

# Full Recycling of EAF and IF Dust Using ZincOx Technology

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*"ubi est squales est aere"*





## ZincOx Background

British company formed in 1999 to bring to account unconventional sources of zinc.

Innovative company combining:

Business acumen

Highly experienced zinc metallurgists

Track record in developing new technologies, financing and project development

Initially concentrated on mines

Developed new way to make high quality zinc oxide from EAFD and IFD

5 years R&D

New treatment process (**Full Cycle**)

2012 developed first plant, in Korean, US\$113 million

World's largest zinc recycling facility (50,000 tpa), sold 2016.

Pre-Development work on Vietnam Plant (under construction), sold 2018.

Full Cycle technology now demonstrated and ZincOx is starting global roll-out:

Europe, Japan, Middle East?



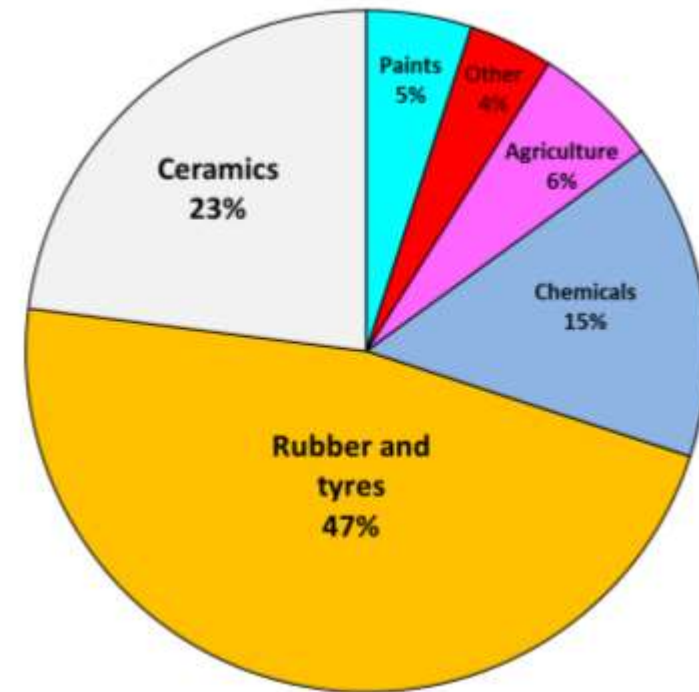
## Product : Zinc Oxide

- Most important zinc compound
- Zinc 80% Oxygen 20%
- 1.6 mil tpa
- Purity > 99% zinc oxide
- Uses are sensitive to impurities
- Use for rubber and ceramics has been verified
- Sells for about 120% of metal value contained

