

Thermosiphon project IV review

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Overall cost estimation and planning

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ATLAS reviewing process

1st Thermosiphon review

- Pre-design and general lines of the project.
- Indico agenda and documents [here](#).

2nd Thermosiphon review

- Detailed design for the 2 kW Thermosiphon, mini-thermosiphon and blends.
- Indico agenda and documents [here](#).

3rd Thermosiphon review

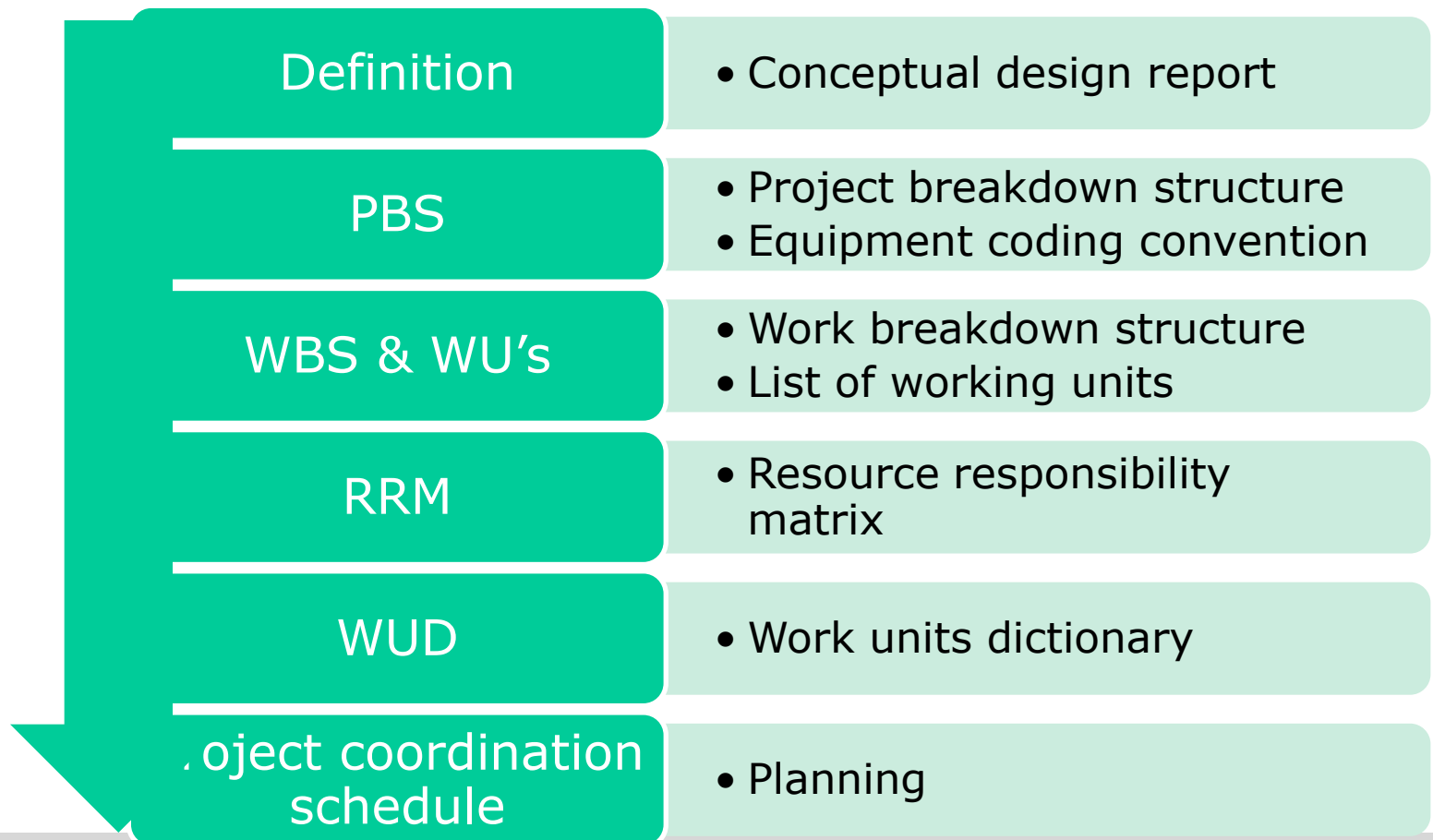
- Advancement status of Thermosiphon project, oil free centrifugal compressors and sonar sensor.
- Indico agenda and documents [here](#).

