

Experience from the commissioning of Andasol 3



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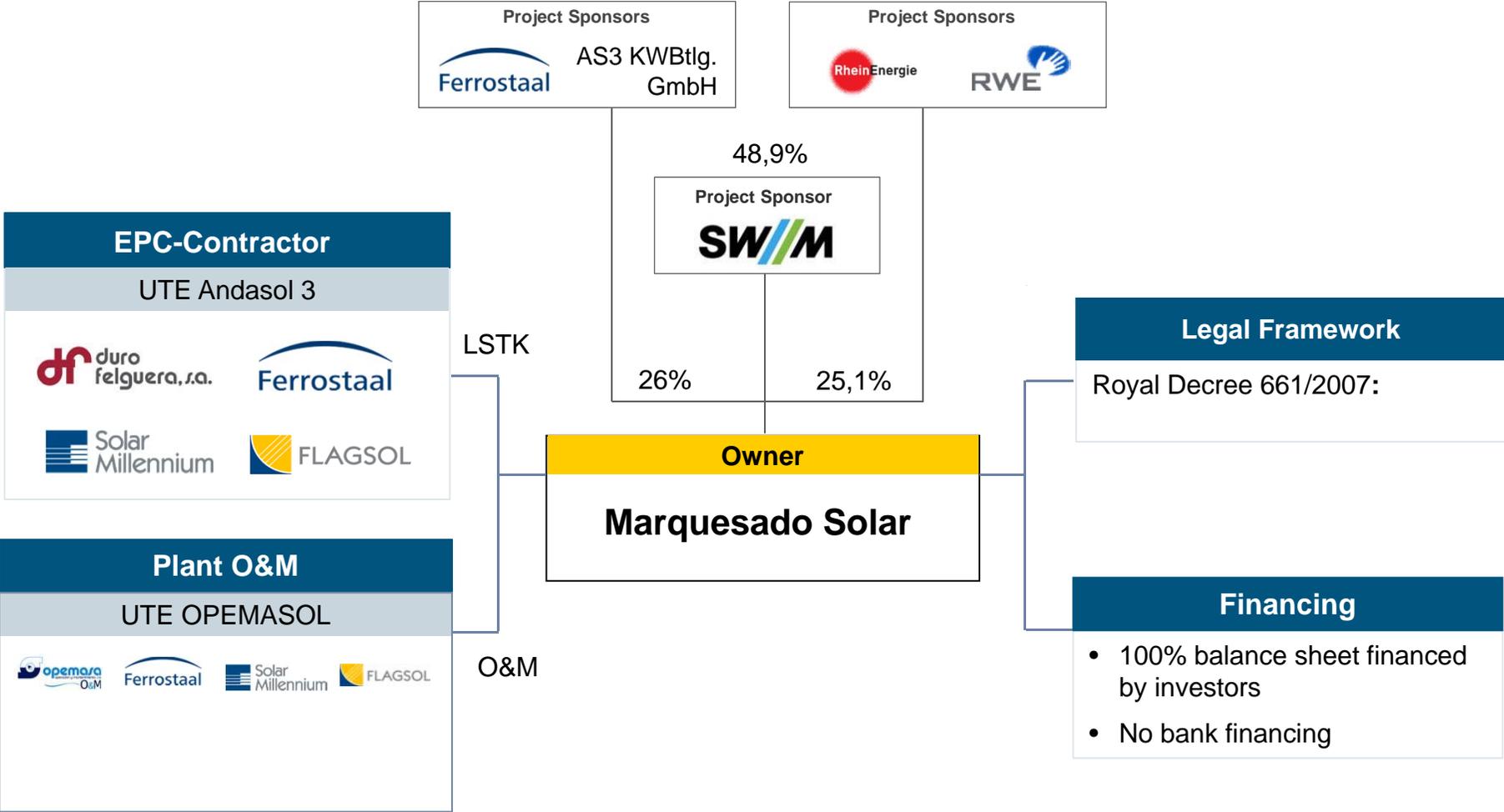


- (1) Project Structure / Plant Overview
 - (2) Different Project Phases
 - (3) TOP
 - (4) Partial Commissioning
 - (5) Commissioning of SF
 - (6) Commissioning of TES
 - (7) Further Key Commissioning Milestones
-

