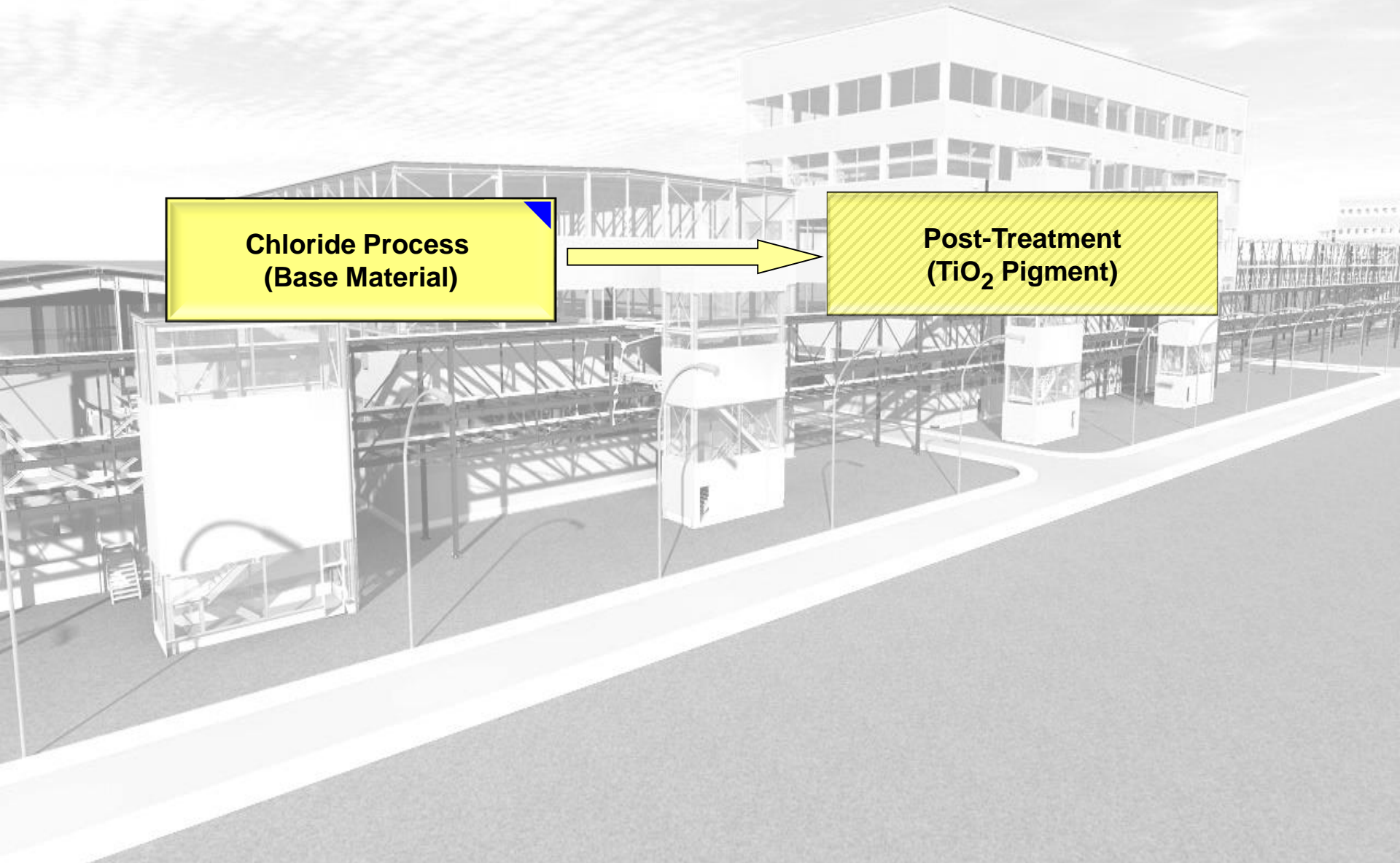


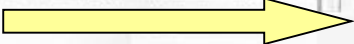
# TiO<sub>2</sub> Chloride Process



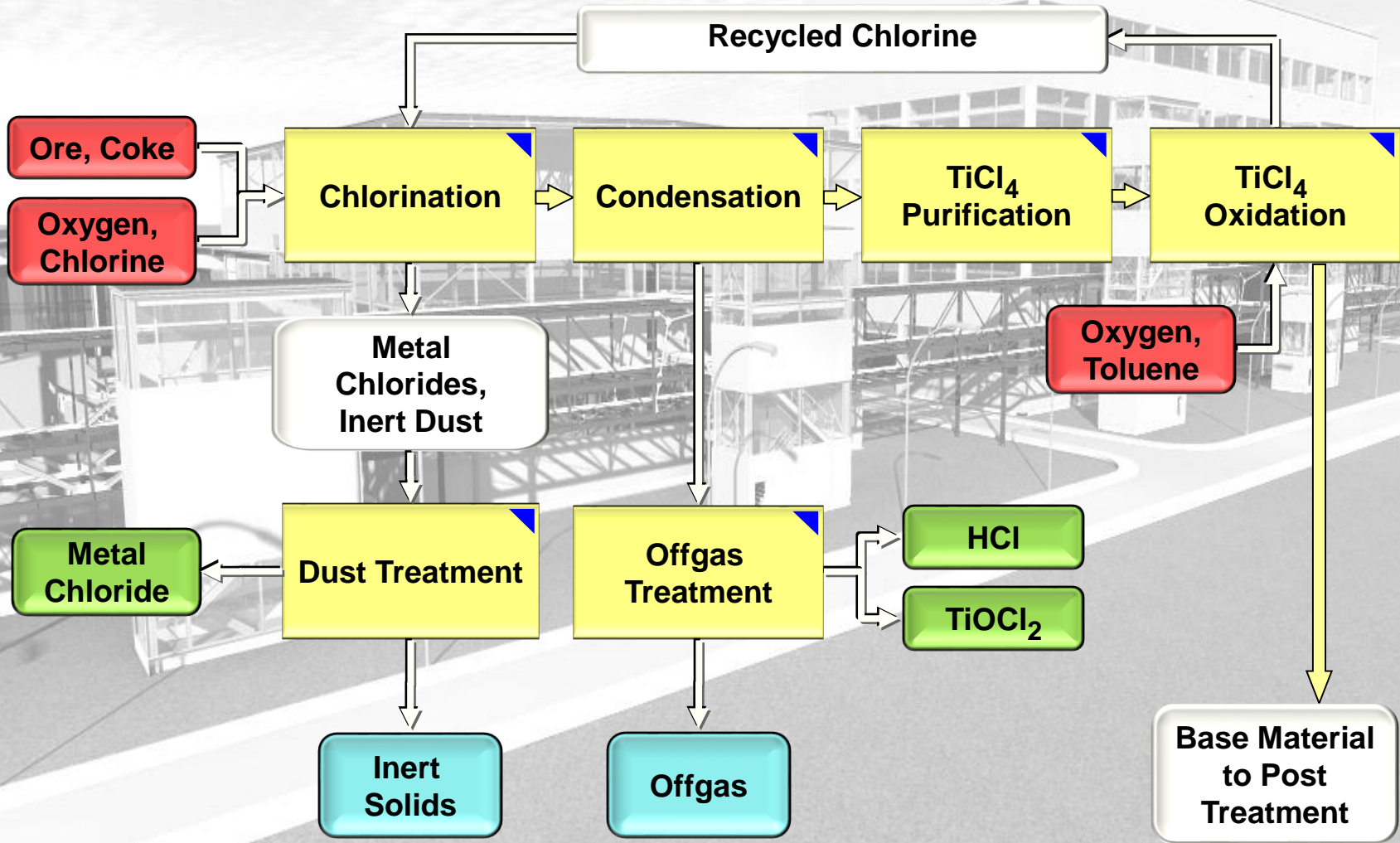
[www.Ti-Cons.com](http://www.Ti-Cons.com)



**Chloride Process  
(Base Material)**



**Post-Treatment  
(TiO<sub>2</sub> Pigment)**



Symbols:

