

# CNIM: the approach for WtE market !

## Proven and robust thermal treatment of residual waste



**ASIA CLEAN ENERGY FORUM 2016**

Manila 6-10 June, 2016

Waste to Energy, transforming strategy into reality

Asia Clean Energy Forum 2016  
7 June 2016, Manila, Philippines

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INNOVATE AND ACT

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# Conditions for a successful W-t-E project



Thiverval sorting & W-t-E, Fr

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ADB W-t-E workshop © AICF 2016, Manila, Philippines, 2016/06/07 - CNIM case study

**ENIM**

# Conditions for a successful project

- Adapted, coherent and effective legislation
- Site
  - Public acceptance, access, availability of energy users
- Secured waste feedstock
  - Ownership, quality, quantity
- Fair contracts
  - Electricity and/or heat sale
  - Gate fee (never 0!)
  - **Appropriate procurement mode** and (long-term) financing
  - **Proven and robust installation**
  - **Flexibility, availability, performances**
- **Experienced operator**

# How to build the project ?



Ardley, January 2013

4

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ADB W-t-E workshop © ACEF 2016, Manila, Philippines, 2016/06/07 - CNM case story

**CNIM**

# Turnkey EPC by general contractor



Ardley, August 2013

bdechefdebien@cnim.com

Palawan, Philippines, 2016/06/07 - CNIM case study

**ENIM**

- Turn-key or EPC contract :

- ◆ Fixed global price and firm commitment on delivery time
- ◆ Single competent responsible with adequate knowledge to complete tailor-made project on budget and on time
- ◆ Avoid complex, uncertain and time-consuming interfaces and coordination management
- ◆ Obtain global guarantees of performances and availability

- EPC client (public or private):

- ◆ Specify performance criteria to be achieved and principles rather than design himself the facilities
- ◆ Exercise control to follow work progress on the way chosen by the Contractor



# Proven and robust techniques



April 2014

bdeche@enim.com 7 ADB W&E workshop @ ACEF 2014, Manila, Philippines, 2016/06/07 - ENIM case study

