

# INSTITUTIONAL AND REGULATORY FRAMEWORK IN THE ELECTRICITY SECTOR IN TOGO OPPORTUNITIES IN RENEWABLE ENERGY

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# PRESENTATION OF TOGO

- West African Country
- between the sixth and the 11th parallel attitudes and North  $0^{\circ} 30$  and  $1^{\circ} 30$
- limited to North Burkina Faso,
- South Atlantic Ocean (Gulf of Benin);
- East: Benin;
- West: Ghana
- AREA: 56,600 sq km
- Population: 6.5 million
- Capital: Lome





# INSTITUTIONAL & REGULATORY

The Electricity sector of Togo is governed by the main following texts:

- The Agreement on the International Code of Benin-Togo Electricity of 23 December 2003;
- Law No. 2000-012 of 18 July 2000 on the electricity sector;
- Decree No. 2000-089/PR of 8 November 2000 establishing the modalities for conducting activities regulated by law No. 2000-012,
- Decree No. 2000-090/PR of 8 November 2000 on the organization and functioning of the Regulatory Authority for Electricity Sector.



## ACTORS OF ELECTRICITY SECTOR IN TOGO

- Ministry of Mines and Energy
- Regulatory Authority for Electricity Sector (ARSE)
- Electricity Community of Benin (CEB)
- Electricity Energy Company of Togo (CEET)
- IPP: ContourGlobal Togo S.A.



## **General principles of organization of electricity sector**

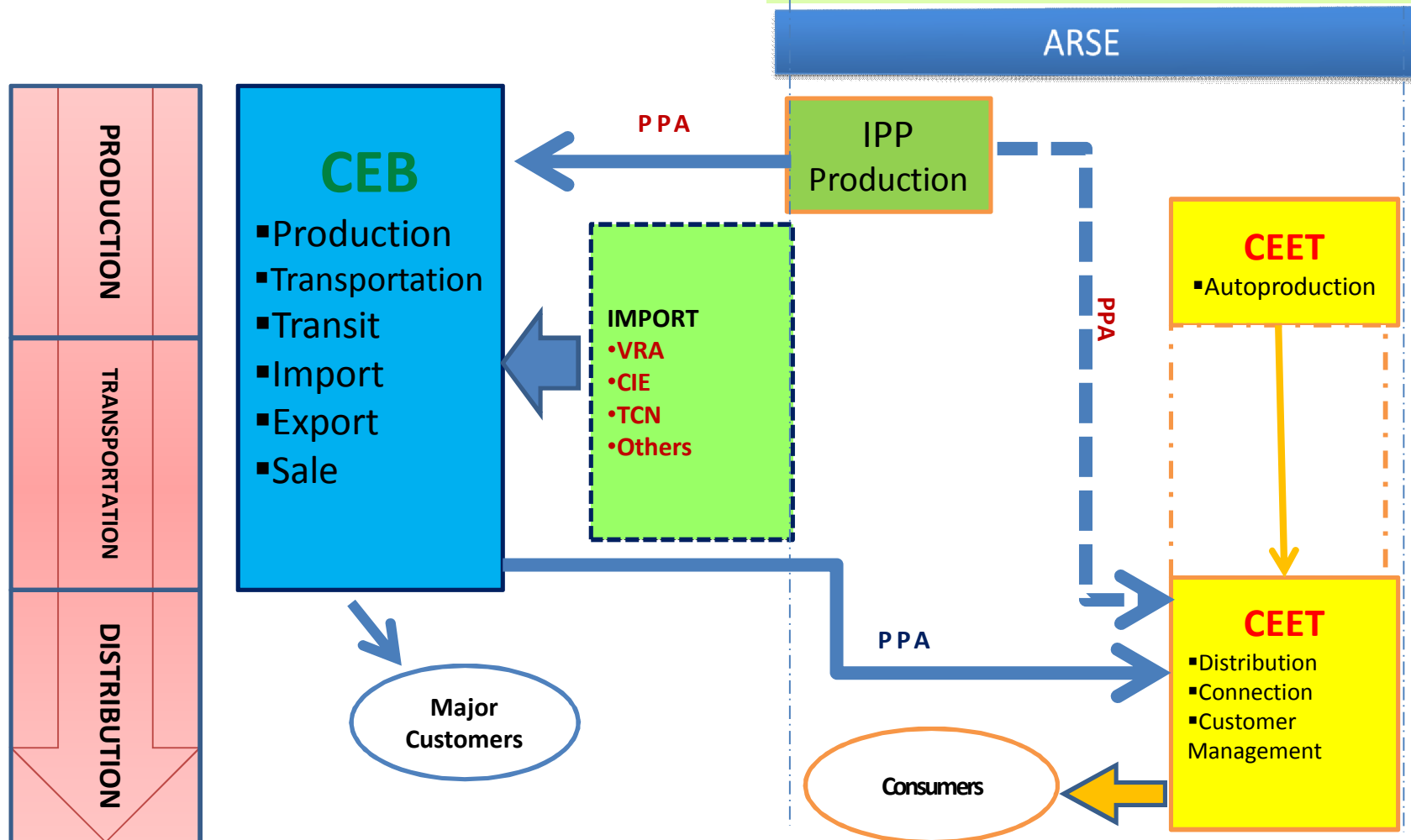
- Beneficial use of national resources for the extension of national grid;
- National Development provides electric power in order to ensure adequate electricity supply to industrial and domestic consumers;
- Principles of public service that govern the activity of electricity supply at reasonable cost and fair;
- Guarantee of economic and financial equilibrium of the electricity sector as well as respect for the environment;
- Guarantee the independence of stakeholders in relation to their functions, duties, functions and powers.

