Building a digital Nerveous System to create a more efficient Infrastructure.

The development of a IoT infrastructure will be carried out and phased in over the next several decades. According to one study by the Electric Power Research Institute (EPRI), a US based non-profit think tank, the cost of phasing in a national Energy Internet over 20 years is estimated between $17 to $24 billion per year.[1] However, the EPRI estimate is a lame approach to the smart-grid, consisting of smart-meters and power line improvements. When energy storage and additional hardware components are taken into account, along with the intelligent communication management infrastructure to coordinate the flow, storage and exchange of renewable energy by millions of prosumers, total cost for an Energy Internet in the US is estimated at $1.2 trillion.[2]

But according to the initial EPRI study, the estimated energy savings that would result from the installation of an Energy Internet is $2 trillion.[3] This alone is around 40% of savings alone trough aggregate energy efficiency gains and is a good justification for the up-front costs.

Financing and construction of a smart-energy infrastructure is already underway in many countries. Many countries are currently implementing smart-grids, financed through increases on consumer energy bills with the remainder absorbed by local, state and federal governments in the form of subsidies, incentives and allowances.[4] This is the same mode of private/public financing that has been used to fund national scale infrastructure development in the past.

Energy and utility companies are anxious to profit from a smart-grid. The European Union has taken steps to force companies to unbundle their power generation from electricity transmission, allowing small energy producers to connect to the main grid and to support a more open nature of the Energy Internet. Slowly energy corporations adapt to the new energy reality and change their business models as a greater number of prosumers are encouraged to produce their own green energy. As more people begin to generate their own renewable energy, the future income of these companies will rely more and more on managing their customers' energy needs, increasing their energy efficiencies and productivity, and sharing a percentage of the increased productivity and savings with them.

To help advocate the benefits of an intelligent energy infrastructure, social entrepreneurs such as the Cleanweb Movement, are using social media to "cluster like-minded people together to create lateral economies of scale in the implementation of energy efficiencies and the introduction of renewable energy harvesting technology. Similarly, a US government initiative called Green Button is encouraging power and utility companies to provide access to real-time energy usage data that is now available with the installation of millions of smart-meters. In less than one year, the number of customers with instant access to their personal

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[1] *Estimating the Costs and Benefits of the Smart Grid: A Preliminary Estimate of the Investment Requirements and the Resultant Benefits of a Fully Functioning Smart Grid,* Electric Power Research Institute, p.4. http://ipu.msu.edu/programs/MIGrid2011/presentations/pdfs/Reference%20Material%20-%20Estimating%20the%20Costs%20and%20Benefits%20of%20the%20Smart%20Grid.pdf

[2] Same source

[3] DiSavino, Scott. 2011. *U.S. Smart Grid to Cost Billions, Save Trillions,* Reuters. http://www.reuters.com/article/2011/05/24/us-utilities-smartgrid-epri-idUSTRE74N7O420110524

[4] Rifkin, Jeremy. 2014. *The Zero Marginal Cost Society: The Internet of Things, The Collaborative Commons, And The Eclipse of Capitalism*, New York: Palgrave Macmillan, p.142

energy use data increased to 31 million.[5] Apps are now in development that will allow users to easily share and compare this data with friends over social networks and incentivize increased efficiencies—perhaps ranking user's homes against one another or comparing the energy use of different brands of appliances, etc. More advanced applications are also being created that will allow people to co-generate and exchange renewable electricity across an Energy Internet.

In February 2013, the US Federal Communications Commission (FCC) published a proposal to make wireless connection free for everyone.[6] Today, 2019 Germany and many other countries in Europe are still far away from this goal. Near zero marginal cost communications and near zero marginal cost renewable energy will give the society the critical operating platform to build out the Internet of Things infrastructure and change the economic paradigm.

The Revolution will not be Centralized

With the build of an IoT infrastructure a decentralized Nervous System will continue to strengthen and expand across lateral networks to give access to everybody. Competition is partially superseded by cooperation, buyers and sellers transition into prosumers, and markets yield to networks as the marginal cost of producing goods and services are dropping significant across all sectors of the economy. As this new economic paradigm unfolds, a hybrid economy will emerge where some industries based on the Digital Community will operate at near zero marginal cost, while other industries will continue to cling to traditional consumer markets.

Companies such as Uber and Airbnb will attempt to bridge the gap between the two economies and take advantage of both. However, as truly decentralized peer-to-peer networks begin to take over, hybrid companies wil have it more and more difficult to edure. Hybrid companies like Uber, Airbnb and YouTube, will have to change into decentralized networks for direct peer-to-peer transactions without the need for a third-party intermediary.

Sustainable Abundance

As scarcity is increasingly uprooted by an abundance of resources through efficient technologies, a new economic indicator is required—one that does not measure growth, but sustainability. While the term *abundance* is subjective, the *biocapacity* of the planet is not.

To transition to an economy of sustainable abundance, the disparity between humanity's ecological footprint and the carrying capacity of the Earth must be addressed.

Studies indicate that the millennial generation is the "most empathic of any generation in history…less interested in keeping up with materialistic trends and less invested in obsessive consumerism as a way of life…the focus on helping others is what millennials are responding to." These findings coincide with the sharp expansion of a collaborative sharing economy, where access and use value are favored over ownership, exchange value and status. In addition to being less materialistic, millennials are also far more committed to environmental

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[5] 2012. *Green Button Data: More Power to You,* US Department of Energy.
http://www.energy.gov/articles/green-button-data-more-power-you

[6] Rifkin, Jeremy. 2014. *The Zero Marginal Cost Society: The Internet of Things, The Collaborative Commons, And The Eclipse of Capitalism*, New York:

sustainability and stewardship. A 2009 survey conducted by the Center for American Progress found that "75 percent of the Millennial Generation favors a shift out of fossil fuels and into renewable energies—surpassing all the other adult generations." [7]

Millennials are now spearheading the co-creation of "a shareable economy that is less materialistic and more sustainable.

Conclusion

The productive efficiencies and disruptive capacities of new technologies will increasingly drive the marginal cost of producing goods and services towards near zero. As traditional markets are circumvented, a new economic paradigm will progressively emerge that is built upon decentralized collaborative networks.

A fast network and the Internet of Things infrastructure will propel aggregate energy efficiency from 14 percent to 40 percent across society. An Energy Internet will empower prosumers to harvest, store and exchange clean and renewable energy across a distributed smart-grid. More and more automated manufacturing processes will generate immense gains in productivity and efficiency. Blockchain applications will eliminate the need for the middleman and allow for the decentralization of everything from currency and finance, to legal agreements, licensing, social media, data storage, voting and governance.

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[7] Madland, David and R. Teixeira. 2009. *New Progressive America: The Millennial Generation,* Center for American Progress. https://www.americanprogress.org/issues/progressive-movement/report/2009/05/13/6133/new-progressive-america-the-millennial-generation/