

COMPUTER AIDED DESIGN OF ELECTRICAL INSTALLATIONS

COURSE 2



REVIEW

- Differentiated tariffs for electricity applied in Romania

1. Monomial CR rate with reservation
2. Monomial CI rate with consumption included
3. CS rate – social type
4. Monomial CD rate without reservation
5. Monomial CR2 rate with reservation
6. Monomial CR3 rate with reservation
7. Monomial CTP rate

Form 2012, to this electricity tariffs were added: green certificates value (2013: 0,191CV/MWh \Leftrightarrow 0,034 lei/kWh), a separate active power tariff and the competitive market component (CPC).

REVIEW

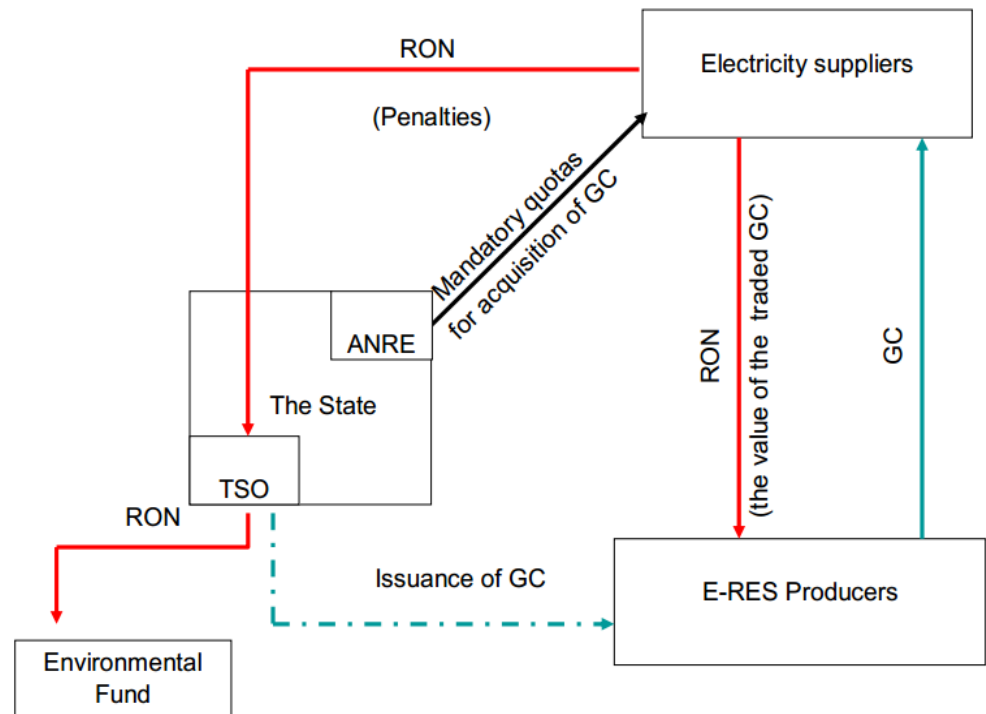
- Tradable Green Certificates

A green certificate is a document certifying the amount of 1MWh of electricity produced from renewable sources.

Electricity suppliers have the obligation to acquire annually a certain number of green certificates determined for each year by ANRE.

- price trading limits of 27 and 55 EUR per certificate

Figure 1: Functioning of green certificates system



REVIEW

- Competitive market component (CPC)
- a "new active electricity tariff applied by providers of last instance to bill end users that have not used their eligibility, correlated with the timing of removing regulated tariffs" (according to the Methodology) in order full liberalization of the electricity market.

"includes the cost of purchasing electricity from centralized competitive markets and the costs of this energy related services provided to the consumer"

- CPC rate applies only to a portion of the active power, calculated according to the percentage of the purchase of the competitive market set out by the calendar of eliminating tariffs.

