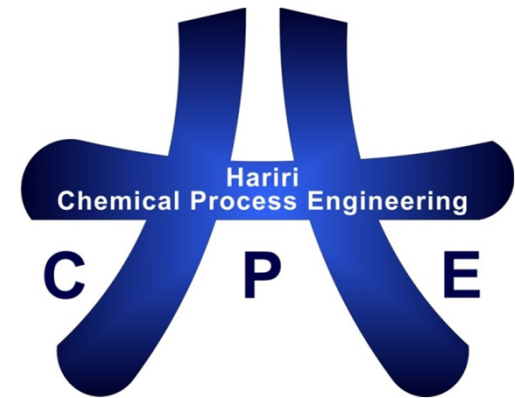


DHRS **Dynamic** **Heat Recovery System**



Hariri Chemical Process Engineering (H-CPE)

Hauptstrasse 6, 4402 Frenkendorf, Switzerland

www.h-cpe.com

DHRS, Target



- Save Cost using DHRS to recover 1-50 TJ/year
- Use **DHRS to Reduce:**
 - Gasoline / LPG / NPG / NG consumption by **min. 50%**
 - CO₂ emission → related Tax charges
 - Cooling Water consumption
 - Steam consumption
- Produce saturated steam (e.g. 3-6 barg)
- Supply required demand any time at required conditions

DHRS

DHRS, Applications

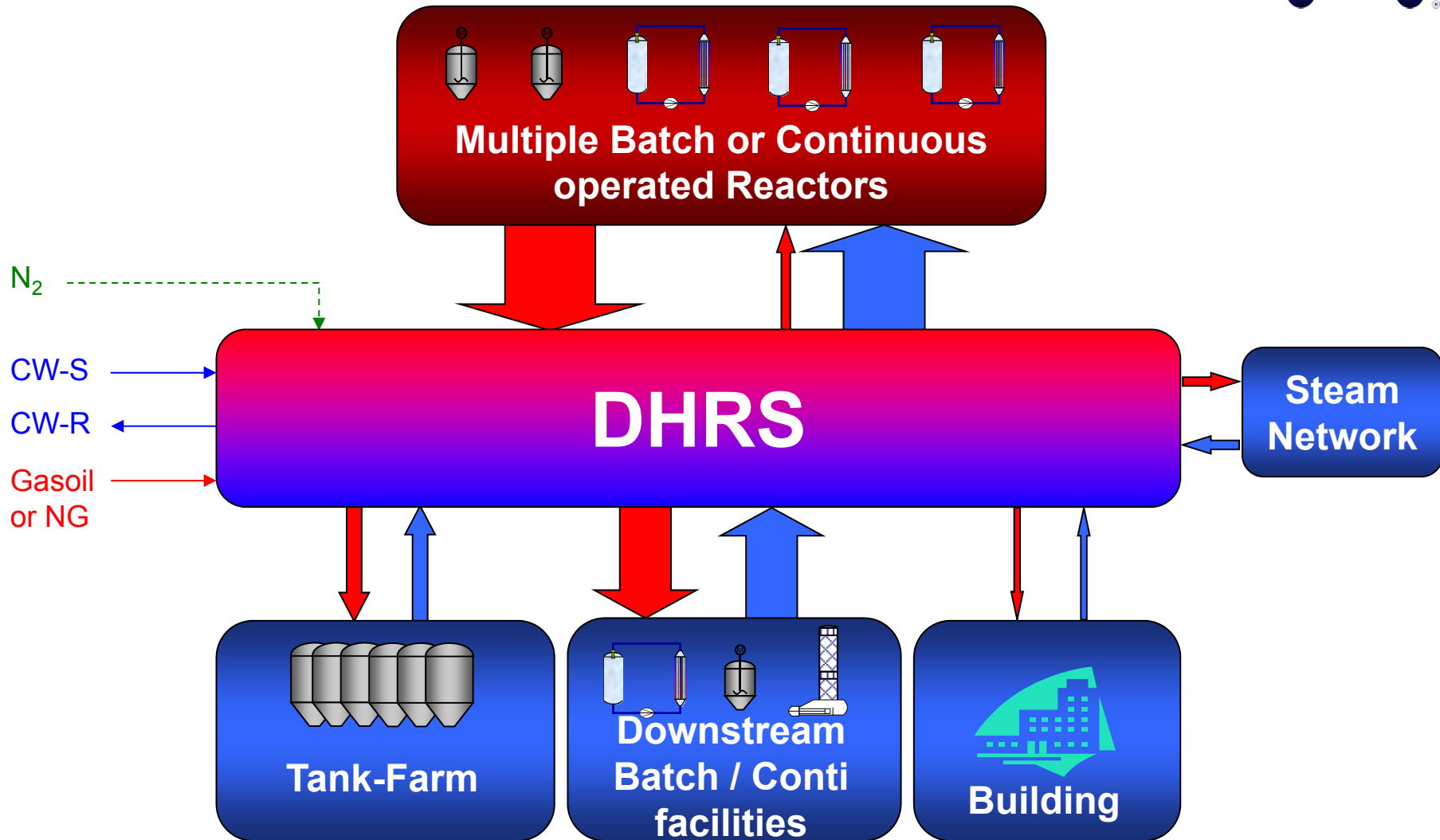
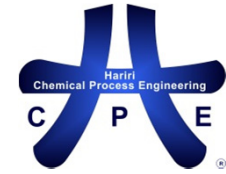


