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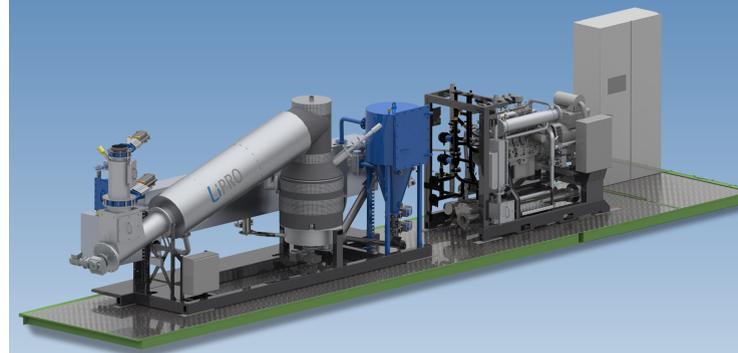
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LiPRO Wood-Gasification-CHP-Plant
Power and Heat from Woodgas



| LiPRO Energy GmbH & Co. KG | | | |
|--|--------------------------|---|---|
| LiPRO HKW Manufacturing, Sales & Contracting | | Decentralized energy supply Project- development Consulting | Biofuel Trading and Supply Consulting |
| LiPRO HKW Sales | LiPRO HKW Contracting | | |

LiPRO Wood-Gasification-CHP-Plant

The LiPRO Wood-Gasification-CHP-Plant is an innovative renewable energy conversion facility, which converts solid biofuel by the LiPRO staged gasification process through a thermo-chemical reaction into a combustible syngas. This generated syngas will be converted by a combustion engine into thermal and mechanical energy. The thermal energy will be used for local district heating purposes, the mechanical energy will be converted by an electric generator into electric power in the same step and same technical unit.



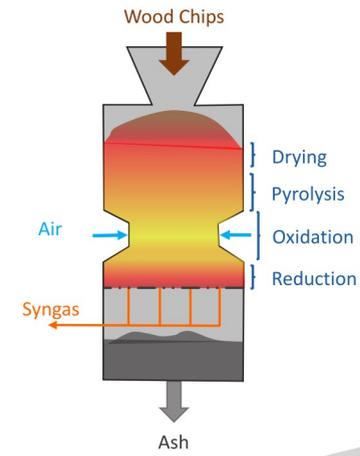
Technical Specifications of LiPRO CHP

| Description: | HKW 30 | HKW 50 |
|--|--------------------------|-------------|
| Nominal Electrical Output | 30 kW | 50 kW |
| Nominal Thermal Output | 60 kW | 90 kW |
| Engine hours / Year | 8.000 h | 8.000 h |
| Electrical Output / Year (at 8000h/a) | 240.000 kWh | 400.000 kWh |
| Thermal Output / Year (at 8000h/a) | 560.000 kWh | 720.000 kWh |
| Fuel Quality | P 45 | P 45 |
| Water Content [%] | < W10 | < W10 |
| Fuel Consumption/h | 22,5 kg | 37,5 kg |
| Fuel Consumption/a | 180 t | 300 t |
| Electrical Output Voltage | 400 V | 400 V |
| Frequency | 50 Hz | 50 Hz |
| Thermal Outlet Temperature | max. 90°C | max. 90°C |
| Thermal Inlet Temperature | max. 75°C | max. 75°C |
| Dimension Gasification Unit | 6.166 x 1.600 x 2.300 mm | |
| Dimension CHP Unit | 2.360 x 1.100 x 1.910 mm | |
| Dimension Control Cabinet | 1.200 x 500 x 2.200 mm | |

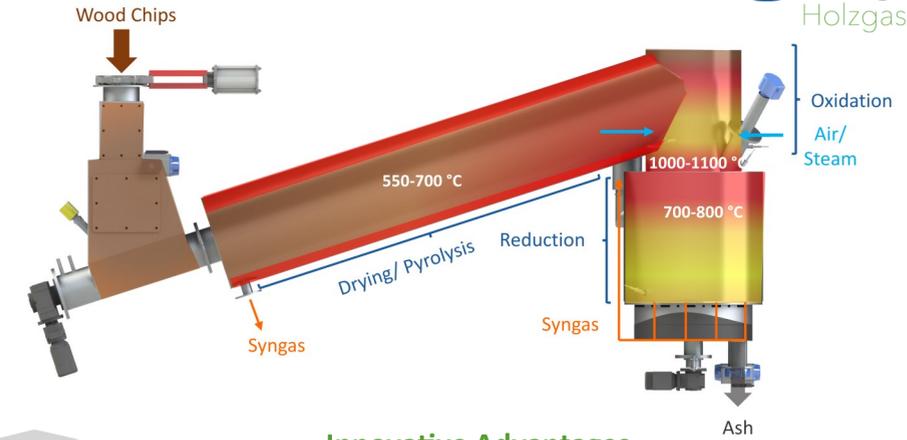
LiPRO Wood-Gasification-CHP-Plant with a multi-stage gasification process