These principles guide the policy organization of the electricity sector defined by the government (MME)

# MINISTRY OF ENERGY MANAGEMENT

Benin-Togo electricity Code of 23 december 2003

Law 012-2000 of 18 July 2000 and its  
implementing decrees





# Ministry responsible for Energy

**MISSIONS** (Article L7 of the Code et Article 6 of the law)

- Define the general policy of sector organization
- propose or approve every new production project
- Arrange administrative and regulatory organization of the sector
- Contribute to the development of master production and transmission of electric energy
- Approve or modify the structures and tariff regulations
- Conclude concession agreements in the area on the advice of the regulator

Technical offices for these missions: DGE & ARSE



# REGULATORY AUTHORITY OF THE ELECTRICITY SECTOR (ARSE)

LAW 2000-012 OF 18 July 2000

## MISSIONS

- participate in project evaluation and supervision of national competitive bidding or international for the conclusion of concession agreements, construction of new electrical installations and modification of existing electrical installations.
- propose to the Minister for Energy of draft standards and formulas to regulate the activities especially in the area of tariffs charged by concessionaires and operators, quality of power supplied, the specification loads and safety standards.
- make examinations and investigations required, and certify compliance of electrical safety standards and technical standards and the provisions of the law by dealers and exhibitors.
- In disputes between various stakeholders in the electricity sector, the Regulatory Authority is before it can be in a room for arbitration and conciliation or arbitration of the dispute.





# Benin Electricity Community (CEB)

## MISSIONS (Article L5 et L33 of the Code)

- Engage in the activities of transportation, import, single buyer for the purpose of Benin and Togo.
- Conclusion in case of necessity of transit agreements or export of electricity
- Develop master plans for generation and transmission of electric energy



# ELECTRICITY ENERGY COMPANY OF TOGO (CEET)

## MISSIONS

- Perform the activities of electric energy distribution throughout the territory of Togo.
- Exert further production activity

## ONGOING ACTIONS

- The government signed in 03 February 2009 a performance contract for 5 years which establishes the objectives of public service delivery of electricity to the CEET.
- Regulatory process underway for a Technical Regulation of Distribution (RTD).



# The IPPs

## CONTOURGLOBAL TOGO S.A.

Concession Agreement: BOOT, signed 19 October 2006 for a period of twenty five (25) years for the rehabilitation, expansion and operation of Powerhouse Lome (CTL)