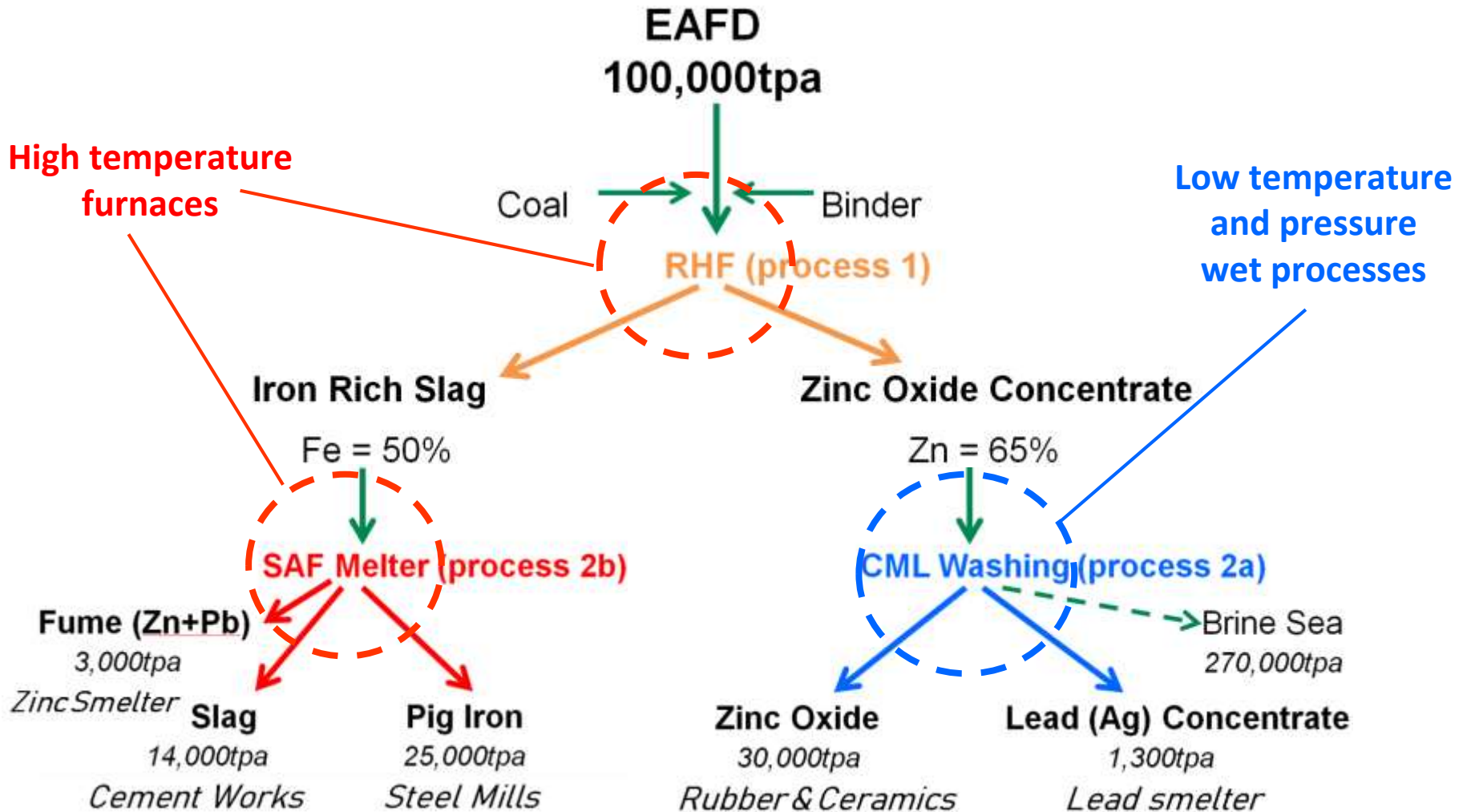
- Ceramics can be for pigment and frits (glaze)



- Rubber products needs about 2% zinc oxide as a catalyst for rapid hardening (vulcanisation)



