Holistic concepts for CO_2 reduction

Tomorrow's production requires new approaches and ideas to protect the environment. The industry needs to rethink in these times of the Paris Climate Agreement to reduce CO_2 as well as the global demand for climate-friendly processes, report Sebastian Pantel and Blazej Sadowski.

The classical production of glass is a process with a high thermal energy demand and therefore a process in which large quantities of CO_2 are still released to this day.

In most glass plants globally, natural gas or oil serves as the primary fuel for melting the raw materials. Large quantities of CO_2 are emitted into the atmosphere, which contribute to global warming and damage the environment in the long term.

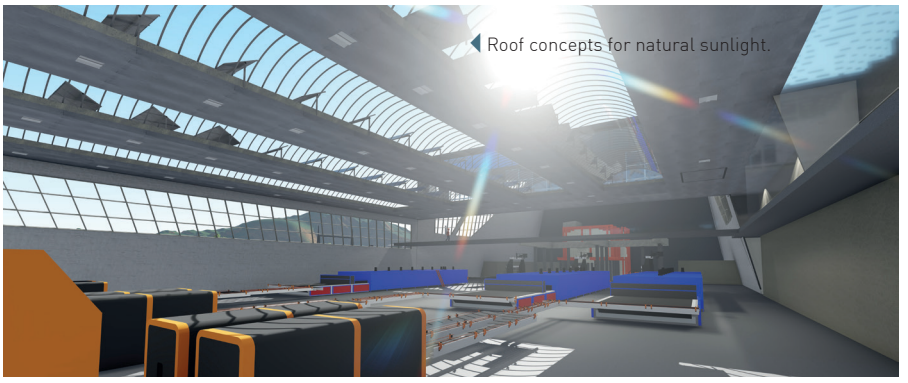
Germany's cm.project.ing, as an independent engineering and planning office in the glass industry, has questioned how efficient production and environmental protection can be combined and implemented today. The focus of this consideration is on reducing the climate-damaging CO_2, while at the same time ensuring the highest possible production and cost efficiency.

The approach of purely electrical melting with a high use of cullet alone will not do justice to the problem, since this approach cannot be implemented in all regions or leads to restrictions in furnace capacity or product portfolio. The use of cullet requires it to be available everywhere in the required quantity and quality.

The most important approaches to reducing CO_2 are, above all, increasing the use of renewable energies and the re-use of raw materials, as well as the holistic consideration of the production building and the production process in the area of energy saving and the optimisation of the production building to use the entire roof area for the generation of electrical energy.

Combination of building concept and renewable energies

One way of avoiding the use of fossil fuels is to use a high proportion of electricity for melting in combination with alternative fuels whose energy requirements could be partially or completely covered by renewable energies such as solar, wind or biofuel. On the one hand, the city grid and a supplier of renewable energies could supply the plant, or it could generate its own energy locally.



Roof concepts for natural sunlight.

The large amount of space required by photovoltaic systems to provide the energy must already be integrated into the building concept. The available roof areas can be optimally used through architectural concepts. Flow-optimised production buildings are able to conduct heat specifically from the inside of the building, which reduces the need for complex roof ventilation systems.

The use of natural ventilation also has the advantage of not incurring maintenance costs and increases the general working climate through more pleasant temperatures at the workplace. The free roof area gained as a result can now be used to generate energy through photovoltaic systems.

Biogas and Biodiesel

Since energy production by means of photovoltaics is often unfortunately insufficient to cover the entire energy demand, the use of biogas or biodiesel is an efficient way to provide energy. Particularly in rural regions, biogas or biodiesel can be obtained from agricultural sources and is available locally. It can be used as fuel in a generator to generate electricity, or directly as primary fuel for the melting process. Compared to fossil fuel, biodiesel and biogas have a much lower CO_2 balance. Tests with up to 30% biogas as primary fuel have so far shown no negative influence on glass quality or process reliability.

Other advantages of this technology are the independence from central sources of supply and the support of local agriculture, which is an advantage for the population and the development of the country, especially in developing countries.

Hydrogen Fuel

The generation of hydrogen from electrical energy is a known and tested process. With the help of electrical energy from renewable energies, pure hydrogen can be produced, which can be stored, transported and converted back into electrical current. In combination with the glass industry, this results in an interesting approach as a possible source of energy. In addition, test series are underway to use the hydrogen as a primary gas in the furnace.