Project Structure

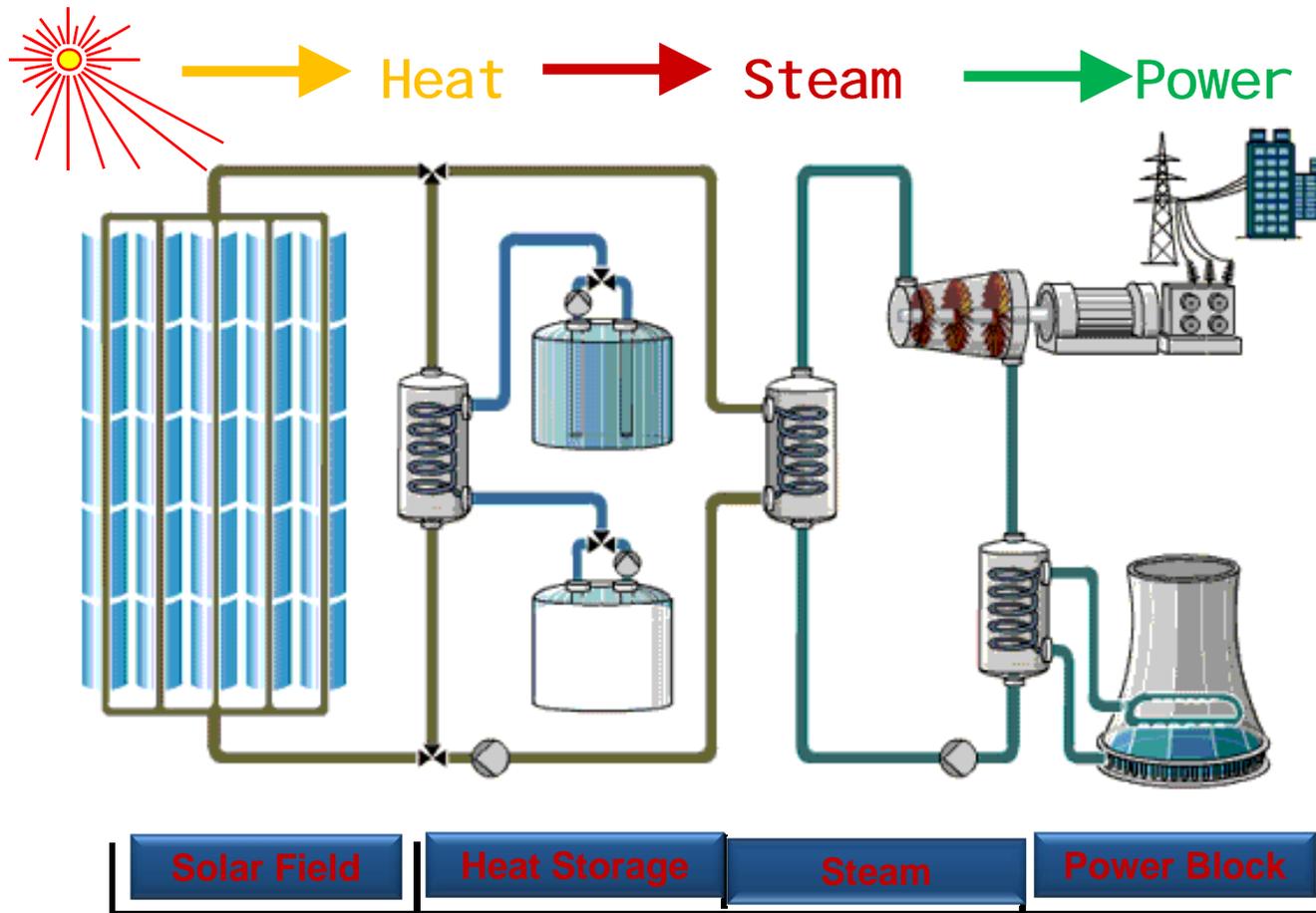


Investment of foreign strategic investors:

