Memo on the Coal to Gas Switch in Egypt, and EBRD Involvement
Submitted to the European Bank for Reconstruction and Development (EBRD)
by: The Egyptian Center for Economic and Social Rights (ECESR)

Attached to Letter from Egyptian, Regional, and International CSOs, to EBRD Governors, Executive Directors, and Staff

Contents:

Definitions

WDF: Waste Derived Fuels which includes RDF, sustainable biomass and agricultural waste
RDF: Refuse Derived Fuel defined as the 20% of industrial and municipal that cannot be recycled and is currently burnt in the open air in Egypt
Sustainable biomass: organic waste, not crops grown specifically as a fuel
Agricultural waste: organic waste from agricultural processes

1. A snapshot not a trajectory - Global coal consumption

Citing coal as the "*basic fuel for cement plants worldwide*" does not take into the account the overall reduction in the use of coal in the EU and other developed countries. Moreover it hides the two main reasons as to why some countries uniformly use coal: either they have no natural resources therefore have to import all fuel; or the country has vast coal reserves that it would not be economically viable to import other fuels instead of.

Global coal consumption
85% of coal extracted globally is used in the country of origin. Figure 1 presents the countries with the highest global ranking for coal consumption (whether for electricity generation or for industrial applications), with their corresponding coal, natural gas and oil reserves. It can be seen that most countries with the highest coal consumption are those that have the largest coal reserves.

Figure 1: Country ranking based on coal consumption, coal reserves, availability of gas and oil reserves (IEA, 2011)

	Coal Consumption world ranking	Coal reserves world ranking	NG reserve (TCF)	Oil reserve (K Mio Bar)
China	1	3	109.3	17.30
USA	2	1	300	35.00
India	3	5	47	5.70
Japan	4	Negligible	Negligible	Negligible
Russia	5	2	1162.5	87.20
RSA	6	9	Negligible	Negligible
S. Korea	7	Negligible	Negligible	Negligible
Germany	8	6	2	Negligible
Poland	9	11	4.2	Negligible
Indonesia	10	12	103.3	3.70

Similarly demonstrated by the World Resources Institute in the two tables below:

TABLE 1. Top 10 coal-producing countries as of 2012[3]

Ranking	Country	Coal Production (Mtoe)
1	China	1825.0
2	U.S.	515.9
3	Australia	241.1
4	Indonesia	237.4
5	India	228.8
6	Russian Federation	168.1
7	South Africa	146.6
8	Kazakhstan	58.8
9	Poland	58.8
10	Colombia	58.0

TABLE 2. Top 10 coal-consuming countries as of 2012[3]

Ranking	Country	Coal Consumption (Mtoe)
1	China	1873.3
2	U.S.	437.8
3	India	298.3
4	Japan	124.4
5	Russian Federation	93.9
6	South Africa	89.8
7	South Korea	81.8
8	Germany	79.2
9	Poland	54.0
10	Australia	49.3

Other countries which use coal and have negligible coal reserves do not have considerable native fossil fuel resources and are therefore forced to import all of their energy while attempting to diversify by using different types of fuels to enhance their energy security.
“Coal consumption is dominated by China (47%), the United States (14%), and India (9%), with those three countries together accounting for 70% of total world coal consumption in 2010” (IEA, 2011). It is interesting to note that these three countries have 47% of total coal reserves worldwide.

Presently, Egypt has insignificant coal reserves but large natural gas reserves. Countries

with similar profiles to Egypt do not import coal. Either to avoid the pollution and environmental degradation resulting from the use of coal, and/or so as not to jeopardize the use and development of renewable energy sources.

Furthermore, there is a general trend for countries - including those with the largest coal reserves - to move away from the use of coal in favour of capitalizing on the use of renewable sources of energy among other alternative energy sources both for electricity and thermal energy generation.

European coal consumption

A prime example of this trend can be seen in Germany, which has the sixth largest global coal reserve and no other fossil fuel resources, but is decreasing the use of coal in electricity generation from 42% in 2011 to 24% by 2030 (31% 2011 to 13% in 2030 installed capacity 2030).

In spite of the large European coal reserves, the use of all fossil fuels (including coal, pet coke, oils and natural gas) has been decreasing across Europe.

Alternative fuels consumption

This decrease in coal use has been accompanied by an increase in the use of waste derived fuels (WDF) such as refuse derived fuel (RDF) and biomass. Coal use in cement manufacturing in particular is decreasing: in 2006 fossil fuels accounted for 82.1% of the total fuel used, alternative energy sources (waste fuel) accounting for the remaining 17.9% (Askar, et al., 2010), by 2011 however, the use of fossil fuels dropped to 66% and the use of alternative energy increased to 34% (IEA, 2012b). It can be seen that the use of WDF has almost doubled in five years while the use of fossil fuels has decreased by over 16%.

