Enel CO_2 Post-Combustion Capture Project: Brindisi Pilot Plant

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European CCS Demonstration Project Network

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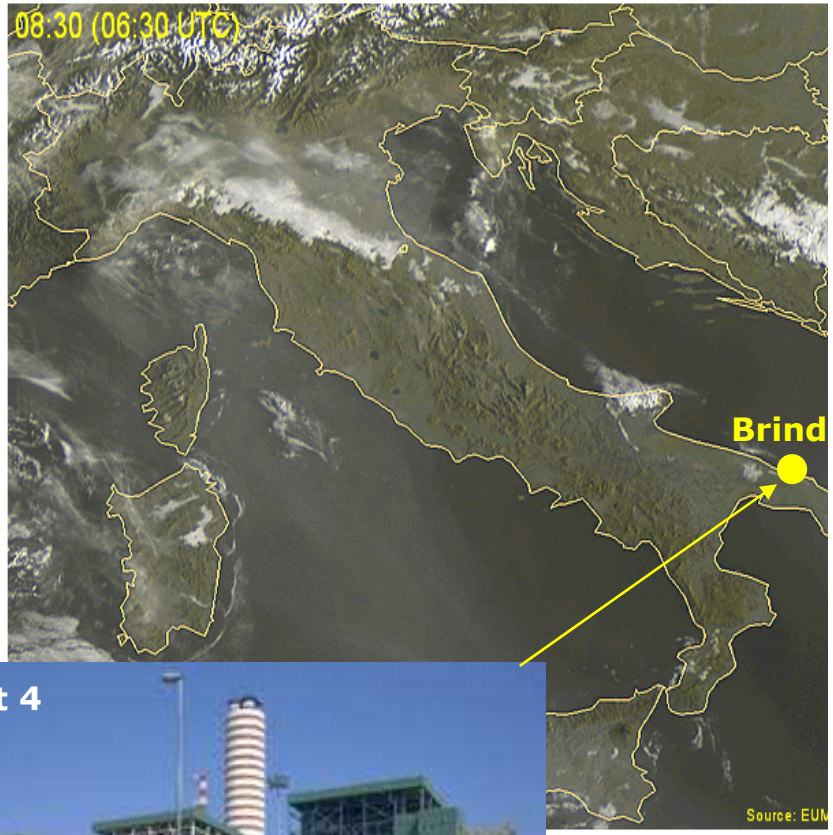
ZEPT – R&D supporting activities

Pilot Stage – Brindisi CO2 Capture Pilot Plant

- At the site of **Brindisi** coal fired power station a pilot plant for CO_2 separation via amine scrubbing is in operation. The plant is installed on the Unit 4.
- The plant is composed by a flue gas pre-treatment section (able to remove completely the particulate and the SO_3 and to reduce SO_2 level below 20 mg/Nm^3) and by a CO_2 separation unit
- The plant size is **10.000 Nm^3/h**, capturing about **2,5 t/h of CO_2**
- Target: gain experience in CCU designing and operation, and assess the environmental impact of the process