Designed for:

1. Exothermic Multi-Batch and/or continuous operated reactors. **Examples:**
 - Hydrogenation
 - Ethoxylation
 - Oxidation
 - Chlorination
 - Phosgene Production
 -
2. Heat Recuperation from hot source without reactive background.

DHRS

DHRS: Heat Distribution in conjunction with up- / downstream facilities



DHRS

DHRS characteristics



- Fully automated utility system (Steam & cooling water)
- Heat storage from multiple batch operated reactors during the phase of reaction and cooling,
- Supply required heat during the heating phase of the corresponding reactors,
- Excess Heat to be used for boundary infrastructure:
 - Tank-Farm
 - Downstream distillation columns
 - Downstream endothermic reactors
 - Production of saturated steam within DHRS, supporting the low pressure steam (e.g. 3 barg) network
 - Building during appropriate season

DHRS

Example:

DHRS Interaction with up- & downstream facilities

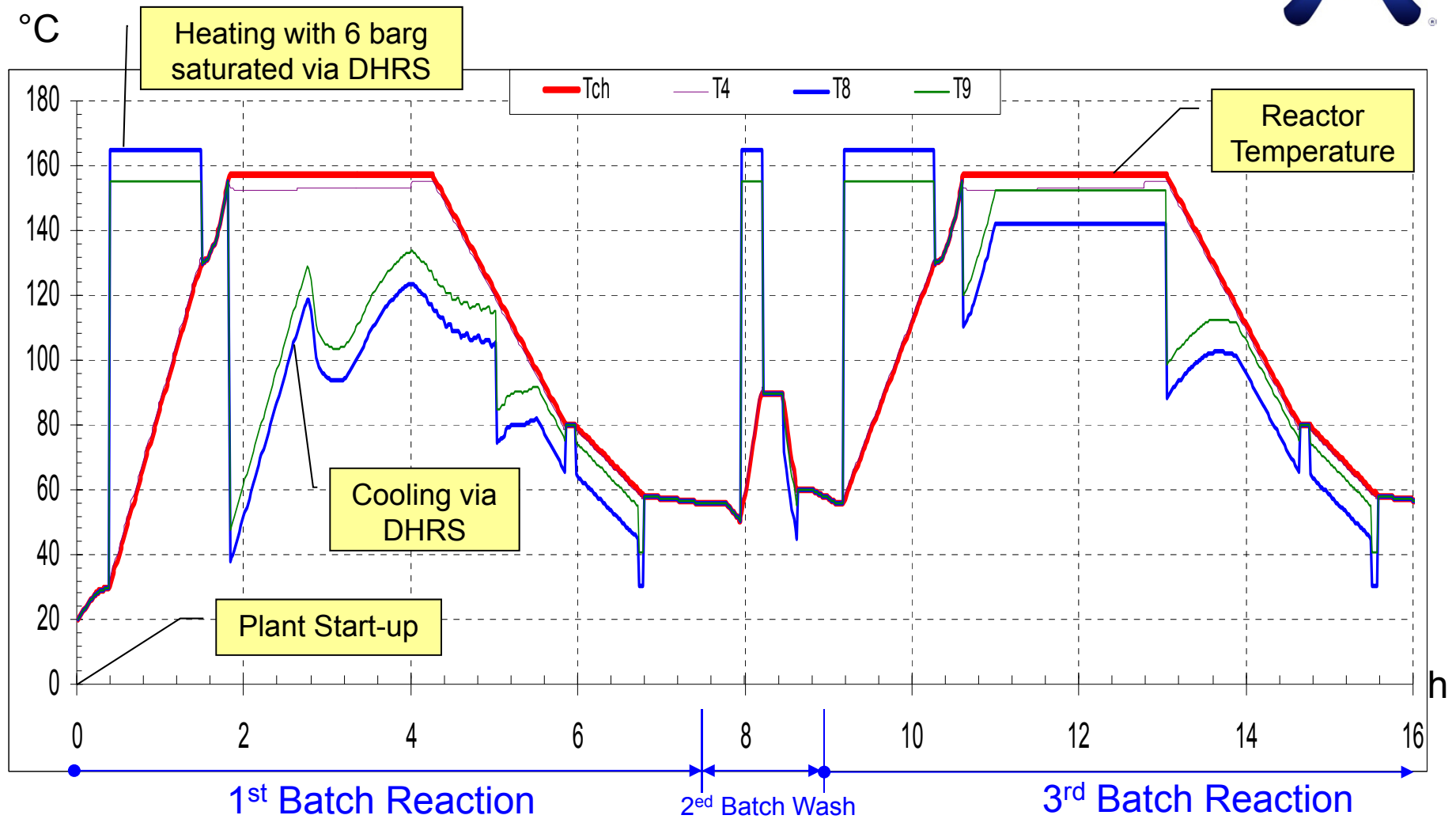


Plant Containing:

- 3 Batch operated Reactors,
- Tank-Farm containing 12 Tanks,
- 1 down stream distillation column,
- 1 down stream endothermic reactor,
- Building heated during appropriate season.

