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ENERGY HUB CONCEPTUAL IMPROVEMENT WITH HOUSEHOLD INVOLVEMENT

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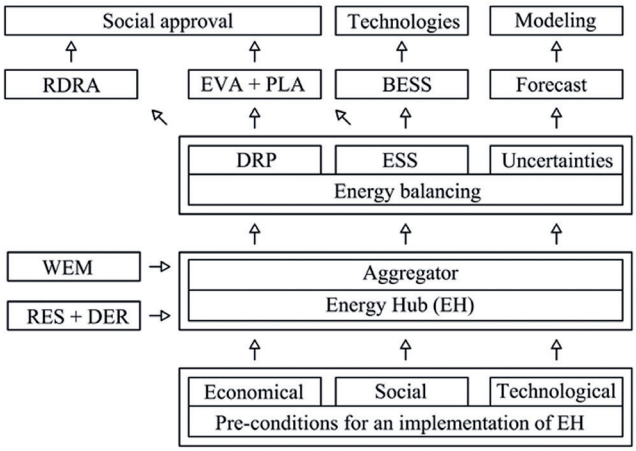
Abstract – Existing energy systems in the global energy market are historically based on the centralized generation using fossil fuels, which has been largely unchanged due to the high impact of lobbyists in fossil resource market and geopolitical situation. However, due to the increased renewable energy resource implementation in the energy portfolio, shift to more decentralized energy production and distribution is increasing. New energy system concepts emerge like energy hubs (EH) and demand response programs (DRP), which have been increasingly studied for energy sector improvement, which allows to adapt demand to the supply. Supply is fluctuating due to discontinuity of solar and wind energy. Most recent reviews regarding energy hubs and energy sector are highlighting the various solutions for energy supply balancing, which include residential and industrial sector involvement into the demand response program, using household appliances, electric vehicles and other shiftable electricity consumers as well as other demands like heat, natural gas and domestic. Energy management in energy hub is organized by aggregators, which are responsible for most optimal distribution, storage and price of electricity, prioritizing locally generated power over imported electricity from centralized units. Such approach allows to exploit he locational value of energy and bypass the transfer losses via conventional distribution network. Such losses are more impactful during the peak hours, which increases the electrical load of the wire, thus increasing the marginal losses. High importance has social approval for energy system development to energy hubs, thus involving consumers more than some might be interested in. Survey will be conducted to determine the opinion and limitations of society in Latvia. Aim of this research is to improve the energy hub concept modeling and social aspects and meanwhile address the main problematics of the currently developed systems, especially based on household involvement and sizing restrictions.

Keywords – Aggregator; district heating; Demand Response Program; grid balance; Multi-Energy System; smart home; waste heat



Framework for Energy hub modeling and conceptualization

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