4th Thermosiphon review

- Project Readiness Review.
- Indico agenda and documents [here](#).

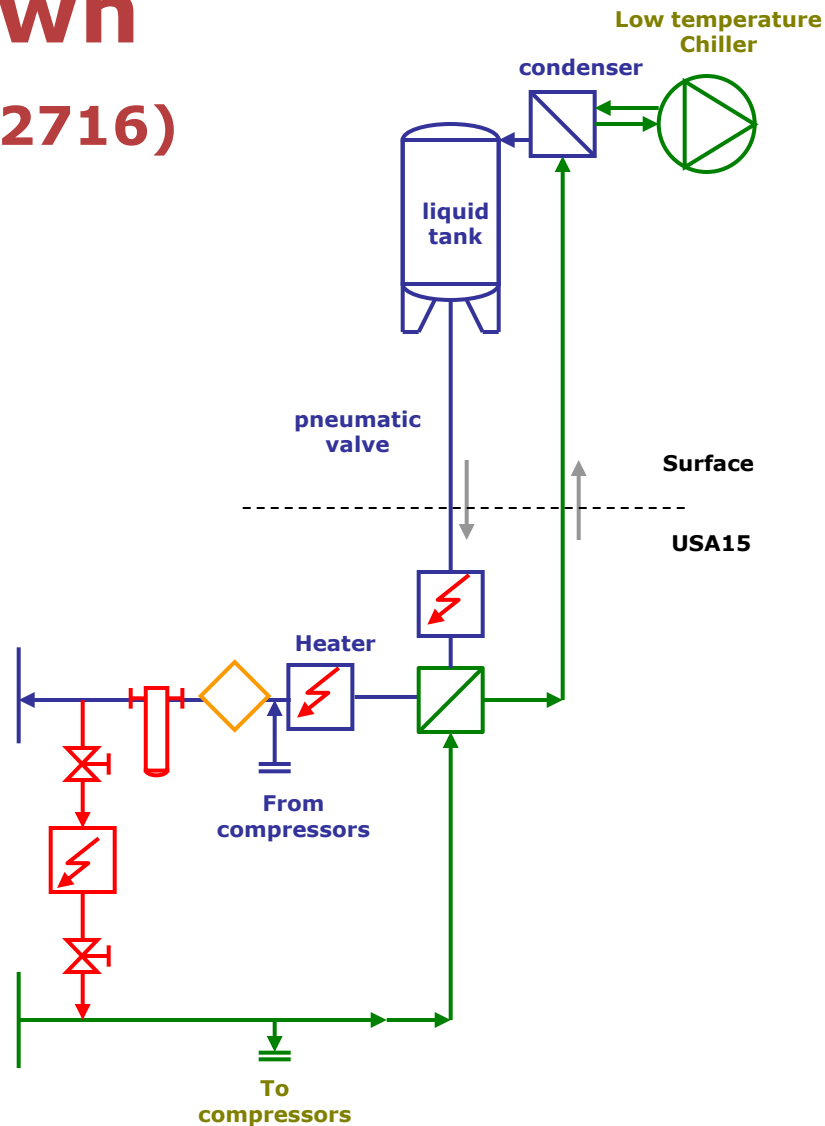
EVM Project management

- This project will follow the Earned Value Management (EVM) technique



Project Breakdown Structure (EDMS 1102716)