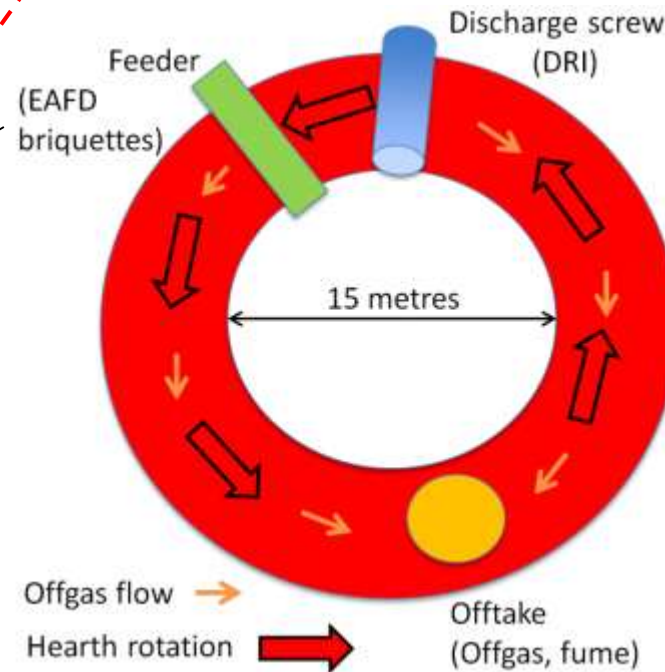
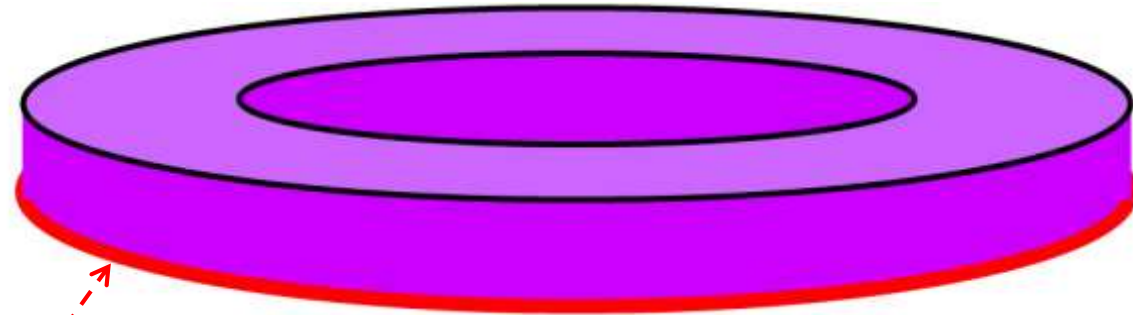
# Full Cycle Process Summary



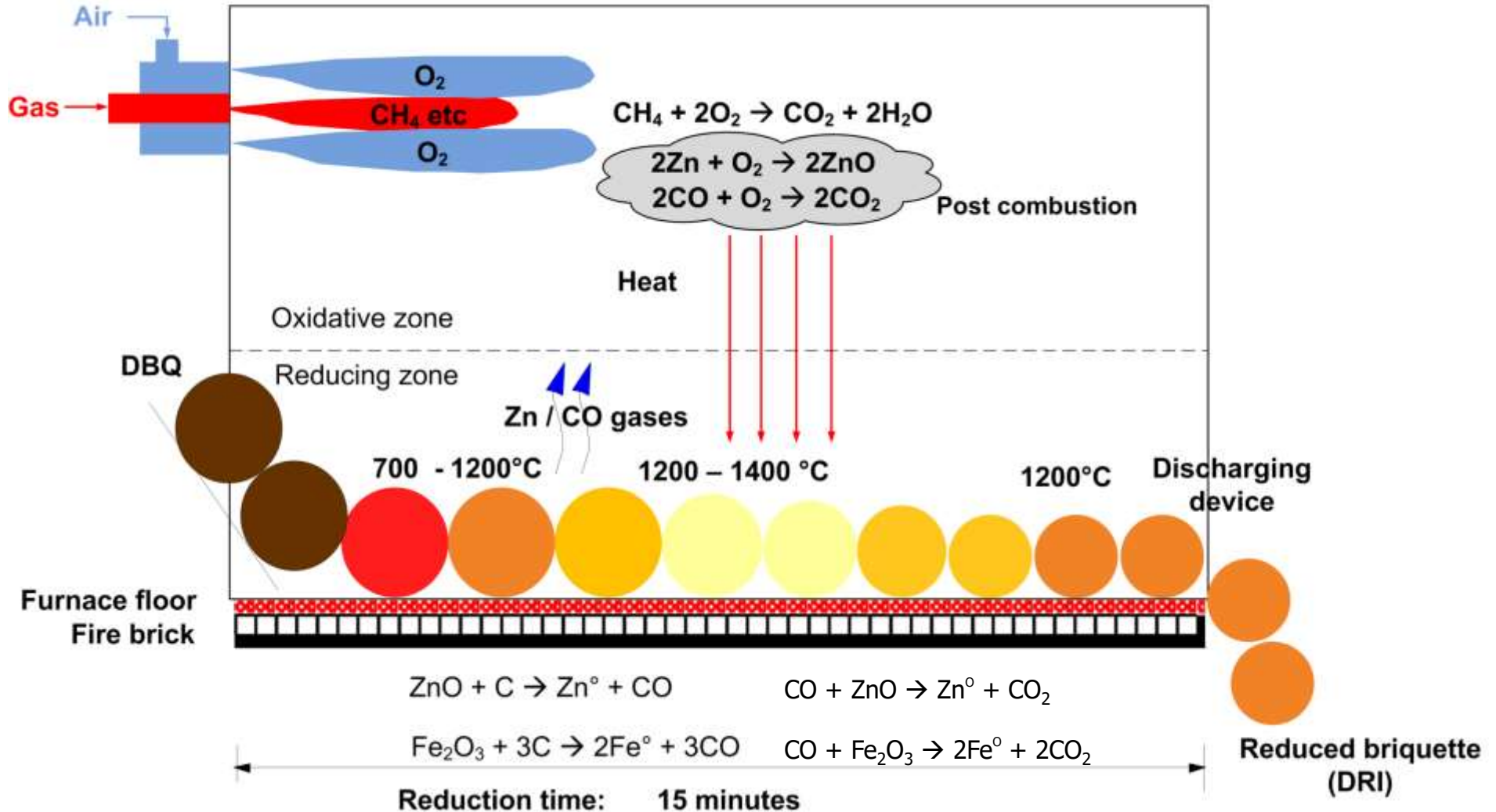
# Key Technology - Rotary Hearth Furnace (RHF)