DHRS

Example: Reactor 1, Batch Temp. profile

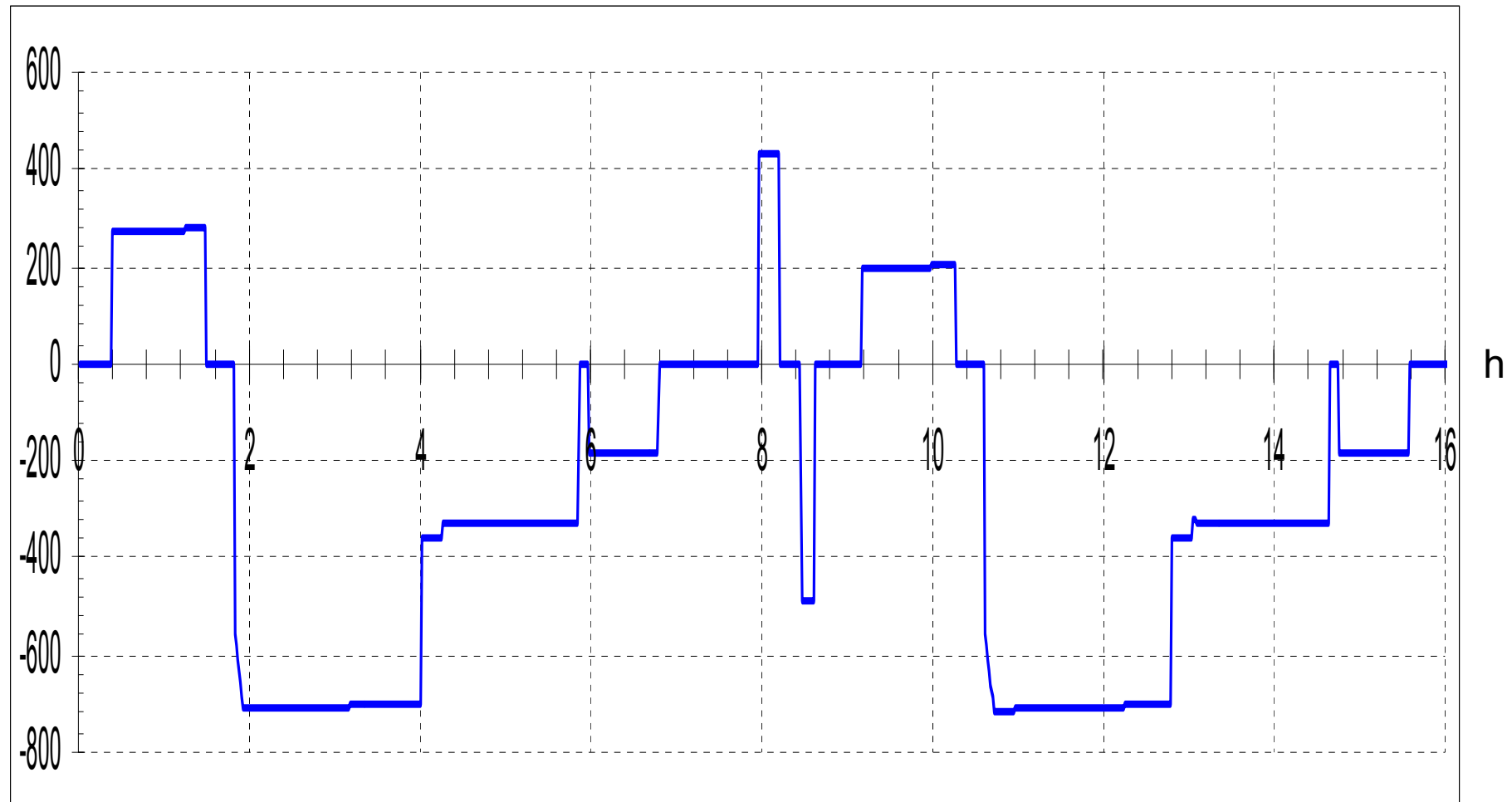


Example: Reactor 1, Batch Heat & ↓Energy profile