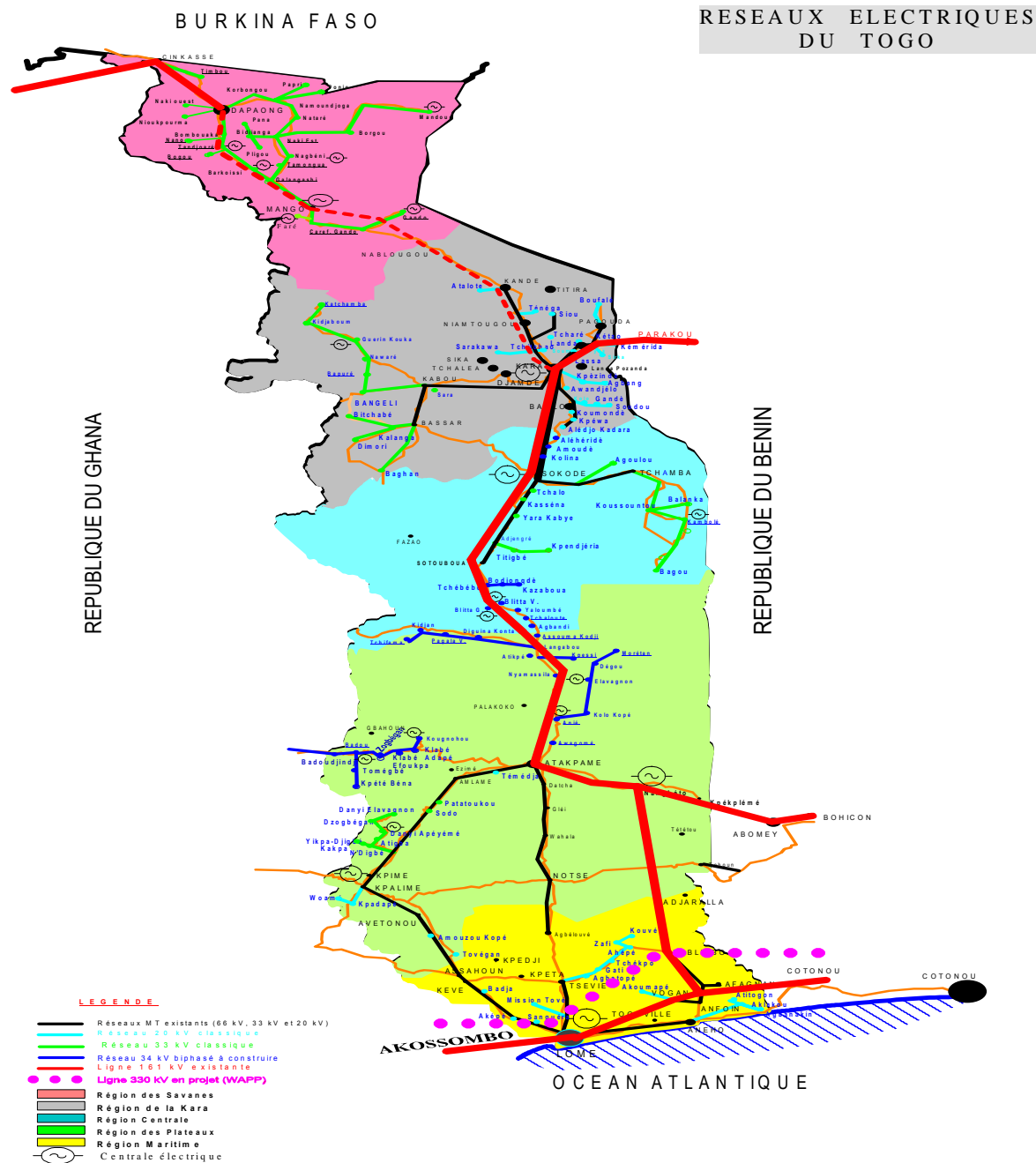
### EXTENSION OF CTL

Total power: 100 MW

Plant equipment:

6 Tri-fuel diesel engines Wärtsilä (18DF50 type)

with an unit power 16.5 MW





# CURRENT PROJECTS

## IN THE CONTEXT OF THE ELECTRICITY SECTOR ORGANIZATION

- Conducting the study of a strategic plan of the sub-sector of electric power in Togo (ongoing by the group SOFRECO-IIC)
- Elaboration of policy document's energy sector (current process for selecting the consultant)
- Construction of a wind farm of 24 MW (Awarded to the company whose Deltawind Togo process Concession Agreement is in progress)



# Renewable Energy potentials

## Background

To enable a balanced development of the country and improve the living conditions of urban and rural populations, new directions of energy policy are to develop existing potential, including renewable energy which include mainly solar, wind, biogas and micro-hydroelectricity. Each of these energies represent an energy potential more or less important but largely untapped.