**ENIM**

# Proven and robust technique

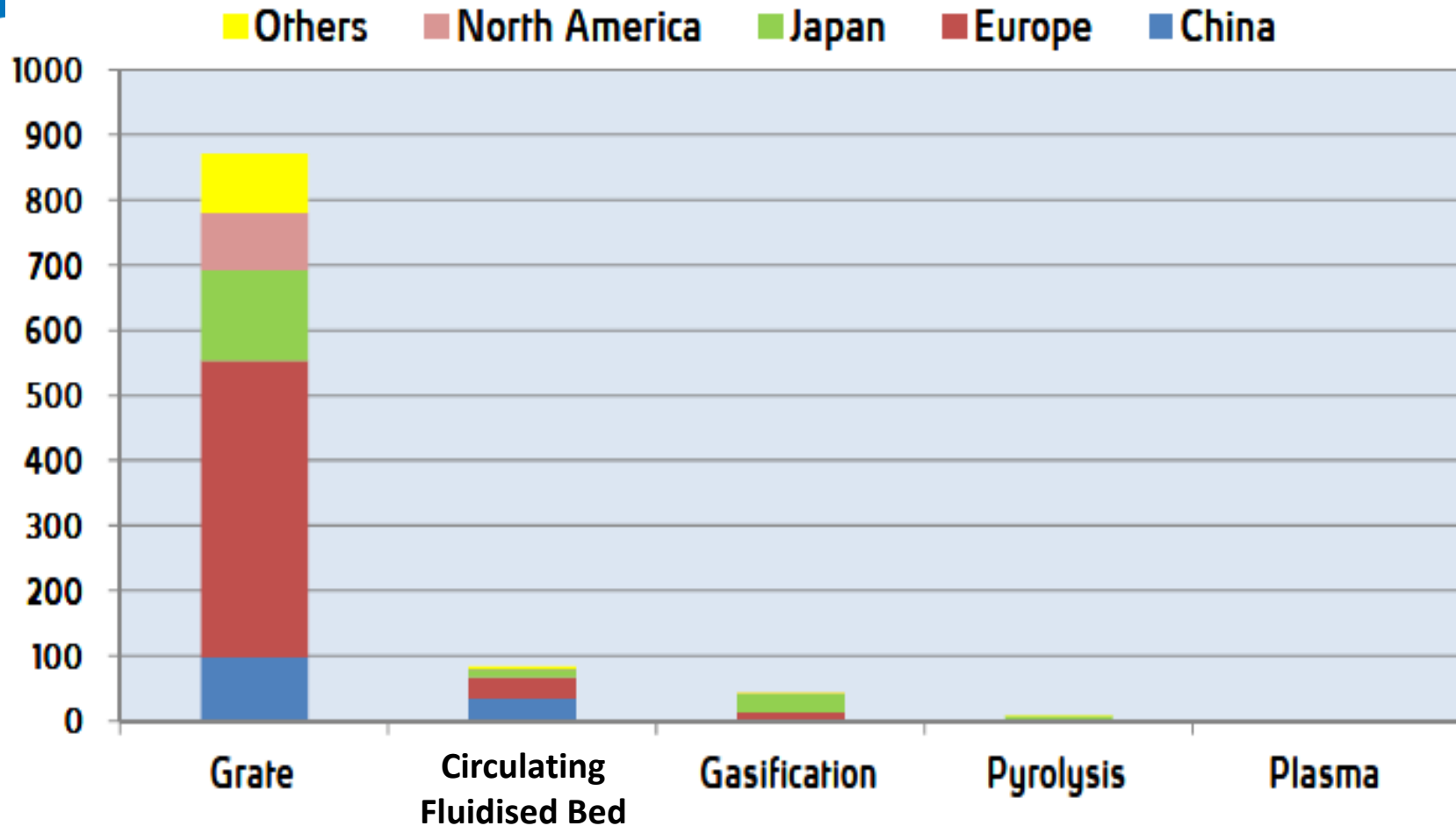
- Grate-fired furnace with integrated boiler
  - Very flexible
    - No preparation required
    - No left out (almost all sorting residues accepted)
    - MSW Similar waste accepted (Commercial & Industrial, Sewage sludges, Hospital waste, ...)
    - Very large possible NCVs (design 6-16 MJ/kg)
    - Wide NCV range in operation (grate diagram (6-12 MJ/kg))
    - Wide accepted range of pollutants (quality and concentration)
  - High energy recovery efficiency (> 82%)
  - High availability
    - > 8200 hr/y
    - Long life span (30-45 years)





