



Consejo Social de la UPM

Seminario sobre

Energía y Medio Ambiente Local

Un caso de estudio en la valoración energética de Residuos
Urbanos e Industriales

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FUENTES POSIBLES DE ENERGÍA

TODOS LOS C-H-O

BIOMASA

RESID. AGRICOLA

RSU

PROD. AGRICOLA



RSI

ALGAS



SOLUCIÓN

GASIFICACIÓN



OBJETIVO COMPARTIDO:
SOSTENIBILIDAD

ENERGÍAS RENOVABLES

ELECTRICIDAD

BIO COMBUSTIBLES

BIO PETROLEO

METANOL

ETANOL

H2

GASIFICACIÓN POR PLASMA



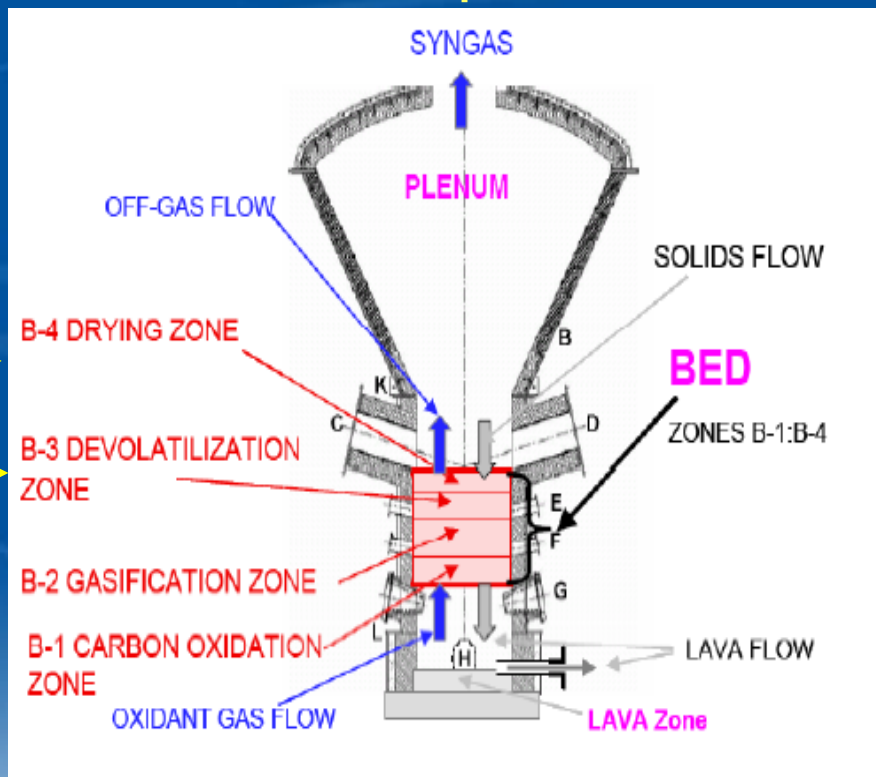
$C_{30} H_{48} O_{19} N_{0.5} S_{0.05}$



$C_{44} H_{37} N_{0.86}$



$C_x H_y \quad x > 17; \quad y = 2x$



GLASSY SLAG INERTE