MICROGRIDS

- definition, features

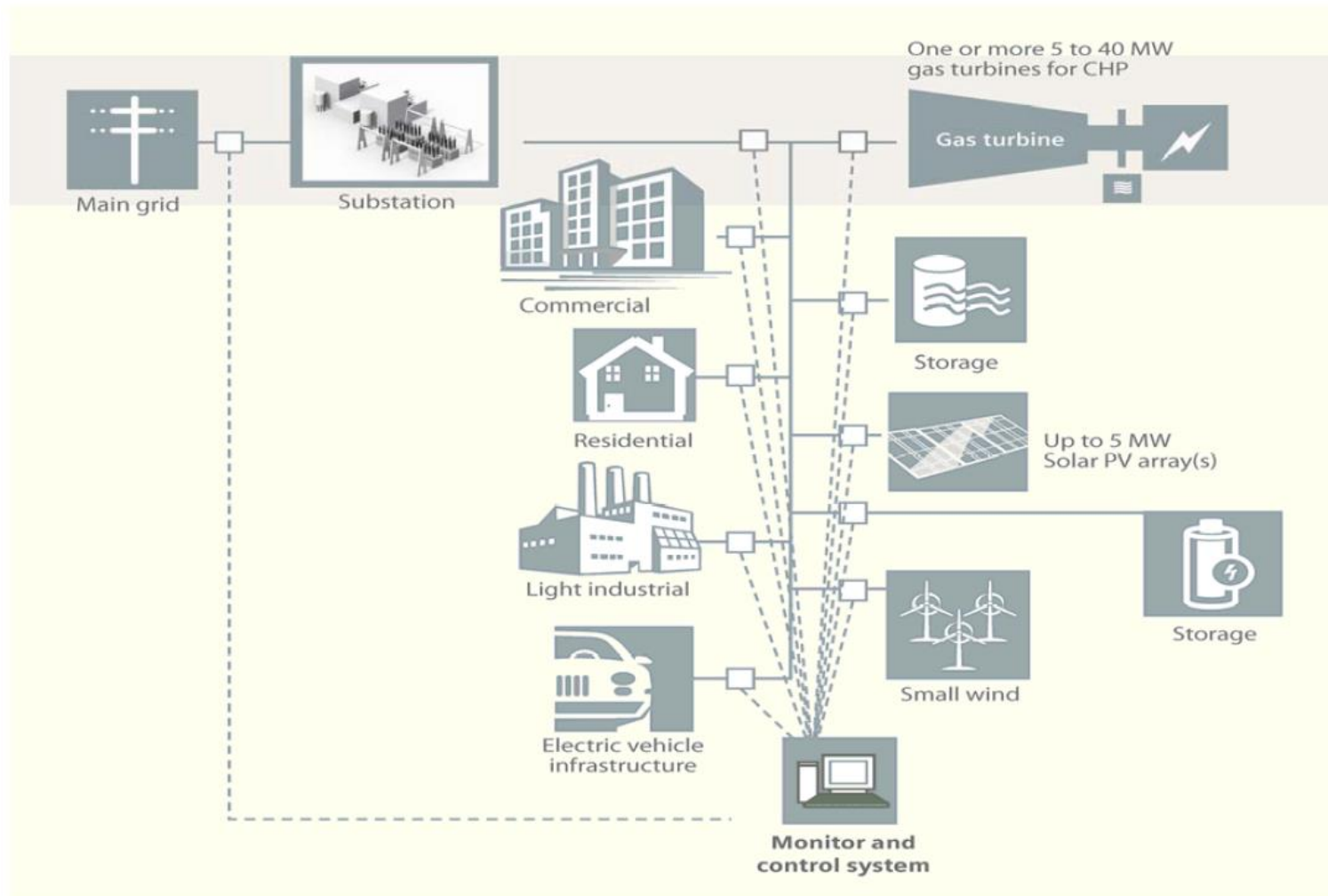
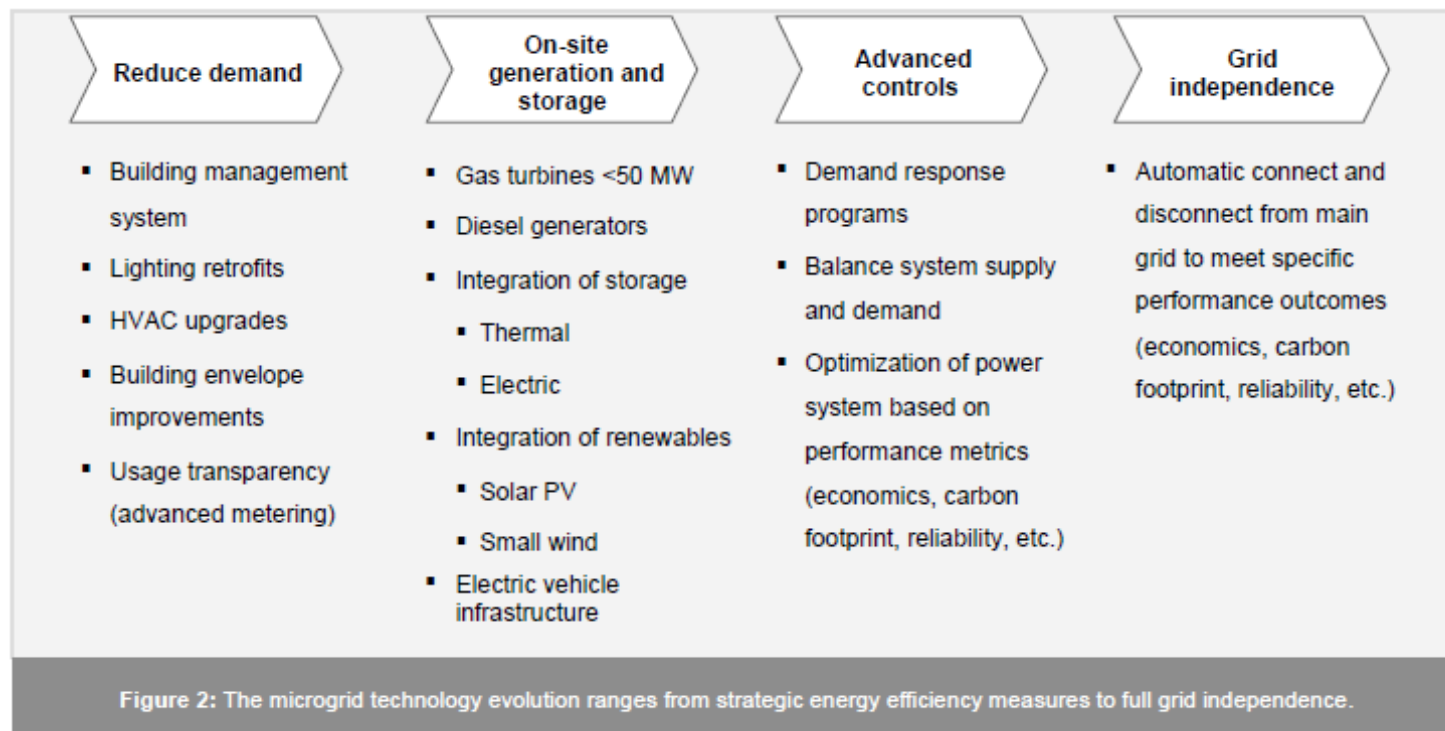