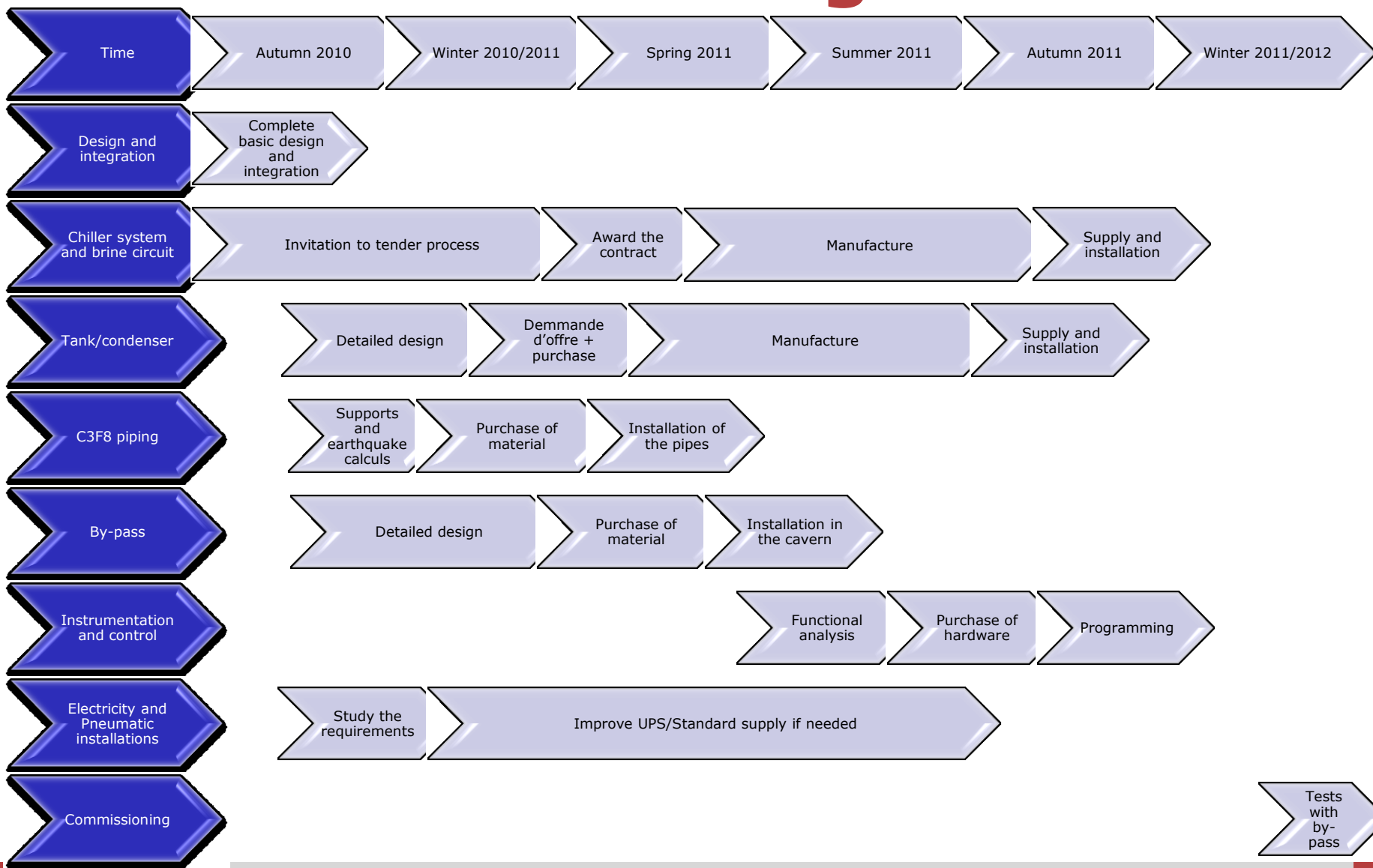
Code	Description
2	Primary water
2.1	Primary water piping
3	Chiller system
3.1	Chiller system
4	Brine circuit
4.1	C6F14 piping
5	Tank/condenser
5.1	Tank
5.2	Condenser
5.3	Subcooler
5.4	Degassing system
6	C3F8 piping
6.1	Piping in the surface
6.2	Piping in PX15
6.3	Piping in the cavern
6.4	Recuperation heat exchanger
7	By-pass
7.1	By-pass piping
7.2	Dummy load
8	Instrumentation
8.1	Instrumentation
9	Electricity
9.1	Standard power supply
9.2	UPS power supply
9.3	Power cabling
9.4	Signal cabling
10	Pneumatic system
10.1	Pneumatic system for the thermosiphon circuit
10.2	Pneumatic system for the chiller system
11	Control
11.1	Control system for the thermosiphon circuit
11.2	Control system for the chiller circuit
12	Civil engineering
12.1	Roof modifications