# Proven and robust technique

Number of plants in commercial operation (> 5t/h) - Source : Ecoprog



# CNIM References in Environment

992 units delivered  
to Waste and Biomass to Energy Plants, since 1960

Europe: 705 units

MSW  
Furnace-  
Boilers

234

Flue Gas  
Cleaning  
Units

373

Biomass  
Boilers-  
Plants

84

Americas: 37 units

MSW  
Furnace-  
Boilers

4

Flue Gas  
Cleaning  
Units

16

Biomass  
Boilers-  
Plants

17

World: 992 units

MSW  
Furnace-  
Boilers

281

Flue Gas  
Cleaning  
Units

424

Biomass  
Boilers-  
Plants

287

Asia: 135 units

MSW  
Furnace-  
Boilers

43

Flue Gas  
Cleaning  
Units

35

Biomass  
Boilers-  
Plants

58

Africa: 128 units

MSW  
Furnace-  
Boilers

-

Flue Gas  
Cleaning  
Units

-

Biomass  
Boilers-  
Plants

128

# Case study: Baku, Azerbaijan



# Initial situation

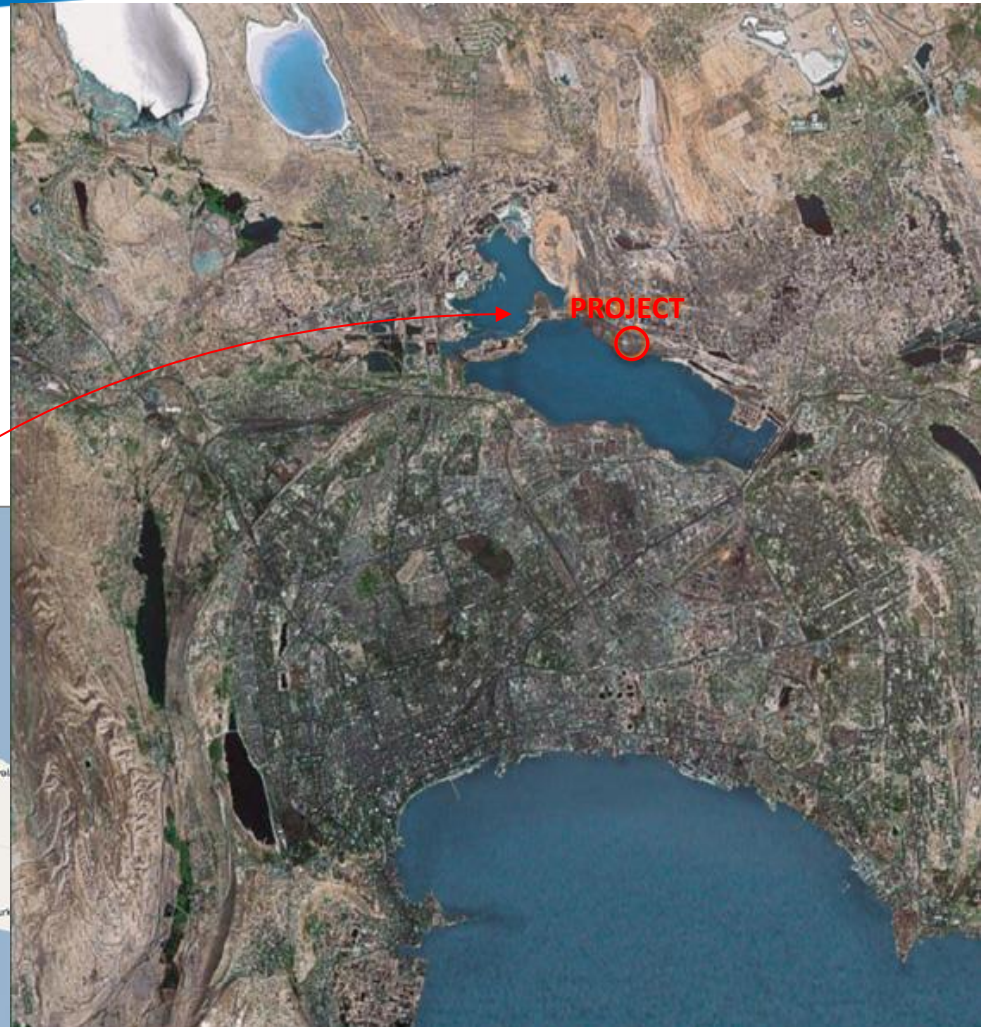
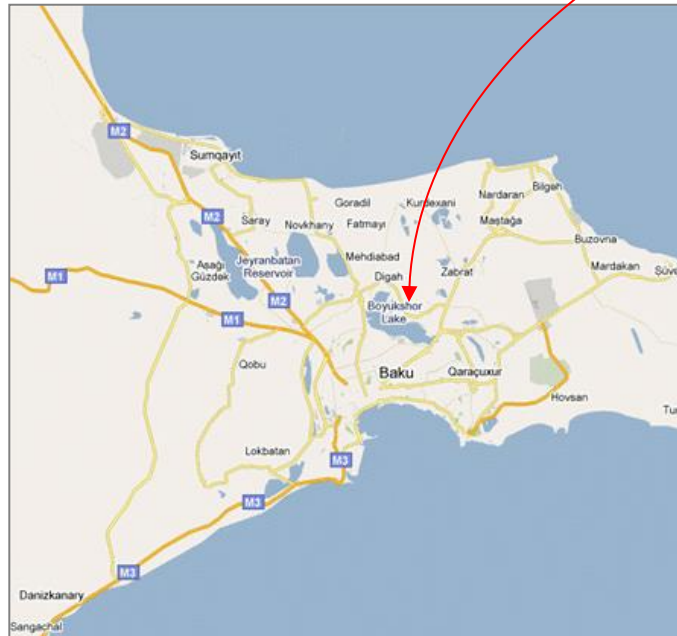
## Baku / Balakhani Landfill in 2006 - 2007