USOS COMERCIALES

GAS DE SÍNTESIS

$H_2 + CO + CO_2 + N_2 + H_2O + HCl + H_2S$

$\geq 80 - 90 \%$



ROMPER TODAS LAS CADENAS

$T \geq 2000^\circ C$

ATMOSFERA REDUCTORA

CONDICIONES
SUB-STOCHIOMETRICAS

~~CO_2~~

OXIDACIÓN PARCIAL

~~N_2~~

REFORMACIÓN

VELOCIDAD SUPERFICIAL





ELECTRICIDAD



**GAS DE
SÍNTESIS**



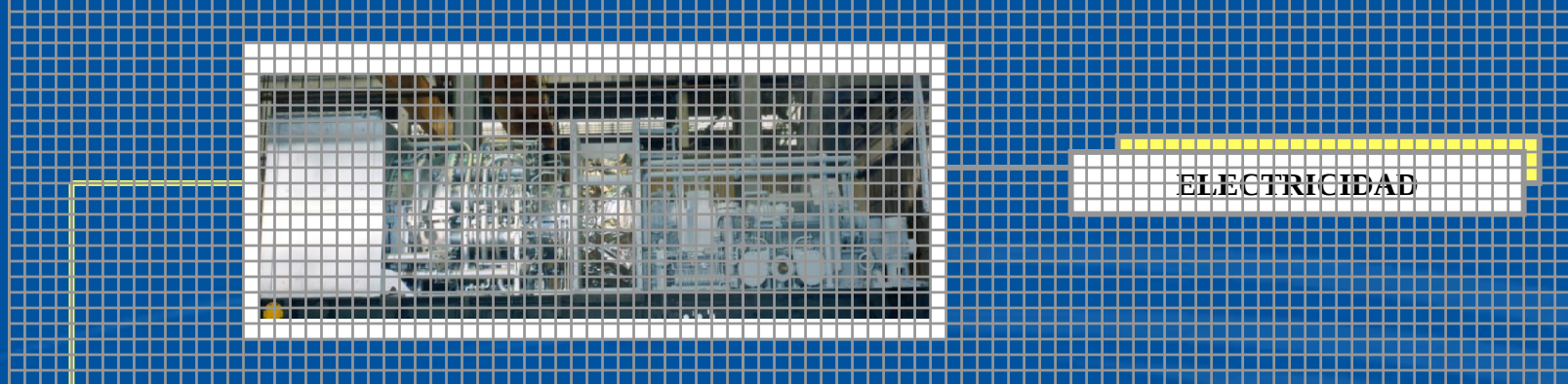
ELECTRICIDAD

**GAS DE
SÍNTESIS**

**SUSTITUTO DE GAS
NATURAL**

METANOL





ELECTRICIDAD

**GAS DE
SÍNTESIS**

**SUSTITUTO DE GAS
NATURAL**

METANOL

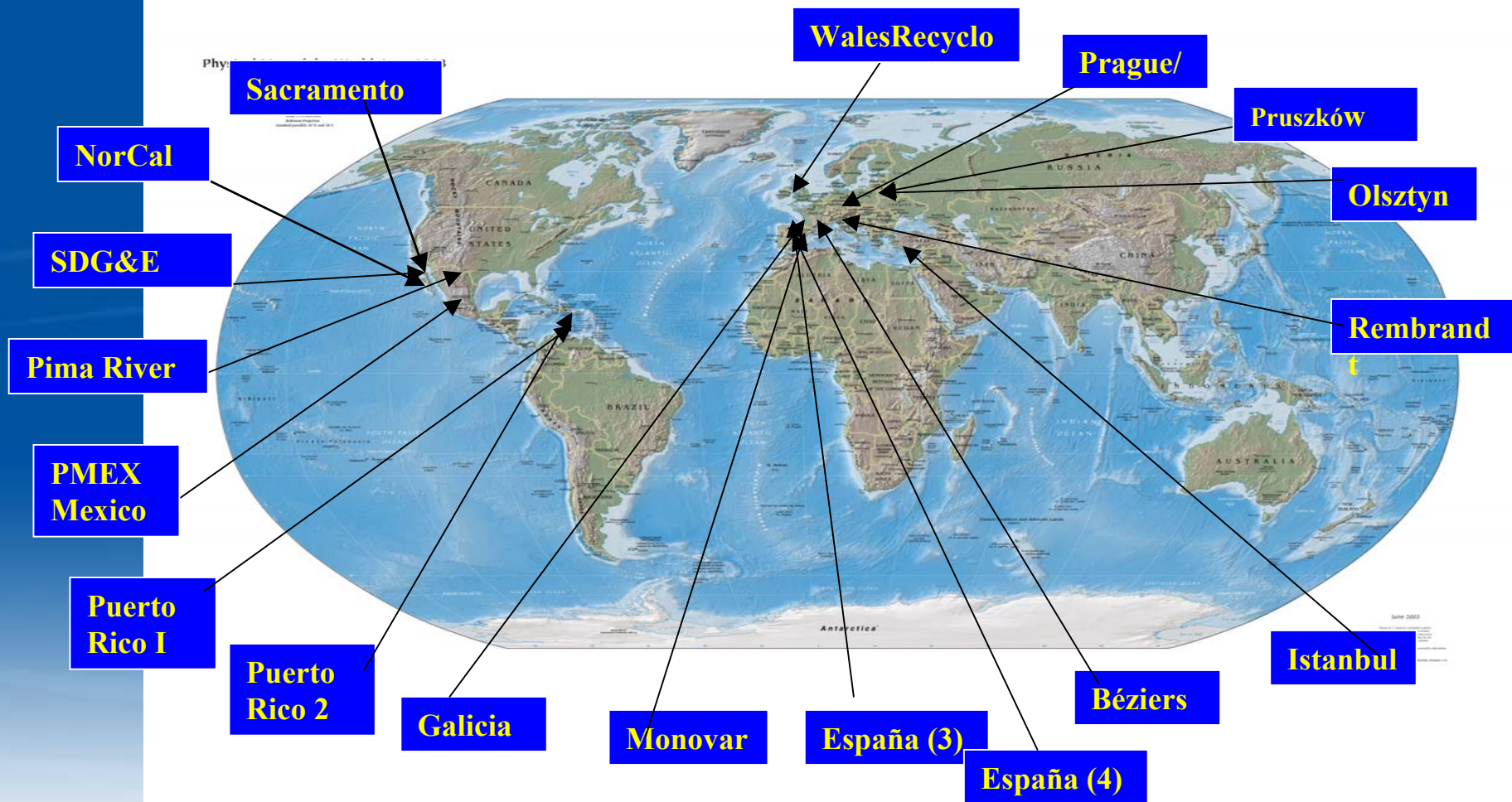


BIODIESEL/ KEROSENO

FISHER TROPSCH



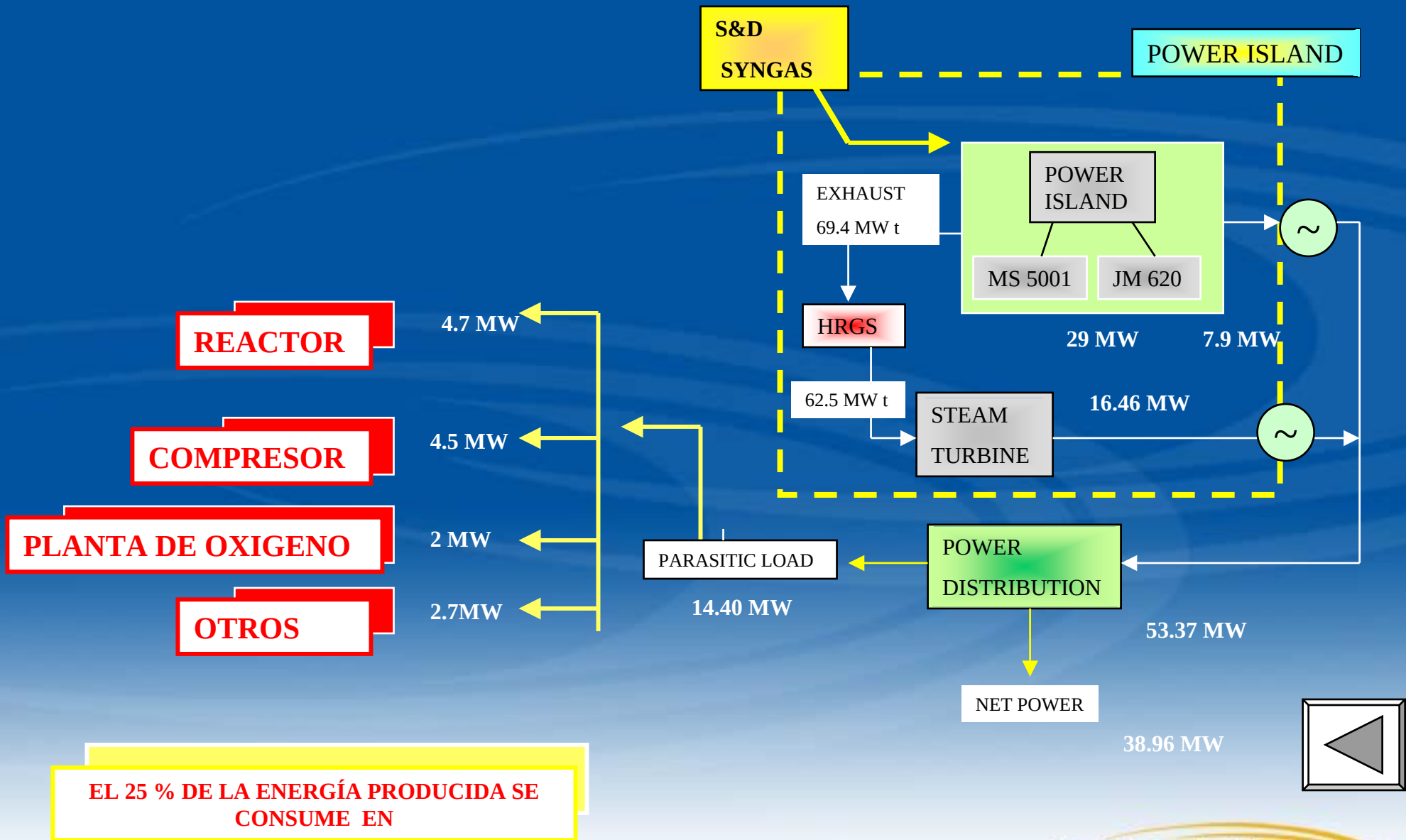
CUESTIONAR Y REDEFINIR LAS 3 R