Working tasks	Responsibility													
	EN/CV/DC				PM				Other					
	EN/CV/DC	PM	DC	EN	CV	DC	PM	EN	CV	DC	PM	EN	CV	DC
Project management and integration														
1.1 Project management	R	X												
1.1.1 Manage the project	R	X												
1.1.2 Issue project management documents	R	X												
1.1.3 Prepare technical documentation	R	X												
1.2 Integration studies	R	X												
1.2.1 Integration studies for the thermopump circuit	R	X												
1.2.2 Integration studies for the chiller system	R	X												
2 Primary water														
2.1 Primary water piping	R	X												
2.1.1 Perform a detailed design of the water network	R	X												
2.1.2 Purchase and supply the materials	R	X												
2.1.3 Negotiate connection point	R	X												
2.1.4 Install primary water connection	R	X												
3 Chiller system														
3.1 Chiller system	R	X												
3.1.1 Write and send tender/buy for chiller system	R	X												
3.1.2 Perform a detailed design of the chiller system	R	X												
3.1.3 Write invitation to tender for the chiller system	R	X												
3.1.4 Prepare specification meeting for the chiller system	R	X												
3.1.5 Award contract for the chiller system	R	X												
3.1.6 Supply chiller system	R	X												
4 Brake circuit														
4.1 CP14 piping	R	X												
4.1.1 Perform a detailed design of the CP14 circuit	R	X												
4.1.2 Purchase and supply the cables for the CP14 circuit	R	X												
4.1.3 Install piping for the CP14 circuit	R	X												
5 Tank and condenser														
5.1 Tank and condenser	R	X												
5.1.1 Prepare a detailed design of the tank	R	X												
5.1.2 Prepare a detailed design of the condenser	R	X												
5.1.3 Prepare technical drawings for the tank	R	X												
5.1.4 Prepare technical drawings for the condenser	R	X												
5.1.5 Award contract for the tank	R	X												
5.1.6 Award contract for the condenser	R	X												
5.1.7 Purchase and supply tank	R	X												
5.1.8 Purchase and supply condenser	R	X												
5.2 Degassing system														
5.2.1 Perform a detailed design of the degassing system	R	X												
5.2.2 Purchase and supply material for the degassing system	R	X												
5.2.3 Perform engineering meeting	R	X												
5.2.4 Calculate degassing system	R	X												
5.2.5 Install degassing system in tank	R	X												
6 CP15 piping														
6.1 CP15 main piping	R	X												
6.1.1 Calculate supports	R	X												
6.1.2 Purchase and supply material	R	X												
6.1.3 Prepare materials for welding	R	X												
6.1.4 Clean material	R	X												
6.1.5 Install supports	R	X												
6.1.6 Install pipes	R	X												
6.2 Recuperation heat exchanger	R	X												
6.2.1 Perform detailed design of recuperation heat exchanger	R	X												
6.2.2 Purchase and supply material for the recuperation heat exchanger	R	X												
7 Bypass														
7.1 Bypass piping	R	X												
7.1.1 Perform a detailed design of the bypass piping	R	X												
7.1.2 Purchase and supply material	R	X												
7.1.3 Prepare for pipe joints for welding	R	X												
7.1.4 Clean bypass pipes	R	X												
7.1.5 Assemble bypass piping in the workshop	R	X												
7.2 Dummy lead	R	X												
7.2.1 Perform detailed design of dummy lead	R	X												
7.2.2 Purchase and supply dummy lead	R	X												
7.2.3 Assemble dummy lead in the workshop	R	X												
8 Instrumentation														
8.1 Instrumentation	R	X												
8.1.1 Perform detailed design	R	X												
8.1.2 Purchase and supply the instrumentation	R	X												
9 Electricity														
9.1 Standard power supply	R	X												
