Institute for **Electricity Economics and Energy Innovation**

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European Demand Response Centre (EDRC) - Access to new markets by pooling demand

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What does EDRC stand for?

The project called "European Demand Response Centre" is built up to identify load shedding possibilities in Austria. Demand response (DR) was a commonly used method in the last decades to gain additional income. The change of market conditions resulting from liberalisation and unbundling processes caused DR no longer being profitable due to the excess of generating capacities. Nowadays, many old and inefficient power plants are decommissioned without covering the lost capacity. As a result of this coverage problem, DR has again become attractive for participants in the electricity system. Because of these changes, EDRC is intended to activate DR potentials in the industrial sector. The goal is to unite demand from several industrial companies by pooling their ability for load reduction (or increase) potentials.

The project's primary objective is to find the theoretical potential for demand response in Austria, which can be put into action by experts from CyberGrid in a second step. Therefore, an automated system for DR should be developed including a database of companies in Austria, which participate in the EDRC. If an external signal to reduce or generate additional load is received by the EDRC, a communication process starts in order to gain the demanded load in- or decrease from the companies participating in the EDRC. The reason for and source of the external signal may vary in different business cases.

Power intensity of various industry branches

The first step to provide sufficient capacity for entering e.g. the control energy market is to find out where potentials high enough for DR are given. In order to do that, a statistical analysis of power intensity in industry sectors has to be performed. Because of these power intensities several relevant branches for DR can be identified, for which the dependency of energy consumption per produced unit in general and especially the specific energy consumption per gross added value (kWh/1000€) is investigated (Figure 1).

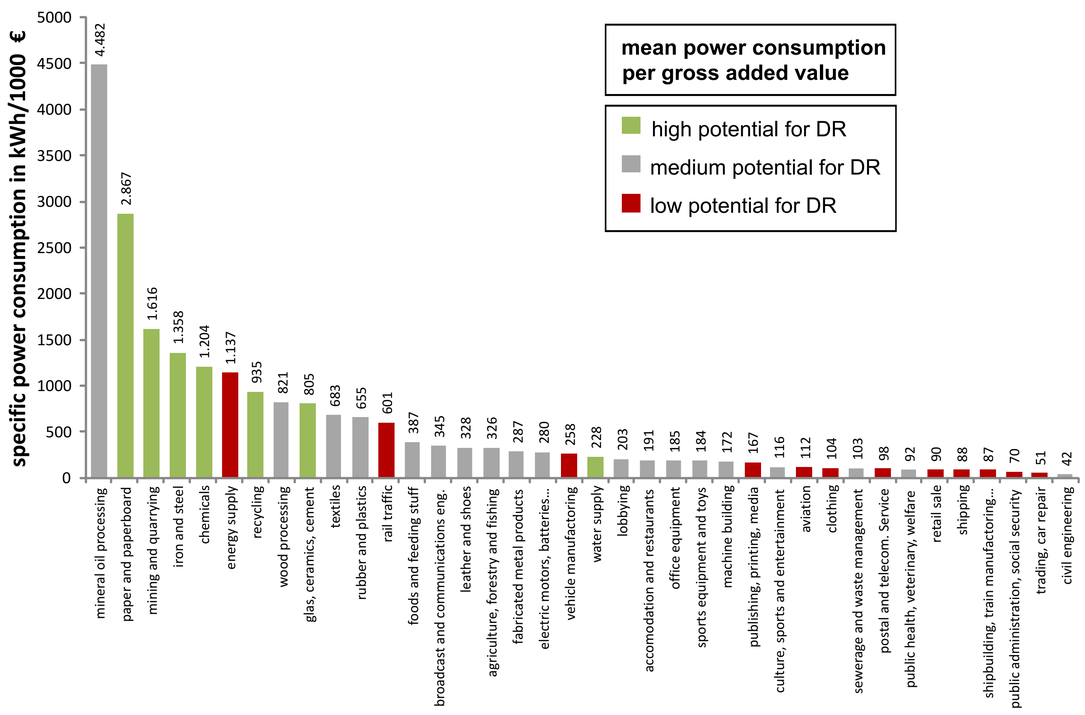

Fig. 1: Specific power consumption in various industry branches (source: based on Statistik Austria)

Even if the power intensity is rated high, a branch is not necessarily qualified to deliver capacity for DR. A possible criterion for exclusion is that the product is a service, e.g. like railway transportation. Although rail traffic has a high power intensity ratio, it is not qualified for DR, because a train cannot be stopped in case the need of DR is given. It is also necessary that consumer loads with an adequate high value of capacity, or several loads which can be switched off together, are available in the participating companies.

