



## ENERGY X.0: Future of energy systems

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### ABSTRACT

Climate change is an existential threat for human-beings and energy sector is the prime responsible. On the other hand, the technological progress has made it possible to use sustainable resource for energy generation and consume energy more intelligently. The latest has made the large industries to be willing to take control over their own energy system. EX.0 (ENERGY X.0) encapsulates the visions for a change in the energy systems considering the technological progress and the need for a revolution to save our planet.

### Why ENERGY X.0?

There has been a long debate if the climate change is real or not. Although, the scientific proofs to support the climate change are undeniable [1] but the concerns of those who denies climate change can be addressed. To have a fair judgment, the risk of such a threat must be calculated. To calculate the risk, the severity is multiplied by the likelihood. Assuming the likelihood of the climate change is very low, the risk is anyway very high due to extremely high severity. This is a global threat, and nobody is safe if this is real. Therefore, believing that the energy sector needs a revolution to save our planet, is not any far from a fact. On the other hand, the technological progress is at a tipping point where such revolution is not a cost but makes reasonable returns on the investments.

In this paper, ENERGY X.0 concept with its four pillars is introduced. A Strength, Weakness, Opportunity and Threat (SWOT) analysis is done for three main players in ENERGY X.0.

### What is ENERGY X.0?

ENERGY X.0 encapsulates the visions for such a revolution in the energy systems considering the technological progress and the need for a revolution to save our planet [2]. The target groups for such a revolution are three main groups:

1. Utilities
2. Large Energy Consumers
3. New Players

Utilities are convectional energy providers and their interest, primarily imposed by regulators in each country, is to provide reliable energy services, reduce costs and then to keep their market position and even expand their business. Large Energy Consumers are referred to large industries or group of smaller energy consumers and their interest is to keep or even increase their security of supply and decrease their costs and dependency on utilities. The New Players in the energy market are referred to opportunistic SMEs (Small and Medium Enterprises) that their interest is to serve the needs of energy consumers and bypass utilities or at least stop them from further expansion in the new business areas [3]. Energy X.0 has four pillars as shown in Fig. 1. In Table 1, a SWOT analysis of the ENERGY X.0 for the four players in the market are shown.

### Future work

The four pillars of ENERGY X.0 will be described in more details and relevant solutions will be presented in the next phases of this work. For each pillar, the existing solutions, their advancements and value



Fig. 1. ENERGY EX.0 and its four pillars.

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**Table 1**  
SWOT (Strength, Weakness, Opportunity and Threat) Analysis of EX.0 for three main players.

	Strength	Weakness	Opportunity	Threat
<b>Renewable Energy Investment</b>				
Utilities	Established market position	Low organizational agility	Potential for market expansion	Loss of market share to the New Players
Large Energy Consumers	Asset ownership and more control	Lack of knowledge	Energy cost reduction	Loss of business focus
New Players	Organizational agility	Need of capital and reputation	Reduction of dependency on utilities	Changing market environment
<b>Local Energy System</b>				
Utilities	Access to end consumers	Lack of innovation ecosystem	Potential for new business opportunity	Expose to competition
Large Energy Consumers	Asset ownership and more control	Lack of knowledge	Contribution of low-carbon society	Higher costs and immaturity of the technology
New Players	Organizational agility	Low access to capital and past experiences	Create an energy disruption to get a market share from utilities	Low short-term return on investment for cash-constraint players
<b>Sustainable Transportation</b>				
Utilities	Established connections	Unknown market position	Potential for new business opportunity	Loss of business focus
Large Energy Consumers	Asset ownership	Lack of knowledge	Contribution of low-carbon society and green branding	Higher costs
New Players	Organizational agility	Low access to capital	High long-term potentials	Low return on investment
<b>New Energy Solutions</b>				
Utilities	Access to end-consumers data	Lack of innovation ecosystem	Potential new opportunities	Expose to competition and change of regulation
Large Energy Consumers	Asset and data ownership and control	Lack of knowledge and experiences	Cost saving	Cyber-security threats
New Players	Organizational agility and innovation	No access to data	New business opportunity and blue ocean	Pave the way for big players

creation for the above three players will be described. The contribution of each pillars to United Nation Sustainable Development Goals (SDGs) will be evaluated and presented.

#### Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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