CO_2 SNG

One of the most innovative approaches to primary CO_2 reduction is the production of synthetic natural gas from the CO_2 of combustion processes, such as Short CO_2-SNG. Through this process, methane can be produced from CO_2, hydrogen and electrical energy, which in turn will serve as primary fuel or drive generators. The electrical energy required for synthesis can in turn be obtained from renewable

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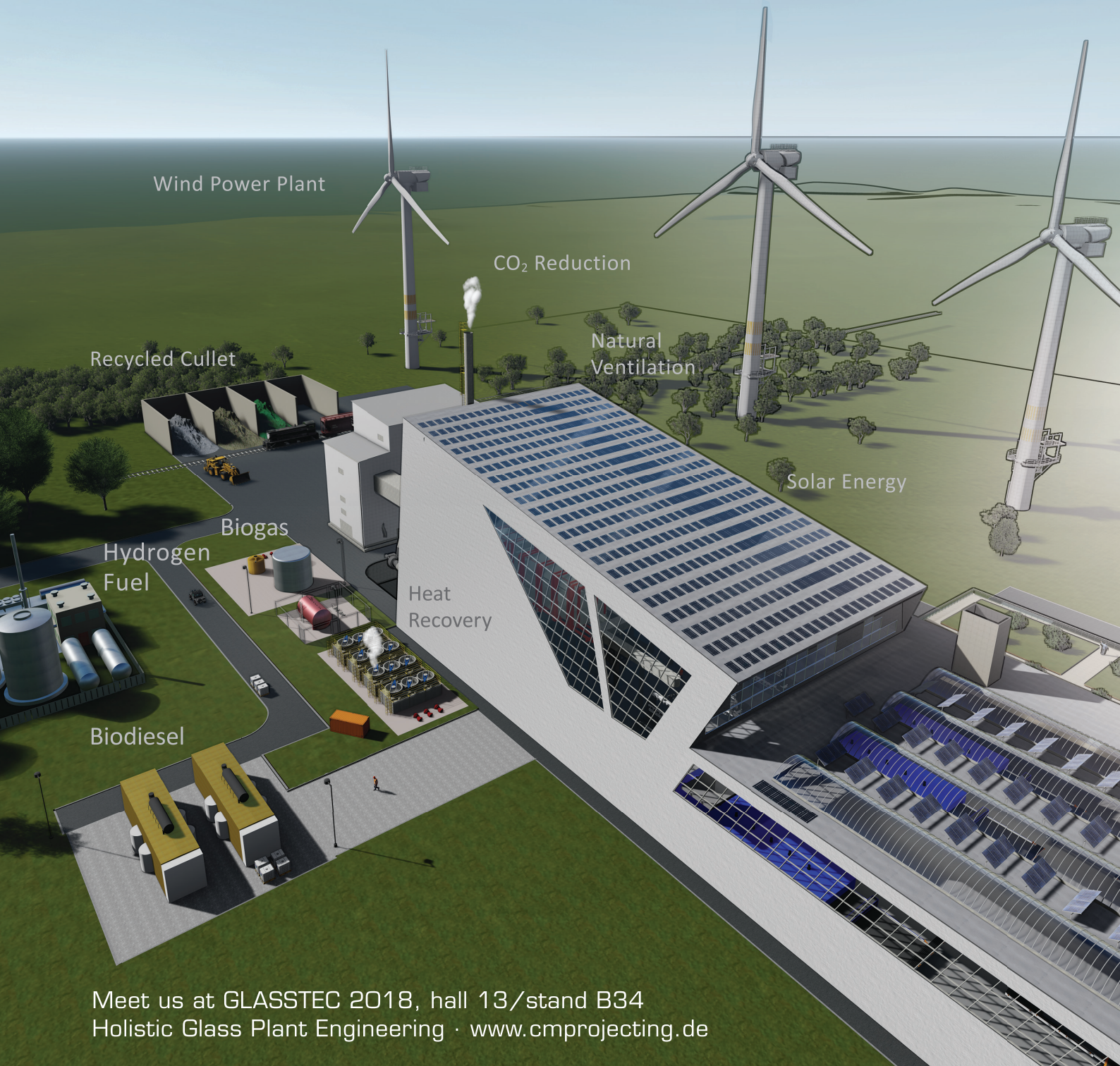
CO_2 Reduction meets Producers Needs