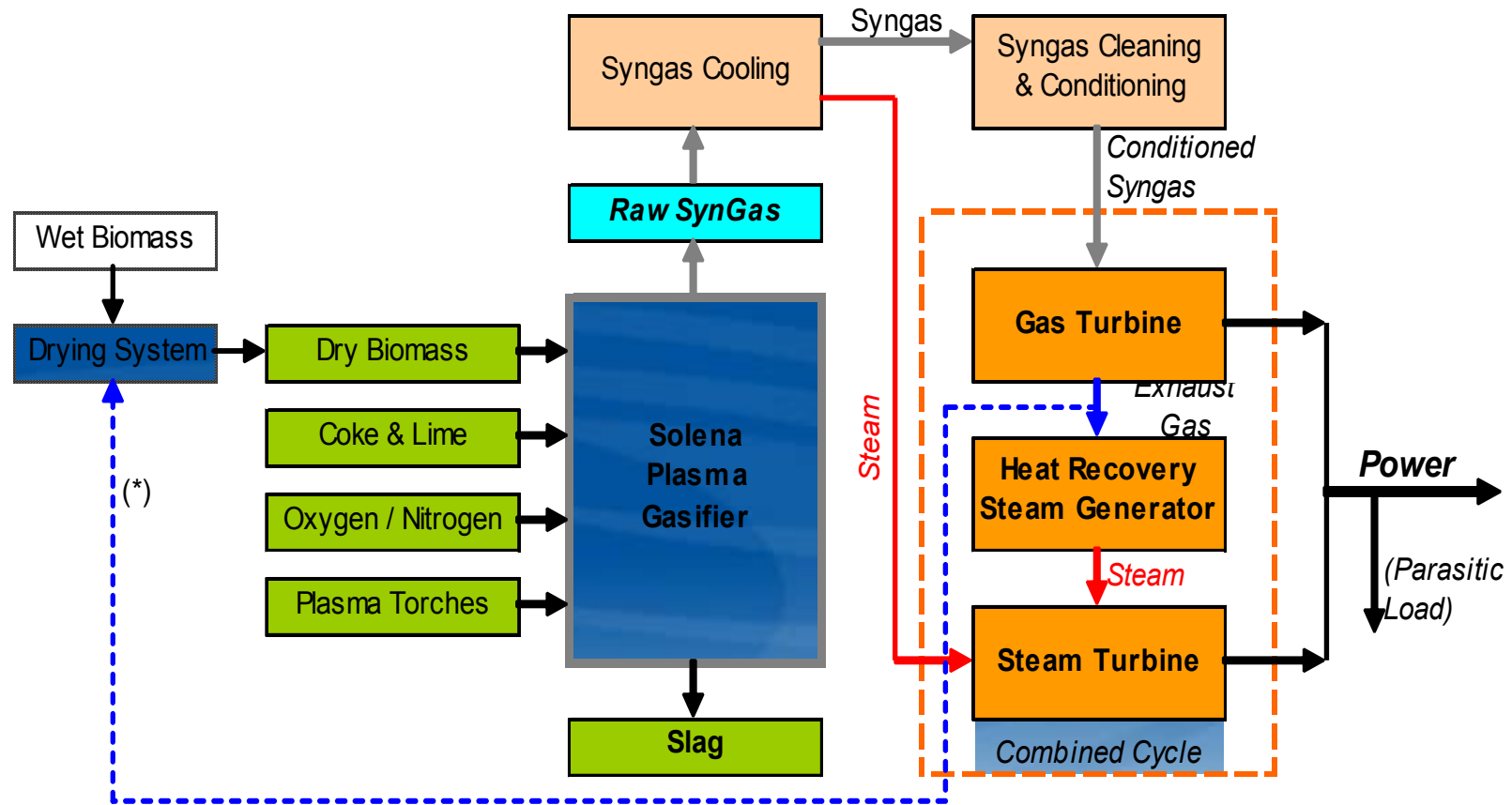
FIN DE LA PRESENTACIÓN

MUCHAS GRACIAS



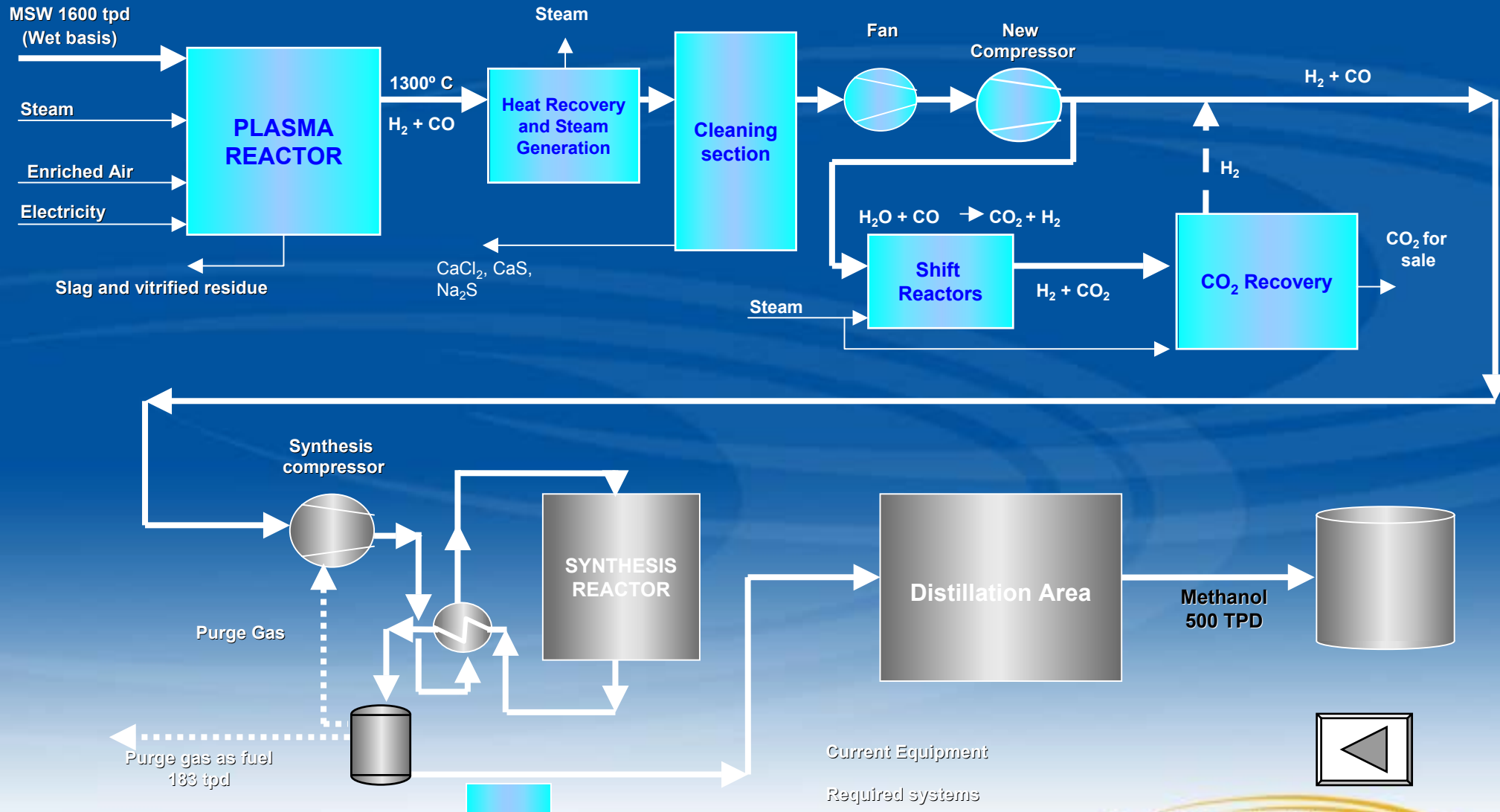


IPGCC CONCEPT DIAGRAM



(*) When required, a side stream of the GT exhaust can provide the thermal energy for the drying system. Alternatively, an external co-generation unit can provide the necessary heat.