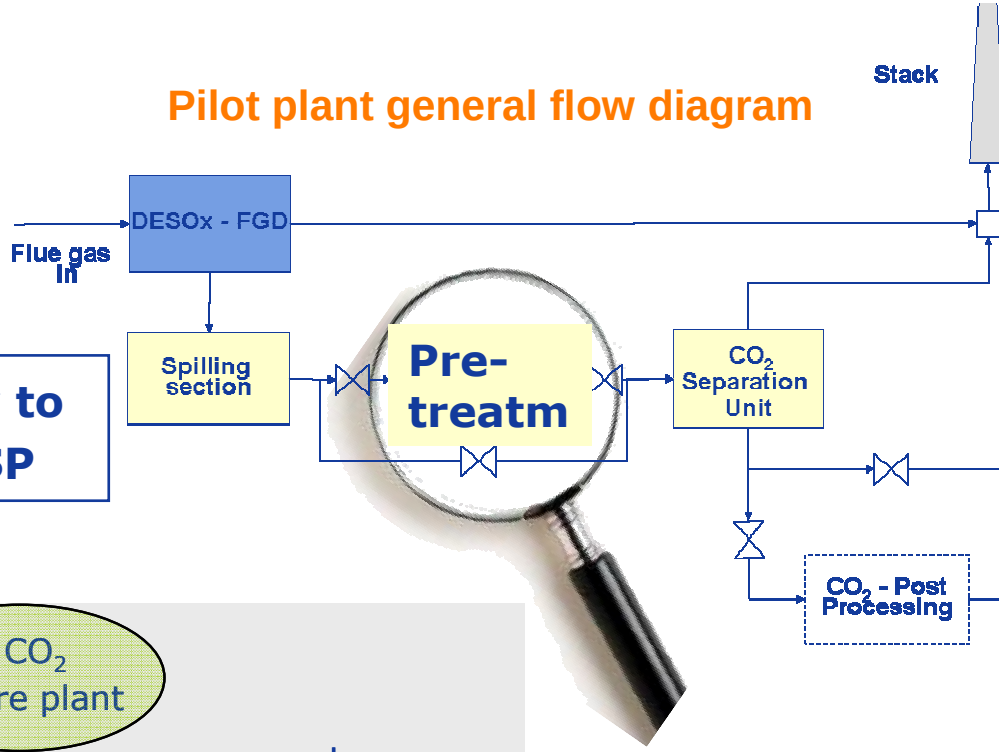


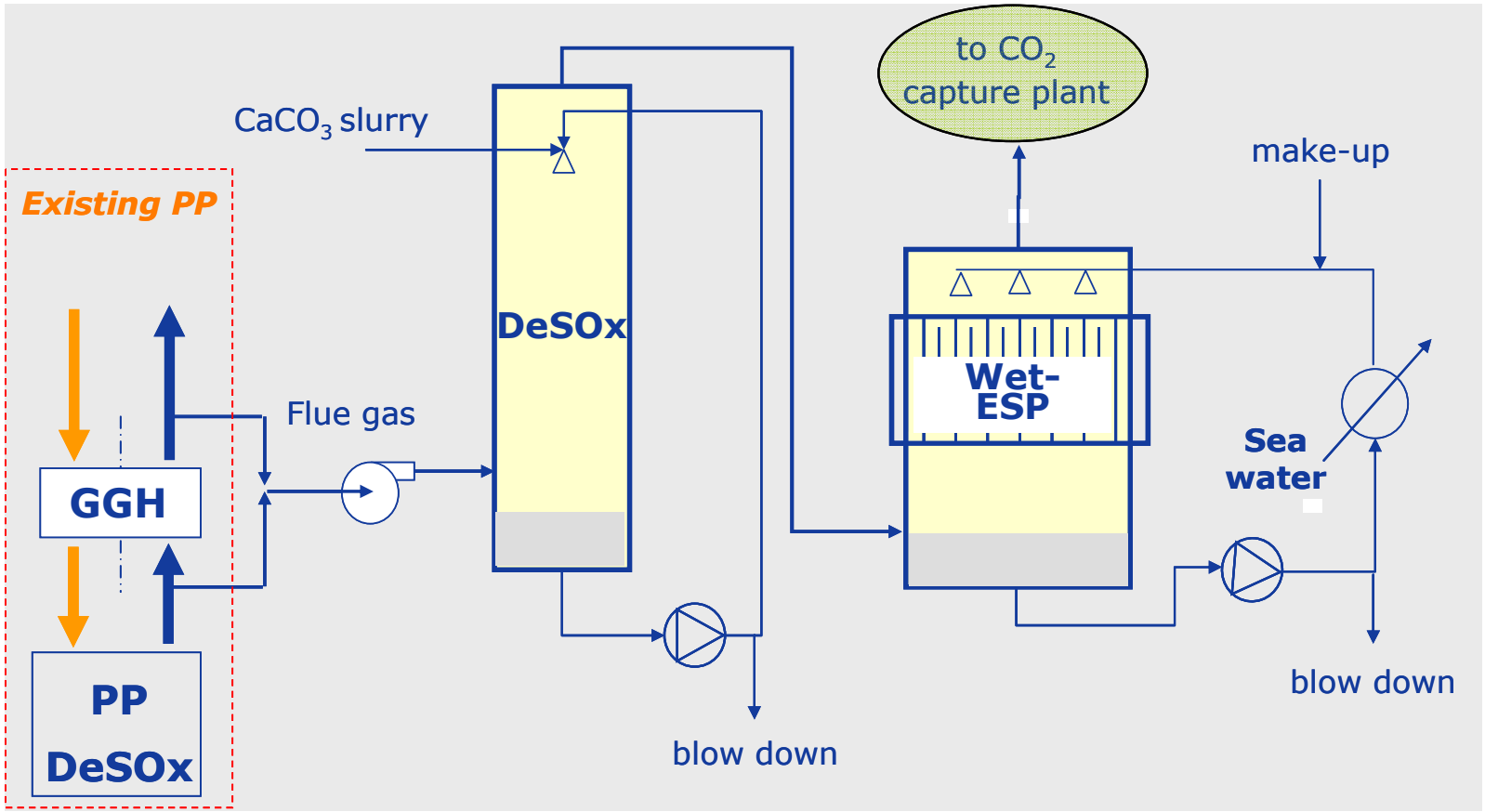
ZEPT- CO_2 capture pilot plant

Flue gas pre-treatment

The pre-treatment plant gives the possibility to partially bypass both the WFGD and the WESP