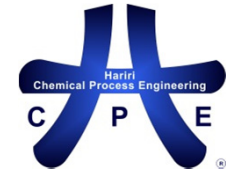
kW

+ Heating / - Cooling



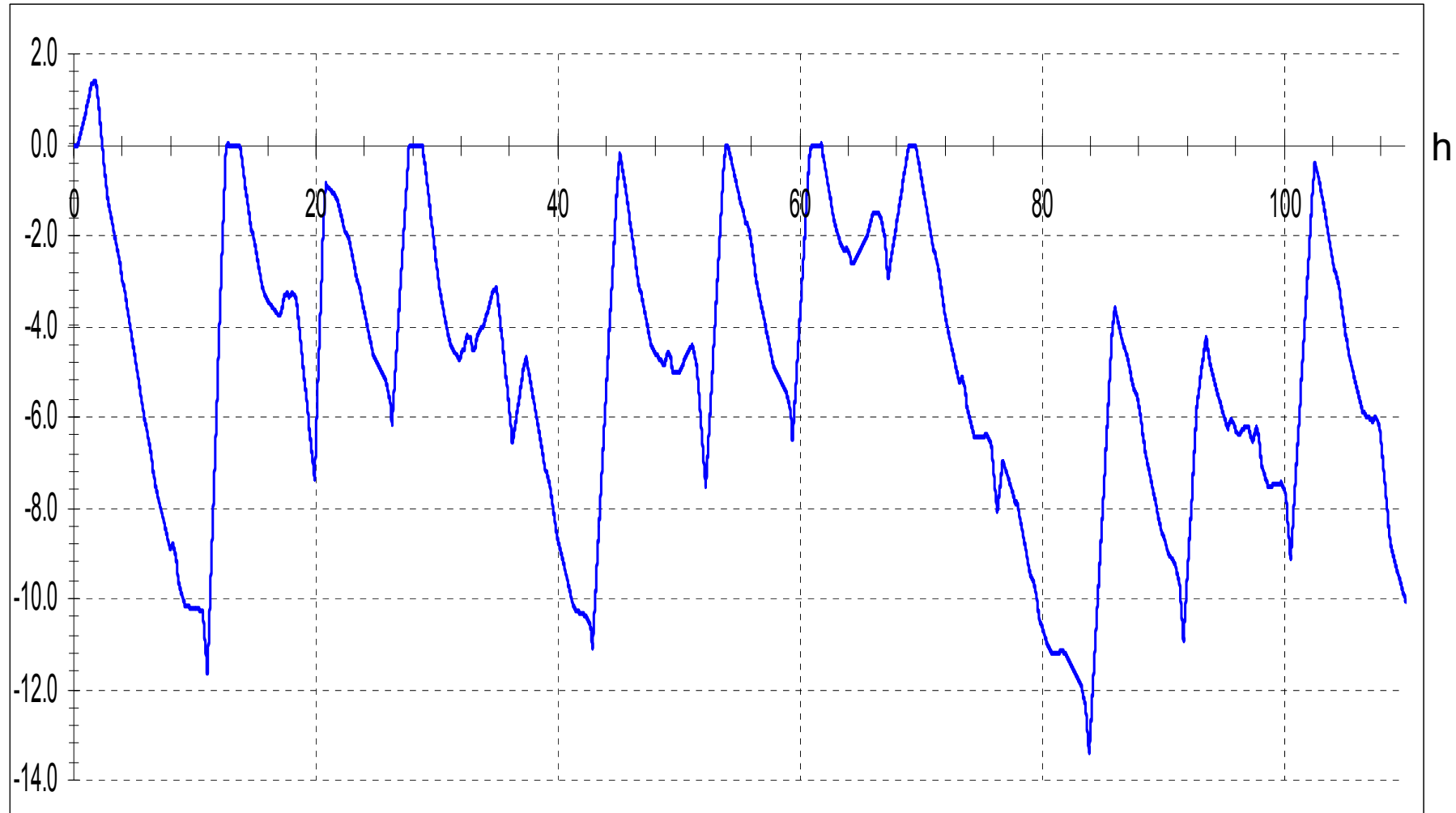
DHRS

Total Plant Heat Balance with DHRS