Floor or Hearth



# RHF chemistry, lateral section





# Transformation into Products (Full Cycle)

Element	Weight %	Products	Form	Annual Tonnage
Zinc	28.5	Zinc Oxide	dry powder	30,000
		Zinc Concentrate	dry powder	3,000
Lead	1.57	Lead concentrate	damp filter cake	2,300
Silver	trace			
Iron	21.1	Pig Iron	pigs	25,000
Manganese	1.69			
Copper	0.18			
Chromium	0.24			
Suplhur	0.66			
Phosporous	0.13			
Nickel	0.02			
Carbon	2.39			
Silicon	2.24			
Calcium	3.94			
Magnesion	1.45			
Aluminium	0.09			
Chlorine	3.59	Effluent (brine)	liquid	250,000
Sodium	1.85			
Potassium	2.63			
Cadmium	0.05		solid	<100 tpa
Fluorine	0.04			
Oxygen	27.65	Offgas in CO <sub>2</sub>	gas	na
	100			



## Environmental: EAFD Waste or Resources?

- EAFD contains toxic lead (Pb) and cadmium (Cd) as simple compounds that can be dissolved by rainwater
- EAFD must be carefully impounded to protect the environment
- EAFD is classified as a Hazardous substance
  
- Full Cycle technology views EAFD and IFD as a resource not a waste and will pay the mills for their EAFD and IFD
  