Pilot plant general flow diagram

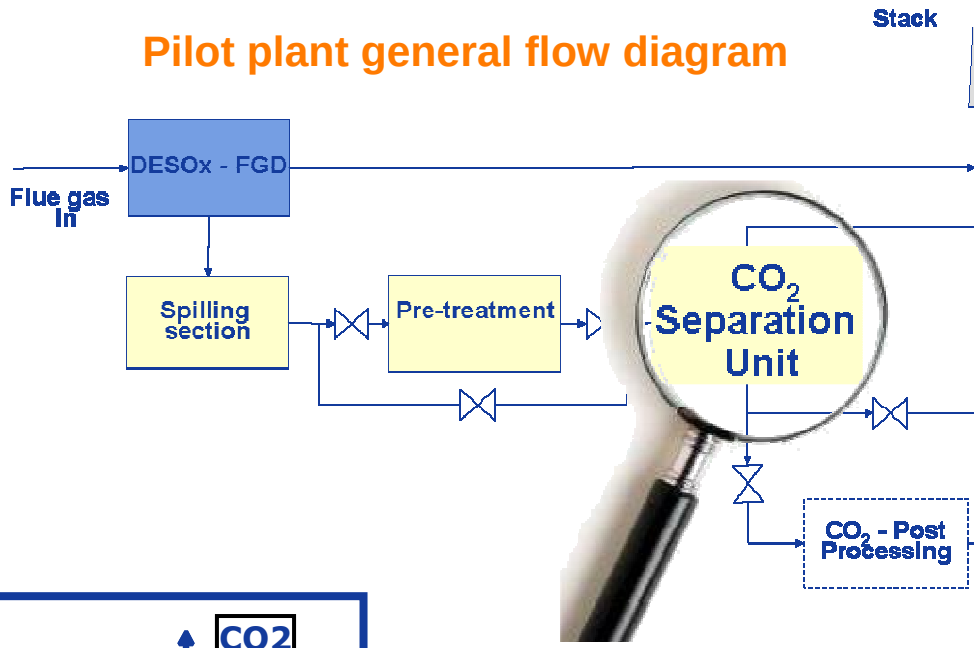




ZEPT- CO_2 capture pilot plant

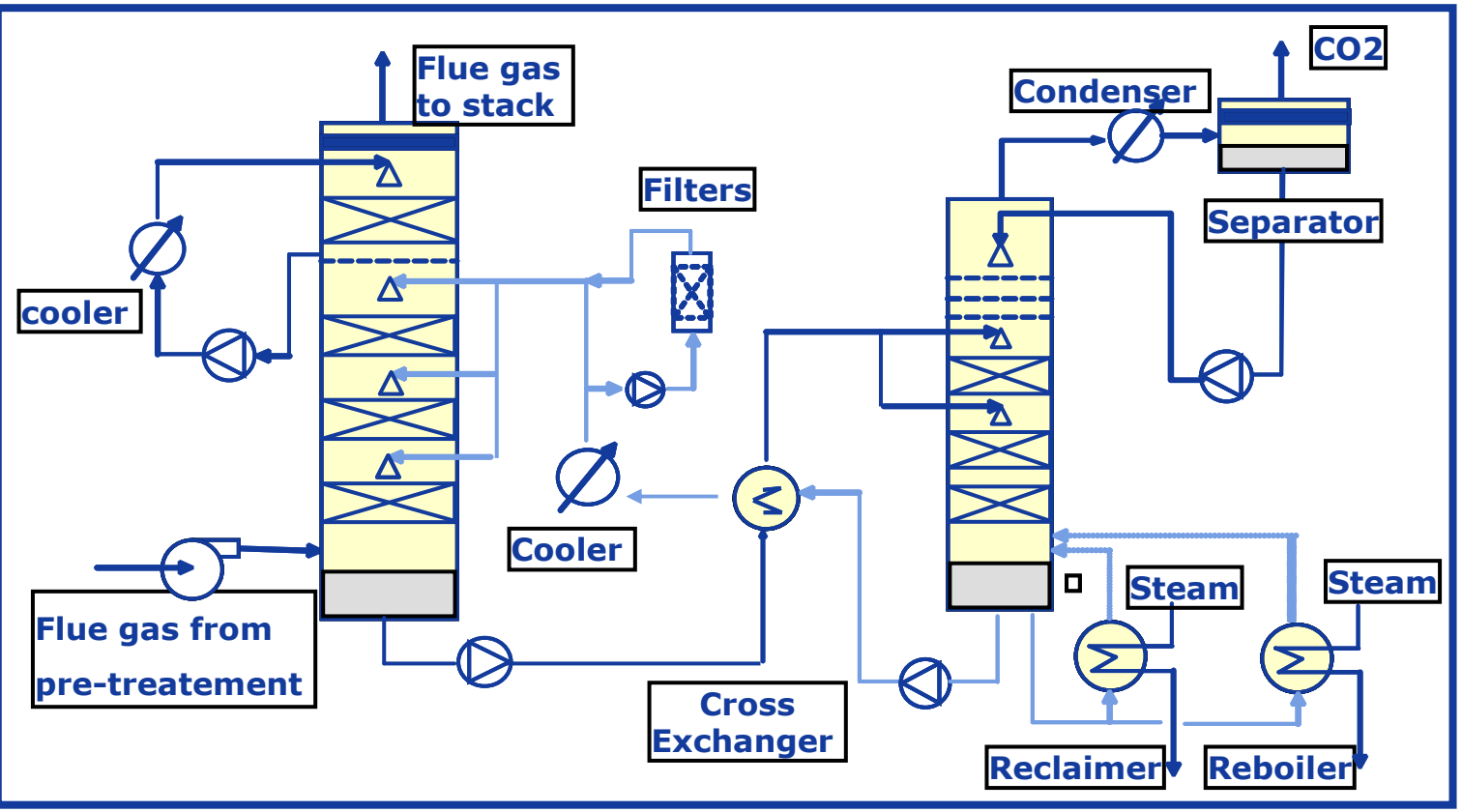
CO_2 separation unit

Pilot plant general flow diagram



Absorber

- 1.5 m Internal diameter
- 3 structered packing sections (22 m total)
- Solvent flow rate : 20 to 80 m^3/h