# Renewable Energy potentials

- Solar potential

The different measurements taken at different latitudes of the country used to estimate the solar global average: 4.4 Kwh/m<sup>2</sup>/j With power up to 0.7 kW / m<sup>2</sup> in dry season.

- Wind power

Togo, can be classified as quiet areas of the sub-region. Only the coastal area of the country shows signs unfavorable with wind speeds of 3 m / s on average.

However, there are peaks instant high wind in some parts of the country that reach 4m / s.

# Renewable Energy potentials

- Biomass energy

In Togo, as in other countries of the region, plant biomass (firewood, charcoal and plant waste) is the ultimate domestic energy. The potential of natural forests is a function of the climatic diversity that we find in Togo. The last credible estimates in 1980. They reported more than 449 000 hectares of dense forests in 1970 throughout the national territory, against 287 000 hectares in 1980. The resulting projections, all things being equal, set at 140 000 hectares to date. This decrease is due to demographic factors (population growth of 2.4% / year) at the origin of the increasing needs of the people who use more wood energy (firewood and charcoal) as the main domestic fuel.





# Renewable Energy potentials

- Biogas potential

It is a constituent of vegetable waste from agriculture (cotton stalks, sorghum, millet, maize, cassava, etc..) plus the Togolese feces of livestock valued at more than 10 million animals (cattle, cows, sheep, poultry, etc..) and waste of cities.

- Hydroelectric potential

The latest studies show 1984. This study made by the *Office Tractional* identified nearly forty sites on rivers OTI and MONO nearly half (23) has a potential greater than 2 MW. The expected energy yield of all sites is estimated at around 850 GWh for an installed capacity of around 224 MW



In May 2009 was called for a pilot wind farm capacity of 10-25 MW. Following the procedure of the tender proposal was selected DELTA WIND

Presentation of WIND PROJECT LOME (TOGO)

# DELTA WIND

Presentation of WIND PROJECT LOME  
(TOGO)