Figure 1: Physical view: the individual elements will vary, but in most cases a turbine will be the central component of a microgrid.



Example microgrid investment benefits

- Improved energy efficiency of installations
- Integrated renewable power generation
- Supply and demand balancing
- State-of-the-art security solutions for critical infrastructure protection
- Self-sustaining power generation, particularly for critical loads and systems
- Safe, easy-to-operate and modular solutions that may be upgraded as required
- Turnkey solutions from trusted leaders in technology integration

MICROGRIDS

- types, examples

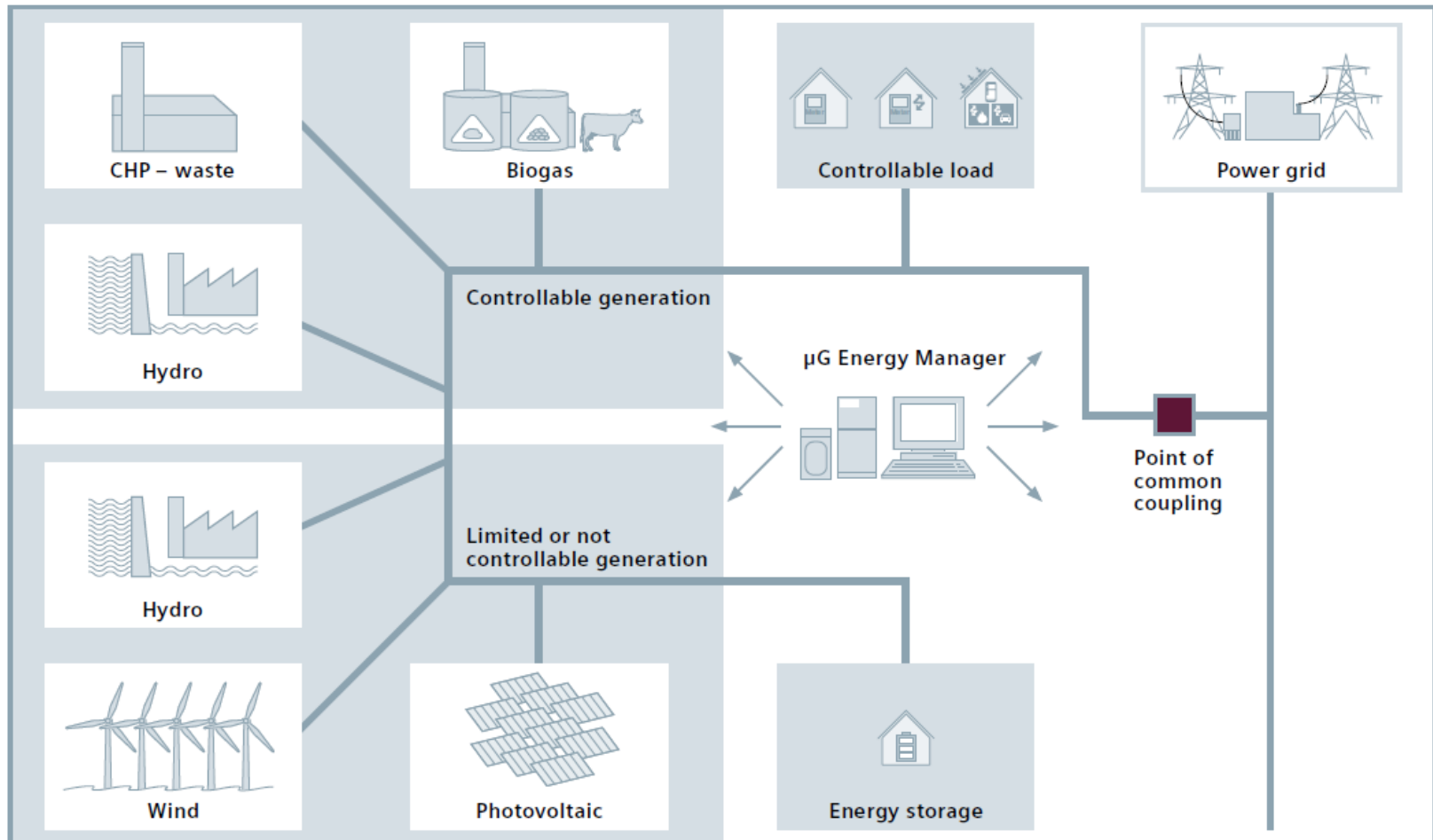
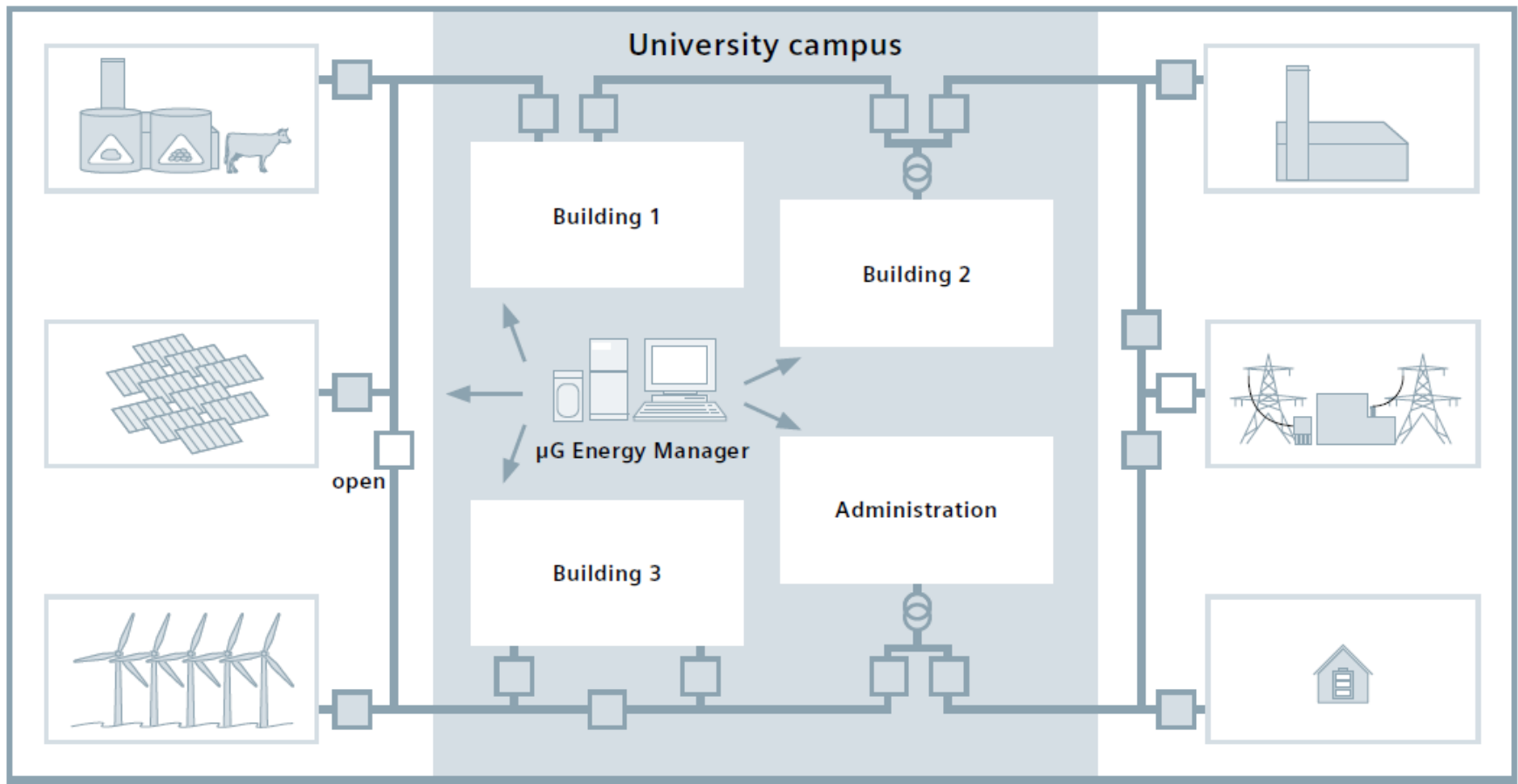
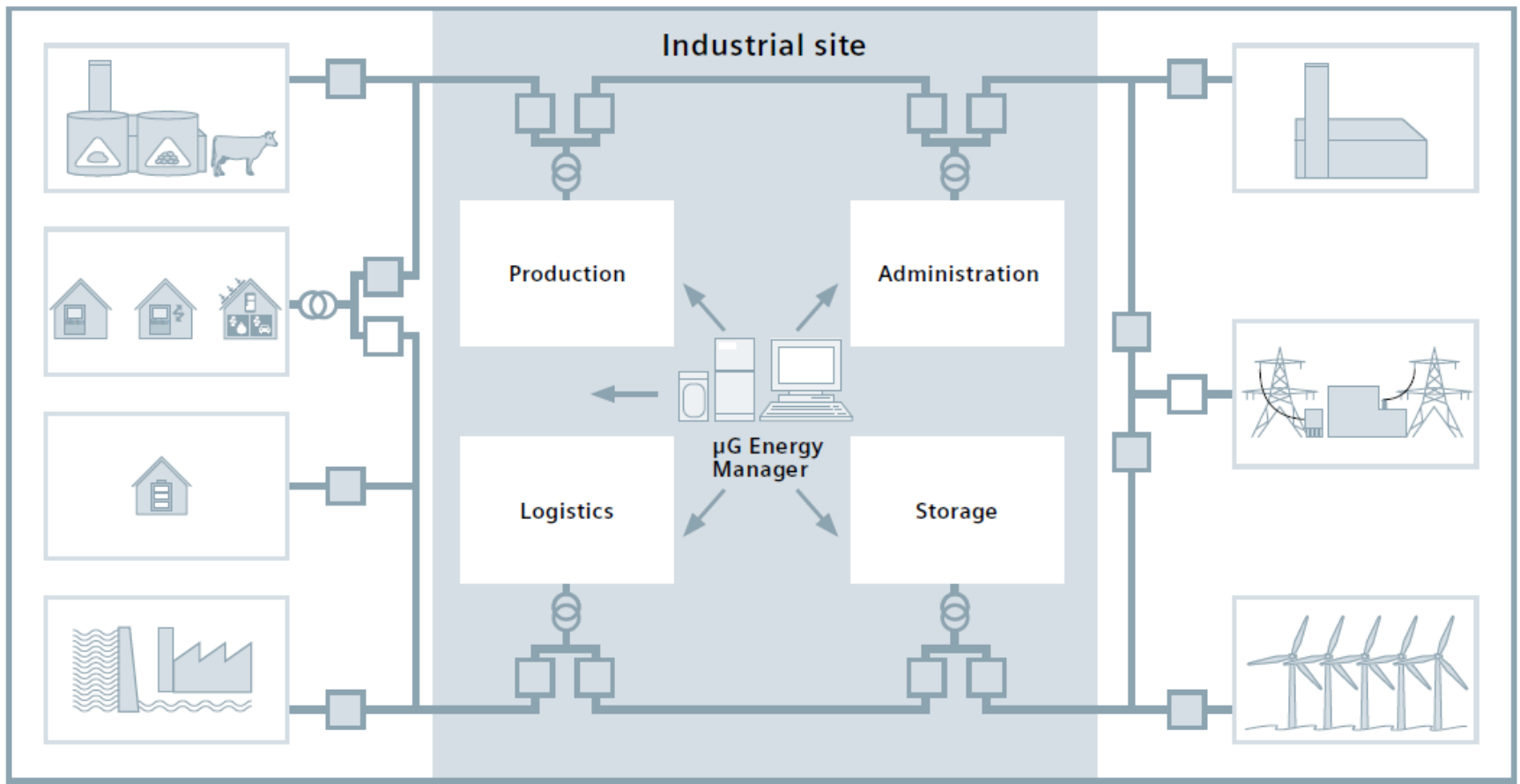