An environmental “problem”

# SITE LOCATION

- In **BALAKHANI** settlement
  - Centre of the Absheron peninsula
  - A few km North to the city of BAKU
  - Road nearby connected to main highway & secondary network



# Project progress

## ■ 2007-2008:

- ❑ Extensive engineering studies: waste characterization, energy recovery, site location, architectural concept  
... and in parallel legislation adaptation (collection, ownership...)
- ❑ Tendering process and project development;
- ❑ Technical, operational and legal negotiations.
- ❑ Establishment of Baku's waste management company (Tamiz Şəhər) by the Azerbaijani State;
- ❑ EPC and O&M contract signature (20 years operation);
- ❑ Financing from the Azerbaijan State and Islamic Development Bank

## ■ 2009-2013:

- ❑ Official incorporation of Tamiz Şəhər JSC;
- ❑ Tamiz Şəhər takes over Balakhany landfill operation and provides a full rehabilitation of the site in line with European Environmental standards;
- ❑ Construction of a waste recycling facility;
- ❑ Tamiz Şəhər takes over W-t-E plant assets;

# BAKU W-t-E plant (Azerbaijan)

CLIENT	Ministry of Economic Development of Azerbaijan and Təmiz Şəhər, a Fully state owned Joint Stock Company
Plant location	Balakhani, BAKU, Azerbaijan
CNIM contract	Design and Turnkey construction, Operation and Maintenance for 20 years (DBO)
Commissioned in	2013
TECHNOLOGIES	
Waste treatment	Mass-burn grate combustion
Grate type	CNIM/MARTIN reverse acting grate
Energy recovery	CNIM Vertical steam boiler and Condensing steam turbine
Flue Gas Treatment	LAB group CNIM FGT with semi-dry system - Injection of lime milk and activated carbon – Bag house filter and SNCR deNOx with urea injection in the furnace



# Identity card of BAKU W-t-E plant (Azerbaijan)



Main technical data	
Annual capacity of Municipal Solid Waste and Clinical Waste incineration	500.000 t MSW/year +10.000t CW/y
Number of lines	2 identical
Nominal NCV	8,5 MJ/kg
Thermal power	2 x 78 = 156 MW <sub>th</sub>
Total nominal incineration capacity	2 x 33 = 66 t/h
Total steam production	184 t/h
Steam pressure	40 bar(a)
Steam temperature	400 ° C
Steam turbine power	40 MW <sub>e</sub>