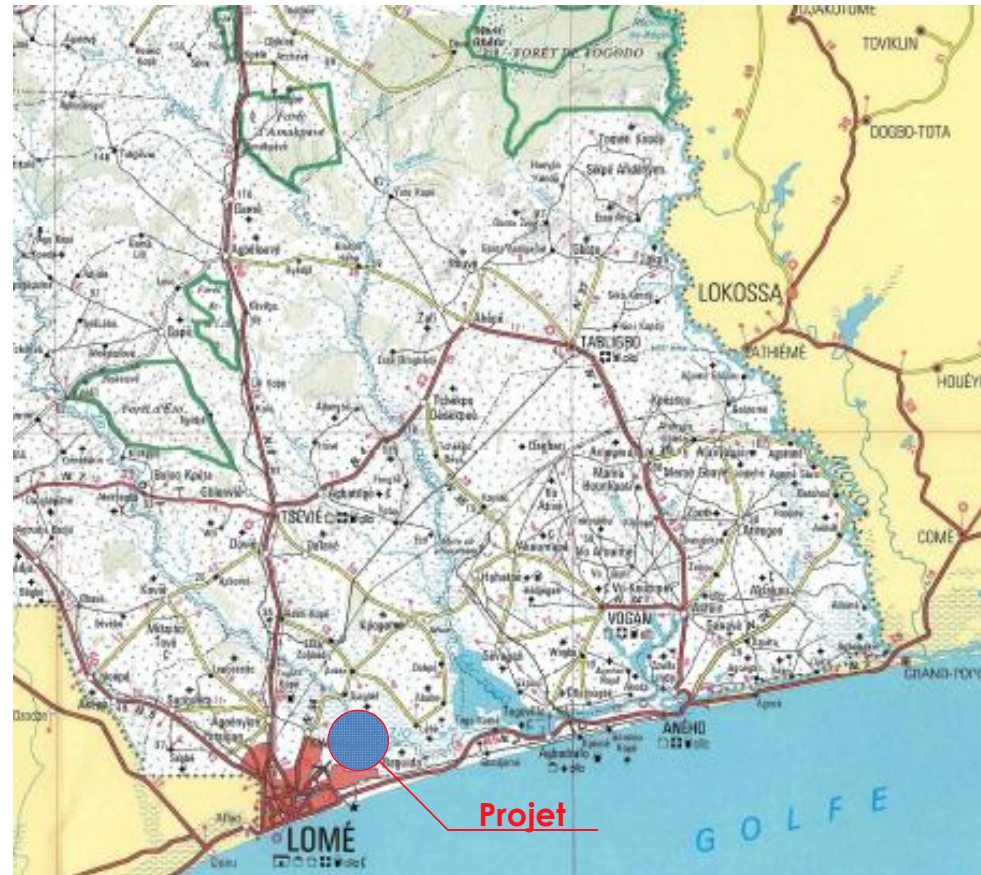


## Wind Farm Project Lome

- Proposal for implementation of 24 MW wind farm
- Currently being finalized the contract for Concession Agreement

## Project location

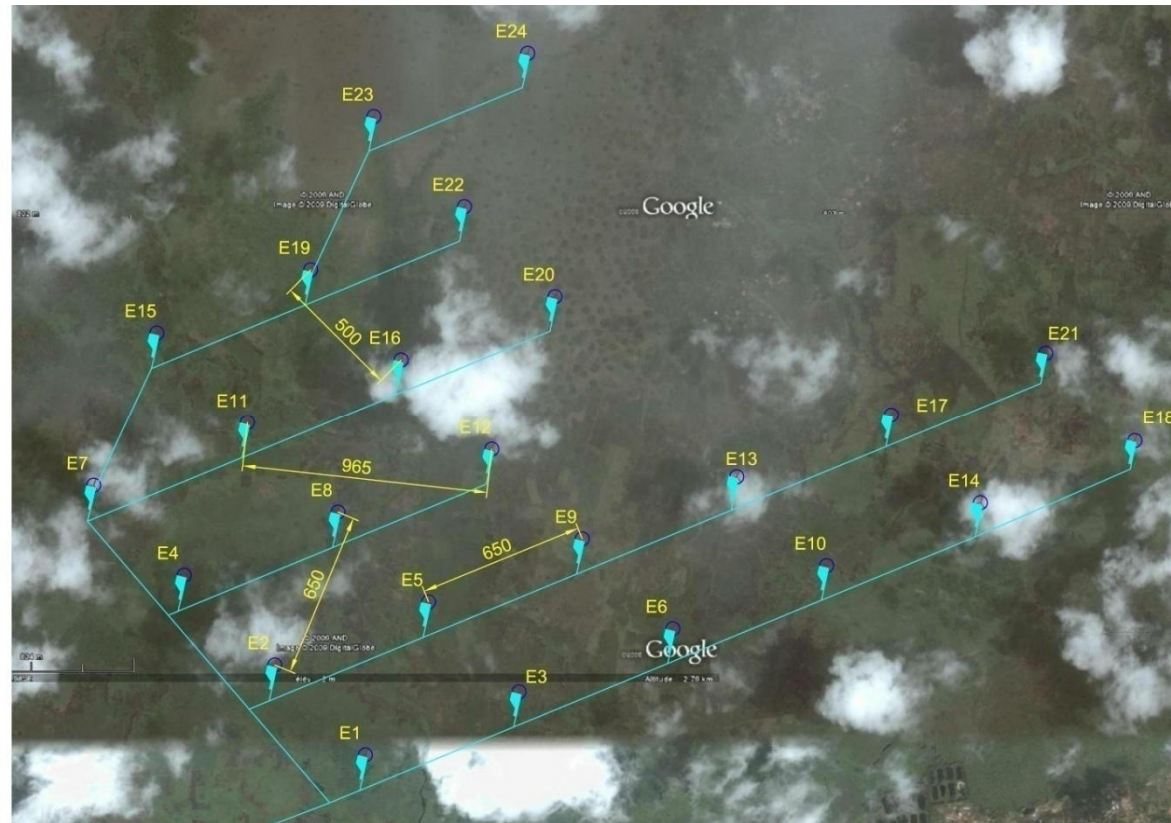
- The selected area is located at the northeast outskirts of Lomé, in a swampy area several hundred hectares.