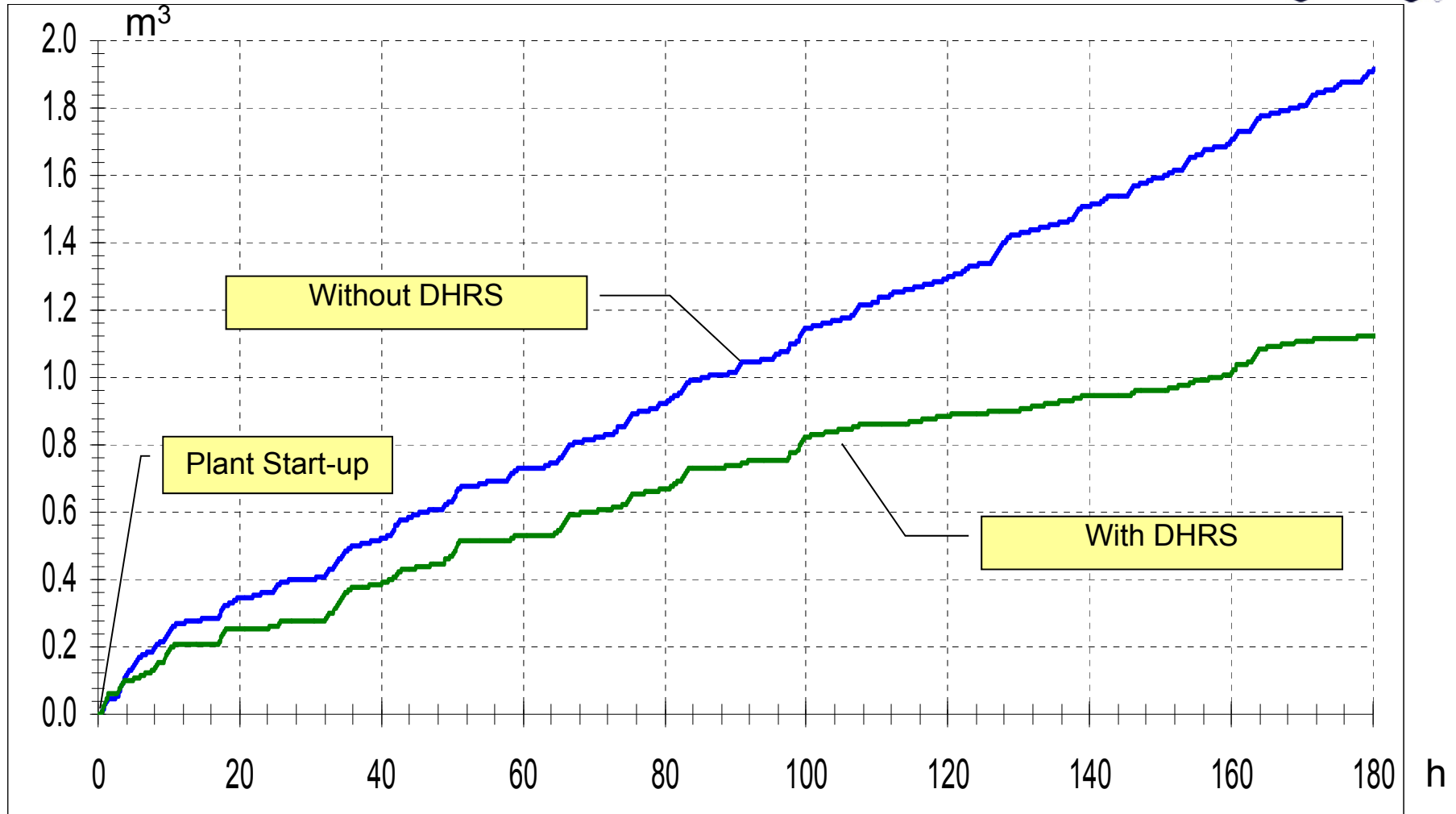
GJ

+ Required Heat / - Excess Heat

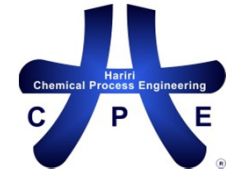