9.1.1 Perform detailed design for the standard power supply	R	X												
9.1.2 Purchase and supply material for standard power supply	R	X												
9.1.3 Negotiate connection point for standard power supply	R	X												
9.1.4 Install required equipment for standard power supply	R	X												
9.2 UPS power supply	R	X												
9.2.1 Perform detailed design for the UPS	R	X												
9.2.2 Purchase and supply material for UPS	R	X												
9.2.3 Negotiate connection point for UPS	R	X												
9.2.4 Install required equipment for UPS	R	X												
9.3 Electrical cabinets	R	X												
9.3.1 Perform detailed design of the electrical cabinets	R	X												
9.3.2 Purchase and supply material for the electrical cabinets	R	X												
9.3.3 Assemble electrical cabinets	R	X												
9.3.4 Feed electrical cabinets	R	X												
9.4 Cabling	R	X												
9.4.1 Perform detailed design of cable network	R	X												
9.4.2 Purchase and supply material	R	X												
10 Pneumatic system														
10.1 Pneumatic system	R	X												
10.1.1 Perform detailed design of pneumatic system	R	X												
10.1.2 Purchase and supply material	R	X												
10.1.3 Install material in the pneumatics cabinet	R	X												
10.1.4 Negotiate connection point	R	X												
11 Control														
11.1 Control system for the thermopump circuit	R	X												
11.1.1 Write functional analysis for the thermopump circuit	R	X												
11.1.2 Purchase and supply components	R	X												
11.1.3 Program software	R	X												
11.1.4 Feed software	R	X												
11.1.5 Negotiate external connection point	R	X												
11.2 Control system for the chiller circuit	R	X												
11.2.1 Purchase and supply components	R	X												
11.2.2 Program software according supplier functional analysis	R	X												
11.2.3 Feed software	R	X												
12 Civil engineering														
12.1 Perform a detailed design	R	X												
12.2 Purchase and supply material	R	X												
12.3 Build and install	R	X												
13 Installation and commissioning														
13.1 Infrastructure	R	X												
13.1.1 Clean the installation area	R	X												
13.1.2 Installation of cables trays	R	X												
13.1.3 Full power test signal cables	R	X												
13.2 Installation	R	X												
13.2.1 Installation of subsea equipment	R	X												
13.2.2 Installation of subsea equipment	R	X												
13.2.3 Perform inspection methods of equipment	R	X												
13.2.4 Connect equipment to infrastructure	R	X												
13.3 Commissioning by bypass	R	X												
13.3.1 Perform electrical test	R	X												
13.3.2 Perform pressure test	R	X												
13.3.3 Perform leak test	R	X												
13.3.4 Do performance test	R	X												
13.4 Commissioning with separator	R	X												
13.4.1 Do performance test	R	X												

Resource and responsibility matrix

Planning



Cost estimation

Description	Cost estimation
Primary water	40
Chiller system	800
Brine circuit	100
Tank/condenser	100
C3F8 piping	
Piping	280
Recuperation heat exchanger	15
Heaters before HEX - 15 kW	15
Heater after the HEX - 60 kW	20
Test dummy load	10
By-pass	
By-pass piping	20
Dummy load - 25 kW	20
Instrumentation	20
Pneumatic system	10
Control	50
Total	1500
Contingency	100

Conclusions

- The Mini-Thermosiphon has proved the working principle for the consolidation.
- The 2 kW Thermosiphon will provide results for the control and detailed design.
- The Full Scale Thermosiphon is already well advanced
 - Basic design is done
 - Planning and cost estimation have been presented
 - Purchase has started
 - Piping installation has been organized

Thank you for your attention