PLASMA TECHNOLOGY INTEGRATION CONCEPT WITH METHANOL PRODUCTION





PROYECTO CALIFORNIA

56 tons per hour

PLASMA
GASIFICATION
REACTOR

SYNGAS
CONDITIONING

steam

To steam turbine

FT Synthesis Off gas

H2 REM

To steam turbine

GAS TURBINE

FISHER TROPSCH SYNTHESIS

Tail gas

CRUDES

PRODUCTS UPGRADE

HRGS

Steam from FT Synthesis

STEAM TURBINE

Steam from Solena Plant

Parasitic Loads

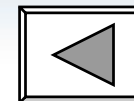
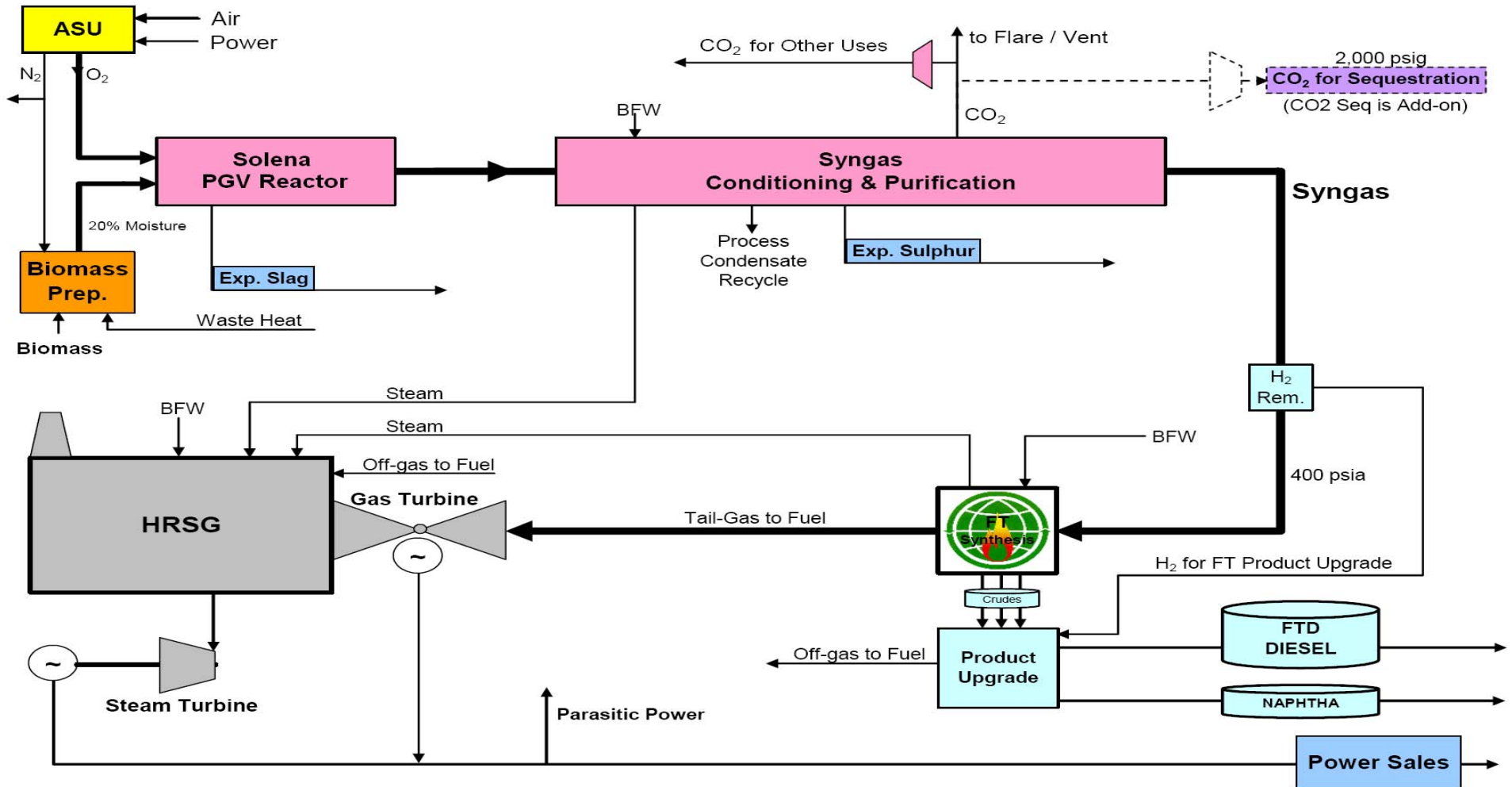
Net Power: 19 MW