DHRS

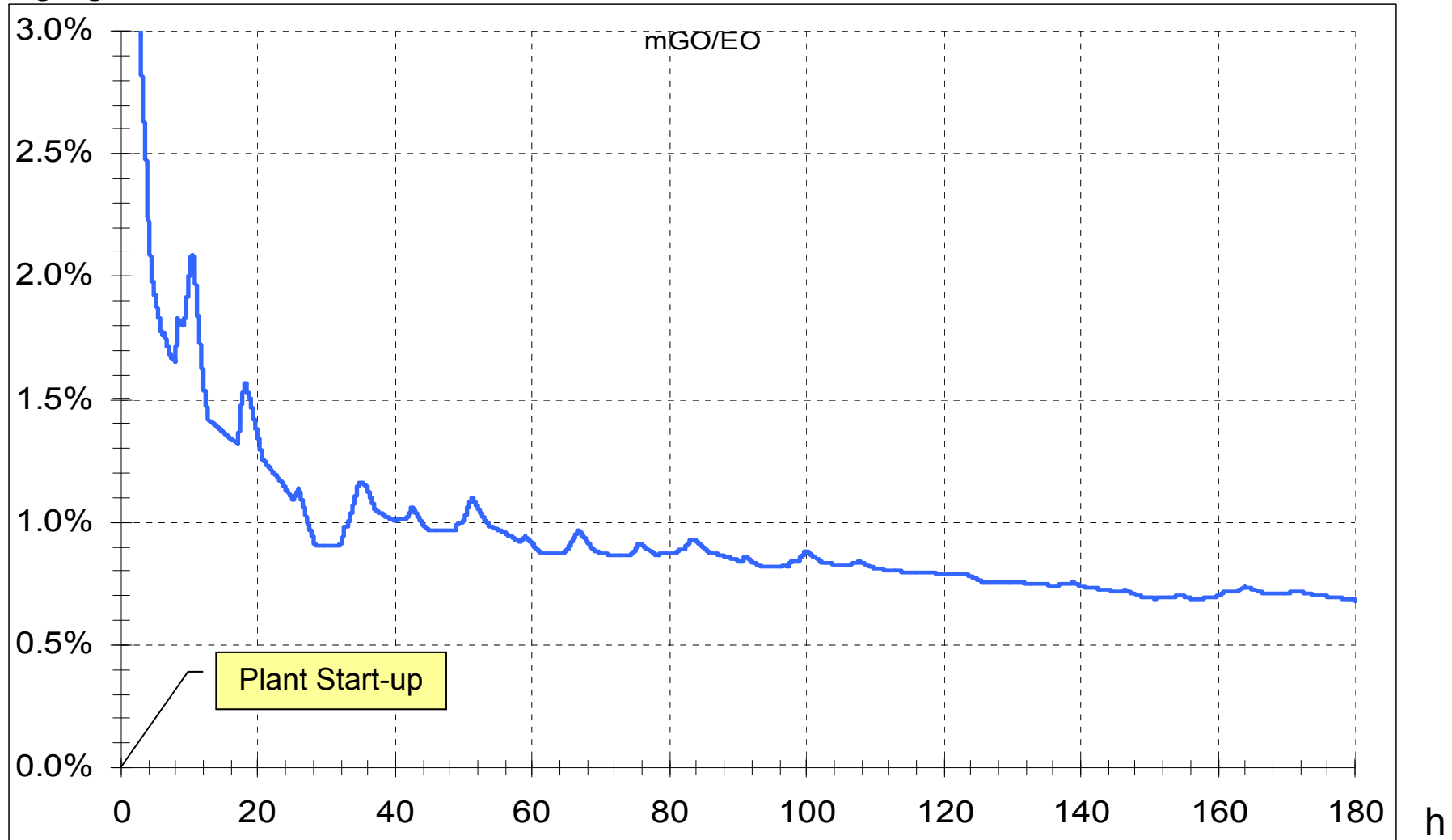
Plant Gas-Oil consumption, 180 hours



DHRS: $m_{\text{Gas-Oil}} / m_{\text{EO}}$ [kg/kg]