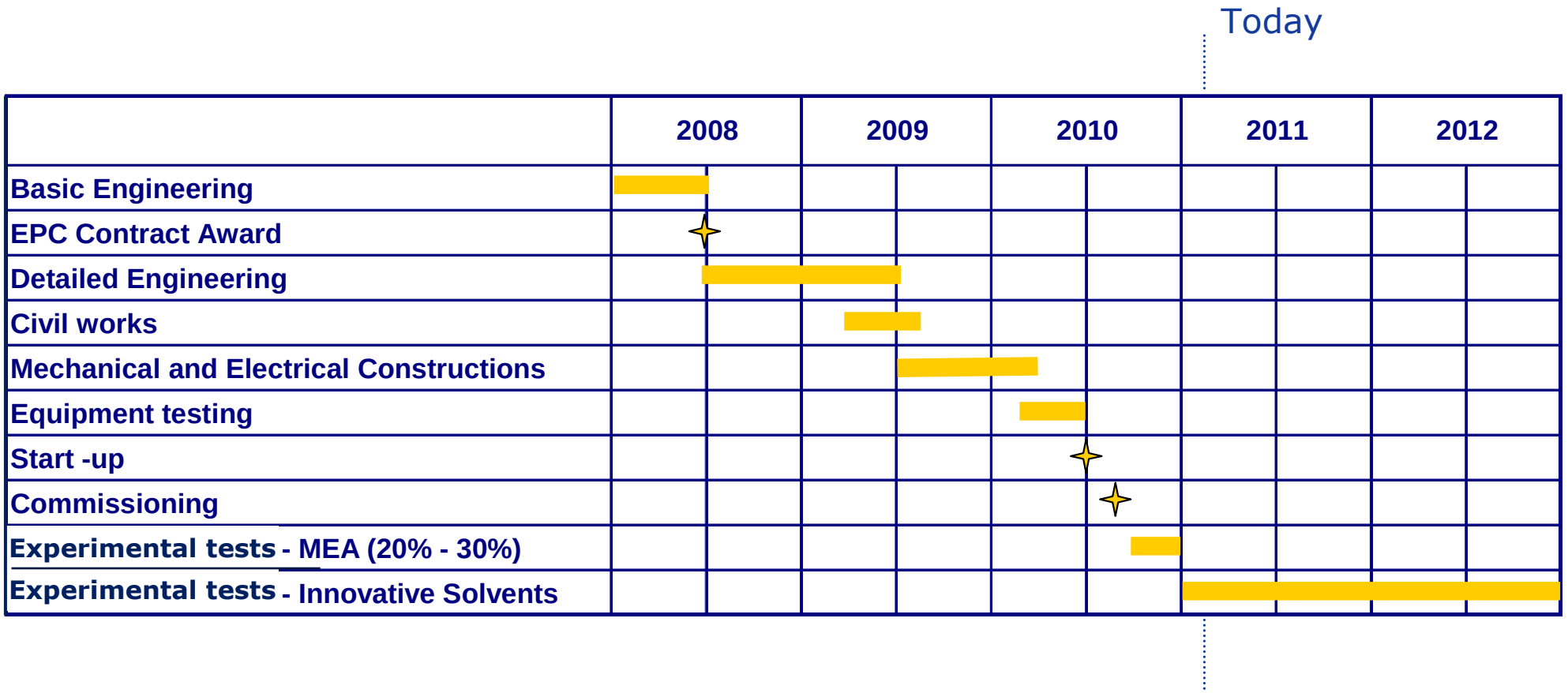


Stripper

- 1.2 m Internal diameter
- 3 random packing sections (10 m total)
- Operative pressure up to 2.5 bar

ZEPT- R&D Supporting Activities

Brindisi Sud Pilot Plant : Project Schedule



- ✓ **About one year for site construction activities**
- ✓ **Less then 2 years to first CO_2 separation since starting detailed engineering**

ZEPT – R&D supporting activities

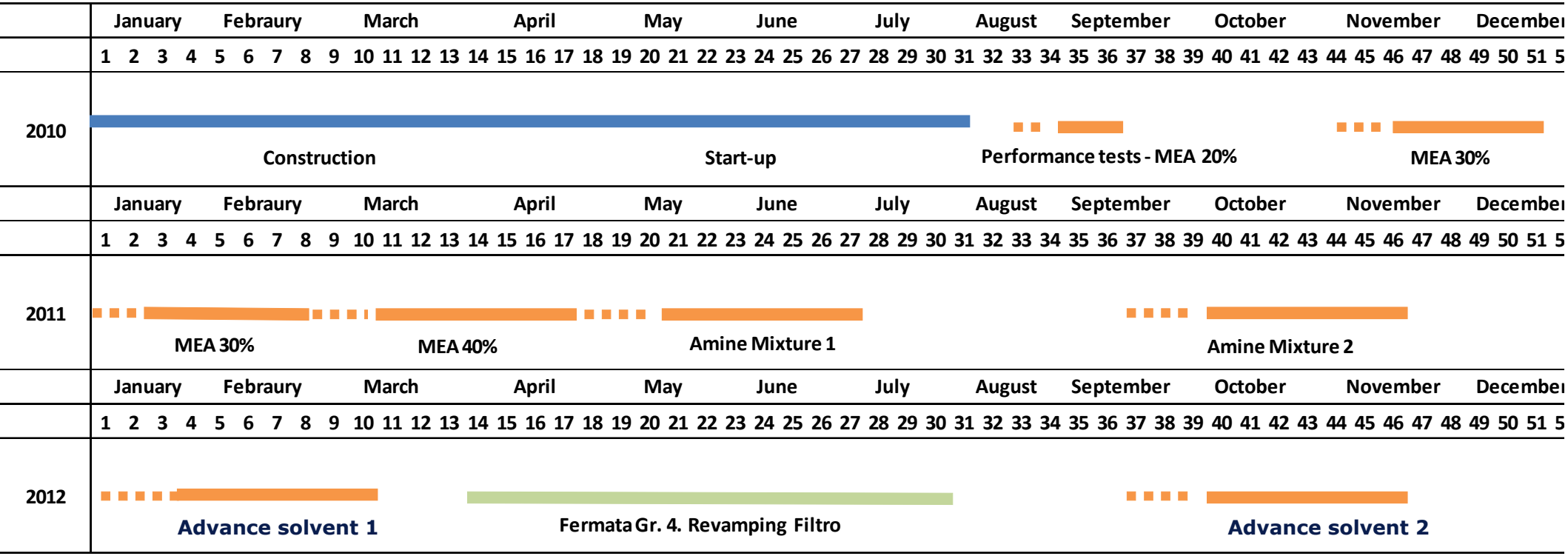
CO_2 Capture pilot plant : Research Program

- **Operational experience (MEA 20%- 30%+ inhibitors)**
  - Assessment of the MEA absorption technology: reliability, environmental impact, power consumption and capture performance
  - Definition of operating procedures, management
  - Cost evaluation at different operating conditions for retrofit application: solvent consumption, inhibitors, waste treatment management
  - Flue gas composition: CO2 stream and emissions