## The project area and location of machines

- Satellite view of the settlement area of the wind farm







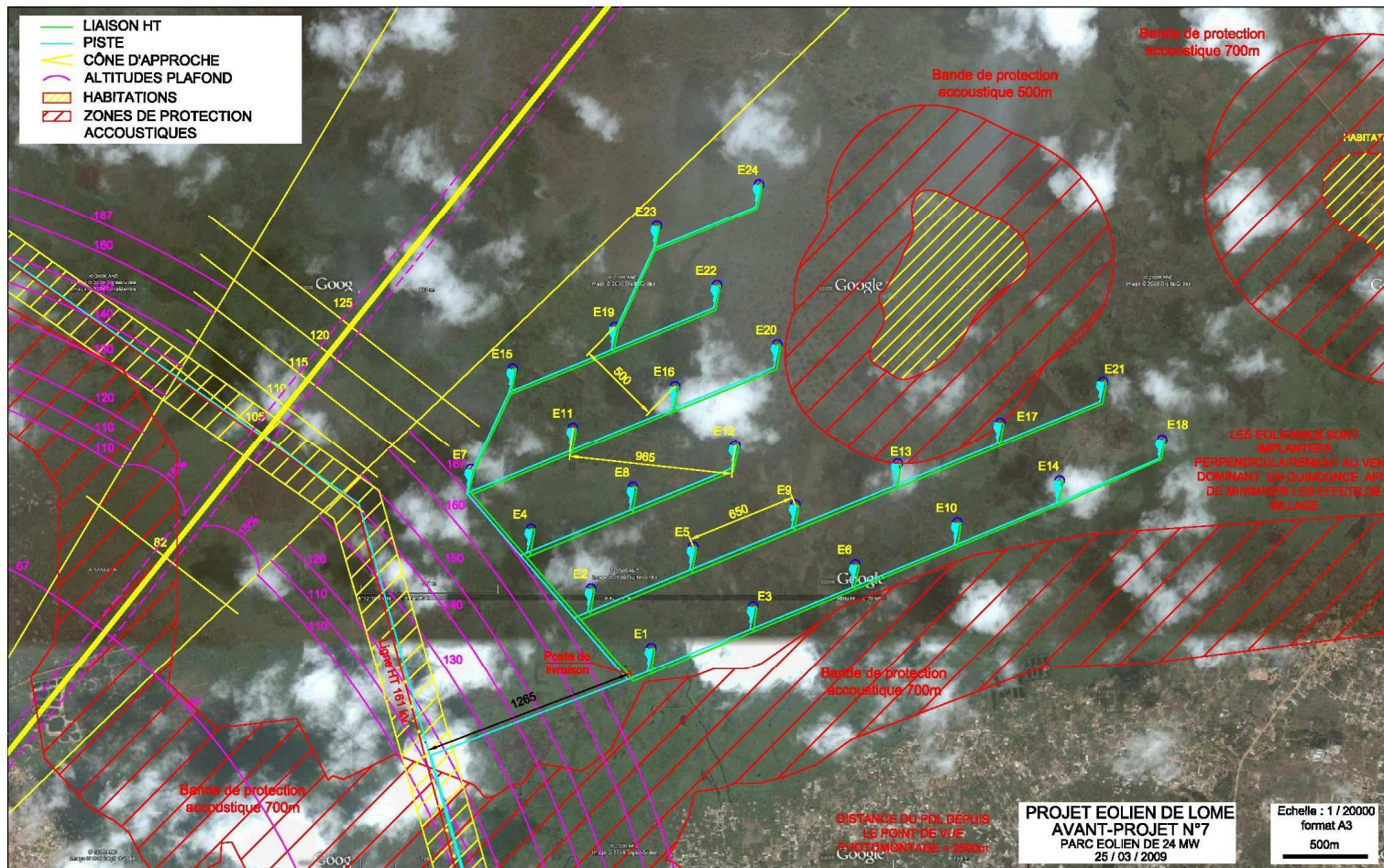
## Geographical coordinates of machines

- The coordinates of implantation machines  
(Format geographical deg ° min 'sec"WGS84)