Additionally this capacity should not be part of the limiting process in the production chain, which will be shown in the next part.

Storage potentials for Power Demand Side Management (PDSM)

An important topic in relation with DR is the possibility to store so-called energy services in some industry branches, which is the fact if the production process can be split up in several step. One step is limiting (just in time) and the semi-finished products of the other steps can be stored with adequate expenditures. An example is given in Figure 2, which shows the basic process chain in the cement industry. Loads which can be used for DR are shown in green and unshiftable loads are shown in red letters.

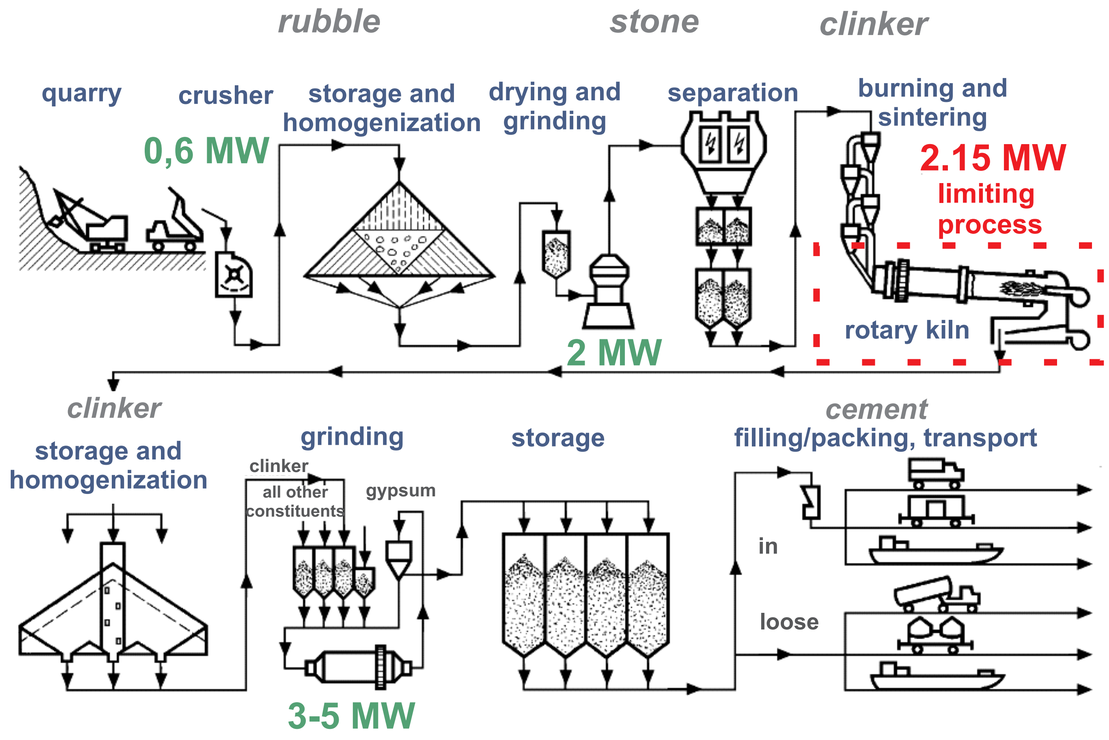

Fig. 2: Basic process chain in the cement industry (source: based on VDZ)

Business cases for DR and project outlook

There are many different options to save energy costs or earn money by using industrial DR. From several business models which can be set up, the following three seem to be the most promising:

- Participating in the control energy market (ancillary services)
- Cutting peak load in less than 100 severe hours per year
- Supporting the transmission grid in critical load cases

The individual consumers may fit to different markets or business cases. Primary control can be provided by industrial gas or steam turbines. In chemical industries a chlorine alkali process could be a support for secondary control. For tertiary control all machines in industrial companies which can react within 15 minutes will suffice, e.g. crushers or mills in mining industry, electric melting furnaces in chemical industry or every other device which fulfils the pre-qualification criteria to take part in the market. For cutting the peak load, almost every device can contribute according to ist potential. Some listed applications are refiners in paper industry, chillers, arc furnace in steel industry, heat pumps, technical gases, air conditioning etc. To support the transmission grid, loads at highly occupied grid nodes should be shifted, if there is sufficient capacity available.

The next steps for the EDRC project will be to determine how many and where loads can be activated for one or more of these business models. Therefore the part of the key players in the most relevant branches in Austria will be investigated and the results will then be extrapolated to represent the total potential. After that, several simulations with the model ATLANTIS, which was developed by the IEE at Graz University of Technology, will be performed to investigate the possible influence of industrial DR on the Austrian electricity system.

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