



DECARBONIZATION MASTER PLANNING

TAILORED TO OUR CLIENTS NEEDS

Stork has been advising clients on how to decarbonize for decades, but often hidden under the 'how can we help give you higher energy efficiency = lower OPEX' banner. However, with CO2e taxes becoming a sizable OPEX, focused asset decarbonization road mapping is becoming a necessity for our clients.

Our overall aim is to assess the existing facility and organization, discuss aspirations and then help the client identify the right emission reduction opportunities. This includes development of sound business cases.

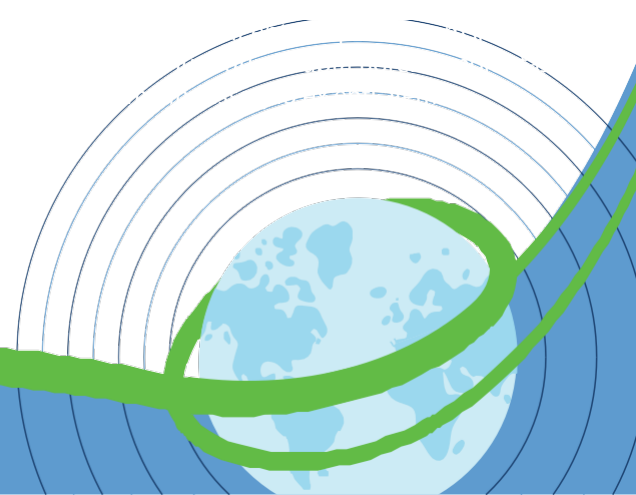
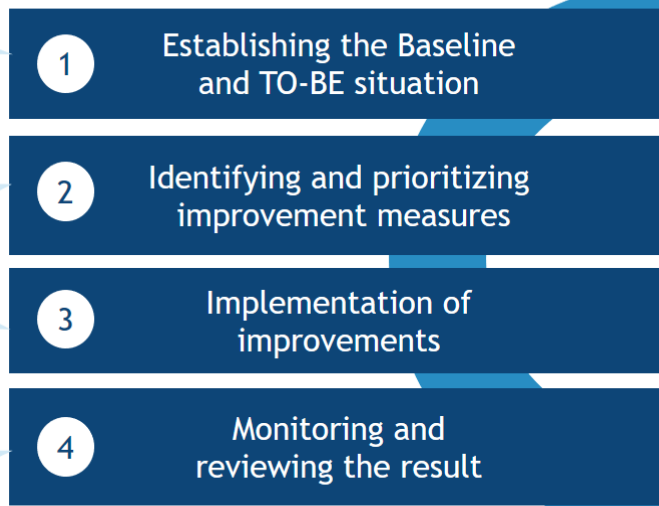
A SUSTAINABLE ROADMAP

Stork's AMT group has formalized a **Decarbonization Master Planning** offering to help clients make a roadmap to help sustainably reduce the carbon footprint of a client's asset.

It is a 4-step process:

1. Establish the baseline (as-is) and to-be situation
2. Identify and prioritize improvement measures
3. Implement improvements
4. Monitor & review results

- Energy value stream mapping
 - Energy audit (ISO 50002 & EN 16247)
 - Energy Management System evaluation (ISO 50001)
- Compliance check
 - Criticality and risk analysis
 - Energy reduction roadmap
 - Technical assessment
 - LCC and business case analysis
 - Asset Investment Portfolio
- Better energy housekeeping
 - Renewable energy sources
 - Energy 4.0 solutions
 - Energy-efficient technologies
 - Process and installation redesign
- Energy Performance Indicators (EnPI)
 - Monitoring EnPI's
 - Energy Management System software
 - Benchmarking
 - GRI reporting (302 - Energy)





DECARBONIZATION MASTER PLANNING

These steps can be applied to look at the client situation from the following **3 angles**:

1. **Energy Value Stream Mapping:** by looking at energy streams in an asset provide a first assessment of opportunities
2. **Energy Performance Audit:** based on the insights of the EVSM, extra attention can be given to the critical parts of a client installation at the equipment / installation level in line with EN-16247-1:2012 or ISO 50002:2014
3. **Energy Management System Audit:** besides above more technical approaches, the organizational part is of importance to embed energy management and decarbonization into client org. So this third approach is useful to obtain a broader view on getting the proper processes in place for continuous improvement and managing these processes aligned with the ISO 50001:2018 on energy management

RECENT EXAMPLES DECARBONIZATION ADVISORY SERVICES:

PAPER FACTORY

Paper factories tend to have highly fluctuating steam demands. In order to ensure sufficient steam supply, the local boilers/CHP plants are usually operated at loads above the required steam flow. Excess steam is usually vented or condensed in air cooled condensers resulting in multiple MW's of heat being rejected. Stork assessed their situation and advised to install a steam accumulator that can store this excess heat and release it during demand peaks. As a result, the steam generation plant can now run at lower loads without jeopardizing reliable steam supply to the paper mill. Other applications of the Stork Steam Accumulator also show reduction in losses of 80 to 100%.

UNIVERSITY

A university needed a steam source for heating water as well as other processes. Stork assessed (and provided) them with a steam boiler which supplies both steam and hot water from the boiler directly. This solution reduced the amount of carbon emitted for the heat demanded by about 15%

POWER STATION

A 400MW power station wanted to reduce their startup time. Starting up is a very carbon-intensive phase with no usable electricity being delivered. Stork assessed the whole steam circuit and the subsequent Stork-engineered upgrade resulted in the startup time to full load being reduced by a factor 4. The station is now capable to