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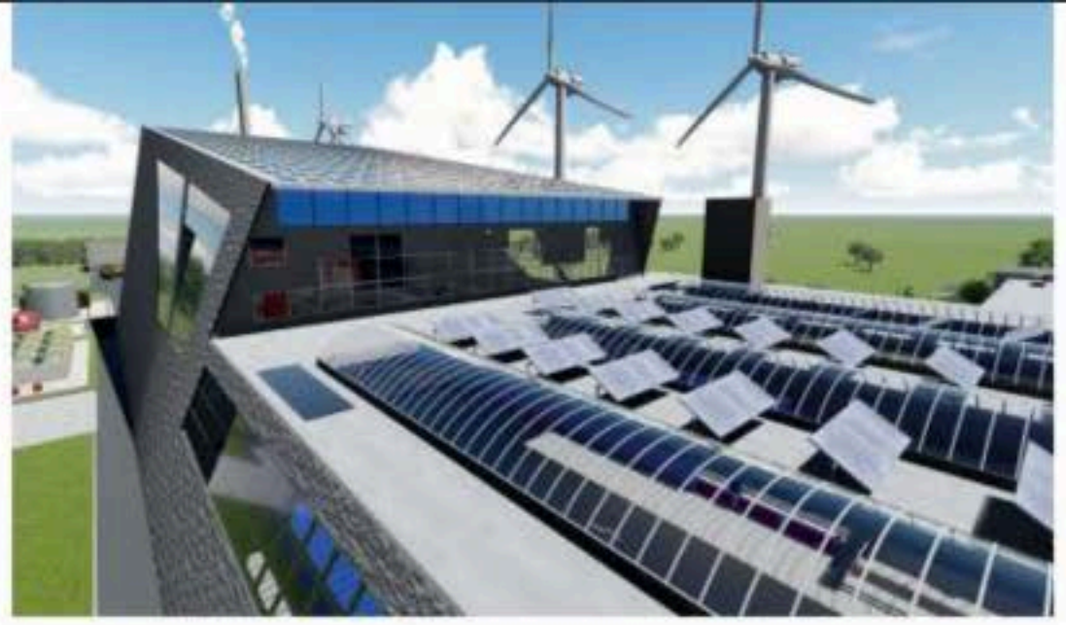

▲ Use of photovoltaic technology on roof structure.

▲ New energy supply concepts for glass production

energies. A first pilot plant for this process is already in operation and a large-scale industrial use is being tested.

Waste heat utilisation

The avoidance of fossil fuels represents an opportunity for CO_2 reduction, but the efficient use of existing energies also offers possibilities. By using the waste heat during the melting process, a heat exchanger system can be used to supply heat to office buildings or workshops, for example, so that no additional heat generators have to be installed. In addition, cold in the form of cold water can be generated from the waste heat by means of an adsorption chiller system.

This cold, in turn, can be used to cool and air-condition buildings, creating more pleasant temperature conditions for employees.

The waste heat utilisation could also be combined with an ORC process in which electrical energy is generated from the heat by means of a steam turbine.

Furthermore, the unused waste heat could be transferred to surrounding industries or private households instead of leaving this energy source unused.

The right strategy

The local and infrastructural conditions of a plant are always decisive for the use of these technologies. In regions with strong and constant wind, for example, the replacement of wind turbines makes sense, and in regions with many hours of sunshine per year, photovoltaic systems would be a conceivable investment.

In rural regions with a high share of agriculture, the use of biogas or biodiesel is worthwhile. The precise balancing of costs and benefits in terms of security of supply and availability is the key to rethinking in the industry.

Plant of the future

Although the path to CO_2-neutral glass production is still long, such approaches are already showing the first signs of success towards a plant of the future that combines production efficiency and environmental protection.

The combination of technologies and the testing of new avenues will bring progress to the industry and expand opportunities. Even if only partial aspects can be implemented, every reduction of the climate-damaging CO_2 is a benefit for the glass industry and the planet. ■

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MAVSA improves press machines

MAVSA produces complete press machine lines and high quality moulds for the glass container and tableware markets.

The Argentinian production line producer is highly experienced in parts manufacturing and production, as well as providing customers with reliable equipment and production knowledge.

The new technologies incorporated over the years has resulted in efficient applications at a high production speed and reduced electrical consumption to help the environment.

MAVSA is currently manufacturing the Servo Linear Take Out Mechanism and Servo Hydraulic Press Systems. This will result in more efficient mechanism mixing of commercial components for the big worldwide suppliers with High Level Electronics components.

The producer is also working with the technology supplier Siemens AG in Germany, offering a Direct Drive Technology 'Torque Motor', which will provide an alternative to the indexing of Press Machines, and continue to produce accurate Geneva Wheel and Quick Index 'Gear Driven' Table indexing systems.

It has also manufactured the successful Cold Test of Press Machinery for a Mexican customer.

MAVSA's products include a Quick Index GDS 16-30 Press Machine (Gear Driven Press), Special Delivery Equipment and a Special Fire Polisher with an indexing spindle for a European company, according to their requirements. The production line will produce Tumblers, Chopps and free Press Plates and bowls.

Special Delivery Equipment

Free Press Gob Delivery

- Automatic Gob Delivery System, especially for Free Press Production to centre the gob according to the ware shape and drawing.
- 11 Calibrated Regulations.
- Scoop-Through & Deflector: different sizes.
- Moving Funnel
- Stand Alone Installation.

MAVSA will be at Booth F63 (Hall 12) at glasstec 2018 in Düsseldorf, Germany.

▲ MAVSA MDP 24-34 Press Machine.