Our management

The directors and the Strategic Committee

Alexandre Borde began his career as an economist at the World Bank before joining the FAO in 1997. After a PhD in environmental economics funded by the French Ministry of Ecology and Sustainable Development, he has been a senior analyst of the carbon market at Dexia Asset Management. He founded and manage Carbonium. Mr. Borde was also a lecturer at the Institut d'Études Politiques in Paris and the University of Versailles. He has a doctorate in environmental economics at the University of Versailles. In 2013 he published a book on the economic impacts of natural disasters by Oxford University Press.


The Strategic Committee of Carbonium is composed of the following members:

- Jean PASTERNAK (Former Director, Sustainability Services, Schneider Electric)
- Philippe DE DREUZY (DG Findev-2)
- Sébastien LEROY (Director Investors Relations, Essilor)
- Patrick ROTHEY (Former Director, Legal Departmete, Eramet)
- Stéphane Metral (Partner N Capital)
Our activities

A coherent and global offer

Financial and Technical feasibility studies
Identification, evaluation, analysis and selection of RE projects (wind, solar, hydro, biomass, biogas, etc.) and energy efficiency. Detailed technical feasibility and financial analysis.

Suppliers relationship
Negotiation with various equipment suppliers, according to the budget and client objectives.

Projects development, operation and maintenance
Project management and implementation of the project. Coordination of specific studies. Supports administrative development (building permits, insurance, financing, connection to electric grid, etc.).

Brokerage of green products and carbon credits.
Electricity certificate produced from renewable energy, CO2 emission permits.
Our know how (1/4)

Financial and technical feasibility studies

ACTIVITY

Identification, evaluation, analysis and selection of RE projects (wind, solar, hydro, biomass, biogas, etc.) and energy efficiency. Detailed technical feasibility and financial analysis.

SERVICES

- Site(s) visit and measures of main characteristics: orientation, solar radiation, wind, shades, constraints, etc.
- Technical feasibility study: initial design of the plant, capacity and production estimation, equipments to be used, etc.
- Financial analysis: costs estimation (OPEX and CAPEX), revenues estimations (sell of electricity, carbon credits, etc.), profitability and solvability analysis, etc.
- Proposal of the institutional arrangement of the project

Engineering and architecture expertise for the integration of renewable energy systems

STRENGTHS

- Extensive experience in the financing and budgeting of RE projects.
- Work on field.
Suppliers relationship

ACTIVITY

Costs optimization. Negotiation with various equipment suppliers, according to the budget and client objectives.

SERVICES

- Assessment and definition of needs together with our clients according to its budget and target
- Request for quotations from a pre-selection of suppliers (equipment, maintenance, subcontractors). Assistance to select the most pertinent suppliers
- Verification standard of quality and safety (DIN, IE, etc.)
- Knowledge of the market and evolution of equipment’s price.

STRENGTHS

- Market and prices knowledge
- No exclusivity with any suppliers
Projects development, operation and maintenance

**ACTIVITY**

Project management and implementation of the project. Coordination of specific studies. Supports administrative development (building permits, insurance, financing, connection to electric grid, etc.).

**SERVICES**

- System design and performance simulation. Technical and financial study on the lifetime of the plant.
- Administrative procedures: obtaining building permits, feed in tariff, etc.
- Coordination and verification of specific studies: Environmental Impacts Assessment, structure studies, etc.
- Secure insurance and financing.

**STRENGTHS**

- Experienced consulting firm specialized in finding the best financial arrangement
- Large experience in project development in emerging countries and France

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Our know how (3/4)
Our know how (4/4)

Operation & Maintenance

**ACTIVITY**

Maintenance and performance monitoring of the plant. Diagnosis and analysis of measures.

**SERVICES**

- Remote monitoring of several technical indicators and follow up of the plant(s) performance. Diagnosis and analysis of measures.
- Coordination of interventions (preventive and curative) for maintenance of equipments.
- Evaluation of the plant’s condition at the end of operation and recommendation for its dismounting or the extension of its operation.

**STRENGTHS**

- Maintenance and follow up of the operation on the lifetime of the plant.
- Evaluation of the plant’s condition at the end of operation.