- **Advanced solvent and inhibitor testing**
  - Reduction of power consumption (reduction of operating cost)
  - Solvent degradation (reduction of operating cost)
  - Assessment of corrosion (reduction of capital cost)
  - Reaction rate (check of design parameters)
  - Environmental performances

ZEPT- R&D Supporting Activities

Brindisi Sud Pilot Plant : Experimental Program



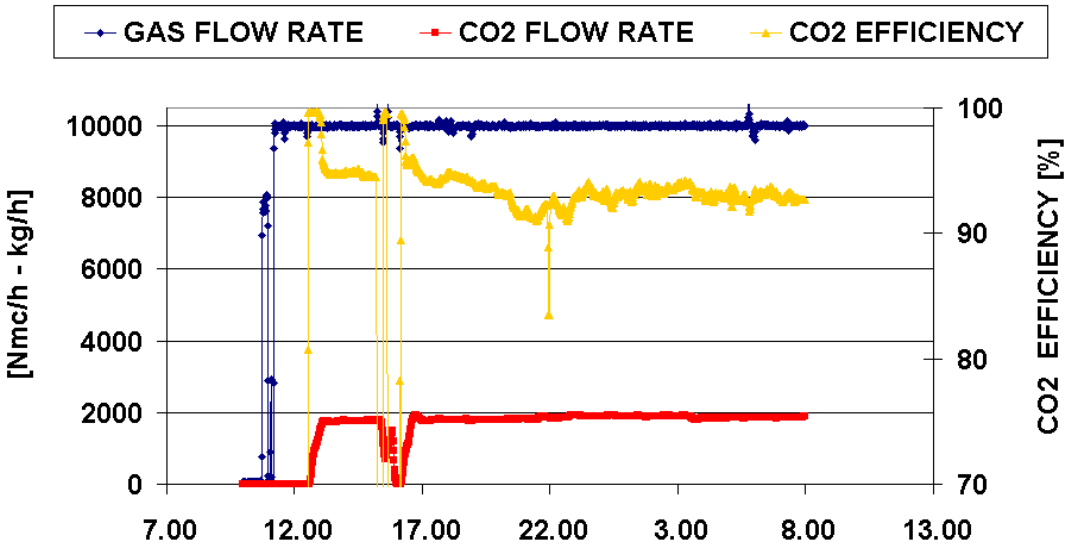
- 2011 → 4000 hr continuos operations; 8000 ton of separated CO_2
- 2012 → 3000 hr continuos operations; 6000 ton of separated CO_2
- Tests with Advance solvents

Base line campaign

General Performance of 20% MEA

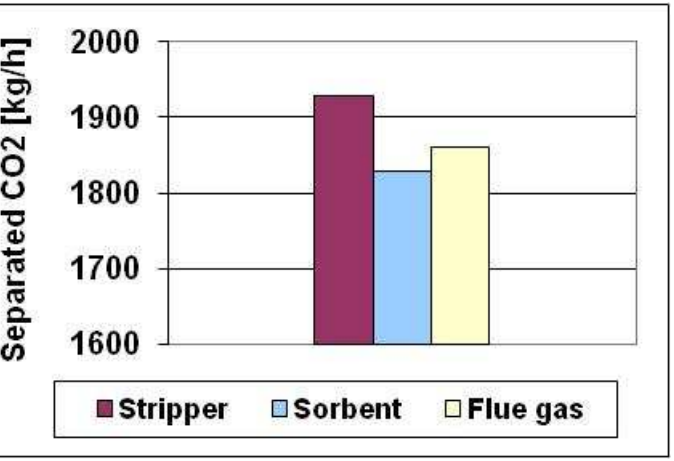
Main process parameters

	U.M	07_09	08_09	09_09
ortata Fumi	Nmc/h	10.000	12.000	3.000
O_2 in abs	% vol dry	12,00	11,5	11,5
fficienza di cattura	%	90	88	98
ortata solvente	mc/h	52	60	25
O2 separata (liq)	kg/h	1830	2300	800
onsumo energetico (liq)	Gj/ton CO_2	4,12	3,69	5,06