# Plant Construction, 2009-2010

November 2009



January 2010



February 2010



March 2010



# Plant Construction, 2010

April 2010



May 2010



August 2010



September 2010



# Plant Construction, 2011

March 2011



April 2011



August 2011



# Plant Construction, 2011-2012

November 2011

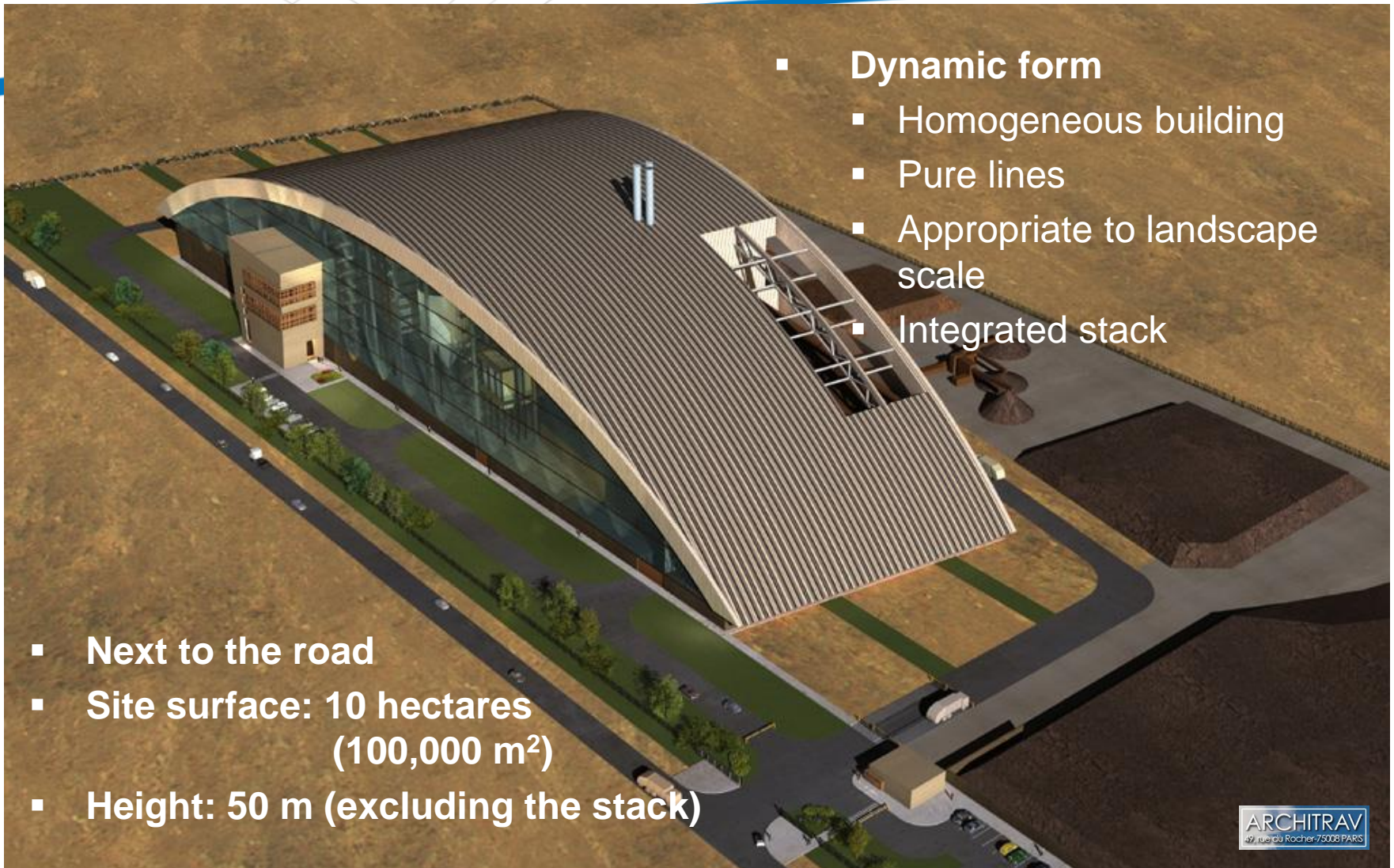


January 2012



May 2012

# ARCHITECTURAL CONCEPT

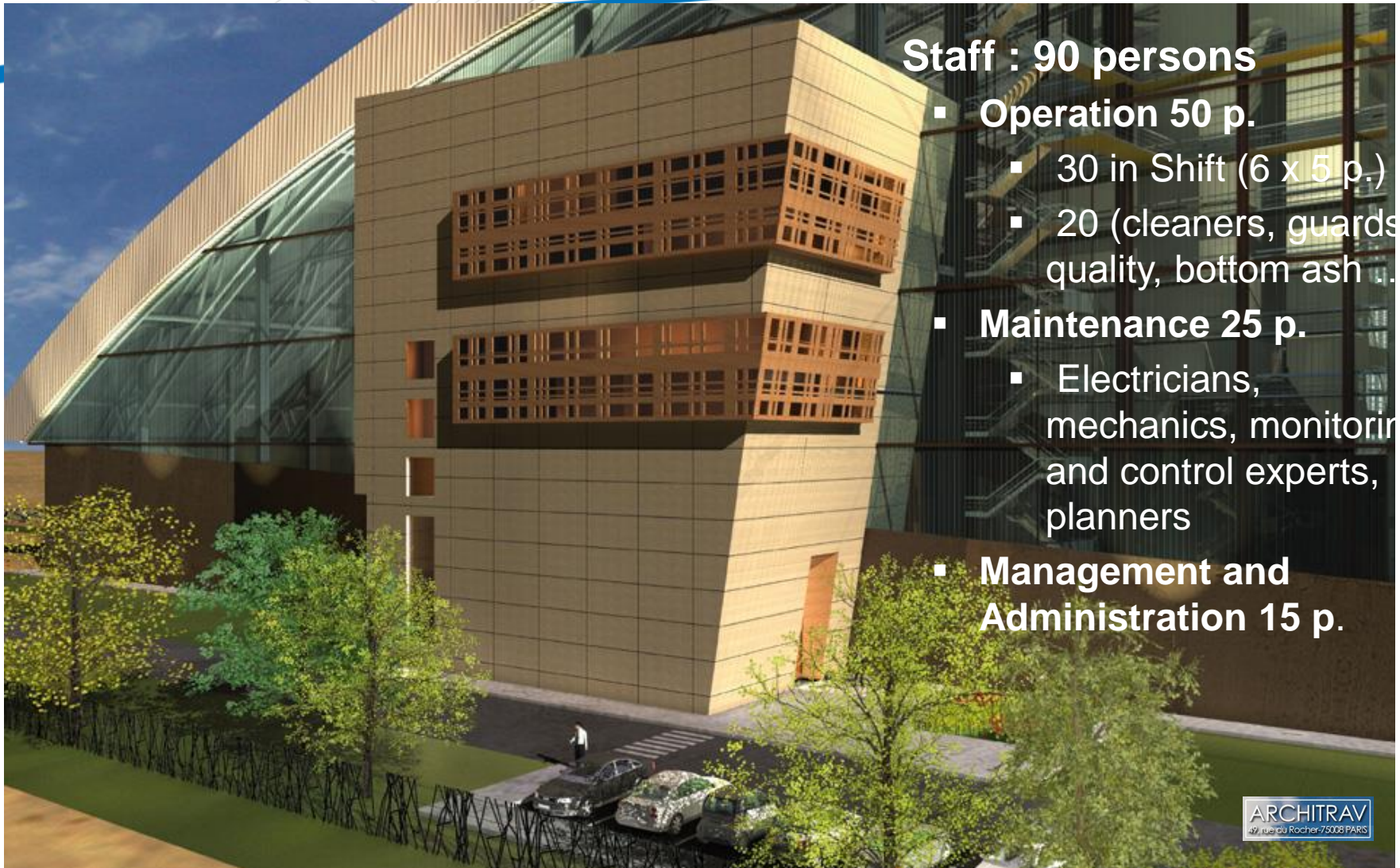


- **Dynamic form**
  - Homogeneous building
  - Pure lines
  - Appropriate to landscape scale
  - Integrated stack

- Next to the road
- Site surface: 10 hectares (100,000 m<sup>2</sup>)
- Height: 50 m (excluding the stack)

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# 20 year OPERATION contract: a guarantee of Reliability, Safety, Performance



**Staff : 90 persons**

- **Operation 50 p.**
  - 30 in Shift (6 x 5 p.)
  - 20 (cleaners, guards, quality, bottom ash...)
- **Maintenance 25 p.**
  - Electricians, mechanics, monitoring and control experts, planners
- **Management and Administration 15 p.**

# Recruitment and training



- Local employees : More than 80
- Shift supervisors trained on simulator then in plants operated by CNIM in France or UK
- Administrative and maintenance staff selected during the erection phase

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# Comply with the most stringent Azerbaijan and EU environmental requirements