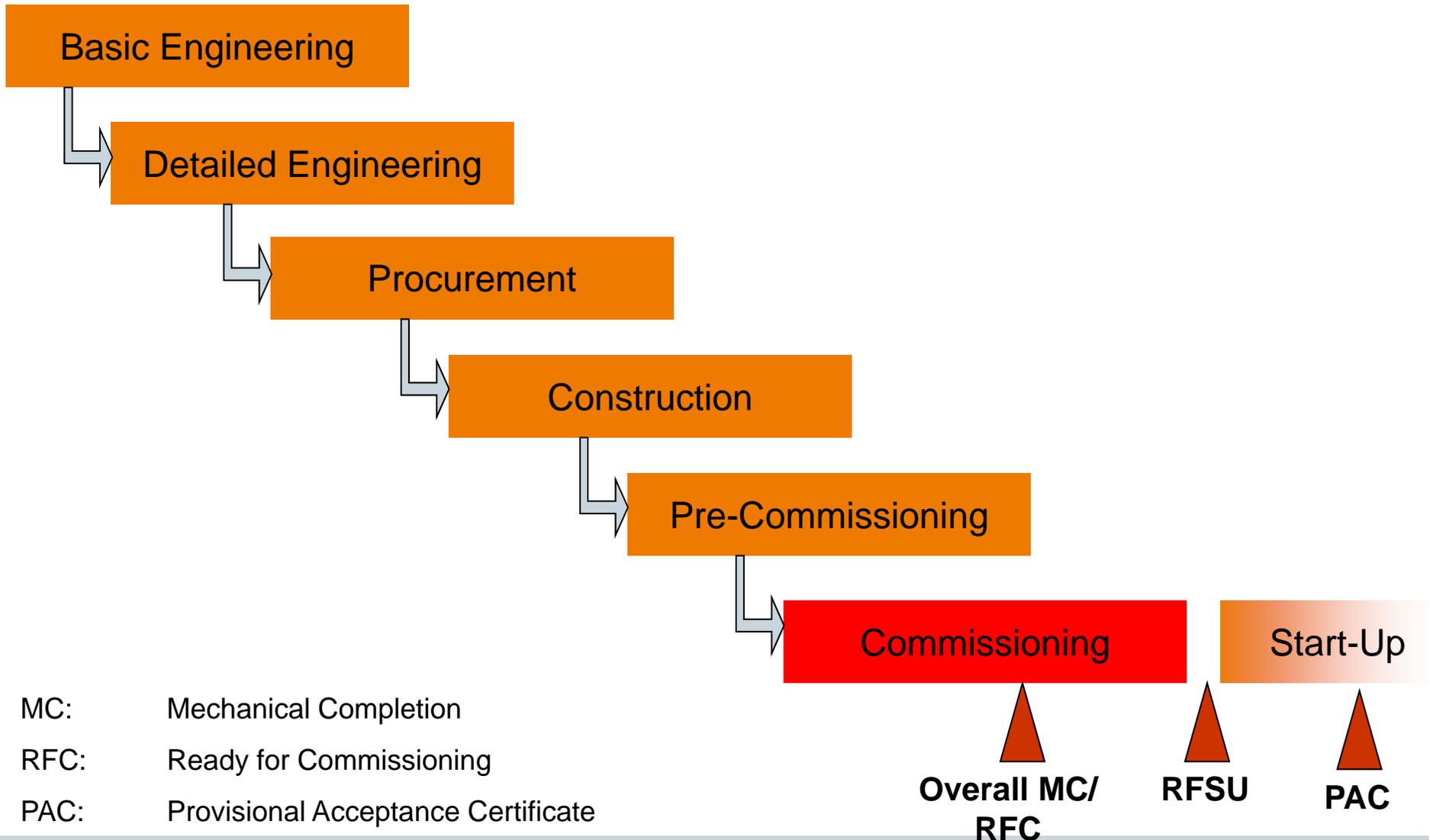


Plant Overview

ANDASOL³

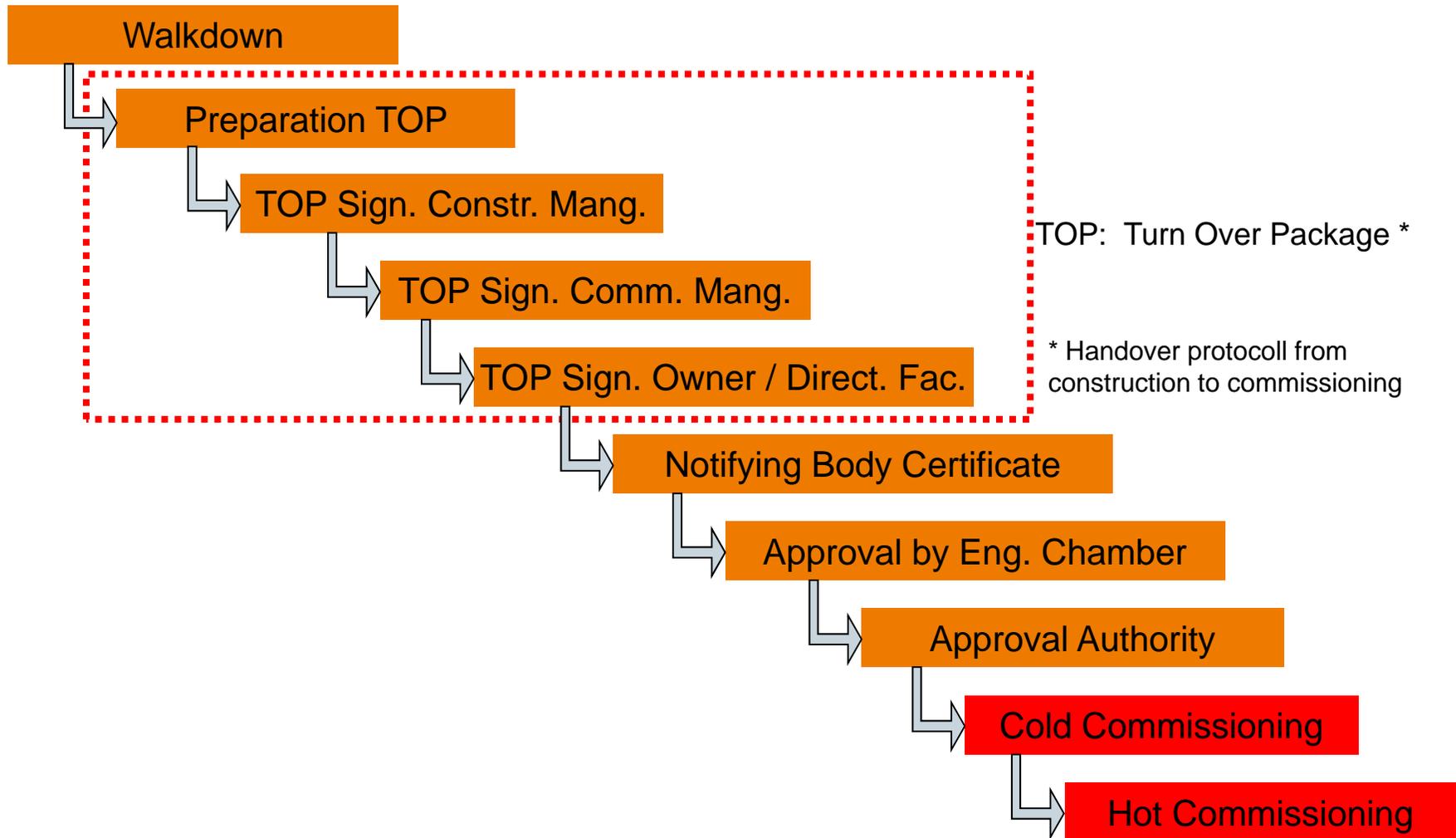


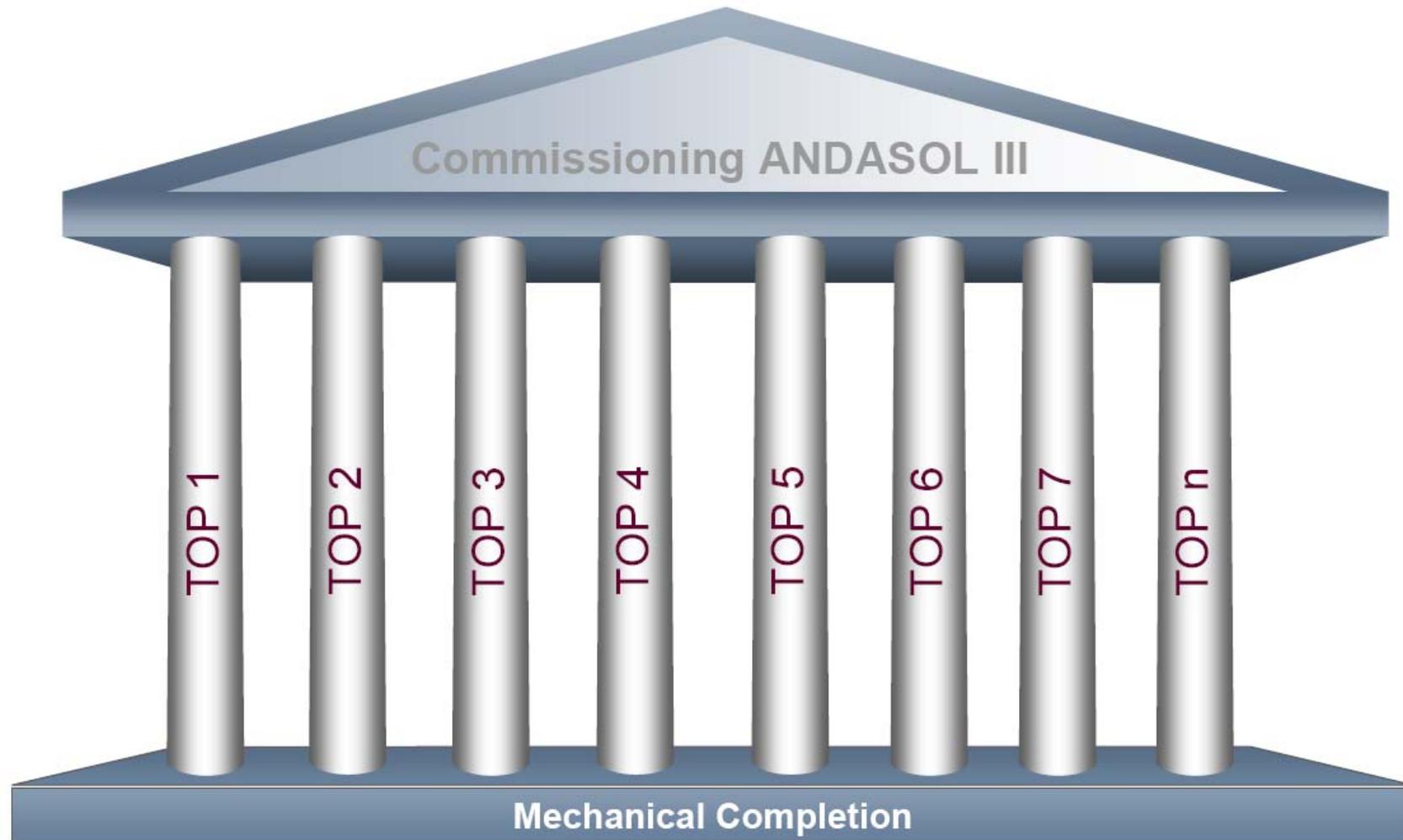
Project Phases



From Pre-Commissioning to Hot Commissioning **ANDASOL³**

Pre-Commissioning





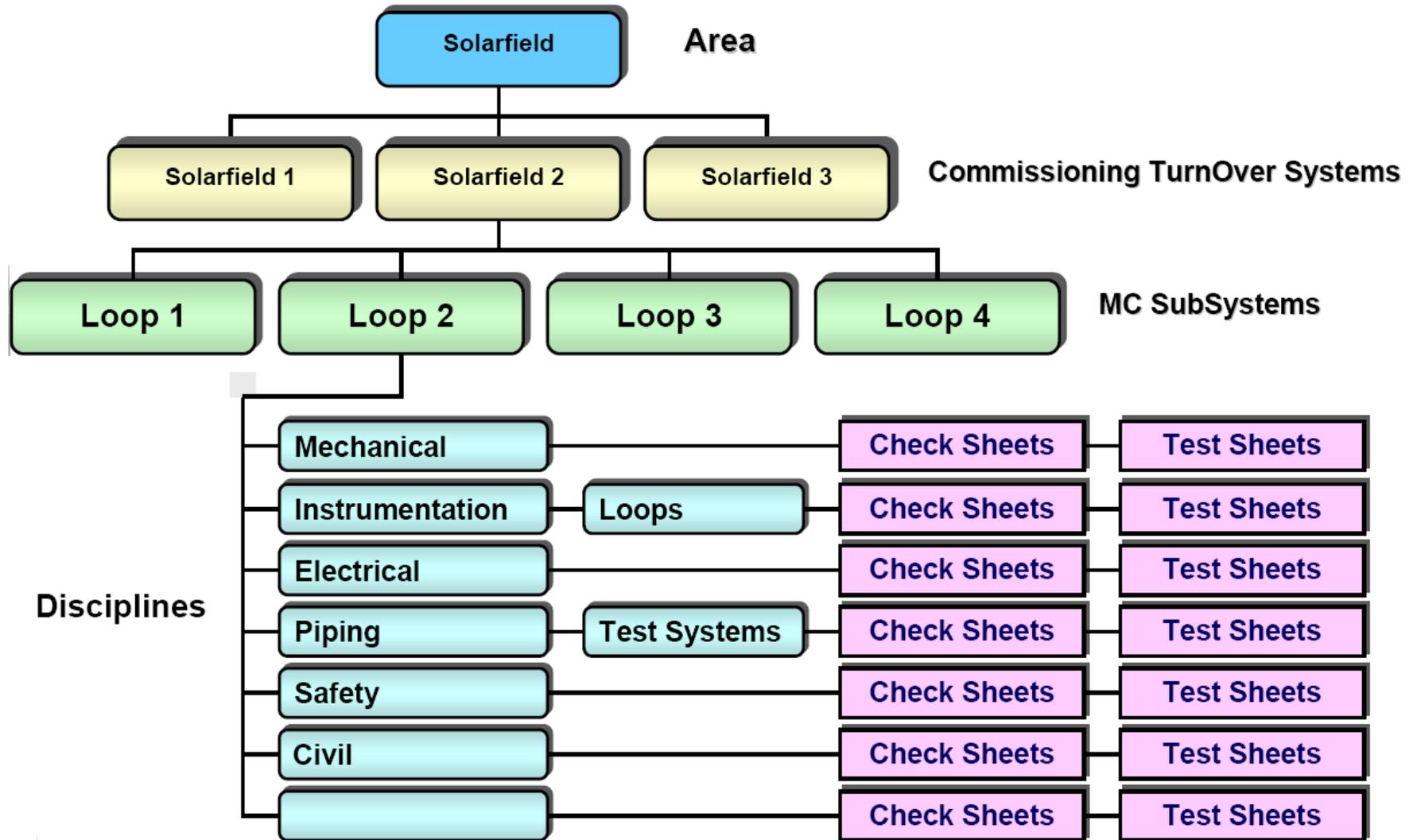
Example TOP Status Summary



DATE: 07-jul-11

 ANDASOL 3						
TOP STATUS SUMMARY						
CODE	TOTAL	WALKDOWN	CONSTRUCTION SIGNATURE	COMMISSIONING SIGNATURE	DELIVERED INDUSTRY	CLIENT SIGNATURE
E	48	45	45	44	42	33
BOP	25	25	25	23	25	0
TES	5	5	5	5	5	1
HTF	4	4	4	4	4	2
PB	29	29	29	28	29	12
SF	13	13	13	13	13	13
	124	121	121	117	118	61
TOTAL		97,58%	97,58%	94,35%	100,00%	49,19%