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*carbonium*
Some references (1/10)

Hydropower

<table>
<thead>
<tr>
<th>Nam Tha 2 HPP</th>
<th>Hydro Power Project in Yata</th>
<th>Hydro Power Project in Chieng Ngam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnam</td>
<td>Bolivia</td>
<td>Vietnam</td>
</tr>
<tr>
<td>4 MW 2010</td>
<td>2 MW 2009</td>
<td>10 MW 2012</td>
</tr>
</tbody>
</table>

- Project coordination
- Development of the carbon cycle process
- Feasibility study and business plan
- Organization of meetings and forums

- Feasibility study of the plant
- Calculation of greenhouse gases emission reductions

- Due diligence of the plant
- Carbon cycle processus development
- Feasibility study and business plan
### Some references (2/10)

**Hydropower**

<table>
<thead>
<tr>
<th>Hydro Power Project in Dak Nir</th>
<th>Hydro Power Project in Tanafnit El Borj</th>
<th>Hydro Power Project in Xiangfan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnam</td>
<td>Maroc</td>
<td>Chine</td>
</tr>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
<tr>
<td><strong>4.8 MW 2010</strong></td>
<td><strong>40 MW 2009</strong></td>
<td><strong>9 projects, 24 MW 2011</strong></td>
</tr>
</tbody>
</table>

- Project coordination
- Carbon cycle processus development
- Feasibility study and business plan
- Organization of meetings and forums

- Technical due diligence of the plant
- Technical and financial study
- Advisory services on the plant monitoring

- Carbon feasibility study
- Technical analyze and greenhouse gases emission reductions calculation
### Some references (3/10)

**Solar power**

<table>
<thead>
<tr>
<th>Solar project development</th>
<th>Parabolic solar trough plant</th>
<th>PV solar field In Kandi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marseille, France</td>
<td>8 plants, 1 MW 2009</td>
<td>Macedonia</td>
</tr>
<tr>
<td></td>
<td>50 MW 2011-2013</td>
<td>Benin</td>
</tr>
<tr>
<td></td>
<td>6 MW 2010</td>
<td></td>
</tr>
</tbody>
</table>

- Response and selected to a call of tenders from the French Ministry of Environment
- Site and technology selection
- Technical and financial design
- Arrange the sale of the project
- Detailed financial analysis and business plan
- Organization of financial seminar
- Development of project design documentations
- Technical and financial feasibility study
- Carbon eligibility study and greenhouse gases emission reductions calculation
- Recommendations on the development of carbon cycle
### Some references (4/10)

**Solar power**

<table>
<thead>
<tr>
<th>6 solar plants in Martinique</th>
<th>Rural electrification of 250 villages</th>
<th>Rural electrification of 1000 villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martinique, France</td>
<td>Togo</td>
<td>Niger</td>
</tr>
<tr>
<td>6 plants, 1 MW 2011-2012</td>
<td>~5 MW 2013-2014</td>
<td>~30 MW Etude en cours</td>
</tr>
</tbody>
</table>

- On-field measures
- Site and technology selection
- Technical design
- Draft of the complete feasibility study
- Implementation design
- Draft of the business plan
- Coordination of the survey on consumption
- Feasibility study and business plan
- Project Implementation
- Consumption survey coordination.
### Some references (5/10)

**Biogas**

<table>
<thead>
<tr>
<th>Waste Water Treatment in Marrakech</th>
<th>Landfill in Ouagadougou</th>
<th>Donetsk Waste treatment plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>Burkina Faso</td>
<td>Ukraine</td>
</tr>
<tr>
<td><img src="image" alt="Image" /></td>
<td><img src="image" alt="Image" /></td>
<td><img src="image" alt="Image" /></td>
</tr>
<tr>
<td><strong>100,000 m³ water/day 2010</strong></td>
<td><strong>300 000 tons/year 2011-2012</strong></td>
<td><strong>600 0000 tons/year 2010</strong></td>
</tr>
</tbody>
</table>

- Development of project design documentations
- Computation of emission reductions
- The financial assessment of the project
- Validation and registration of the project
- Preliminary study and on-field measures of biogas
- Technical and financial feasibility study, purchase proposal for the electricity
- Institutional settings and finance of the project
- Study of emission reductions
- Study of biogas productuon and field analyze
- Institutional settings and finance of the project
Some references (6/10)