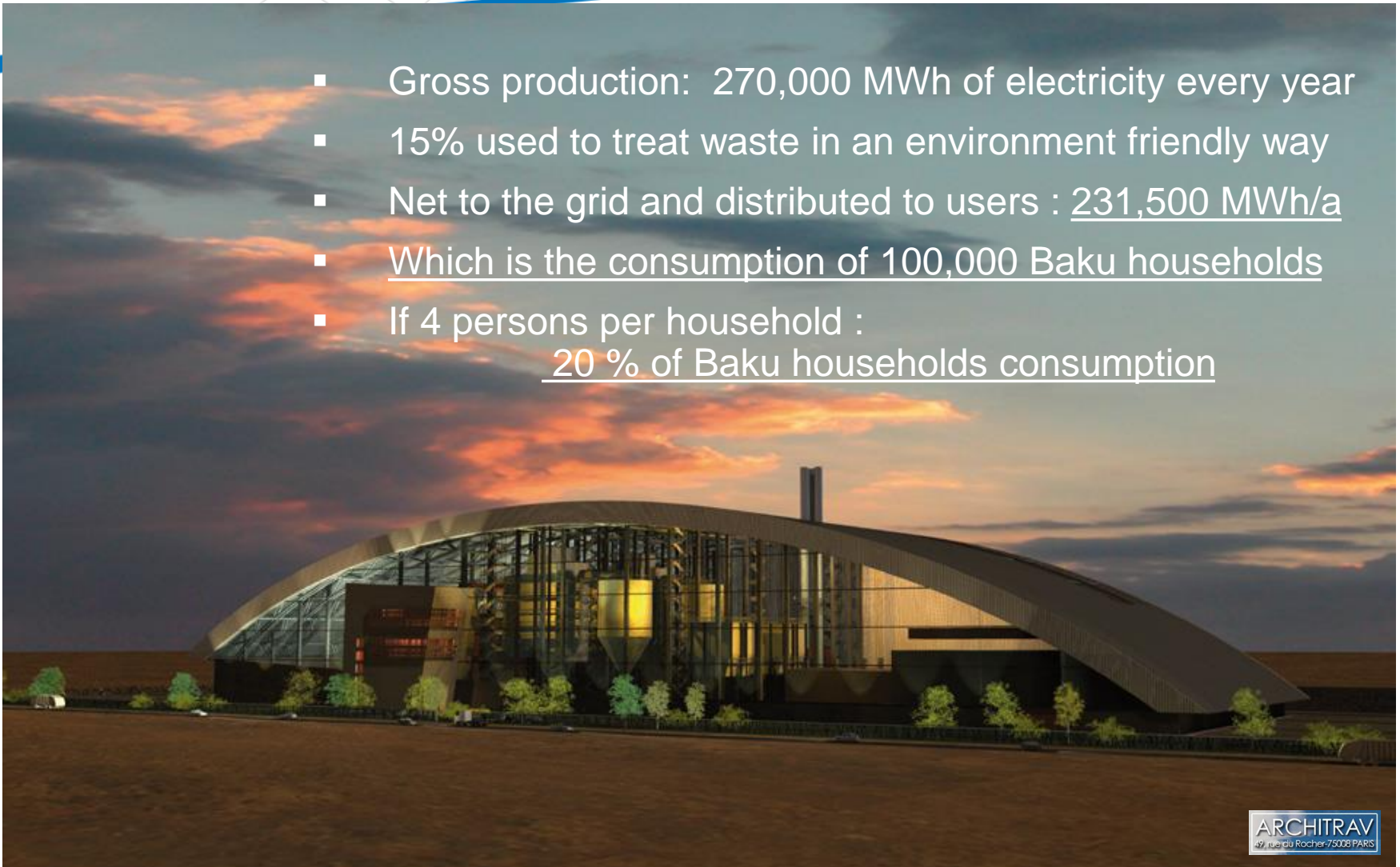
- EU legislation makes Incineration plants the cleanest EU industry
- All pollutants contained in waste are collected and treated
- No water reject : Major benefit for the environment in comparison to the existing landfill
- No odor thanks to Low building pressure





