

Belmopan distributed energy systems

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In the previous chapter, we introduced that Distributed Renewable Energy (DRE) is the most promising model to bring sustainable energy to All. Figure 2.1 schematizes the paradigm shift from non-renewable/centralised energy generation systems to renewable/distributed energy generation unit. Let us see better why DRE is environmentally, socioethically and economically sustainable compared with the dominant centralised and non-renewable energy generation systems.

Paradigm shift from non-renewable/centralised energy generation systems to renewable/distributed ones.

Environmental benefits of DRE

If we look at centralised and non-renewable systems, namely, large-scale plants using fossil fuels as oil and coke, they are environmentally unsustainable because they are based on exhausting resources, so forth fastening resources depletion. Furthermore, these exhausting resources result in high greenhouse gases emission (CO₂ emissions), through several processes along their life cycle, which determine global warming. Finally, they are responsible for other pollution problem during extraction and transportation processes due to their linking.

If we now look at renewable and distributed resources, such as small-scale solar and wind generation units, they are more environmentally sustainable because they use locally available and renewable energy sources, thus resulting in a reduced environmental impact compared to the various processes of extraction, transformation and distribution of fossil fuels. Furthermore, they have much lower greenhouse gases emissions in use. To conclude, compared to centralised systems, local energy production and distribution increase reliability and reduce distribution losses.

Socioethical and economic benefits of DRE

Centralised systems are unsustainable even in socioethical and economic terms. This comes because, due to the composition of oil and coke, they are very complex to be extracted, refined and distributed. Indeed, these processes require very expensive and large-scale centralised structures, which limit the possibilities of direct and democratised access to energy production and consumption. In history, individuals had low power over their own destiny which led to a widened gap (in terms of inequality) between rich and poor [10], which has been pursued in time perpetuating a centralised energy production.

In the transition from centralised to decentralised and distributed energy systems, there are two

well-characterised elements:

System Structure: regarding the configuration of the actors involved in the energy system;

Type of Energy Sources: regarding the nature of the resources, covering from non-renewable to renewable energy sources.

Concerning the System Structure, we can distinguish the following three main types. Footnote 1

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