System Breakdown Structure for Solar Field Commissioning

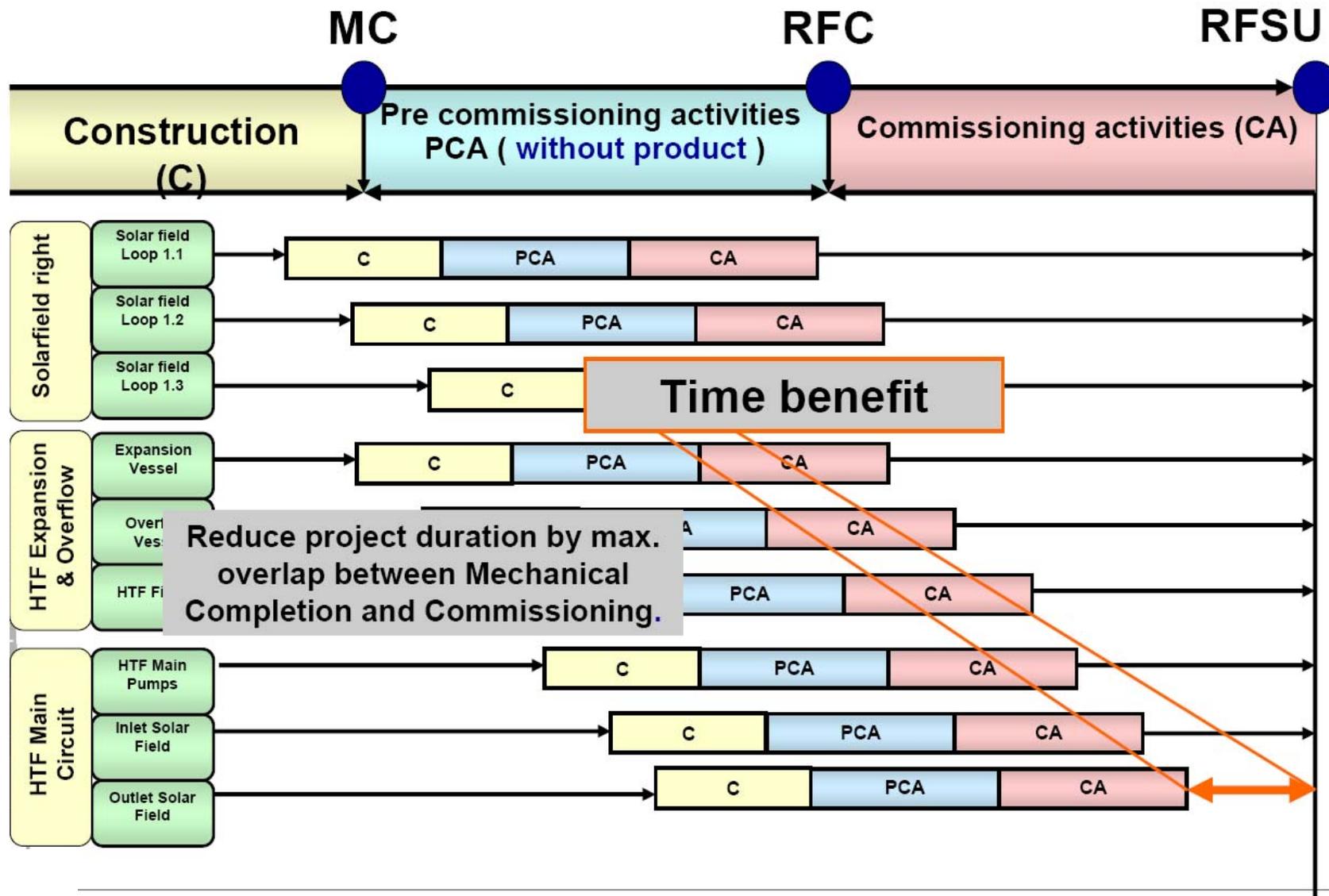


Example: Hydro-testing of the 152 SF loops

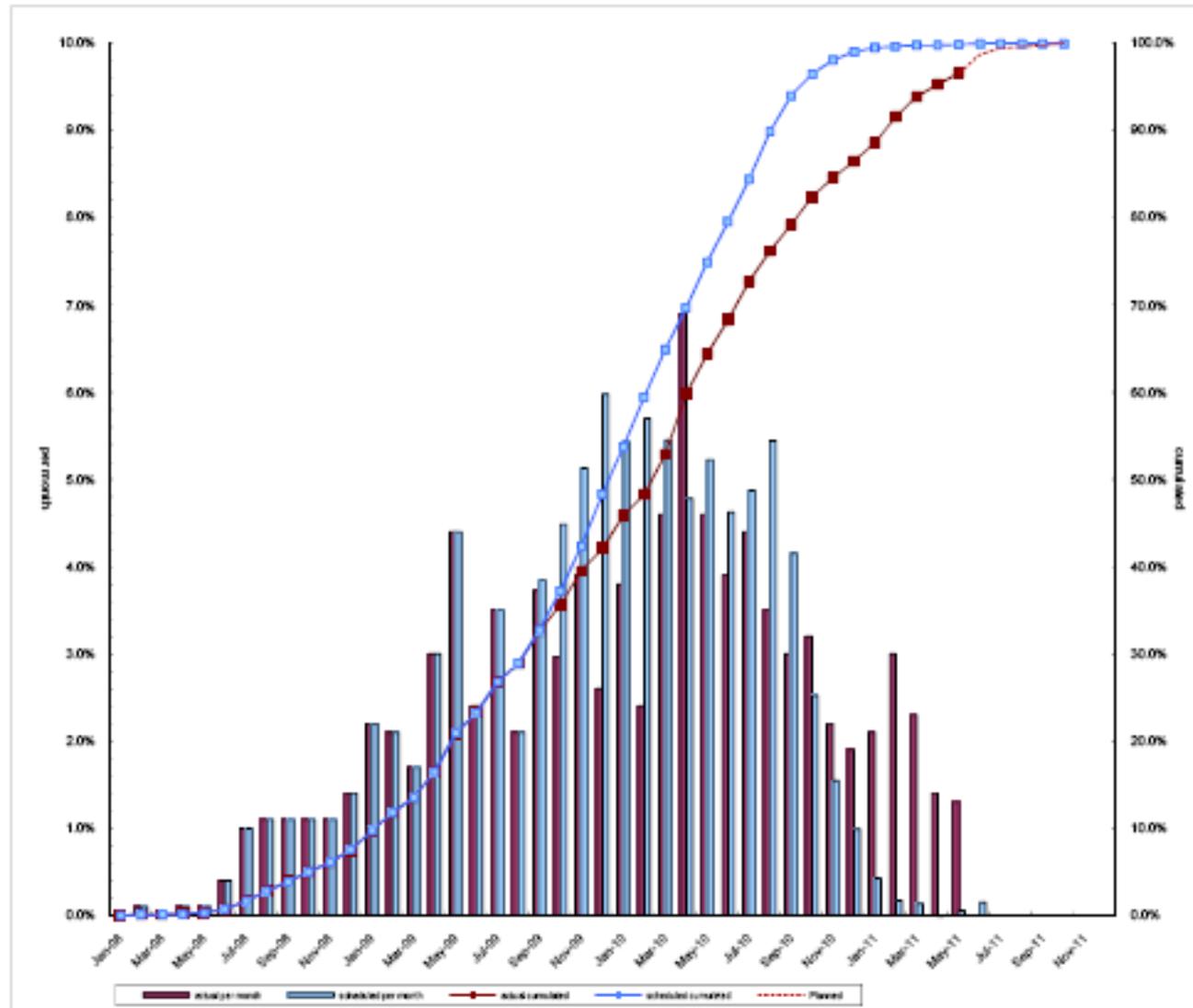
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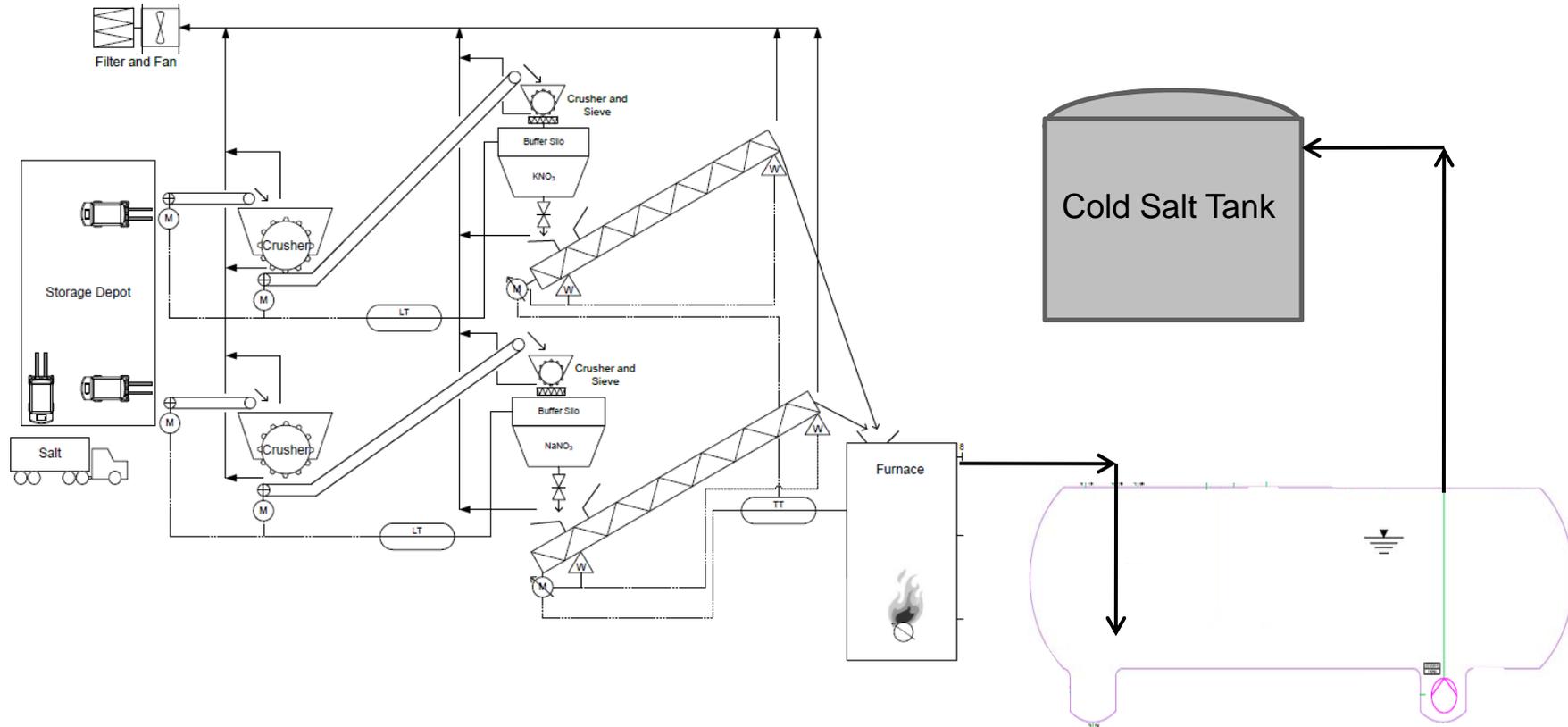
Overlap between Mechanical Completion and Commissioning