Educts

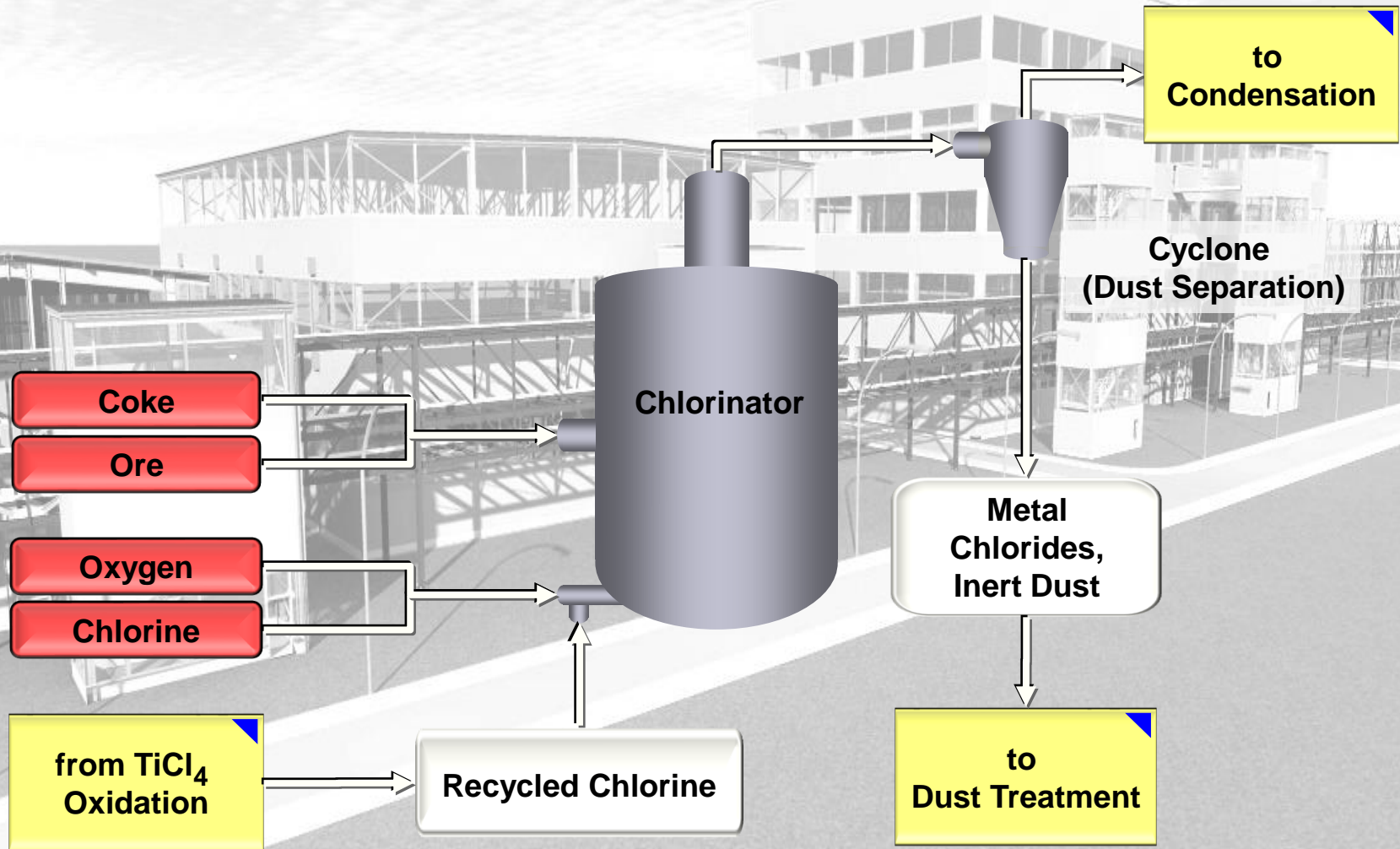
Intermediates

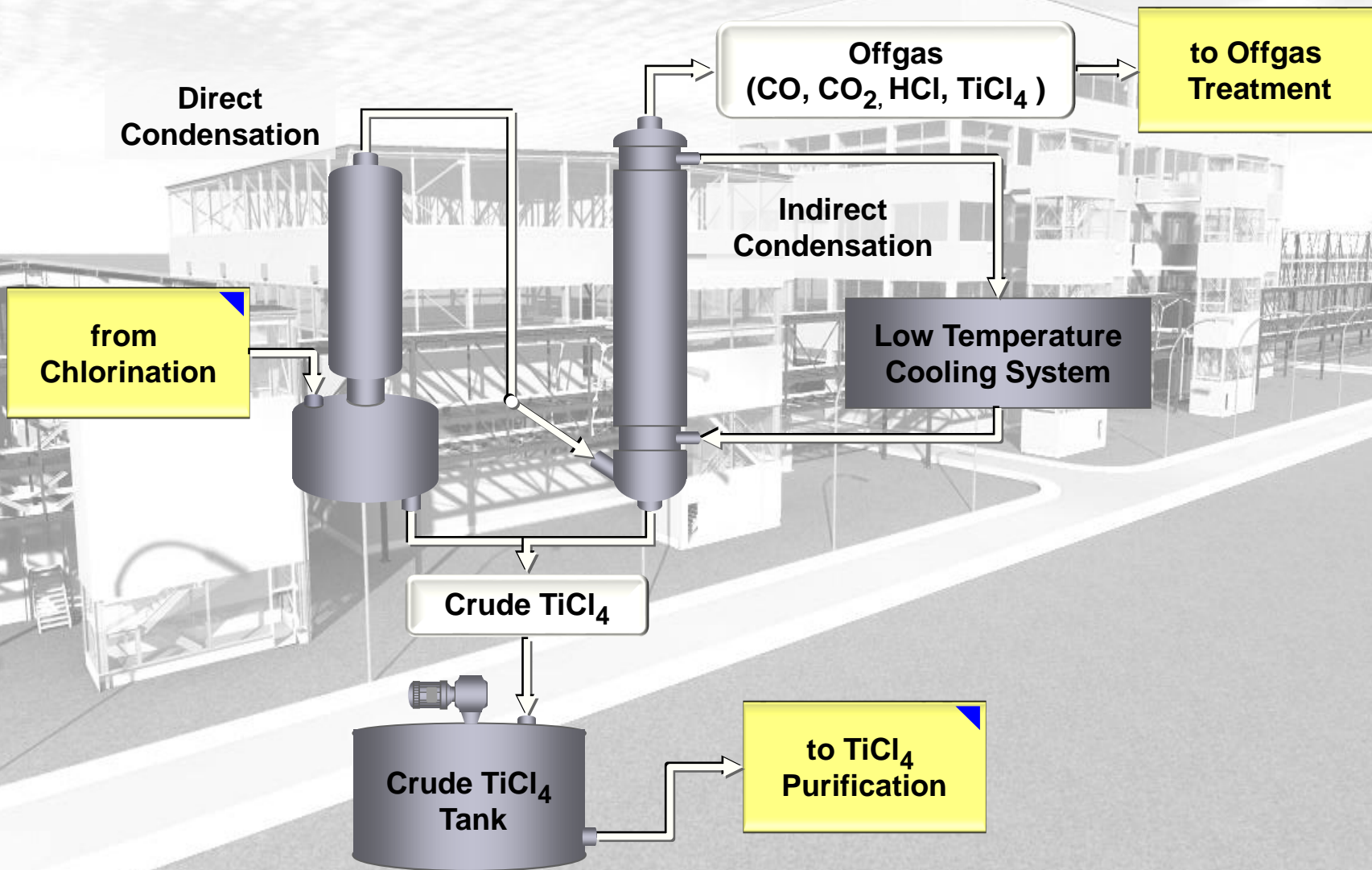
By-Product

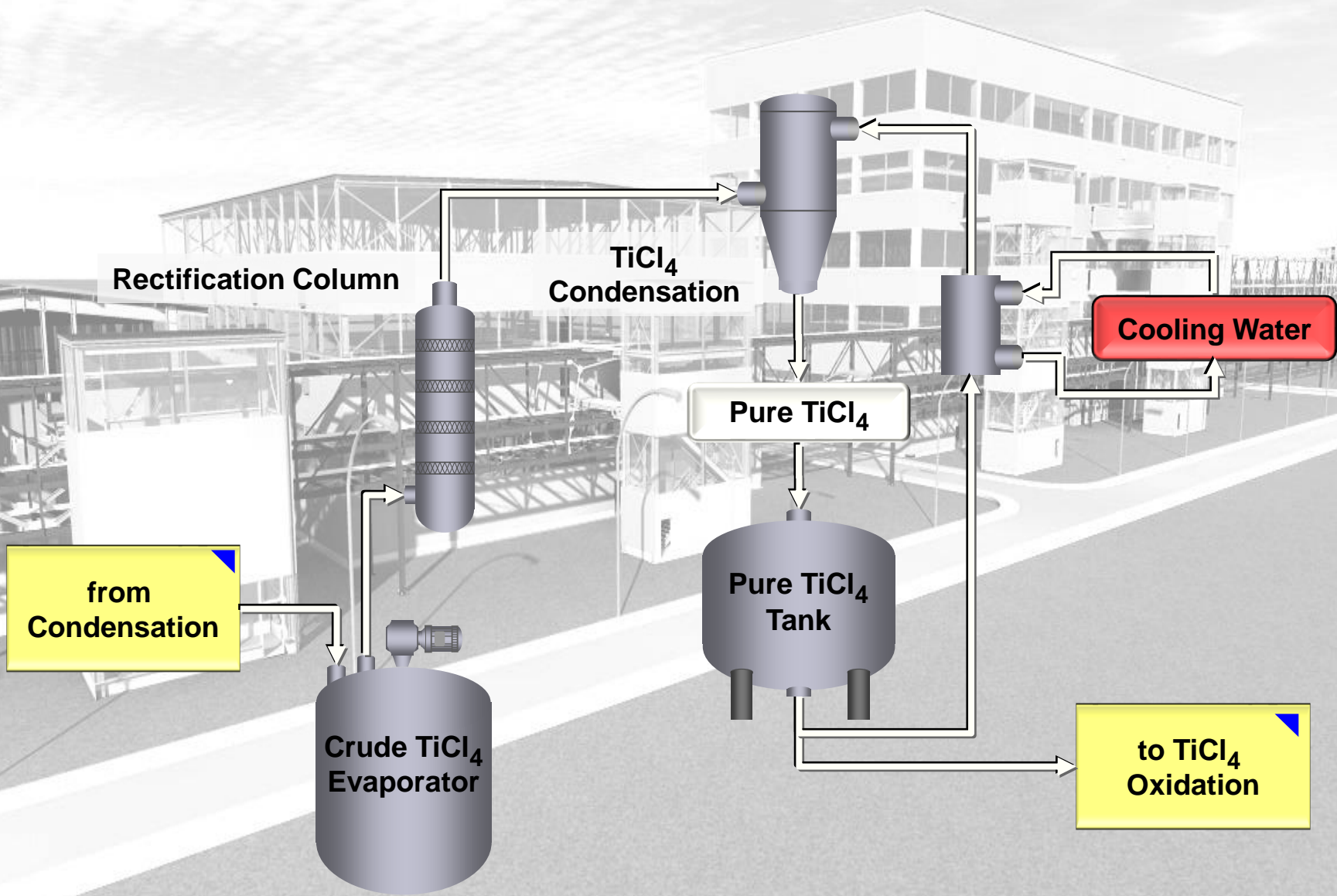
Waste

Overview