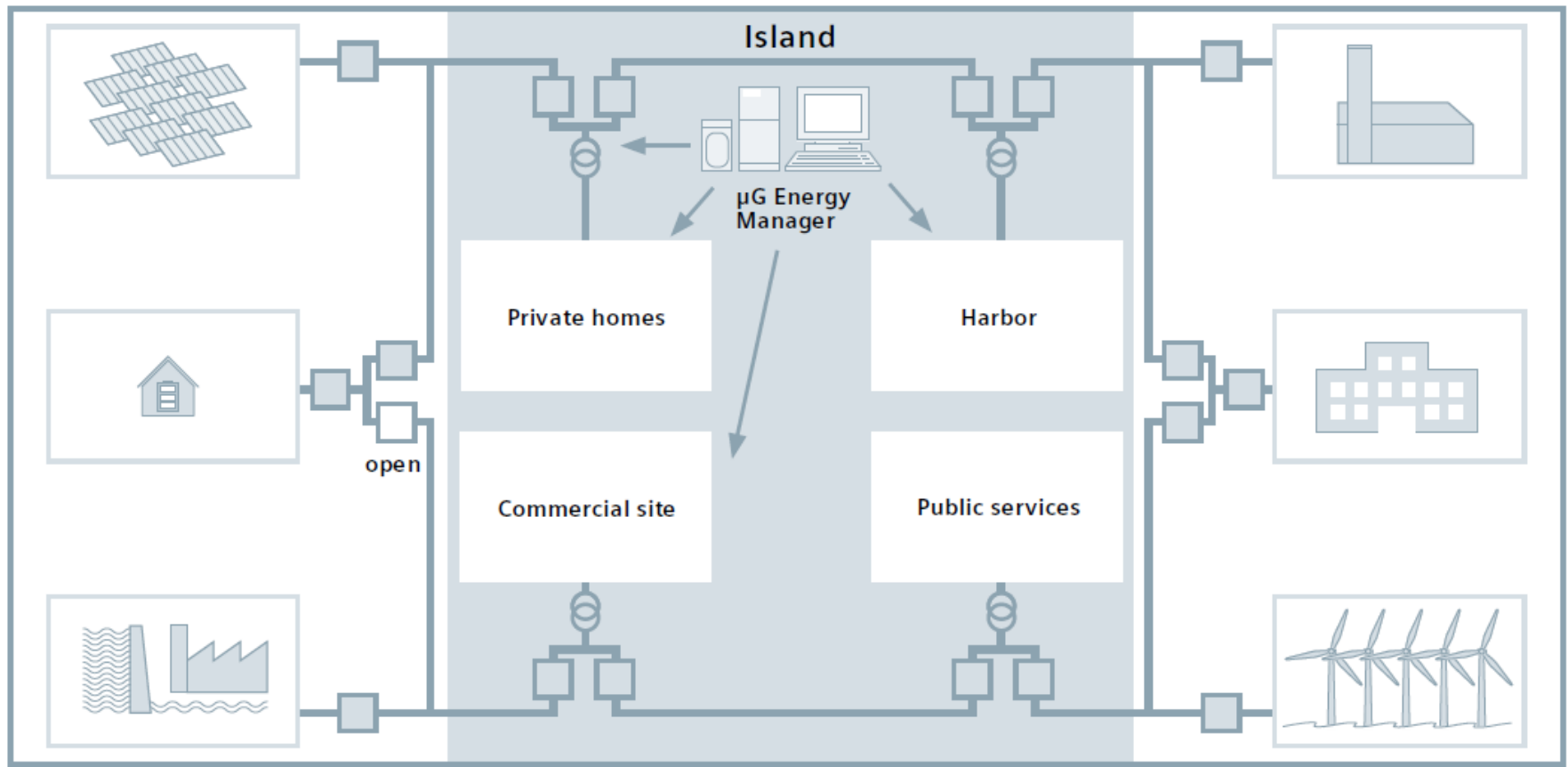
Figure 1: Microgrid with one common point of coupling to the utility grid