Moreover, a continued decrease in the use of coal and increase in the use of waste fuel is projected. Figure 2 shows that the trend for alternative fuel use increasing in both developed and developing countries. Figure 3 shows that in 1986 the fossil fuel substitution percentage in the German energy mix was 4.1% increasing to 61% by 2011 (Hoenig, 2012).

Figure 2: Estimated alternative fuel use 2006-2009 with the maximum levels in each region depending on competition from other industries for alternative fuels (ERCA techonology papers, 2009; WBCSD, IEA, 2009)

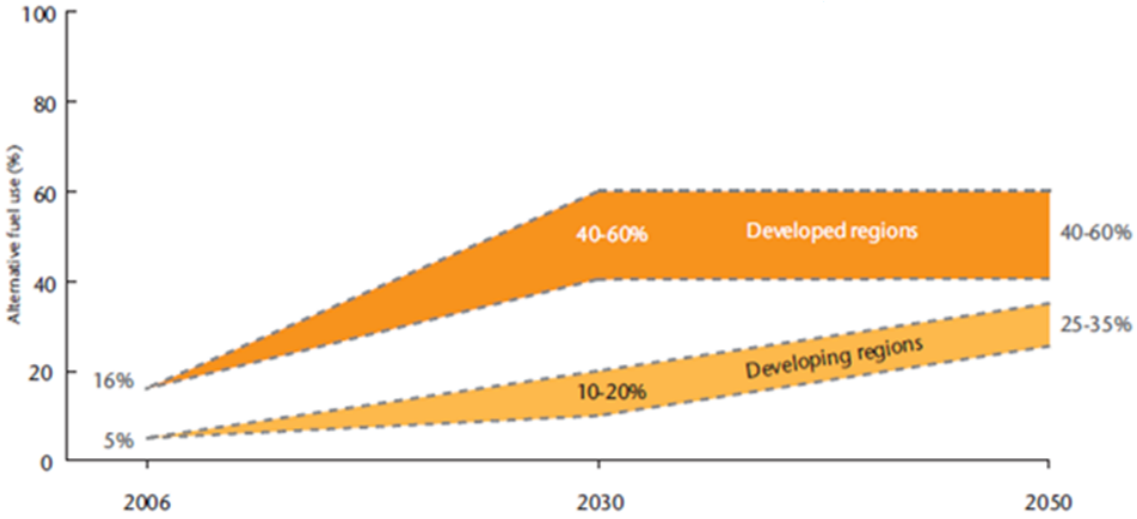
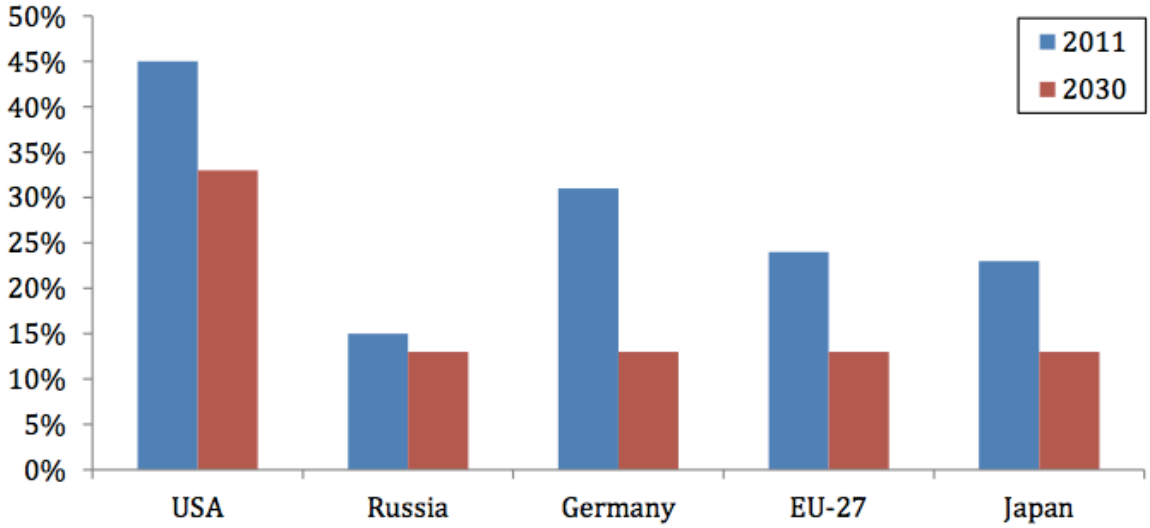
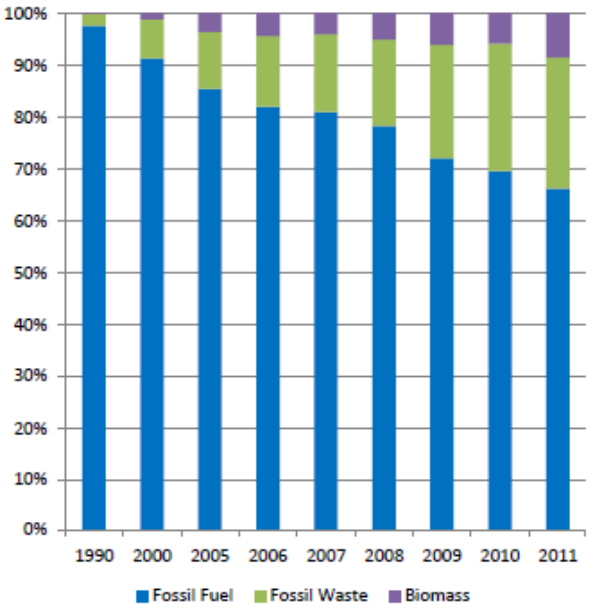