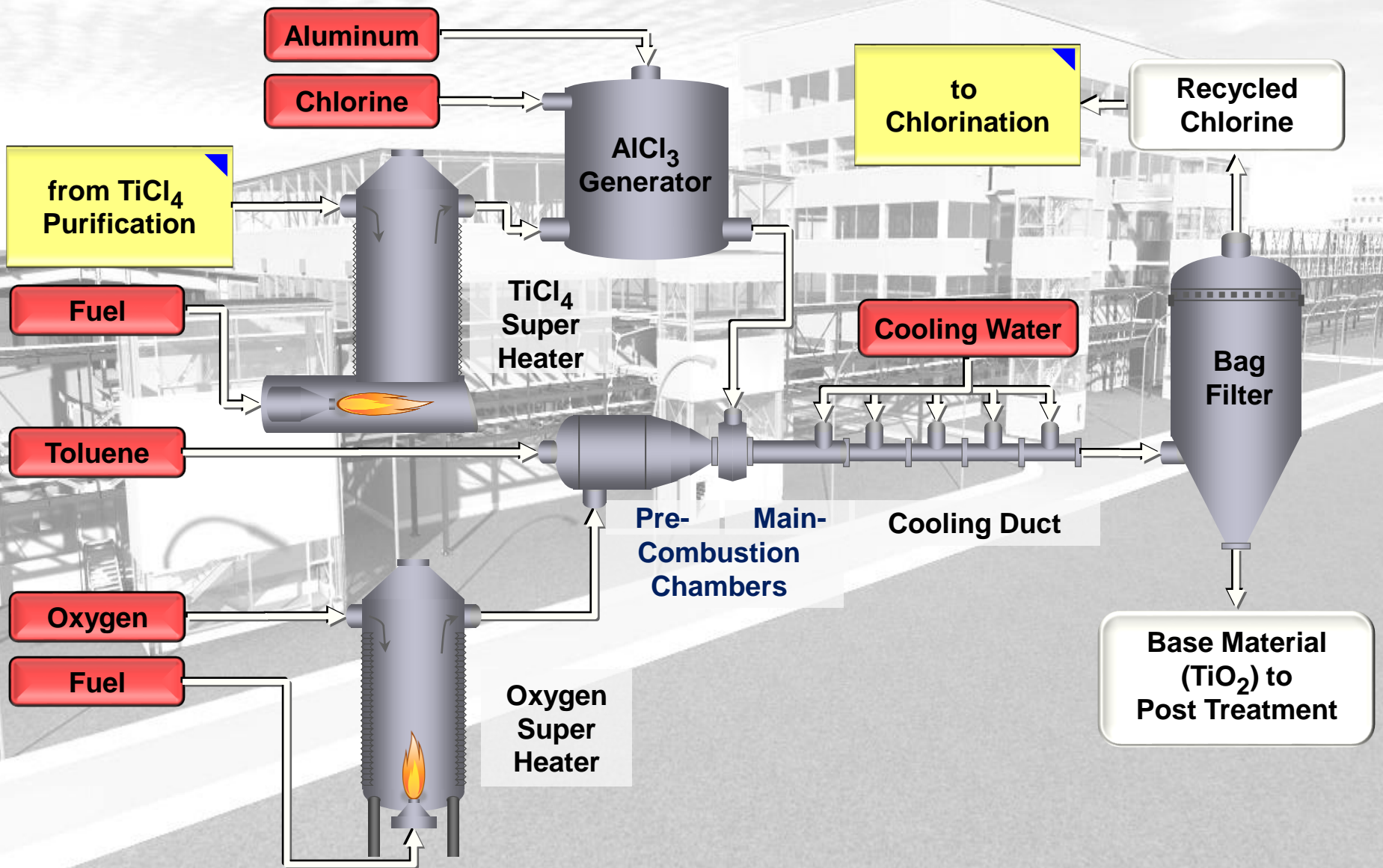


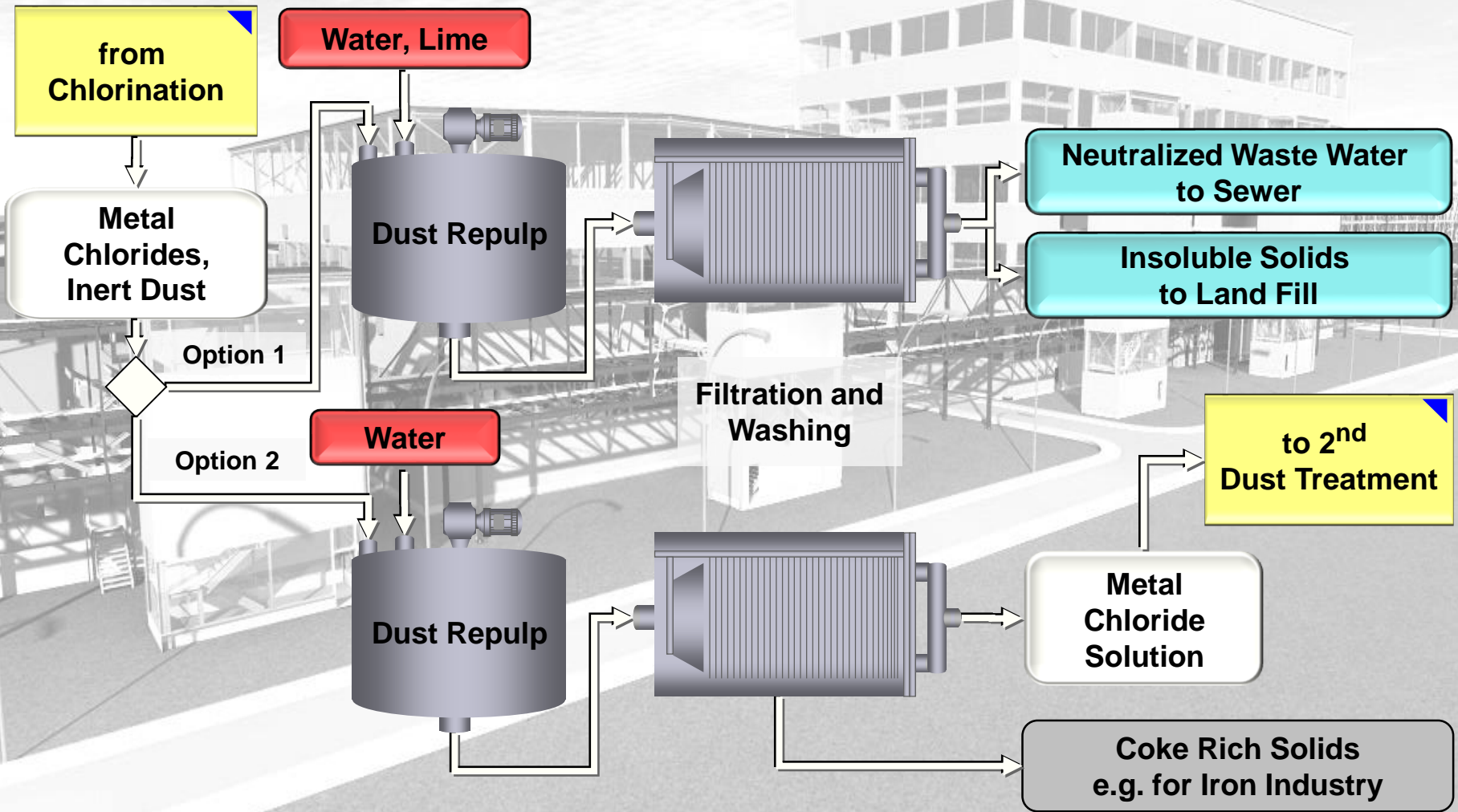




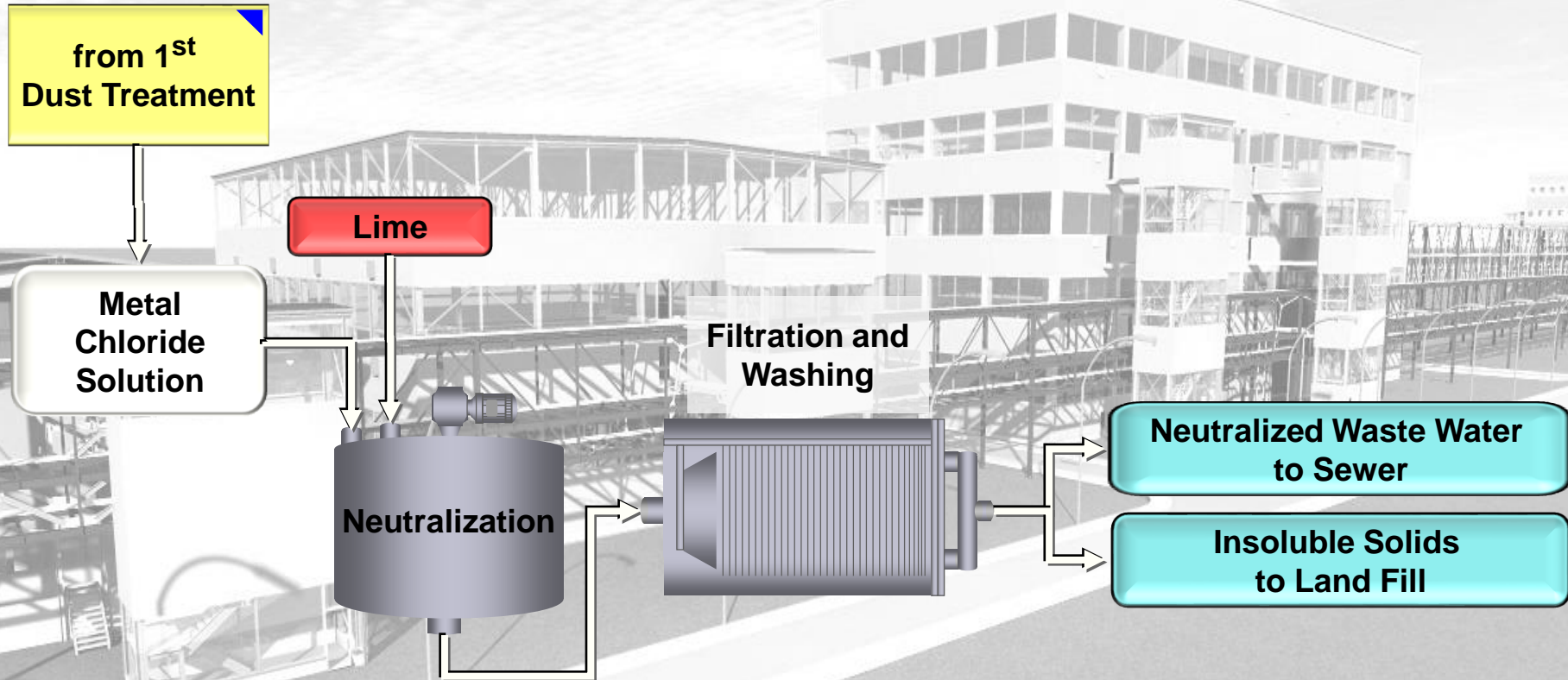


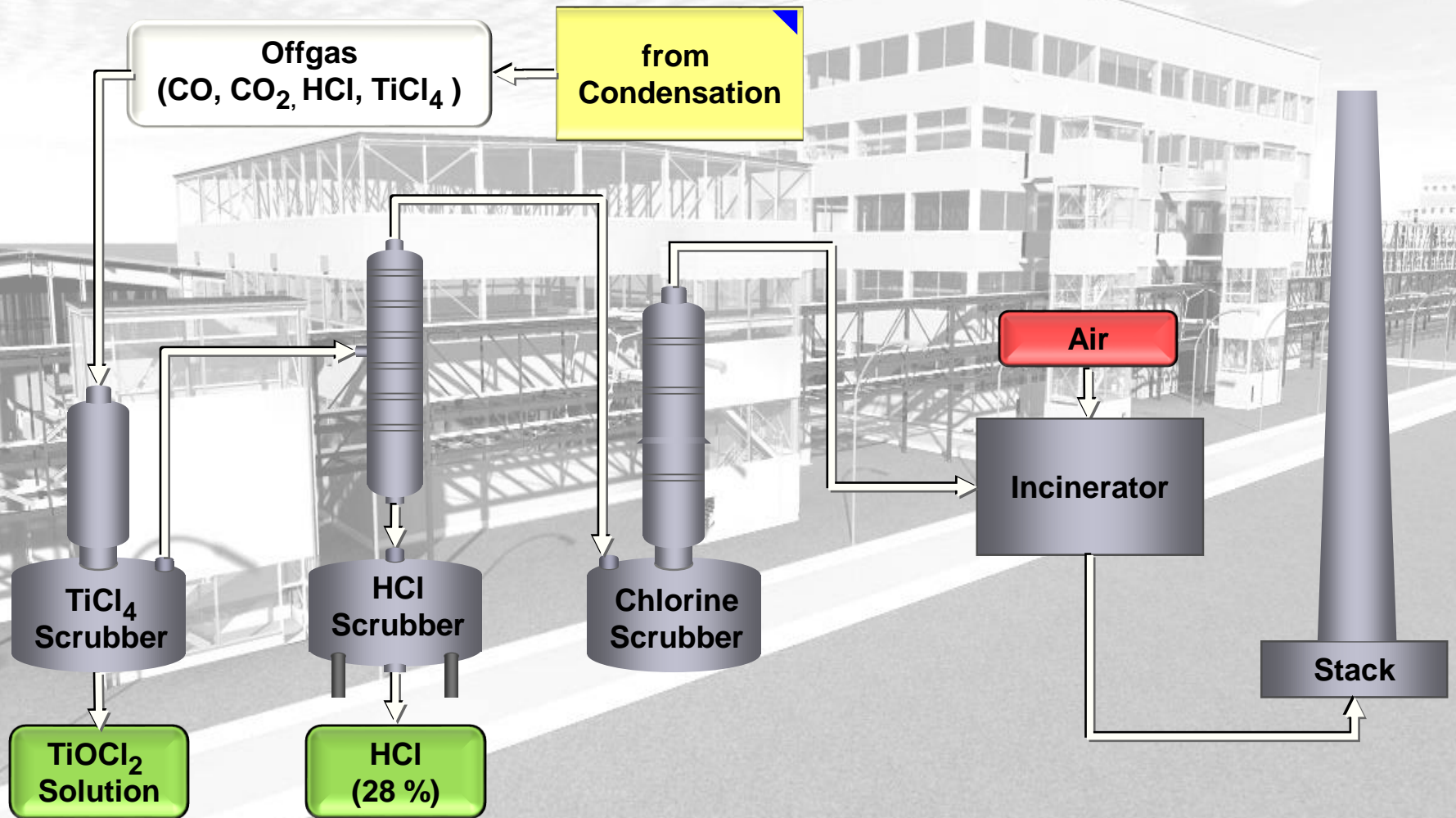
# TiCl<sub>4</sub> Oxidation











# Advantages and Disadvantages of Chloride Process compared to Sulfate Process

## Advantages



- **Continuous Process:**
  - **Good prerequisites for optimization of quality and utilization**
  - **Direct and stable process control**
- **Better product quality regarding the optical and chemical properties**
- **In general, the production costs are lower, but in depends on the special circumstances**
- **Less environmental impact due to less waste**
- **Less man power necessary**