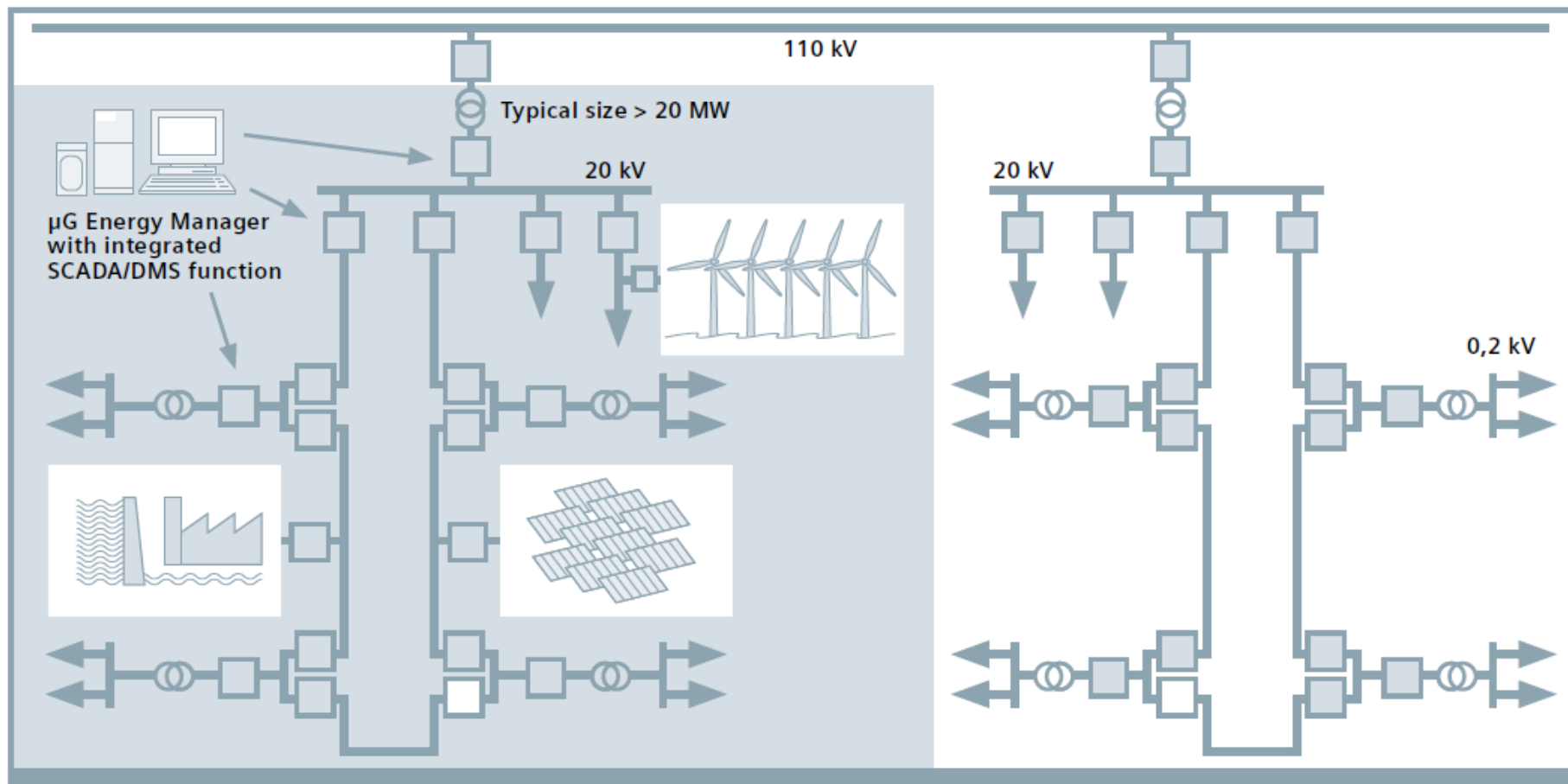
- Institutional microgrid operates continuously in island mode.
- Connection to the utility grid is a backup option.
- The biogas and CHP units are necessary for continuous energy supply, and also for heat for cold winter days.
- However, fluctuating energy of renewable resources like wind and solar systems can be stored, for example with an electrolysis system. This stored energy can then be used with the application of a fuel cell.



