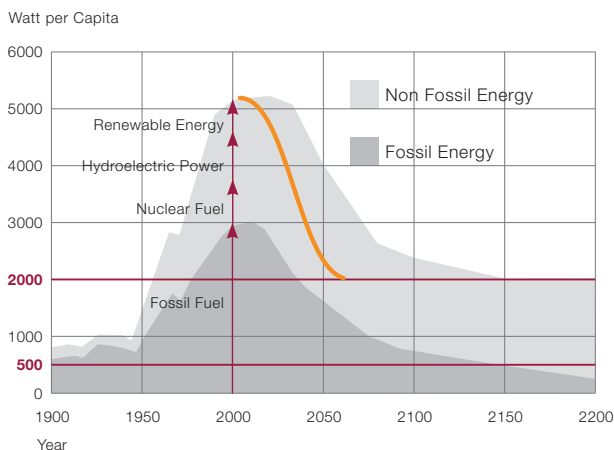


Energy Efficiency: Integrating Potentials

4
5

Sustainable long-term Strategies to reduce CO₂ Emissions

CO₂ is the most important of all climatic gases. Therefore, sustainable long-term strategies of most countries focus on reducing CO₂ emissions that directly relate to burning fossil fuels. Such strategies include extensive savings in energy consumption and commodities while, at the same time, require continued expansion of renewable energies. The correlating terminology that the Swiss Federal Council uses in his "Strategic Paper for sustainable long-term Development 2002" reads as follows: "Our scenario for the 2000-Watt-Society shows our objectives for sustainable energy and climate related policies that include reducing the greenhouse effect (primarily CO₂) to 1 ton/capita and a change in energy supplies to 500 watt/capita from fossil fuel and 1500 watt/capita from renewable energy sources. The Federal Council endeavors to achieve those targets within the coming decades."



— Reduction – Technical Potential

It is a challenge for the industry to participate in good time to achieve those objectives. The Hybrid Cooling Ceiling is continuously embedding energy savings possibilities:

- **Water as Cooling Medium**
Cooling water to cool 80% of a room
- **Using the Building Mass**
One third of the energy is temporarily stored and converted at night
- **High Temperature of Cooling Water**
18 °C (16–20 °C)
- **Requirement dependant Control**
Relative to quantity and VVS interface without system restrictions
- **Switching from Heating to Cooling without Loss of Energy**
Quick response ability to thermal loads
- **System Response Time (Fixed Time Values)**
Same as with cooling ceilings
- **Thermal Exchange at High Level Radiation**
Room air temperature is 1–2 K above the (perceived) room temperature
- **Free Cooling**
Surplus operating hours with free cooling (CO₂ free energy supply)



**Hybrid Cooling Ceiling compared with
Conventional Cooling Ceiling Systems (VVS-System)**

	VVS-System	Cooling Ceiling	Hybrid Cooling Ceiling
Electric Energy 550 g CO ₂ /kWh	29.1 kWh/m ² a 16 005 g CO ₂ /m ² a	19.8 kWh/m ² a 10 890 g CO ₂ /m ² a	9.0 kWh/m ² a 4 950 g CO ₂ /m ² a
Heat Energy 200 g CO ₂ /kWh	27.5 kWh/m ² a 5 500 g CO ₂ /m ² a	6.3 kWh/m ² a 1 260 g CO ₂ /m ² a	2.7 kWh/m ² a 540 g CO ₂ /m ² a
Total	21 505 g CO ₂ /m ² a	12 150 g CO ₂ /m ² a	5 490 g CO ₂ /m ² a

The annual reduction in CO₂ emission at
10 m² floor space allocation per capita

**The Hybrid Cooling Ceiling
in comparison to the Cooling Ceiling**
66.6 kg/a CO₂

**The Hybrid Cooling Ceiling
in comparison to the Conventional Systems**
160.2 kg/a CO₂