

Small, residential, roof-mounted photovoltaic cells should be a consistent part of the Future Power Systems

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Abstract—Some of the new concepts like *enernet, smart grid, net zero energy, microgrid, DER, DEG, prosumer* will be fruitful, others will be forgotten, others will be reformulated. Renewable energies, and special photovoltaic conversion bind with distributed energy resources at the consumer place are a real earning. However, we are in the time of rethinking the world of energy. The paper is focusing on small, residential, roof-mounted photovoltaic cells with storage facilities and connected to the public grid. These new kind of renewable energy cells, that are on/off grid in the same time, are very suitable for residential homes. These new energy cells are thought in the perspective of the future, where every machine should have its own intelligence, its own DNA. These new small energy cells should have a new kind of inverter which contain a bidirectional charger. Simulating on the national power system of Romania the integration of large small residential photovoltaic cells with batteries and connected to the public grid results a “healthier” national power system, more capable of coping with major incidents.

Index Terms— DNA, intelligence, small photovoltaic cells

I. INTRODUCTION

If the fossil resources are, politically, controlled, the sun irradiations are the most available resource of energy in the

world. Sun energy conversion could be done everywhere.

This feature makes the solar energy among all the renewable energies most suited to the principle of *distributed energy generation, DEG*.

The advance of renewable technologies and special on photovoltaic conversion, is real. The advancements in real-time processing, in artificial intelligence and in communication made searching for new approach in power systems possible. As on [1], an intelligent energetic system, iES, is composed of i) intelligent consumers, ii) intelligent generators, iii) intelligent storage facilities, iv) intelligent metering infrastructure and, very importantly, should be accompanied by vi) behavior rules and vii) real time management of the power flows. In the future *intelligent machine* means machine with its own DNA: At the same time, iES must be scalable in both directions, up and down. The small iES, in other words the intelligent energy cells, the iEC, could work alone or together with others iEC's or integrated in large iES. iEC's that produce for own consumption are also named prosumers. The iES could be a tissue of iEC's, as in biology. Intelligence here means machine with encrypted behavior, machine with its own DNA. Meanwhile, consumer categories have diversified, adapted to new conditions imposed by renewable energies (fig.1).

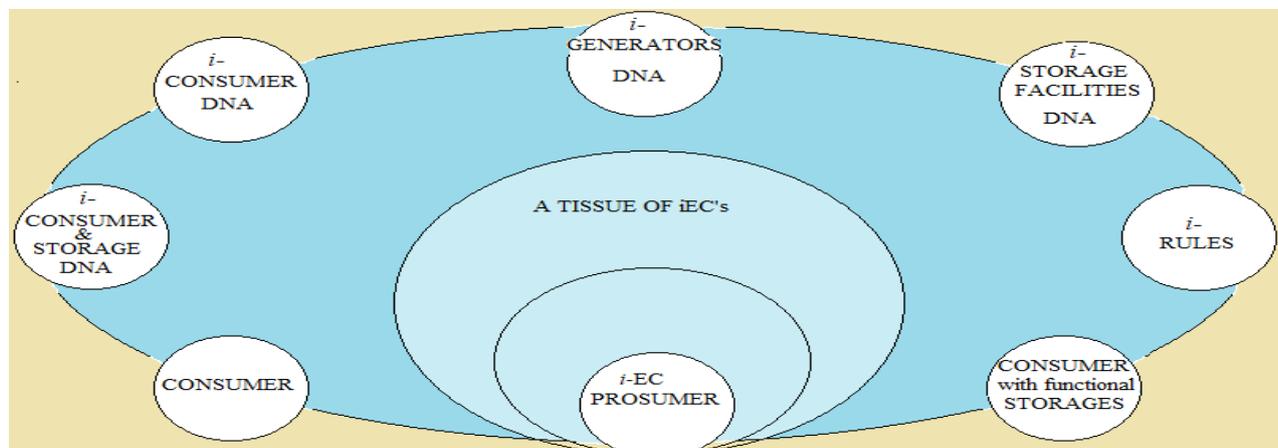


Figure 1 The future of the power systems: almost every component should have its own intelligence, its own DNA