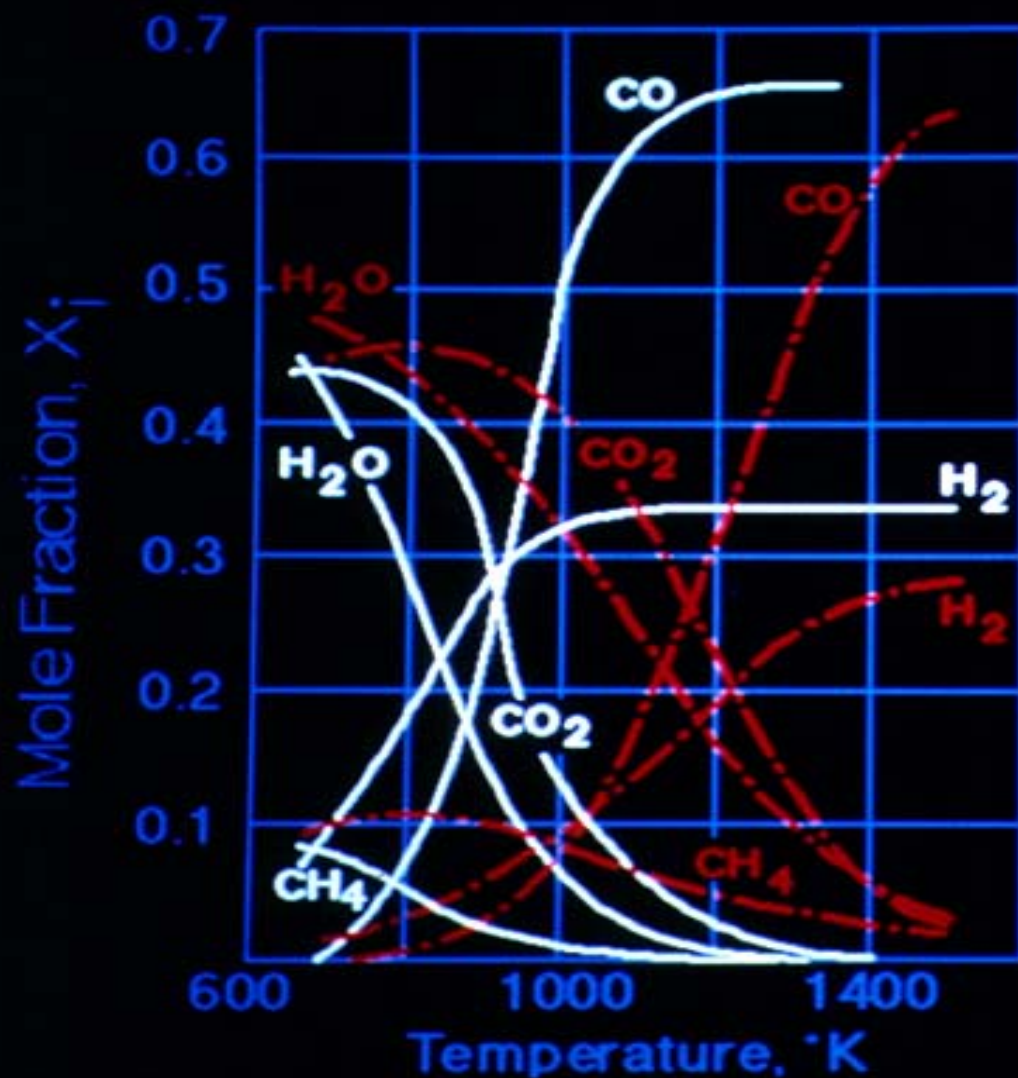
Jet Fuel JP 8
1080 barrels/ day

Naphta
780barrels/ day

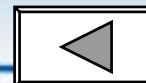
Once-Through FT System

Biomass Gasification Yielding Rentech FT Fuels & Power

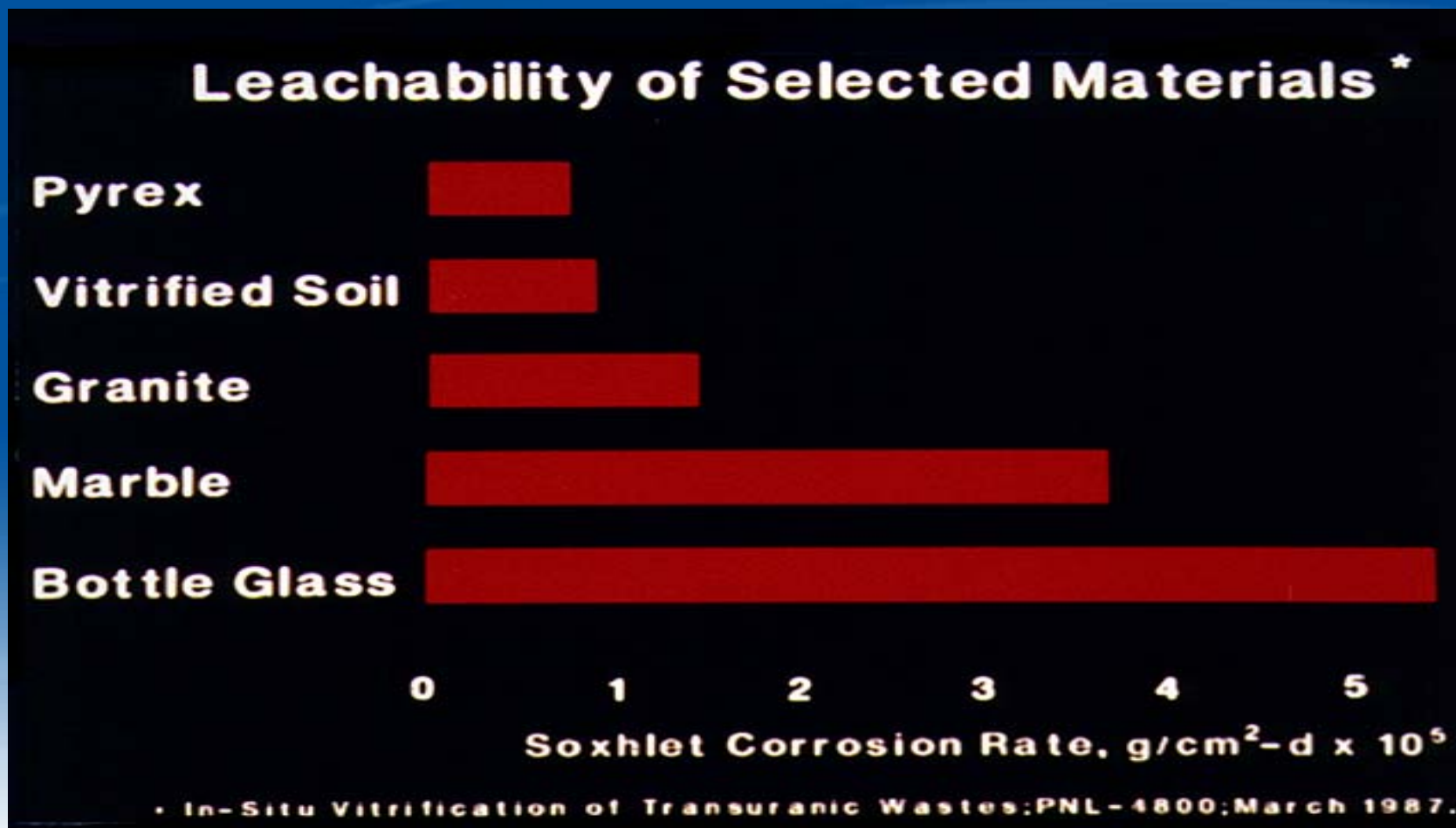




EQUILIBRIUM
CHARACTERISTICS
FOR C-H-O SYSTEM
(hydrogen : oxygen =
1 g-atom / g-atom)



El material vitrificado por el Plasma es cinco veces menos lixiviable que el vidrio de una botella



PROYECTO KOCEALI (RSI) Enero 2008

Feedstock Composition (Wt %)	
Inert	7.06
H	8.14
C	63.20
S	0.58
N	0.58
Cl	2.79
O	6.88
H ₂ O	10.77
TOTAL	100.00

Syn Gas
Temp ° C 826

Syn Gas Composition (gas only)		
Constituent	Weight %	Volume %
CO	79.37%	47.54%
CO ₂	0.56%	0.22%
H ₂	4.91%	40.88%