## Disadvantages



- **Higher safety requirements due to the use of Cl<sub>2</sub>, CO and TiCl<sub>4</sub>**
- **Higher degree of automation necessary**
- **Higher requirements to the qualification of the staff**
- **Requires stable production environment and infrastructure**
- **Because of the closed loop the process is more sensitive to production short-fall**



## Ore:

- The higher the TiO<sub>2</sub> content, the lower is the loss of chlorine and the amount of by-products
- The content of Ca and Mg has to be low
- The mechanical stability of the particles should be high
- The content of radioactive impurities should be low

## Coke:

- Content of sulphur, hydrogen and water should be low
- The mechanical stability of the particles should be high

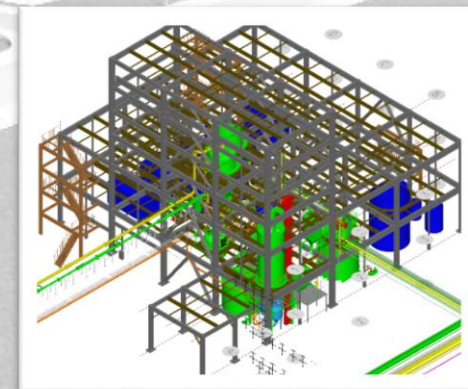
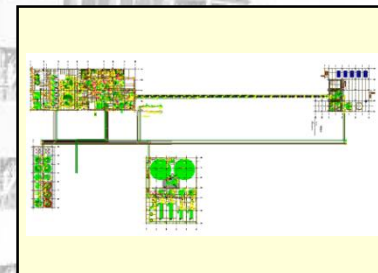
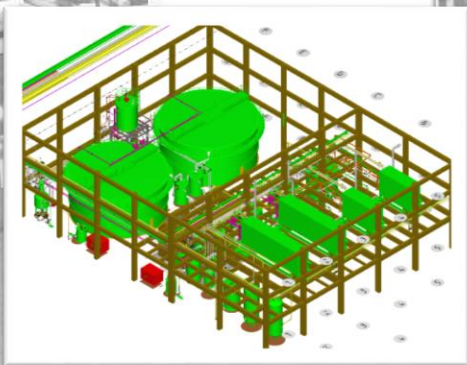
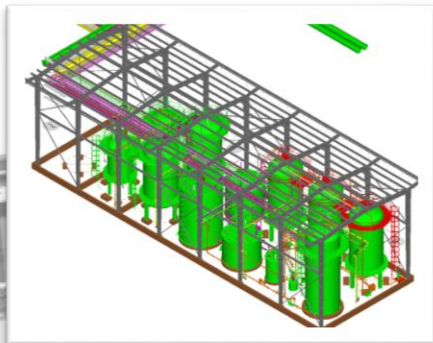
Number	Name	Unit	Quantity [Unit/tTiO <sub>2</sub> ]
1	Electricity	kWh	360
2	Steam	t	0.5
3	Oxygen	Nm <sup>3</sup>	350
4	Nitrogen	Nm <sup>3</sup>	100
5	Compressed Air	Nm <sup>3</sup>	40
6	Clean Compressed Air	Nm <sup>3</sup>	2
7	Chlorine	kg	350
8	Fuel Gas	GJ	2.3
9	Refrigerant	t	0.6
10	Coke	kg	370
11	Slag	t	1.27
12	Toluene	kg	13

Number	Name	Unit	Quantity [Unit/tTiO <sub>2</sub> ]
13	NaCl	kg	8
14	NaOH 50 %	kg	25
15	Aluminum	kg	6.5
16	KCl	kg	0.05
17	Mineral Oil	kg	3.6
18	H <sub>2</sub> O <sub>2</sub> 30 %	kg	1.8
19	Scrubbing Agent	kg	2
20	Ca(OH) <sub>2</sub>	kg	500
21	Water	m <sup>3</sup>	2.5
22	D-I Water	m <sup>3</sup>	2.5
23	Makeup Cooling Water	m <sup>3</sup>	4.5



### Project data

- 100.000 tpa TiO<sub>2</sub>-Pigment
- 4 buildings:
  - Main Building
  - Bag Filter Building
  - Waste Treatment
  - Tank farm
- 196 static equipments
- 134 rotating equipments
- > 14 km of pipes
- > 1.000 isometric drawings
- > 41.000 piping objects



- **Based on the most modern technology and equipment**
- **Sustainable technology regarding resources and environment**
- **Best technology available**
- **Proven technology (2 running installations in China)**
- **Very detailed engineering ready for construction (>20.000 documents)**
- **Long experience in planing, commissioning and operation**