CDM in the Middle East? Prospects for Projects in MENA

Creating Wealth Worth Having
Disclaimer

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Corporate Overview
Climate Change Capital

Climate Change Capital ("CCC") is an investment manager and advisor specialising in the opportunities created by the transition towards the low carbon economy. Our activities aim to make the world’s environment cleaner while delivering attractive financial returns.

CCC is headquartered in London and has offices in Beijing, Boston and Washington D.C. with a focus on the EU, North America and Asia.

Through the combined talents of investment professionals, market specialists, thought leaders and access to a significant capital base, CCC is perfectly placed to deploy capital, at scale, to accelerate the transition to the low carbon economy. We call this Creating Wealth Worth Having®.

- M&A
- Project Finance
- Strategy & Policy

* Acquisition of MJ Bradley provides a platform for CCC in the US market

GROUP FUNDS
Develops, structures and supports a range of funds investing in assets, companies and instruments for the low carbon economy

Carbon Infrastructure Private Equity Listed Equities Property Land and Water

STRATEGIC POLICY DEVELOPMENT TEAM
CCC’s Internal Market Research and Policy Think Tank
The Climate Change Capital Asset Classes

- **Carbon Infrastructure**
  - CCC Carbon Funds
  - €800 million under management investing in GHG reduction projects and their underlying assets
  - Ventus Venture Capital Trusts
  - £37 million under management investing in onshore UK renewable energy companies

- **Private Equity**
  - CCC Private Equity Fund “CPE”
  - €200 million under management, expansion capital for high growth latter stage companies and buy outs

- **Listed Equities**
  - Global Environmental Opportunities Fund
  - $500 million targeted open ended hedge fund focused on emerging environmental sectors exhibiting long term high growth rates, began investing in October 2008

- **Land & Water**
  - Natural Assets
  - Population growth, increased demand for agricultural products and environmental services are driving value in land and agricultural commodities. An increase in adaptive capacity and ecosystem functionality can also increase the long-term capital value of land assets under management

- **Property**
  - Fund Under Development
  - Climate Change, regulatory change and occupier preferences are key value drivers in commercial property. Investments in climate change property can capture any value differential in compliant buildings relative to non-compliant buildings
MENA CDM Overview
Executive Summary

Overview

- CDM kicked off in this region later than in most other places. This is the result of a combination of factors such as DNAs being established only lately, high oil prices that made CDM less attractive, a general tendency of MENA countries not being first movers in new asset classes and also a fear that CDM would touch the main drivers of their economies, hydrocarbons.
- Only 15 projects are being registered. Most of the other projects currently pursued are actually either too small (10k-20k p.a.) or not very charismatic asset classes such as LFG.
- Nevertheless, some of the biggest gas flaring opportunities are within MENA countries.

Investment Opportunity

- Gas flaring projects in co-operation with the National Oil Companies have massive potentials (each project could be worth several million tonnes of Carbon per annum).
- However, these are very expensive projects if the capex is divided by the total number of CERs.
- If, however, these projects are done in combination with securing revenues from actually bringing the gas to markets, they can result in viable projects.
- Renewable Energy in North Africa, given its proximity to Europe, is the other ‘sweet spot’.
### Status of CDM in MENA: Established DNAs

<table>
<thead>
<tr>
<th>Ratified the Kyoto Protocol</th>
<th>Established DNAs</th>
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<tbody>
<tr>
<td>• Algeria</td>
<td>• Algeria</td>
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<td>• Bahrain</td>
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<td>• Egypt</td>
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<td>• Iran</td>
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<td>• Libya</td>
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<td>• Morocco</td>
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<td>• Oman</td>
<td>• Oman</td>
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<td>• Qatar</td>
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<tr>
<td>• Saudi Arabia</td>
<td>• Saudi Arabia</td>
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<td>• Syria</td>
<td>• Syria</td>
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<td>• Tunisia</td>
<td>• Tunisia</td>
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<tr>
<td>• UAE</td>
<td>• UAE</td>
</tr>
<tr>
<td>• Yemen</td>
<td>• Yemen</td>
</tr>
</tbody>
</table>