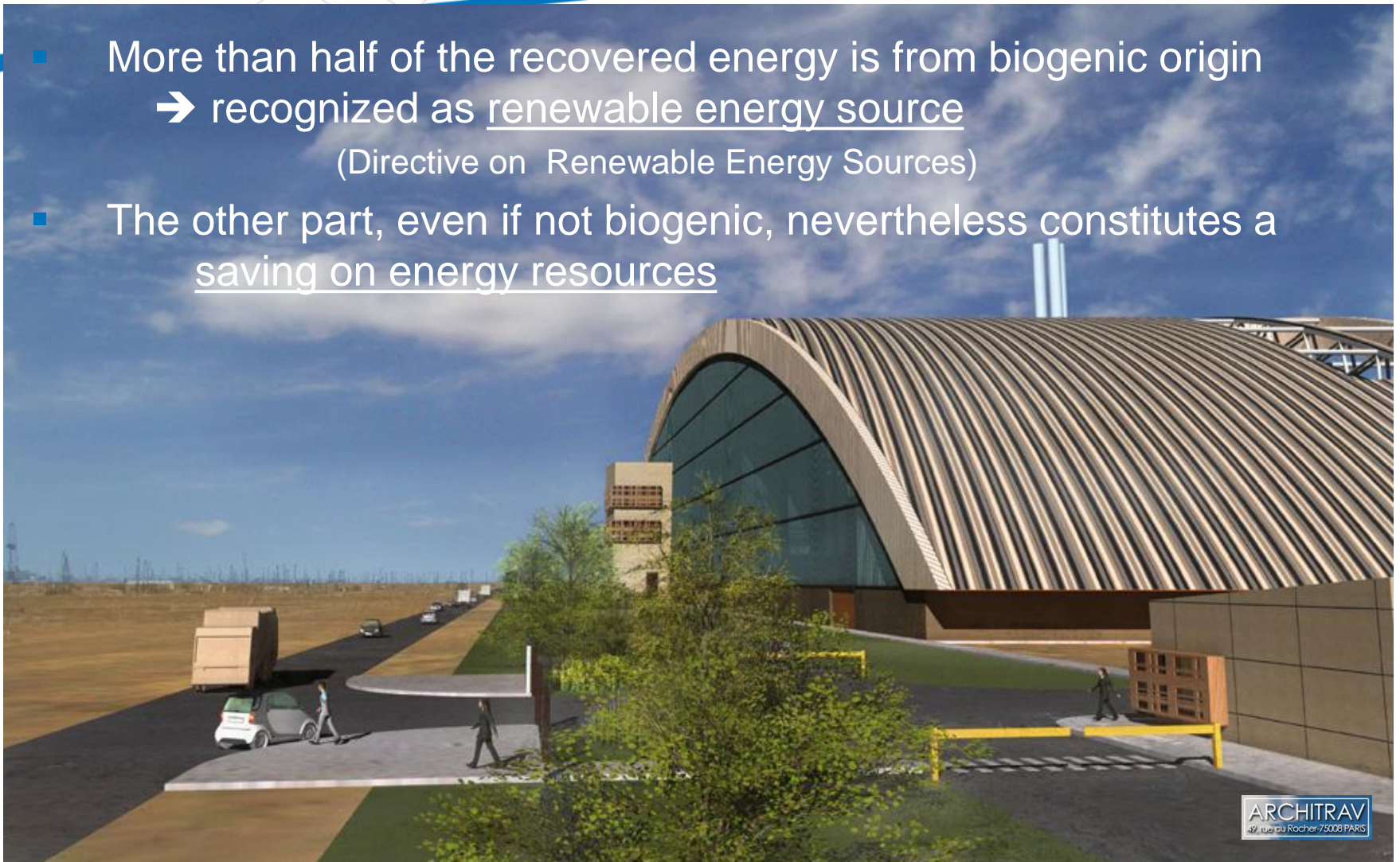
# Electricity-from-Waste

- Gross production: 270,000 MWh of electricity every year
- 15% used to treat waste in an environment friendly way
- Net to the grid and distributed to users : 231,500 MWh/a
- Which is the consumption of 100,000 Baku households
- If 4 persons per household :  
20 % of Baku households consumption



# 50% is Renewable energy / Other 50% is also resource saving

- More than half of the recovered energy is from biogenic origin  
→ recognized as renewable energy source  
(Directive on Renewable Energy Sources)
- The other part, even if not biogenic, nevertheless constitutes a saving on energy resources



# GREENHOUSE GAS emission REDUCTION : 500,000 t CO<sub>2</sub>eq/a

1) Energy savings →

Avoids to burn fossil fuels and saves the related emissions

2) Landfill replacement →

No more emission of landfill gas which contains 55% of CH<sub>4</sub>  
(CH<sub>4</sub> Global Warming potential is 25 times the one of CO<sub>2</sub> in mass)

Thanks to these two aspects →

1 t incinerated = More than 1 t of CO<sub>2</sub> equivalent avoided

i.e. more than 500,000 t of CO<sub>2</sub> equivalent avoided every year



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# European Commission ENDORSED the BAKU project as:

## OFFICIAL PARTNER of the SUSTAINABLE ENERGY EUROPE Campaign