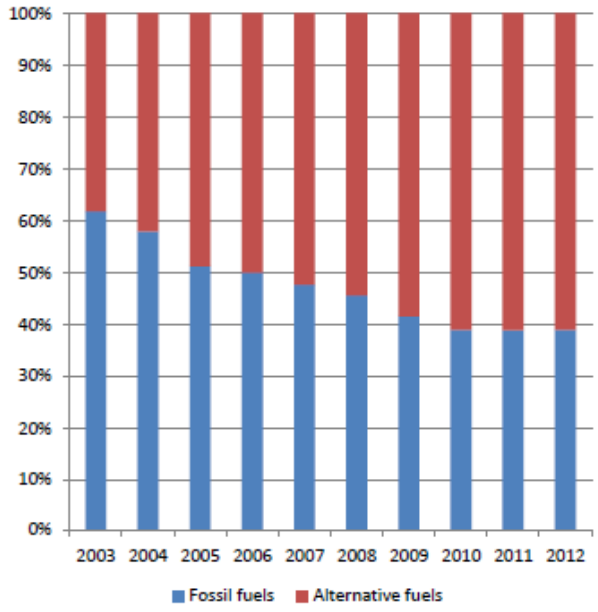
Figure 3: Fuel substitution rate in the German cement industry (Hoening, 2012)



Up to 100% of a cement plant's energy consumption can be fed with waste fuels (European Commission, 2010). In 2007 some cement plants in the US were reaching substitution rates of more than 80%. In the Netherlands waste fuel accounts for 89-98% of the cement industry's energy consumption, depending on the year (CSI, 2009). Figure 4 shows the increase of alternative fuels in Europe and Germany, the German figures particularly striking given it has the sixth largest coal reserve in the world, yet a higher proportion of energy sourced from waste derived fuel (61%) than fossil fuels (31%).

Figure 4: Types of fuels used in the cement industry in (a) Europe and in (b) Germany (IEA, 2012)





Waste fuels in Egypt
WDF have already been used by the Egyptian cement industry; CEMEX is using 25% WDF and Al Arabiya uses 6% and 10% in each of its plants, aiming to increase to 30-40% over the next 2-3 years.

The quantity of solid waste generated in Egypt reaches 140 million ton per year; 70% - 80% of which can be converted into energy (El-Haggar and Hassan, 2014). Assuming 15% of such waste can be turned into RDF and assuming its calorific value is 2500 kcal/kg (on the lower end of the RDF quality spectrum) this would cover 93% of the thermal needs of the Egyptian cement industry.

Current prices of RDF in Egypt are at $4.5 /mmBTU, cheaper than both coal and natural gas. Although these prices do not include the investment cost needed to modify the production process to accommodate the use of WDF, extensive investment in retrofitting cement plans for coal combustion would also be required.

It is also worth noting that in Egypt currently, non recyclables are mostly burnt in the open air, contributing to the smog in Cairo and pockets of air pollution in industrial areas.

2. EU Standards

Best Available Technique (BAT)
As stated by EBRD, coal for cement plants "...is considered a Best Available Technique under the Industrial Emissions Directive of the European Commission".