N ₂	7.42%	4.44%
H ₂ S	0.34%	0.17%
H ₂ O	0.22%	0.19%
CH ₄	5.55%	5.80%
HCl	1.63%	0.75%
Total	100.00%	99.99%
	kcal/kg	MJ/kg
HHV	4317	18.06
LHV	3988	16.69

	Power Input MW	Mass Input kg/hr
Feedstock	120.9	14580
Flux (CaO)		540
Coke	6.1	729
Enriched O ₂	0.0	7200
Temp ° C		
Water Steam	0.0	2520
Temp ° C		
Thermal Plasma Power	4.0	1800
Temp ° C		
Total	131.0	27,369

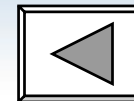
93.00%
25

100

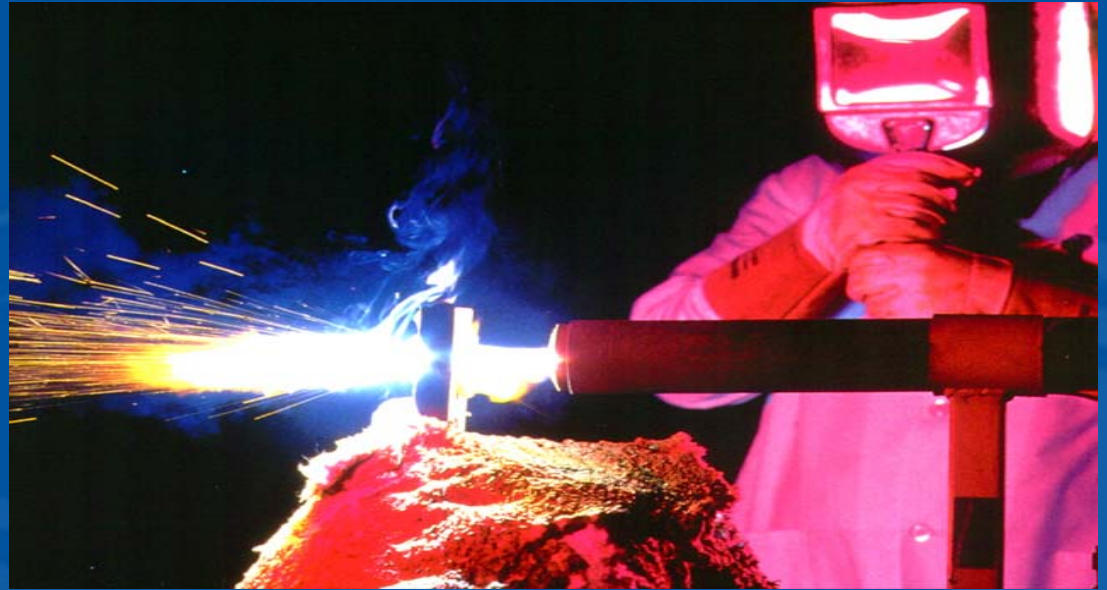
25

Temp ° C
995

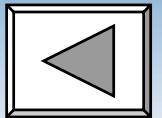
Mass Output kg/hr	Power Output MW	
25,735	10.9 119.3	SynGas Sensible SynGas Chemical
	0.3	Process Losses
1,634	0.5	Slag sensible
27,369	131.0	Total



Plasma Torch Power



750 KWh Torch



SOLENA
GROUP