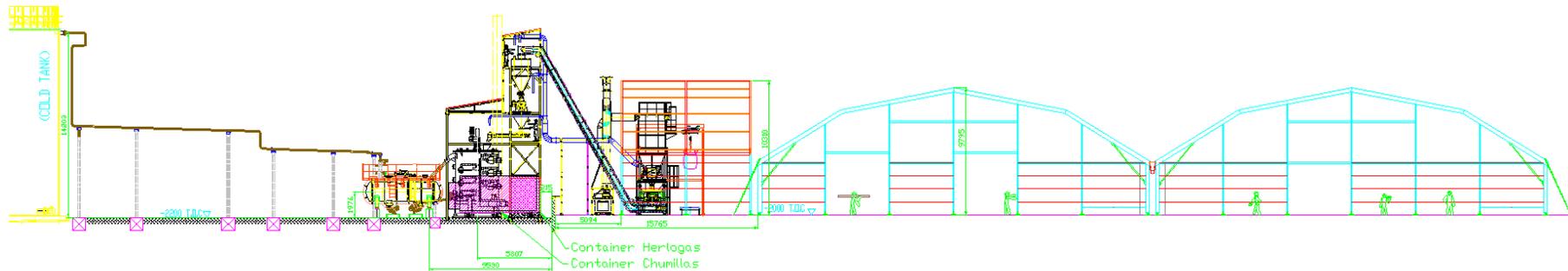
Example: Progress Curves



TES Commissioning: Salt Melting Process



TES Commissioning: Temporary Salt Storage Tanks



Buffer for 5.000t Salt BigBags

1 tent 30m x 60m

1 tent 30m x 70m

Tent for Salt Handling Equipment

1 tent 25m x 10m

During melting continuous salt supply.



Temporary Salt Storage Tents

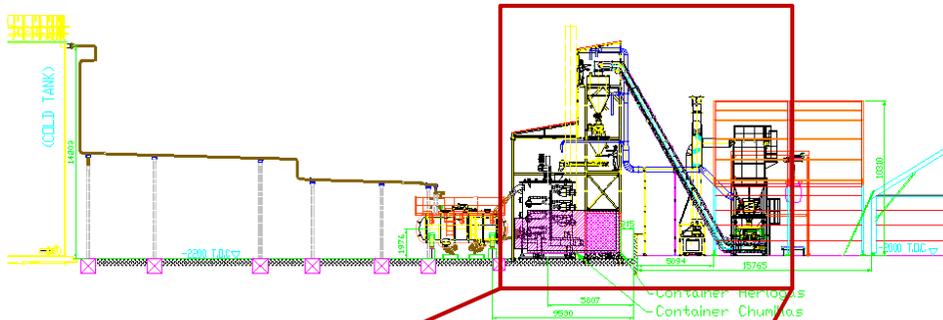


TES Commissioning: Unloading of salt bags

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Salt Handling Equipment



Two parallel lines with working stations for:

- Big Bag Transportation
- Big Bag Crushing and Opening
- Salt Transportation on Conveyor Belts
- Salt Milling to desired grain size
- Dosing Station to Salt Furnace
- Air Filter on working stations

Salt Handling Equipment

ANDASOL³



Salt Handling Equipment

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Crushing of Salt

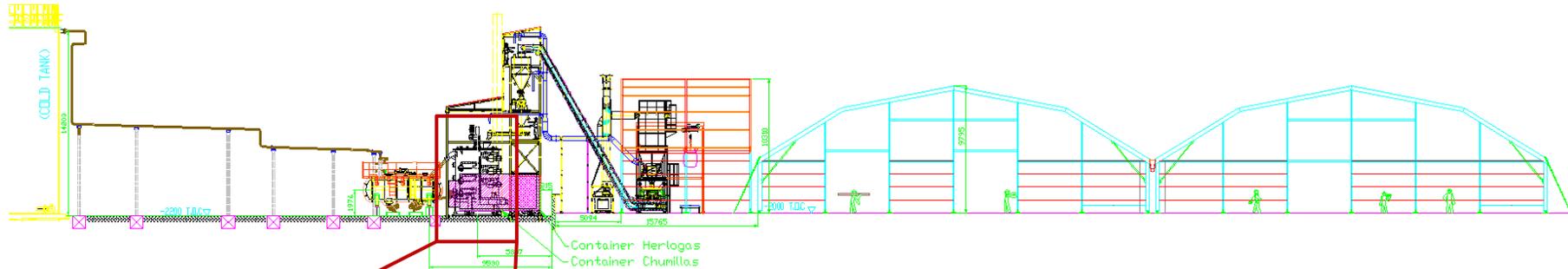
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Salt of the crushing process