*Note: Countries in Italic do not have a DNA yet*
CDM Activity in MENA

MENA has 187 Projects out of 7,759 Globally

Pre-2012 CERs Volume

- MENA 157.8m
- RoW 5,307.8m

MENA has 15 Registered Projects out of 1,631 Globally

Pre-2012 CERs Volume

- MENA 39.6m
- RoW 1,686.9m

Registered Projects in MENA

- Egypt (4) 28%
- Qatar (1) 9%
- Jordan (1) 5%
- Syria (1) 1%
- Tunisia (2) 9%
- Pakistan (2) 17%
- Morocco (4) 4%

# of Projects % by Volume

- Fugitive Emissions 1 35%
- Industrial Gases 2 33%
- LFG 5 16%
- Renewables 5 9%
- Fuel Switching 1 5%
- Energy Efficiency 1 1%

Source: Point Carbon
CDM Assets in Oil & Gas
Current Approved Methodologies for Gas Flaring

- **AM0009 – Recovery And Utilization Of Gas From Oil Wells That Would Otherwise Be Flared**
  - Applicability Criteria:
    - Gas at oil wells are recovered and transported in pipelines to a process plant
    - Energy required for processing and transportation is using recovered gas
    - The products are likely to substitute the same fuel or fuel with higher carbon content per unit per energy
    - The substitution of fuels do not lead to increase in energy consumption
    - In the absence of the project, the gas ids mainly flared
    - Data is accessible

- **AM0037 – Flare Reduction and Gas Utilization at Oil & Gas Processing Facilities**
  - The methodology is applicable to project activities that recover tail gas from oil and natural gas processing facilities that was previously flared and utilize this gas for productive uses (as fuel or feedstock):
    - Gas was flared (not vented) for the last 3 years
    - Gas substitutes fuels / feedstock with equal or higher CO2 emissions
    - Not lead to displacement of production in a new plant build in absence of project
    - Not lead to increase in fuel consumption outside project boundary
    - Energy requirements primarily met by previous flared gas
    - Accurate data on the carbon content of tail gas is available
Facility A: Using Heavy Fuel for Operations (e.g. Diesel Gensets)

Facility B: Flaring Gas
Illustrative Example – Pipeline Infrastructure (cont’d)

- **Project Assumptions:**
  - Gas Flared (in MMSCFD): 50,000,000
  - Resulting CERs (As a rule of thumb, there are between CERs 20,000-100,000 per year per MMSCFD, in this case we will use 40,000 CERs): 2,000,000
  - Natural Gas Volume per Year: 24,000,000 MMBTU
  - Price per CER: $10

- **Scenario A: Carbon Finance Only**

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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</thead>
<tbody>
<tr>
<td>Capex Investment</td>
<td>(44,000,000)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues from CERs</td>
<td></td>
<td>20,000,000</td>
<td>20,000,000</td>
<td>20,000,000</td>
</tr>
<tr>
<td>Revenues from Tolling Fee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Revenues</td>
<td>(44,000,000)</td>
<td>20,000,000</td>
<td>20,000,000</td>
<td>20,000,000</td>
</tr>
<tr>
<td>IRR</td>
<td></td>
<td></td>
<td></td>
<td>17%</td>
</tr>
</tbody>
</table>

- **Scenario B: Carbon Finance + Tolling Fee**

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capex Investment</td>
<td>(100,000,000)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenues from CERs</td>
<td></td>
<td>20,000,000</td>
<td>20,000,000</td>
<td>20,000,000</td>
</tr>
<tr>
<td>Revenues from Tolling Fee</td>
<td>24,000,000</td>
<td>24,000,000</td>
<td>24,000,000</td>
<td></td>
</tr>
<tr>
<td>Total Revenues</td>
<td>(100,000,000)</td>
<td>44,000,000</td>
<td>44,000,000</td>
<td>44,000,000</td>
</tr>
<tr>
<td>IRR</td>
<td></td>
<td></td>
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<td>15%</td>
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# Case Study: Gas Flaring CDM and Pipeline Infrastructure