- ZincOx technology recognised under Basel Convention as acceptable technology

**Environmental compliance is the priority**





## Environmental Protection (Good Design Practice)

### No reason for non-compliance with regulations

#### **Air Quality** (Fugitive emissions, stack offgas – composition and particulates)

Sealed process equipment

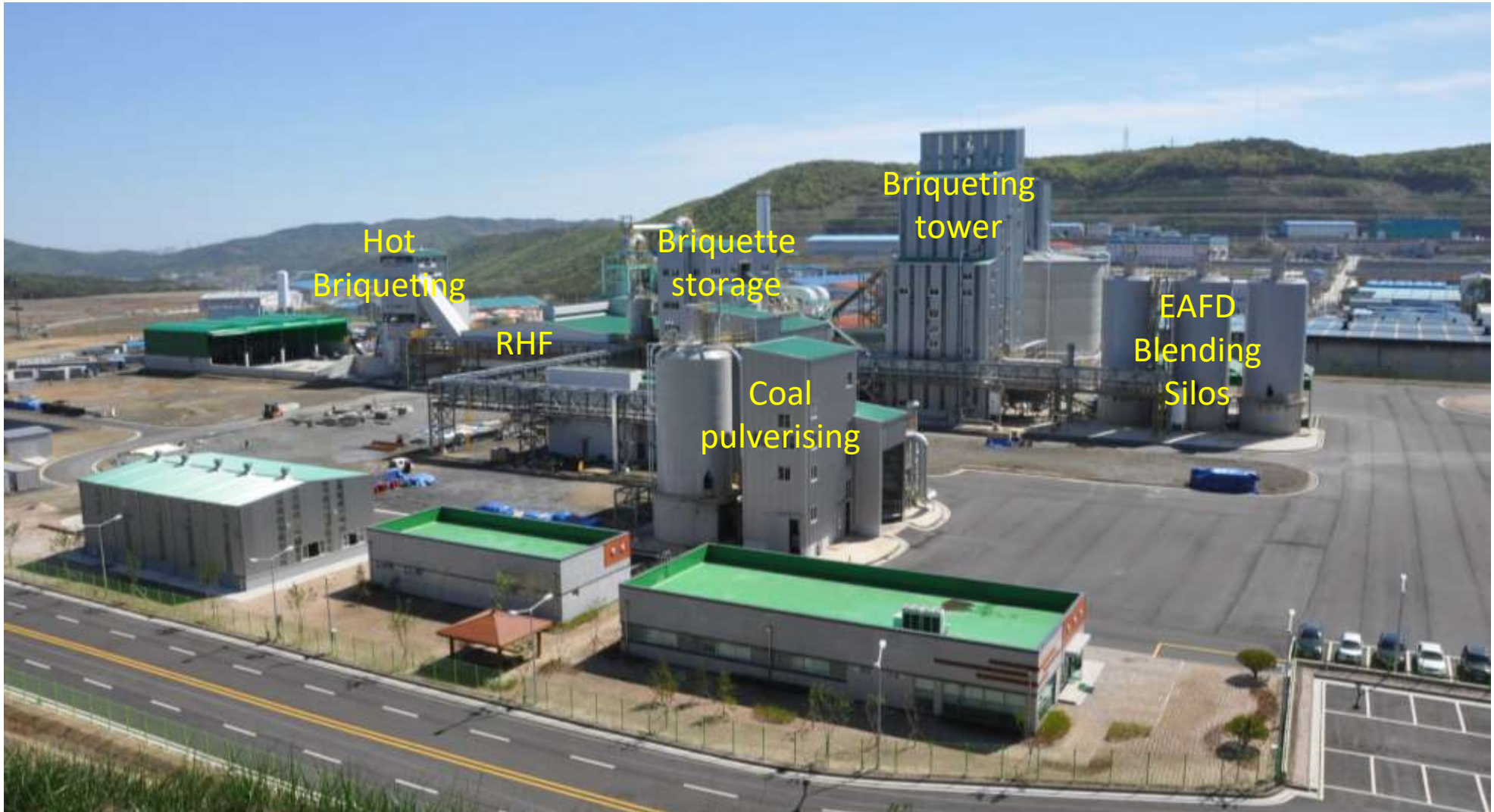
Furnaces under negative pressure

Offgas drawn off under negative pressure to filtration equipment that guarantees particulate capture and composition (NB off gas is a product (\$) recovery system)

#### **Water Quality** (Effluent treatment)

Effluent contains salt but undergoes rigorous treatment before being discharged, via testing ponds, to the marine environment

# Korean Plant (RHF process 1)



# Typical Full Cycle Plant





## Typical Full Cycle Plant

Feed:	100,000 tpa EAFD feed per annum using pyro- and hydro- metallurgy
Producing:	<b>Zinc Oxide (30,000 tpa)</b> , 90% of revenue
By-product:	Pig iron (25,000 tpa) Zinc concentrate Lead-Silver concentrate Slag cement additive
Development Cost:	\$130 million
Employment:	120 direct jobs
Build and commission:	18 months
Ramp up:	3 months



## Thank You For Listening

Please view the new film describing the  
**Full Cycle** technology



on the homepage of our website  
**[www.zincox.com](http://www.zincox.com)**