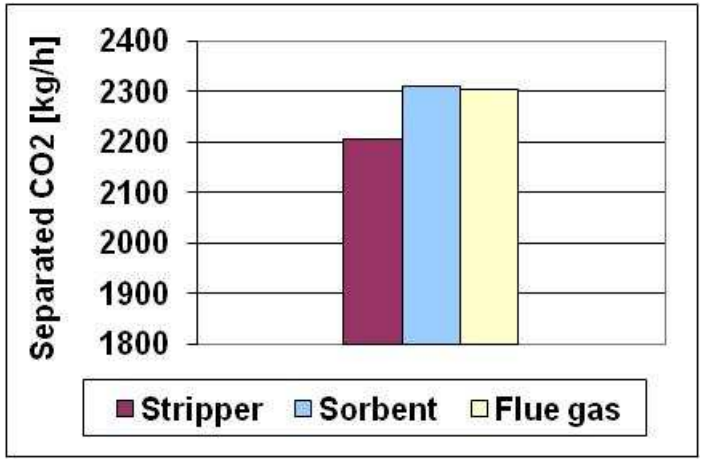


Mass balance check

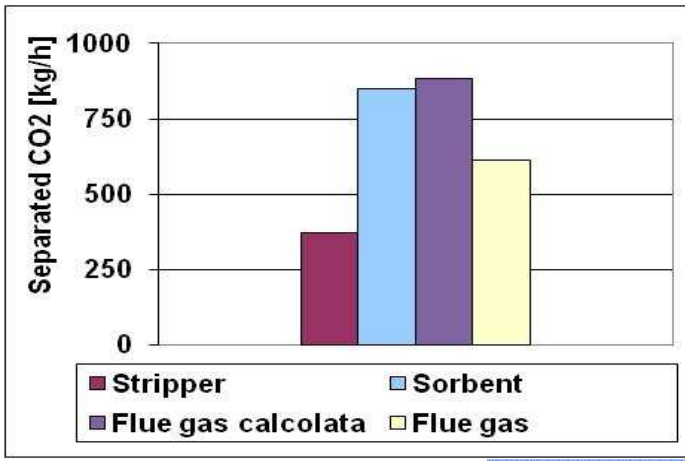
*TEST 07_09_2010



*TEST 08_09_2010

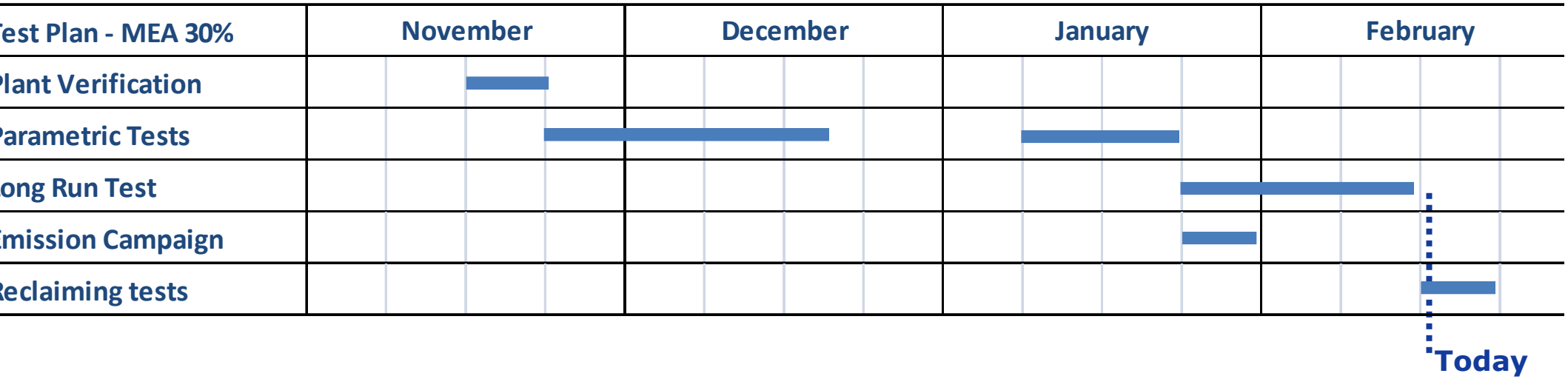


*Test 09_09_2010



The first test campaign

Campaign schedule – 30% MEA



MEA 30 % test run:

- ✓ 500 hours of parametric tests (Nov 15 – 21 Jan)
- ✓ 500 hours of continuos opertion (24 Jan – 11 Feb)
- ✓ Reclaiming procedure to be tested at the end
- ✓ Emission campaign
- ✓ Wet pressure drop tests by IFPEN
- ✓ Corrosion Monitoring