|                                       |  |  |  |  |
|---------------------------------------|--|--|--|--|
| AEG 1<br>6° 11' 41" N<br>1° 18' 30" E | AEG 6<br>6° 11' 57" N<br>1° 19° 08" E  | AEG 11<br>6° 12' 23" N<br>1° 18' 15" E | AEG 16<br>6° 12' 30" N<br>1° 18° 34" E | AEG 21<br>6° 12' 32" N<br>1° 19' 57" E |
| AEG 2<br>6° 11' 53" N<br>1° 18' 18" E | AEG 7<br>6° 12' 15" N<br>1° 17' 55" E  | AEG 12<br>6° 12' 19" N<br>1° 18° 46" E | AEG 17<br>6° 12' 24" N<br>1° 19' 37" E | AEG 22<br>6° 12' 50" N<br>1° 18° 43" E |
| AEG 3<br>6° 11' 49" N<br>1° 18° 49" E | AEG 8<br>6° 12' 12" N<br>1° 18' 27" E  | AEG 13<br>6° 12' 16" N<br>1° 19° 17" E | AEG 18<br>6° 12' 21" N<br>1° 20' 08" E | AEG 23<br>6° 13' 02" N<br>1° 18° 31" E |
| AEG 4<br>6° 12' 04" N<br>1° 18' 06" E | AEG 9<br>6° 12' 08" N<br>1° 18° 57" E  | AEG 14<br>6° 12' 13" N<br>1° 19' 48" E | AEG 19<br>6° 12' 42" N<br>1° 18° 23" E | AEG 24<br>6° 13' 09" N<br>1° 18° 52" E |
| AEG 5<br>6° 12' 00" N<br>1° 18' 38" E | AEG 10<br>6° 12' 05" N<br>1° 19' 28" E | AEG 15<br>6° 12' 34" N<br>1° 18' 04" E | AEG 20<br>6° 12' 39" N<br>1° 18' 54" E |  |

# The feasibility study

## Constraints Mapping





# Technical

## Technical data

24 machines of 800 kW to 1 MW each

Substation approximately 3km

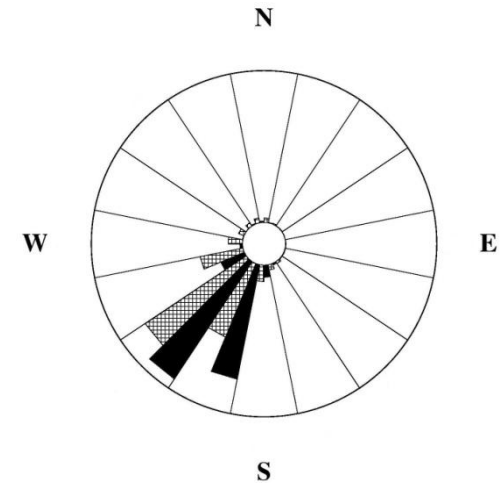
Average wind speed at 40m: about 6.5 m / s  
(measured on a few months only)

Currently, installation of a mat measuring  
70 m

Prevailing wind from the south-west  
(black segments = frequency / gray segments = energy)

161kV power line crossing the site

Injection of about 38 000 MWh / year  
green electricity in the network



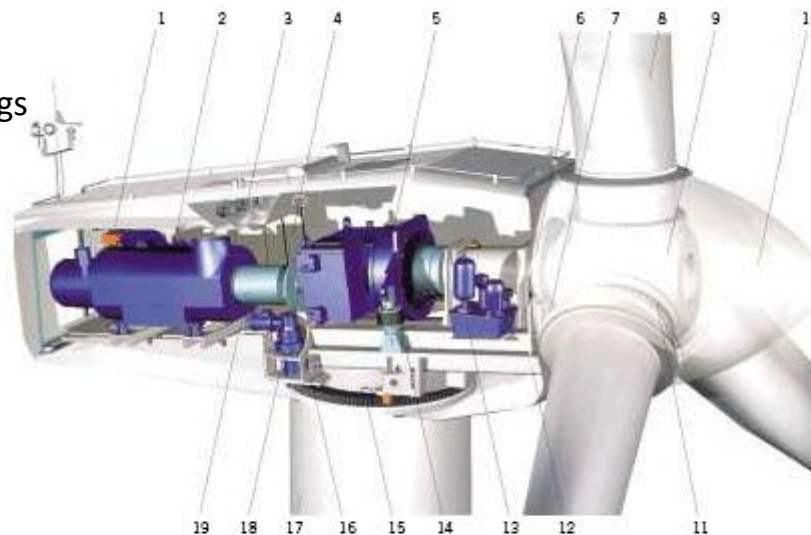
DOMINANT VIEW OF WIND DIRECTION

## Technical constraints

- Height machines summit: 112m Max International Airport (near)
- Marshy area, installation of necessary access
- Need to adapt to the environment builder