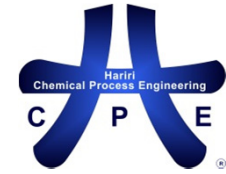


kg/kg

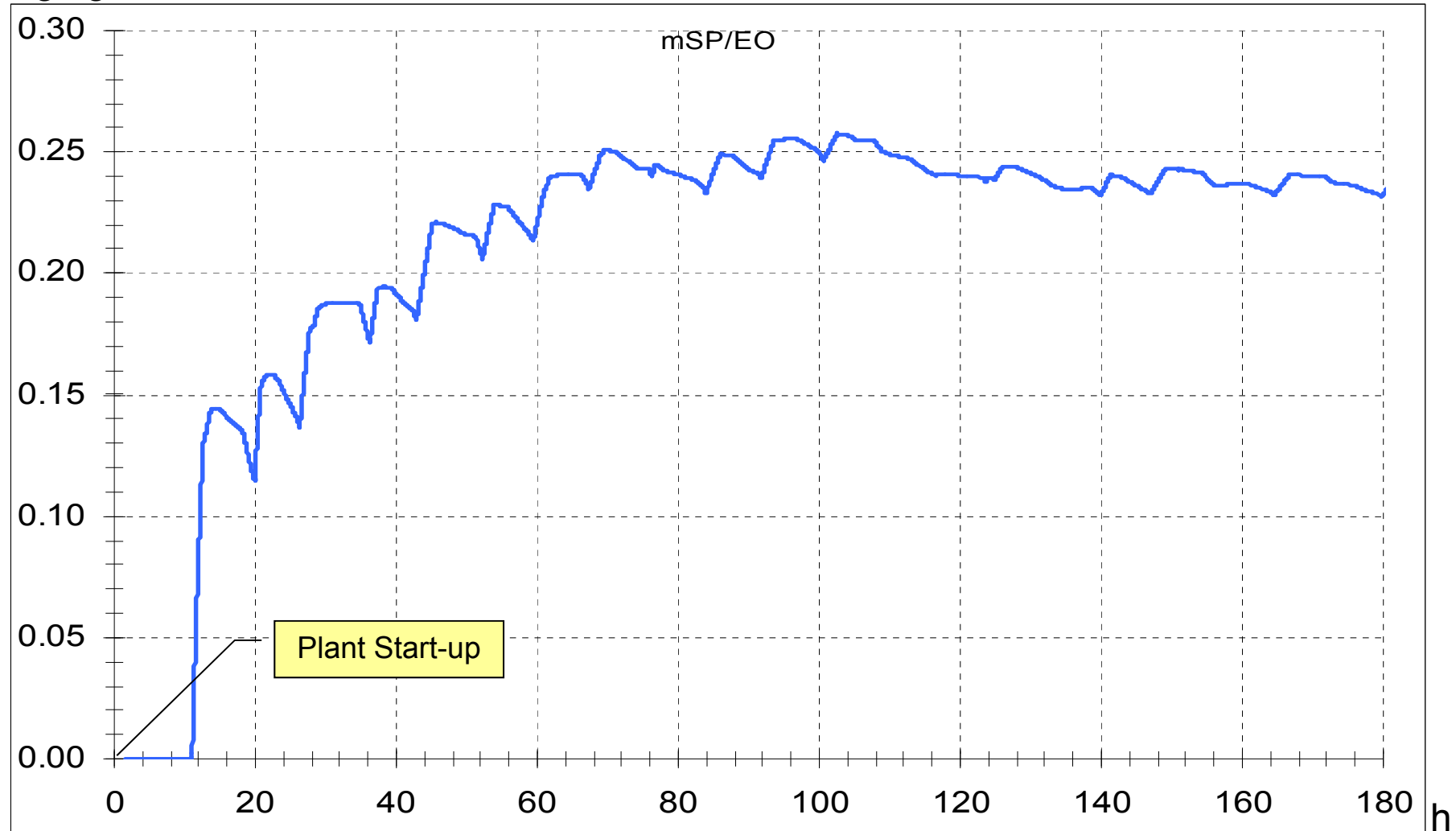


DHRS

DHRS: m,Steam production / m,EO



kg/kg



DHRS

Total Saving using DHRS