## Wind power

<table>
<thead>
<tr>
<th>Wind farm in Tanger</th>
<th>3 wind projects development</th>
<th>Prospecting of wind opportunities in the Caribbean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>Martinique, France</td>
<td>Caribbean</td>
</tr>
<tr>
<td>140 MW</td>
<td>4, 10, 11 MW</td>
<td>Divers</td>
</tr>
</tbody>
</table>

- Technical due diligence of the plant
- Recommendations on the development of carbon cycle and monitoring
- Response and selected to a call of tenders from the French Ministry of Environment
- Site and technology selection
- Administrative project development
- Technical and financial design
- Wind potential studies
- Site selection for wind measurement
- Prospecting of technologies (against cyclones)
## Some references (7/10)

### Energy development in rural areas

<table>
<thead>
<tr>
<th>Rural electrification</th>
<th>Improved cook stoves</th>
<th>2 improved cook stoves projets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Togo</td>
<td>Niger</td>
<td>Niger</td>
</tr>
<tr>
<td>Niger</td>
<td>Burkina Faso</td>
<td>Mali</td>
</tr>
</tbody>
</table>

- **1000 villages in Niger and 250 in Togo - 2012**
- **10,000 foyers 2011-ongoing**
- **1,700,000/1,500,000 foyers 2012**

- Feasibility study and business plan
- Project Implementation
- Coordination of the consumption survey
- Project documents development
- Emission reductions computation
- Project survey and performance tests
- Draft of the complete feasibility study
- Emission reductions computation
- Implementation design
- Project survey and performance tests
### Some references (8/10)

**Carbon Finance**

<table>
<thead>
<tr>
<th>Three hydraulic power plants</th>
<th>Portfolio of 11 renewable energy projects and biogas</th>
<th>Methane generation from domestic waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td>China</td>
<td>Nigeria</td>
</tr>
<tr>
<td>9MW, 9 MW et 19 MW 2010</td>
<td>- 2010</td>
<td>4 MW 2010</td>
</tr>
<tr>
<td><img src="image1.png" alt="Hydraulic Power Plant" /></td>
<td><img src="image2.png" alt="Renewable Energy Projects" /></td>
<td><img src="image3.png" alt="Domestic Waste Methane" /></td>
</tr>
</tbody>
</table>

- Brokerage service
- Technical due diligence
- 80,000 CER / year

- Brokerage service
- PIN preparation
- 3 millions of CER (pre-2013)

- Brokerage service
- Risks analysis
- 100,000 CER / year
### Strategy advices

<table>
<thead>
<tr>
<th>Carbon Capital Fund</th>
<th>CDC Climat Asset management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>France</td>
</tr>
<tr>
<td><strong>26 M€</strong> 2009</td>
<td><strong>€60 million investment mandate 2010</strong></td>
</tr>
</tbody>
</table>

- Investment policy and training of the management team
- Identification of investment opportunities
- Preparation of the tender related to the ONE Call for Tender
- Technical due diligence

- Assistance to the setting up of CDC Climat Asset Management
- Investment policy
- Risk management policy
Brokerage of green products

<table>
<thead>
<tr>
<th>Brokerage on the market of carbon credits and quotas</th>
<th>Brokerage on the market of green electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>France</td>
</tr>
<tr>
<td>Purchase / selling of EUA, CER, ERU, VER spot and forward</td>
<td>Purchase / selling of Guarantees of Origin / gree certificates, under:</td>
</tr>
</tbody>
</table>

**Some references (10/10)**
Mitigation and waste management

Opportunities in Sub-Saharan Africa: methane capture / LFG
Mitigation and waste management

Opportunities in Sub-Saharan Africa: methane capture / LFG

![Graph showing LFG generation, recovery, and utilization over years]

