The new gasification project at
Eni Sannazzaro Refinery and its integration with a
1050 MWe power plant

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A.Cavanna – Eni Refining & Marketing

Thanks to: A.R.Carta-EniR&M – J.Wolff-Shell
The Parent Company

- Exploration & Production
- Gas & Power
- Refining & Marketing

Subsidiaries:
- Snam Rete Gas S.p.A.
- Italgas S.p.A.
- EniPower S.p.A.
- Snamprogetti S.p.A. (*)
- Saipem S.p.A. (*)

(*) Companies operating in Engineering and Oilfield Services respectively
Eni R&M Refineries in Italy

500,000 bpd capacity (1/4 of national cap.)

Eni R&M
EniPower
250 MWe
38,000 Nm3/h H2
VVR(TAR)
Snamprogetti/Ansaldo

Sannazzaro
Venezia
Livorno
Gela
Taranto
Milazzo*
Priolo*
Schematic Complex Block Diagram

Eni Gas & Power

- Natural gas (12.5 km new pipeline)

EniRefining & Marketing

- H2
- Gasification plant
  - 50 t/h Tar

EniPower

- Ansaldo-Siemens V94-3A.2 (400 MW)
- Ansaldo-Siemens V94-3A.2 (400 MW)
- Ansaldo-Siemens V94-2K (250 MW)

Syngas
Eni R&M-Sannazzaro
Process Block Diagram

- AIR SEPARATION UNIT (o.b.l.)
- SHELL GASIFICATION PROCESS (SGP)
- GAS COOLING AND COS HYDROLYSIS
- SULPHUR REMOVAL
- CARBONYL REMOVAL
- COMBINED CYCLE UNIT (EniPower)

- AIR
- NITROGEN
- OXYGEN
- BFW
- HP STEAM
- FEEDSTOCK (VISBREAKER TAR)
- WATER DISCHARGE
- METAL ASH
- FLUE GAS TO REFINERY
- SULPHUR RECOVERY (Refinery)
- CARBON DIOXIDE EXPORT
- STEAM EXPORT
- HYDROGEN
- POWER
- SYNGAS
- (NAT.GAS)
- (SPENT CARBON)
Shell Gasification Process
Gasification Area
Slurry Filtration Area
Eni R&M-Sannazzaro
Process Block Diagram

AIR

SHELL GASIFICATION PROCESS (SGP)

GAS COOLING AND COS HYDROLYSIS

SULPHUR RECOVERY
(Refinery)

HYDROGEN SULPHIDE

SULPHUR

CARBON DIOXIDE EXPORT

STEAM EXPORT

AIR SEPARATION UNIT (o.b.l.)

OXYGEN

NITROGEN

BFW

HP STEAM

FEEDSTOCK
(VISBREAKER TAR)

WATER DISCHARGE

METAL ASH

FLUE GAS TO REFINERY

SOOT WATER

FILTER CAKE

SOOT WATER FILTRATION AND SWS

SOOT ASH REMOVAL UNIT (SARU)

(SPENT CARBON)

CARBONYL REMOVAL

COMBINED CYCLE UNIT
(EniPower)

SYNGAS

HYDROGEN

POWER

(ENI POWER)

WATER DISCHARGE

METAL ASH

FLUE GAS TO REFINERY

SOOT ASH REMOVAL UNIT (SARU)

(SPENT CARBON)

CARBONYL REMOVAL

COMBINED CYCLE UNIT
(EniPower)

SYNGAS

HYDROGEN

POWER

(ENI POWER)
Sulphur Removal (MDEA) Area
Carbonyls Removal Area
## Overall Performances

### Tar Data on dry basis

<table>
<thead>
<tr>
<th>Component</th>
<th>Design Feed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon</td>
<td>%wt 85.73</td>
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<tr>
<td>Hydrogen</td>
<td>%wt 9.05</td>
</tr>
<tr>
<td>Sulphur</td>
<td>%wt 3.54</td>
</tr>
<tr>
<td>HHV (* = calculated)</td>
<td>MJ/kg 41.28</td>
</tr>
<tr>
<td>LHV (* = calculated)</td>
<td>MJ/kg 39.30</td>
</tr>
</tbody>
</table>

**Feed = 2 x 25 t/h**

### Syngas

- ~400 GCal/h @ 3700 kcal/kg
- ~280 GCal/h @ 2800 kcal/kg + 38000 Nm³/h H₂
Integration

PPU

SYNGAS

HPS

CCU

TAR
FUEL GAS
CW
HYDROGEN
TAIL GAS
ACID GASES
BD

MPS
DW
BD

Reefinery

(FIRE WATER, IW, WATER TREAT., IA, SIGNAL EXCH., etc.)
Status of the Project

- July’03-July’04: All EniPower groups tested with natural gas
- All EniPower groups are running at full load with natural gas
- August’04: Construction progress of gasification = 35%
- 2nd half ’05: Syngas production (expected)

Thank you