<table>
<thead>
<tr>
<th></th>
<th>Project #1</th>
<th>Project #2</th>
<th>Project #3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Type</strong></td>
<td>Gas Flare Capture / AM0009</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Counterparty</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Project Size</strong></td>
<td>$7 million</td>
<td>$10 million</td>
<td>$15 million</td>
</tr>
<tr>
<td><strong>Volume of Gas Flared</strong></td>
<td>2.0 MMSCFD</td>
<td>4.0 MMSCFD</td>
<td>5.0 MMSCFD</td>
</tr>
<tr>
<td><strong>Emission Reductions (10-Yrs Crediting Period)</strong></td>
<td>700,000 CERs</td>
<td>1,400,000 CERS</td>
<td>1,750,000 CERs</td>
</tr>
<tr>
<td><strong>Project Description</strong></td>
<td>The 3 projects consist of capturing flared gas at an oil processing plant A, transporting it in a pipeline to another oil processing plant B in order to replace diesel currently used to operate B</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CCC Role</strong></td>
<td>CCC will finance all equipments upfront (compressor, pipeline and new gas turbine) and CDM costs in return for acquiring all CERs generated by the project and a tolling fee</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Potential Project Types in MENA: Fugitive Emissions Reduction in Pipelines

- For any company owning a set of pipeline assets, either on the transmission or distribution side, there are fugitive emissions from key points in the infrastructure, such as compressor, gate or pressure regulator stations.

- Carbon credits can be claimed by fixing these methane leaks, thereby reducing gas losses, generating CDM revenue and improving the company’s standing in terms of corporate sustainability and environmental management.

- In MENA, CCC has evaluated such opportunities in Egypt, working with EGAS.
  - We are currently executing a similar transaction with the State gas company in Pakistan.

- CCC is the only company to have successfully implemented such a project, with KazTransGas-Tbilisi in Georgia.
  - The project is expected to yield 1.3 million CERS by the end of 2012 and over 3 million CERs over the next 10 years.
  - CCC is providing all of the funding for the required project capex.
Current Approved Methodologies for Leaky Pipes

- AM0023 – Leak reduction from Natural Gas Pipeline Compressor or Gate Stations

This methodology is applicable to project activities that reduce leaks in natural gas pipeline compressor stations and gate stations in natural gas long-distance transmission systems, as well as to other surface facilities in gas distribution systems including pressure regulation stations by establishing advanced leak detection and repair practices:

- Where natural gas pipeline operators have no current systems in place to systematically identify and repair leaks;
- Where leaks can be identified and accurately measured;
- Where a monitoring system can be put in place to ensure leaks repaired remain repaired.
Overview of AM0023 in Practice…

Prior to the CDM project, the gas network is typically old and in poor condition. Repairs are made with cheap low quality materials and old equipment…

…the only way to actually detect a leak is by smelling it, hearing it, or spraying soap solution onto the infrastructure…

…but even this is difficult to do when you lack basic equipment such as ladders…
Thanks to CDM however, not only are ladders purchased, but high tech detection equipment is used to locate leaks, such as the Gasurveyor 3-500 Leak Locating Device pictured below...

...while the High Flow Sampler can be used to measure them accurately, thereby allowing teams to prioritise which leaks are worthy of repair.

After measurement, each leak is identified with a yellow tag so that it can later be located and repaired, as demonstrated here, where the repairer has unbolted the clamping plate and removed the old packing hemp, and then wrapped new teflon packing material around stem and compressed with almost maximum pressure by a fastened plate.
Renewable Energy in North Africa
Overview of Renewable Energy in North Africa

- The number of wind power schemes built, under way or planned in Egypt and Morocco points to the enthusiasm with which North African electricity consumers have embraced renewables.
- For wind power, the economic potentials have been estimated: in Morocco (6,000 MW), Tunisia (1,000MW), Egypt (10,000 MW, technical potential 100,000MW).
- Concerning renewable energy development for electricity production, hydro resources have been widely exploited, particularly large ones. Remaining part is dominated by wind energy and is distributed as follows:

<table>
<thead>
<tr>
<th></th>
<th>Algeria</th>
<th>Egypt</th>
<th>Libya</th>
<th>Morocco</th>
<th>Tunisia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed Capacity 2006 (MW)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Hydro</td>
<td>85</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Wind</td>
<td>0.5</td>
<td>225</td>
<td>114</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>PV Systems</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Geothermal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>Wind Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Speed (m/s)</td>
<td>2 - 6</td>
<td>6 - 11</td>
<td>5 - 10.5</td>
<td>8 - 11</td>
<td>7 - 10</td>
</tr>
<tr>
<td>Wind Potential (MW)</td>
<td>N/A</td>
<td>20,000</td>
<td>N/A</td>
<td>6,000</td>
<td>2,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Renewable Energy Promotion Policies</th>
<th>Algeria</th>
<th>Egypt</th>
<th>Libya</th>
<th>Morocco</th>
<th>Tunisia</th>
</tr>
</thead>
<tbody>
<tr>
<td>RE Specific Law</td>
<td>Yes</td>
<td>Ongoing</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Targets</td>
<td>5% of power generation based on solar energy by 2010</td>
<td>20% RE share in electricity demand by 2020</td>
<td>6% of RE share in electricity demand by 2020</td>
<td>10% RE share in TPES and 20% in electricity generation by 2012</td>
<td>Yes, by technology (Wind, SWH, etc.)</td>
</tr>
<tr>
<td>Feed-in Tariffs</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>RE Funds</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>RE Subsidies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>R&amp;D Law</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Public Awareness Program</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>

Source: OME

CCC is currently in negotiation stage for 2 wind farms. One in the Middle East and another one in North Africa with total size of 400MW. Given the current level of Carbon Prices, the concerned Governments have opted, at the moment, to keep out the Carbon Component from the bids.
Project vs. Carbon Finance
Project Finance and Typical Role of CDM Financing

- **Strategic sponsor**
- **Other investors**
- **Debt finance**
- **Equity**
- **Supplier**
- **EPC**
- **Inputs**
- **Contractor**
- **O&M**
- **Project Company**
- **Outputs**
- **Offtaker**
- **Operator**
- **CER offtaker**
## Tensions Between Project Finance and Carbon Finance

<table>
<thead>
<tr>
<th>Project finance seeks</th>
<th>CDM seeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Creditworthy counterparties</td>
<td>✓ Counterparties with limited financing capability and other barriers</td>
</tr>
<tr>
<td>✓ Established technologies</td>
<td>✓ New technologies (not common practice)</td>
</tr>
<tr>
<td>✓ High IRRs</td>
<td>✓ Low IRRs</td>
</tr>
</tbody>
</table>
Characteristics of Current Carbon Finance Environment

- The market is evolving and pure PoD ERPAs seem to be out of fashion
- Primary CER prices have been volatile and not very helpful in securing fixed price ERPAs
- Transaction Costs are increasing
- There are no “low hanging fruits” left in CDM Land
- Uncertainty on Post-2012 environment reduces candidate projects
- EB is taking a more robust view on registration
- DOE are overbooked
Where is Carbon Finance Heading to and What is MENA’s Role in it?
MENA’s Role in Carbon Finance

- Countries within the regions have very different Socio-Economic profiles
  - Very unlikely that they will be classified in the same category after 2012
  - There will be pressure for some of the leading regional Economies to take binding targets
  - This needs to be done with respect to the need for the regional Economies to grow and in return for substantial and real technology transfer

- There is a vast need for infrastructure investments in the region that will allow the spur of growth within the region to continue; attention is shifting to sustainability within those investments, Renewable Energy and Carbon can have a leading role to play in that

- The world depends on MENA for its Energy needs with total energy and infrastructure investments in excess of $1.2 trillion

Carbon Finance in its transformed role as a Renewable and Clean Energy, Infrastructure and PE asset class will become quintessential to MENA and to the world’s need to combat Climate Change
Contact Climate Change Capital

CCC Head Office
Edmond Sassine
Climate Change Capital
3 More London Riverside
London
SE1 2AQ
United Kingdom
Email: esassine@c-c-capital.com
Tel: +44 (0)20 7939 5269
Fax: +44 (0)20 7939 5030
www.climatechangecapital.com