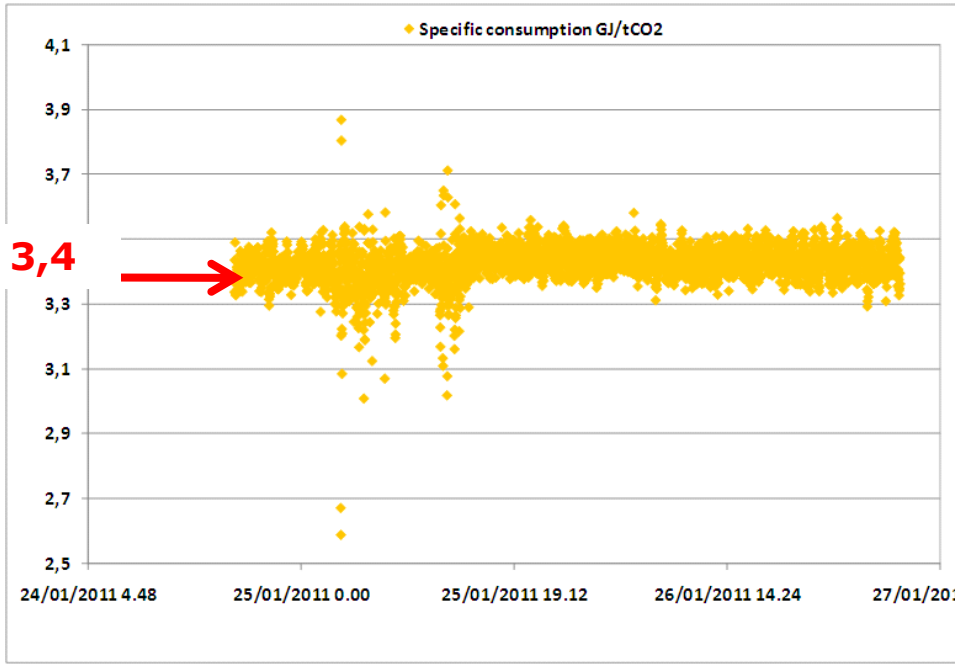
The test campaign with 30% MEA

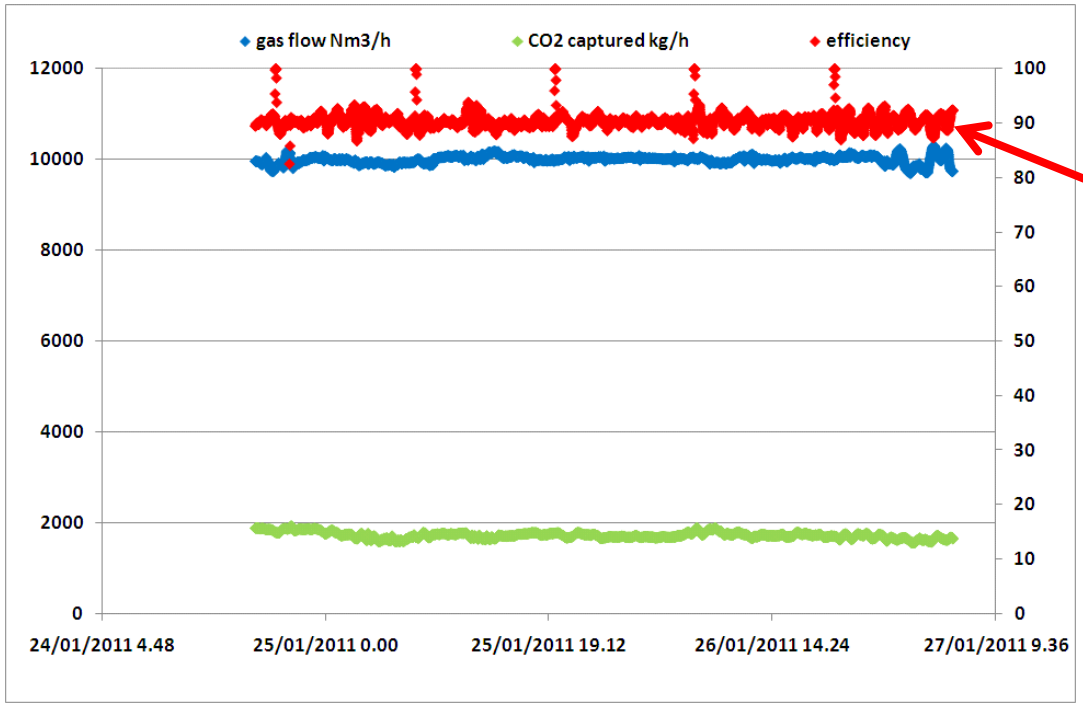
Settings Applied in the Test with Continuous Operation

The following settings have been applied in the 500 hours test (Jan 07 – Feb 11):

- Flue gas flow: 10.000 Nmc/h
- Solvent flow: 30 mc/h
- Stripper pressure: 0.8 barg
- Corrosion coupon are installed: CS 018; SS 316; SS 304

Steam consumption: » 3.4 GJ/ton CO2





Average CO2 capture: 90 %

Thank you!

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