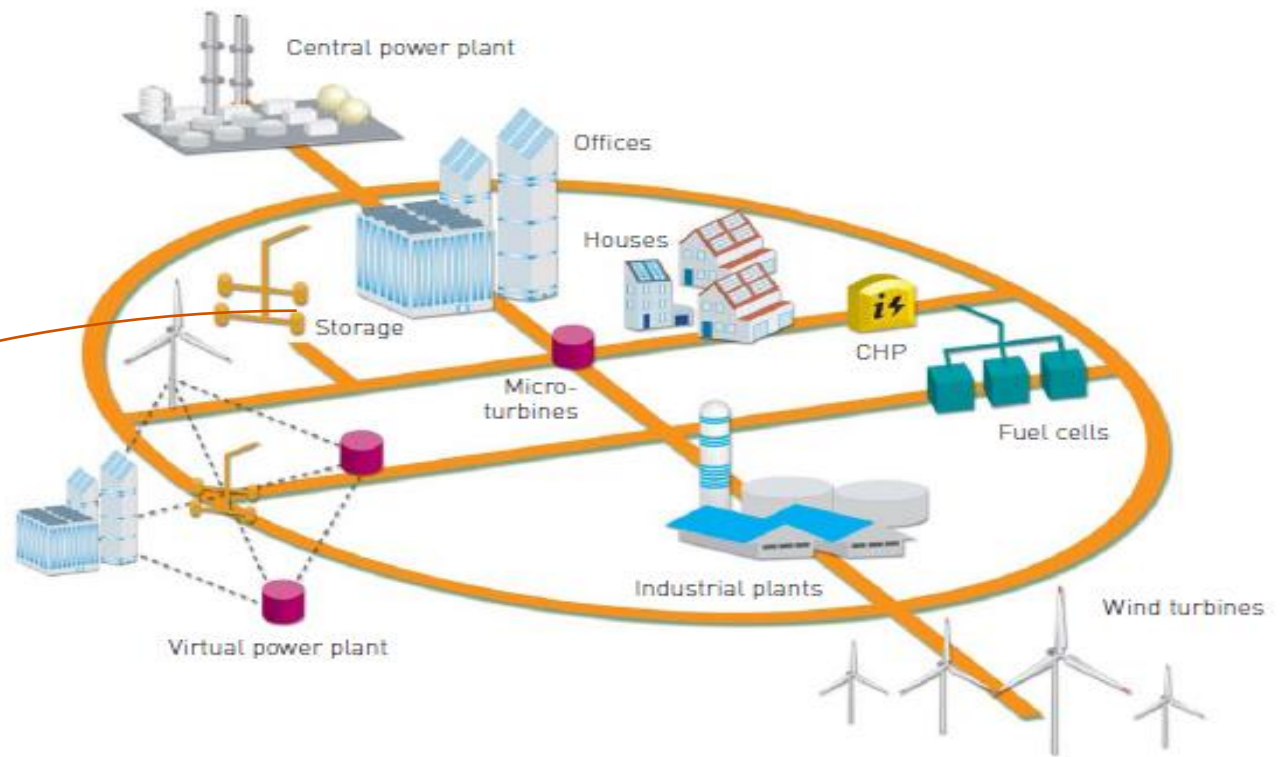
- Industrial microgrid – for evident reasons of security and continuity of supply.
- Typical examples are chip manufacturing, the chemical industry, and the paper and foodstuff industries.
- Today, some industrial sites are installing UPS if their utilization is economically justified.
- Microgrid structures may bring additional advantages, for example the combination of secure power supply with high energy efficiency and the utilization of renewable generation.



- Off-grid microgrid is usually built in areas that are far distant from any transmission and distribution infrastructure and, therefore, have no connection to the utility grid.
- Due to this, such a microgrid must have **black start capability**.



- In utility microgrid, the energy flowing from various generators within the microgrid to the loads and the energy exchange between different segments may become difficult to handle. Thus, the microgrid operation may require the installation of a distribution SCADA and a distribution management system (DMS).
- Additional operation, control, and automation systems such as an outage management system (OMS) and distribution substation and feeder automation may be required to keep the outage time short in case of a disturbance within the microgrid.



Storage unit supercapacitor based

power quality - quality voltage curve (symmetric, sinusoidal) and the quality of service (uninterrupted supply of short or long term).

? Which is the optimal energy storage unit for a low voltage consumer?

- financial aspects and the continuance of supply