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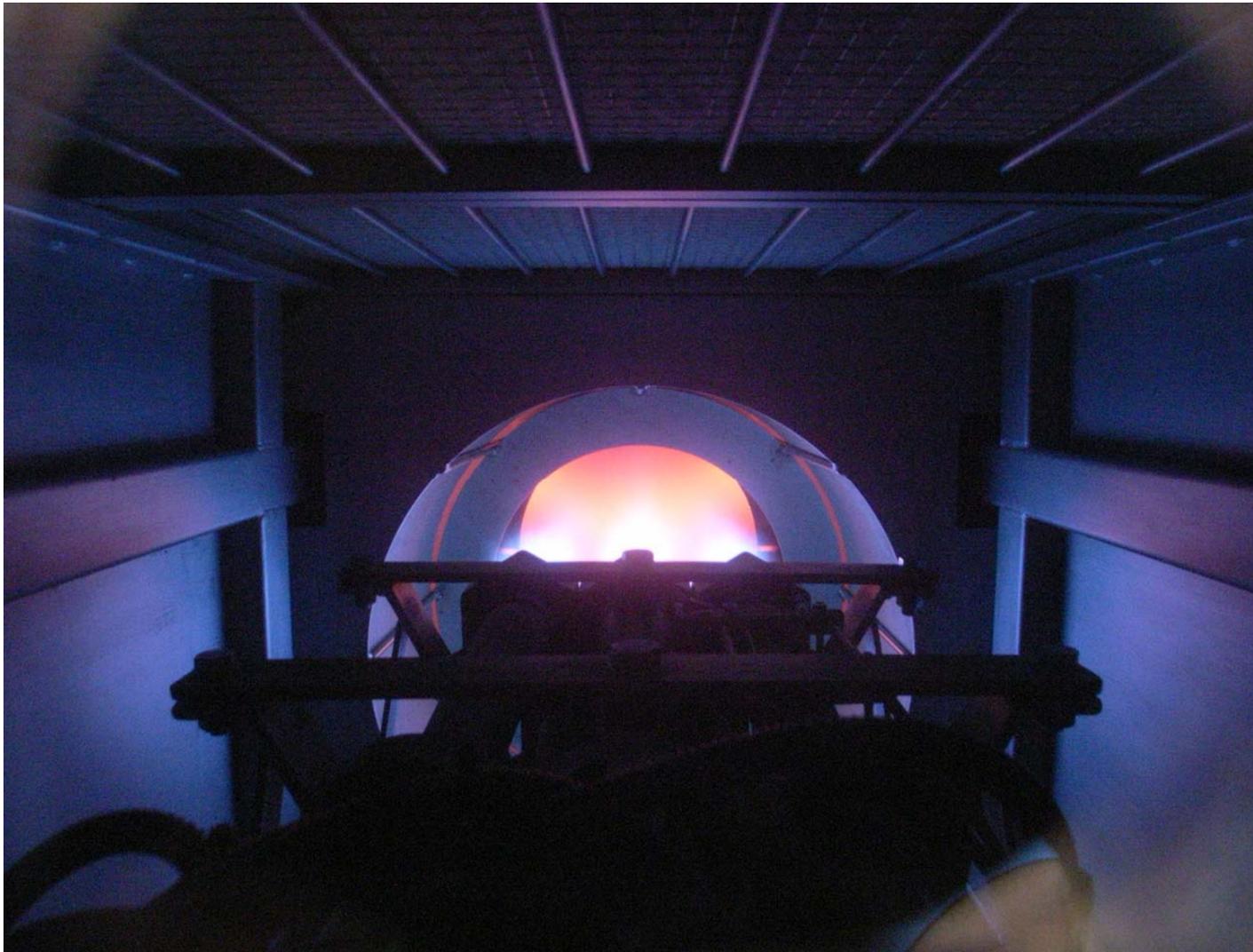


Gas fired Furnace with Stack

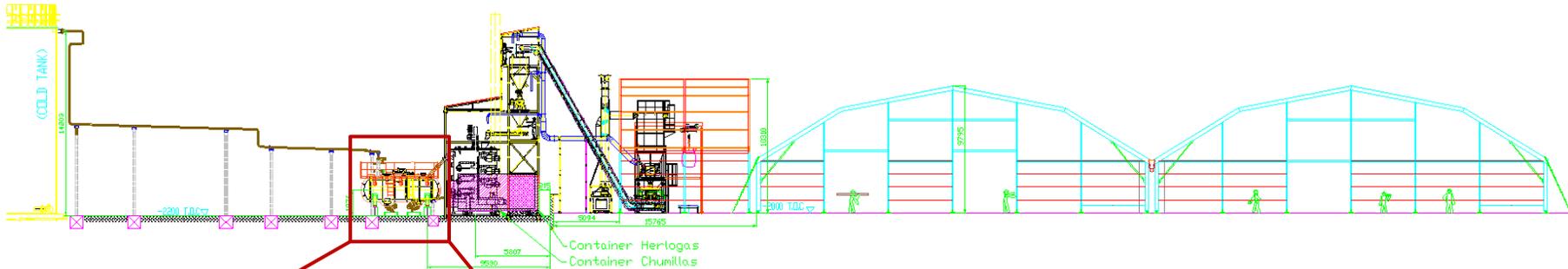
- 20t/h Melting capacity
- 5,4MW thermal capacity
- 12 Burners
- Ca. 570 Nm³/h Gas Consumption
- Ca. 28t weight ; 70 t weight filled with salt

TES Commissioning: Melting Furnace

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TES Commissioning: Buffer Tank



