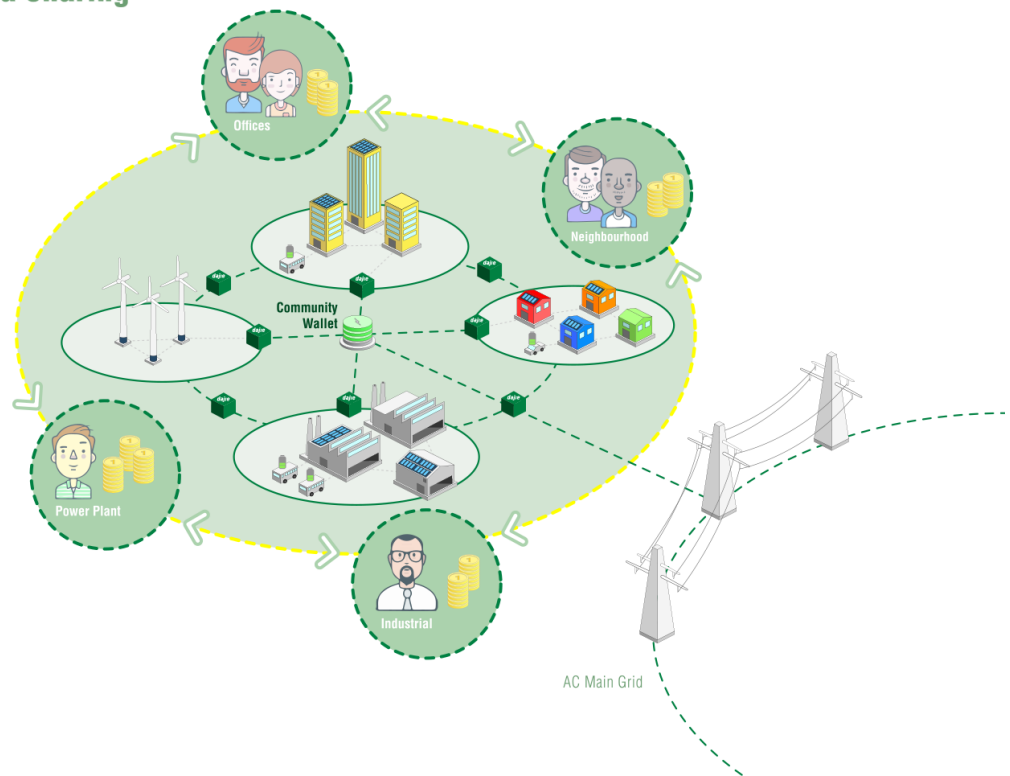

Figure 1: Distributed Smart Grid model for p2p Energy Sharing

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