<table>
<thead>
<tr>
<th>Waste Type</th>
<th>2050</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food waste</td>
<td>39.5</td>
<td>III</td>
</tr>
<tr>
<td>Paper, cardboard</td>
<td>5.9</td>
<td>II</td>
</tr>
<tr>
<td>Garden waste (green waste)</td>
<td>6.3</td>
<td>V</td>
</tr>
<tr>
<td>Wood waste</td>
<td>1.1</td>
<td>I</td>
</tr>
<tr>
<td>Rubber, leather, bones</td>
<td>1.5</td>
<td>IV</td>
</tr>
<tr>
<td>Textiles</td>
<td>2.9</td>
<td>IV</td>
</tr>
<tr>
<td>Other organics</td>
<td>6.4</td>
<td>IV</td>
</tr>
<tr>
<td>Metals</td>
<td>2.5</td>
<td>VI</td>
</tr>
<tr>
<td>Construction and demolition</td>
<td>5.0</td>
<td>VI</td>
</tr>
<tr>
<td>Glass and ceramics</td>
<td>7.4</td>
<td>VI</td>
</tr>
<tr>
<td>Plastics</td>
<td>8.3</td>
<td>VI</td>
</tr>
<tr>
<td>Other inorganic waste</td>
<td>13.3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

**Legend**
- **Dashed Line**: Generation
- **Red Line**: Recovery
- **Blue Line**: Utilization (85%)
- **Pink Line**: Generation corrected

**Note**: The chart and table provide data on methane generation, recovery, and utilization in Sub-Saharan Africa, with specific emphasis on LFG (Landfill Gas).
Mitigation and waste management

Case Study for Nairobi, Kenya

<table>
<thead>
<tr>
<th>Waste Story for Nairobi</th>
<th>The Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nairobi with an estimated 3.5 million residents generating approx 3000 tonnes of solid waste every day. About 950 tonnes reach the Dandora Dump.</td>
<td>Nairobi has no means of safe disposal, and approx. 850 tons of its waste reaches the Dandora dumpsite everyday, and it has been documented that this dumpsite is negatively affecting the health of thousands of Nairobi residents. 2/3 of the waste generated in Nairobi is hard to account for.</td>
</tr>
</tbody>
</table>

- The Dandora dump site in Nairobi is one of Africa’s largest waste dumps. Exploitation was started in 1981 and the surface area is now approximately 98 acres.
- The dumpsite sits on an old quarry site, which is not gazette as a dumpsite and has about 200,000 people living around it who make a living from it.
- The issues at the dump are well documented and contested but all agree it is a social and environmental problem.
- Dumping at the site is unrestricted and thus all kinds of waste including industrial, agricultural, domestic and medical wastes are dumped unhampered and uncontrolled.
- The threat is further exacerbated by the presence of non-biodegradable solid waste for instance plastics and rubber as well as poisonous and hazardous items on the dumpsite.
- Further no financial model has been agreed on the implementation of solid waste management for Nairobi and Kenya as a whole.
Our partners and clients

They trust us
A regular presence in the media

Press articles, radio, TV

- La Tribune.fr (2015)
- Divers médias africains (2014 et 2015)
- Actu-Environnement (2013 et 20)
- Canal + (2013)
- Energia i Ecologia (2012)
- Radio Rwanda (2012)
- Sina News (2011)
- Economic Pravda (2010)
- Energy Risk (2010)
- TV Channel 27 (2010)
- Médiapart (2010)
- L'Expansion (2009)
- Décideurs TV (2008)
- Financial Times (2008)
- L'AGEFI (2006 & 2007)
An internationally recognized expertise

Publications

The Economic Impacts of Natural Disasters
Edited by Debarati Guha-Sapir, Indhira Santos and Alexandre Borde, Managing Editor

Product Details
Hardcover, 344 pages
Mar 2013, Not Yet Published

About the Author(s)
Debarati Gupa-Sapir is Director of the WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED) and Professor at University of Louvain School of Public Health, Brussels.

Indhira Santos is a member of The World Bank.

Alexandre Borde is the Managing Director of Carbonium, a climate change and carbon finance consulting company based in Paris, France.
An internationally recognized expertise

Recent interventions publiques


Intervention of Alexandre Borde on « the opportunities of Green Climate Finance for Africa » in view of COP-22 in Marrakesh, Casablanca Finance City Authority, March 10, 2016
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