Buffer Tank

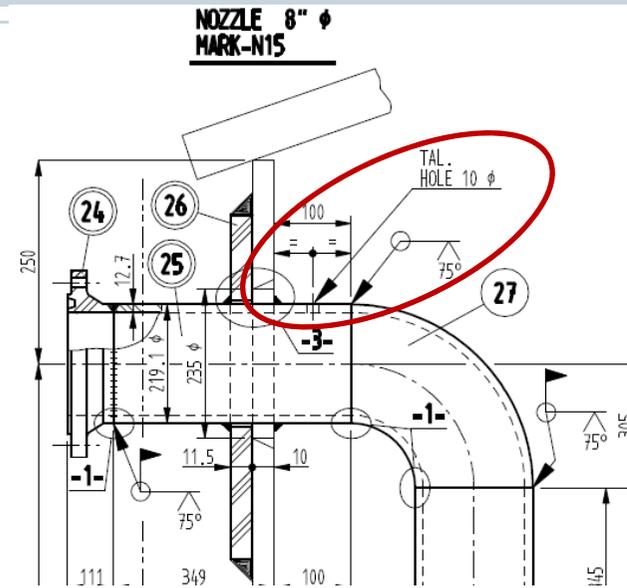
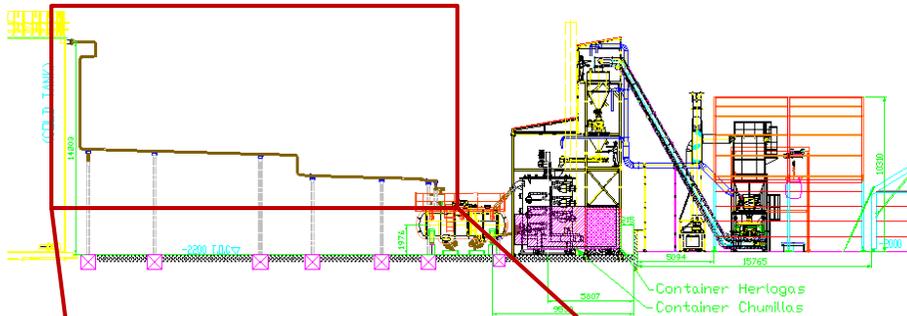
- 8,8m³
- Internals for Salt impurity separation
- Carbon Steel
- Heat traced
- Trays for drainage of tank and furnace

SM Pump

- 14,3 m³/h; 7,5kW
- Vertical suspended Pump to transmit salt to Cold Salt Tank

I&C for control of process (L, P, T) located on Buffer Tank

TES Commissioning: Connection Line to Cold Salt Tank



Pipeline

- Carbon Steel
- 8" Line
- Fully heat traced
- Inlet to Salt Tank with Vent Hole

TES Commissioning: Personal for Salt Melting



- 1 Operation Manager available 24hours
 - 3 Operation Teams working in 12h shifts
 - 2 Operators
 - 1 Shift Responsible.
 - 2 Drivers for Forklift
 - 4 Workers
 - 1 Shift for Salt Unloading 8.00h – 20.00h
 - 3 Driver
 - 1 Worker
 - UTE Commissioning Personnel
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Commissioning Milestone: **Steamblow**

ANDASOL³



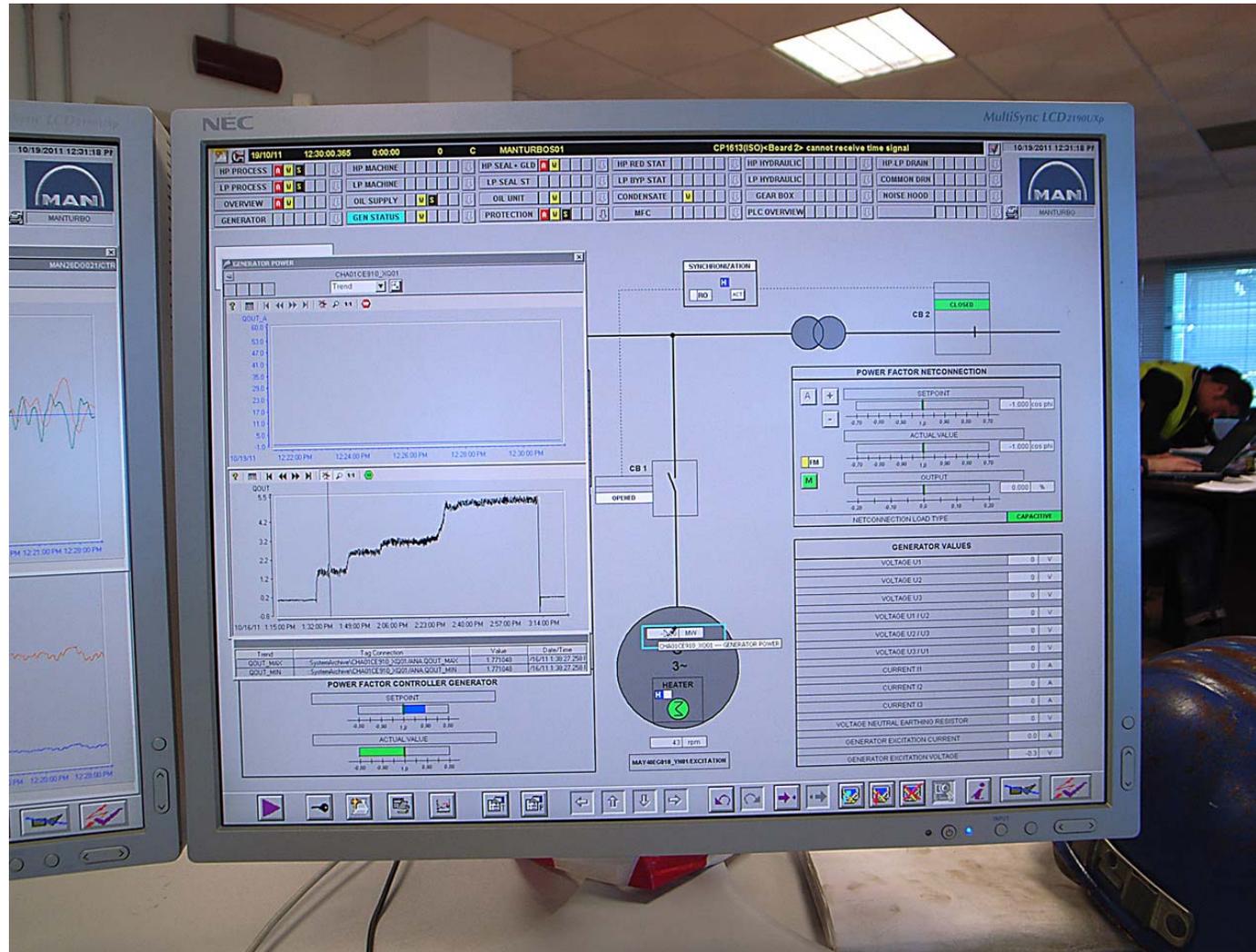
Commissioning Milestone: **Steamblow**



Video

[2013.06.12 SonnenkolloquiumK öln Vers 2 .3GP](#)

Commissioning Milestone: 1st synchronization



- 10 day “Dispatchability Test”
- PAC Performance Test
- Commercial Operation
 - Interim Performance Test
 - Final Performance Test

Thanks for your attention