The innovative LiPRO Wood-Gasification-CHP-Plant is a wood gasification plant with a multi-stage gasification process. The LiPRO gasification unit has individual technical separated process stages in order to control individually but fully automated the single process-specific conditions of individual reactions. This ensures the production of most clean and tar free syngas and due to that, the most reliable plant performance.

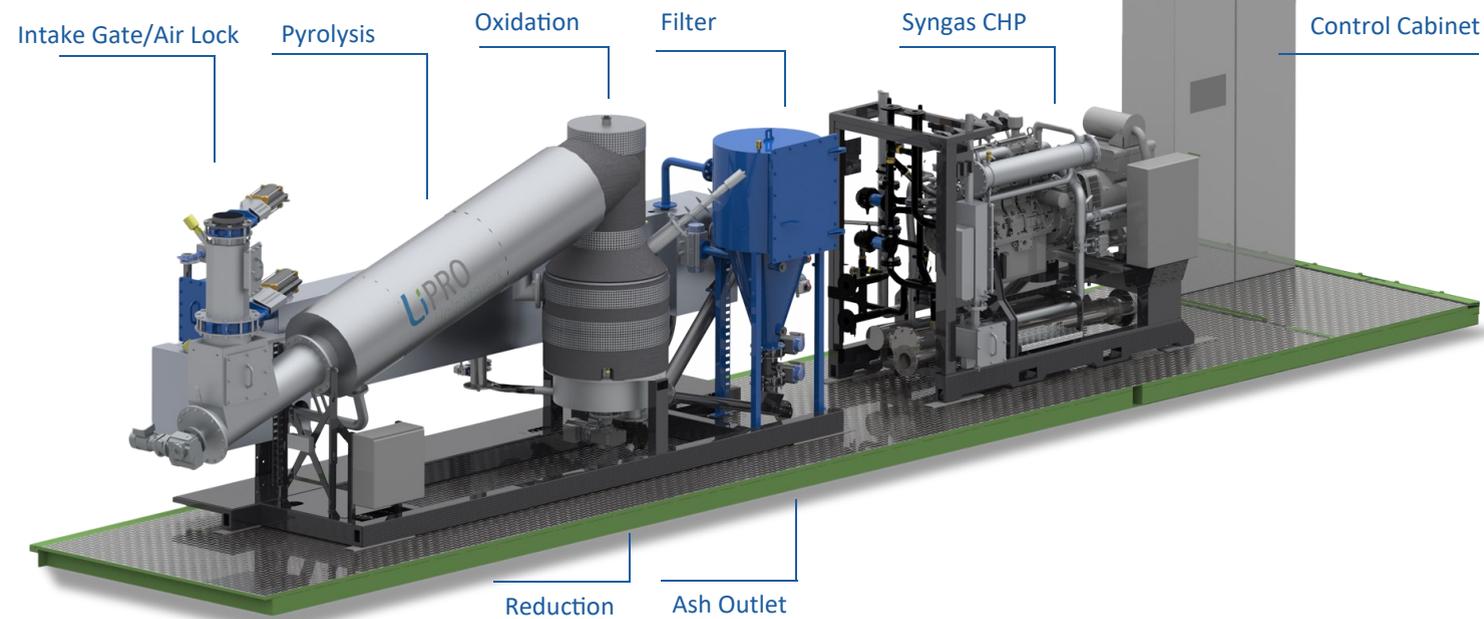
Conventional Downdraft Gasification



LiPRO Multi-Staged Gasification



LiPRO
Holzgaswerk



Innovative Advantages

- ◇ After *Pyrolysis*, the long chained carbon hydrogen molecules get partly oxidised in the *Oxidation* to avoid tar in the syngas. Under the absence of solid fraction, while the charcoal goes straight into the *Reduction* unit, we are able to guarantee a homogeneous combustion on high and equal temperatures around 1050 °C. This ensures continuous production of high quality clean syngas, which can be used in combustion engines without complicated purification.
- ◇ Further advantages consist in the separated *Reduction* and its geometry. This allows consistent lower temperatures to avoid glass ash formations
- ◇ The innovative grate geometry allows an easy discharge of foreign materials such as stones or nails.

