Energy Management--Saving Money and the Climate: A Technological Approach and Device Generating Economic Incentives for Regenerative Energy Production

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Subsidized feed-in tariffs boosted CO2-friendly regenerative energy production in Europe, but were drastically reduced to limit costs. The reduced profitability caused stagnating regenerative energy plant numbers. The concept of this research is to regain profitability for household and small business installations by developing a novel energy manager. In most countries of the world, the owner of a regenerative power plant receives less money for selling the energy to the grid than it costs to buy energy. Hence the profitability of a regenerative power plant increases if energy is self-consumed instead of sold to the grid. An industrially proven concept is to activate large-scale electric devices when self-produced power is available. Attempts were made to transform this concept to households and small businesses, but have failed. The problems of existing devices were solved by several innovations: A new programming paradigm was invented which grants the flexibility needed for a wide variety of applications. Because even skilled amateurs can use it, no expensive experts are needed and configuration costs are kept low. In addition to a new, inexpensive current sensor, several design aspects, e.g. the small physical size of the device, allow inexpensive installation. Parameterizable simulations showed significantly reduced payback periods of regenerative power plants for households. The results were validated in real applications. In summary, the concept and the device have proven to significantly improve profitability of regenerative power plants, thus positively influencing the climate.

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