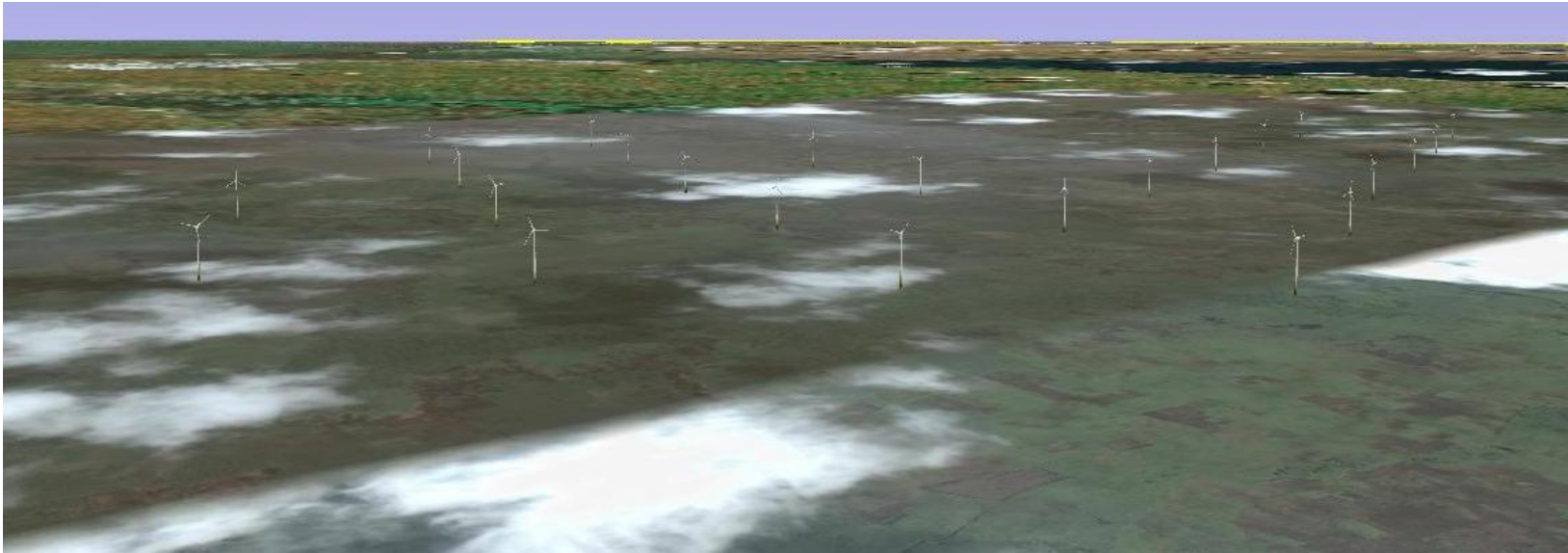
## Wind engine type 850 kW – 1 MW

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- Service crane
- Generator
- Cooling system
- Top control unit
- Gearbox
- Main shaft with two bearings
- Rotor lock system
- Blade
- Hub
- Hub cover
- Blade bearing
- Bed frame
- Hydraulic unit
- Shock absorbers
- Yaw ring
- Brake
- Tower
- Yaw gears
- Transmission.High speed shaft
- Source: [www.Gamesa.com](http://www.Gamesa.com)



## Landscape study / 1

- satellite view of the design wind implanted



Source: [www.ecodd.com](http://www.ecodd.com)

# Landscape study / 2

- Landscape view of Kagome with HT 161 KV line visible on the left





## Maturity of project

- Studies completed
  - Feasibility studies
  - Studies of environmental and social impact (environmental compliance certificate obtained)
  - Studies of electrical connections (with option development)
  - Impact study aeronautical
- Establishment funding *Quarter 4 – 2011*
- Construction begins *Quarter 1 – 2012*
- Commissioning park planned *Quarter 3 - 2012*



THANK YOU FOR YOUR ATTENTION