Yet the Industrial Emissions Directive (IED) itself states that BAT's are part of a five-part approach under the IED: "The IED is based on several principles, namely (1) an integrated approach, (2) best available techniques, (3) flexibility, (4) inspections and (5) public participation.". Requiring the application of all five principles, each carrying their own weight to be balanced in the final decision, and not simply allowing all BAT's to be implemented.
Application of the five principles in the context of Egypt could look like the following:

Firstly an integrated approach, defined as:
"... the permits must take into account the whole environmental performance of the plant, covering e.g. emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, and restoration of the site upon closure. The purpose of the Directive is to ensure a high level of protection of the environment taken as a whole.
Should the activity involve the use, production or release of relevant hazardous substances, the IED requires operators to prepare a baseline report before starting an operation of an installation or before a permit is updated having regard to the possibility of soil and groundwater contamination, ensuring the integrated approach.".

In making this decision the Egyptian Government has not heeded the warnings of its Environment Ministry, and has not completed the required health and environmental impact assessments that would assess the environmental performance of cement plants switching to coal. The Cabinet making the decision has instead required environmental regulatory standards to be set after making the decision, without assessing the potential impact on the country before making the decision; this does not constitute "an integrated approach" as defined under the IED.

Secondly, use of a BAT; according to the European Commission guidance document for BATs in the cement industries ""best" means most effective in achieving a high general level of protection of the environment as a whole". Given this principle definition and that the use of waste fuel in cement plants is also a BAT, the authors would choose to prioritise the use of waste fuel as a BAT for all the reasons listed in section 3 which find coal to be more polluting than natural gas or waste fuels.
It is suggested that applicability to the specific context of the host country should be of priority in recommending action based on BATs; thus the fact that coal use in cement plants is a BAT should not be the ultimate consideration when considering funding, but part of a wider enquiry into its appropriateness within the country context, incorporating the IED's five principles for this very purpose.

Thirdly, flexibility, "The IED contains certain elements of flexibility by allowing the licensing authorities to set less strict emission limit values in specific cases. Such measures are only applicable where an assessment shows that the achievement of emission levels associated with BAT as described in the BAT conclusions would lead to disproportionately higher costs compared to the environmental benefits due to
(a) geographical location or the local environmental conditions or
(b) the technical characteristics of the installation."
As intimated in Section 1 above, the use of less polluting waste fuels would in fact be more cost effective than importing coal in Egypt; thus the use of the third principle of flexibility would only be needed under the introduction of coal given its predicted to be more expensive; application of the BAT for use of waste fuels would not require this however.

Fourthly, inspections, "Member States shall set up a system of environmental inspections and draw up inspection plans accordingly. The IED requires a site visit shall take place at least every 1 to 3 years, using risk-based criteria."
This supporting regulatory provision requires a sufficiently active regulator, independent from the interests of industry to implement this principle effectively.
Thus far, the Egyptian Government has shown itself to be primary caretaker of the private industrial sector's interests: allowing them into cabinet meetings to make their case for coal, without the oversight or presence of other stakeholders, including civil society. The

Ministry of Industry as the licensor to the cement industry, with the power of revoking operating licenses, is generally a promoter of industry and therefore likely carries out its role with inherent bias suggesting it is not capable of performing inspections independently.

Finally, public participation, "The Directive ensures that the public has a right to participate in the decision-making process, and to be informed of its consequences, by having access to
(a) permit applications in order to give opinions,
(b) permits,
(c) results of the monitoring of releases and
(d) the European Pollutant Release and Transfer Register (E-PRTR). In E-PRTR, emission data reported by Member States are made accessible in a public register, which is intended to provide environmental information on major industrial activities."

Egypt's track record for public participation is not surprising given it spent 30 years under authoritarian rule until 2011. Since 2011 various transitional governments, in limbo, have not been able to implement reforms in this area of Egyptian governance, not least as Egypt is still without an elected Parliament. As has been indicated by the recent decision on coal for cement and electricity provision, Egypt's interim government has not waited until a Parliament is elected to decide on a matter of huge national importance with the potential to shape Egypt's development trajectory over the next 20 years. Public participation is low; and furthermore, accountability to the public by publishing transparent plans relating to the decision (including permits, inspections, impact assessments, or even detailed policies) is close to zero. The final blow to public participation potential in Egypt is the lack of monitoring and publicly available data, making public oversight and participation particularly difficult.

Overall, Egypt has a very low capacity to realise all five principles of the IED that make application of a BAT possible. Thus to state that the same policy should be funded in Egypt as a BAT under the EU makes a mockery of the EU regulatory instruments as they are incomparable with those available in Egypt. Once again, country-specific analyses are required before directly importing EU standards that cannot be implemented in Egypt currently, as justification for a policy such as coal use.

2. EU air pollution

The Ministry of Industry and the cement industry are pushing for coal arguing they welcome regulations that meet EU standards for pollution management in return. Yet EU regulations themselves are breached by member states: the European Environment Agency has reported 11 Member States in violation of at least one of the air pollution standards for sulphur dioxide (SO2), nitrogen oxides (NOx), ammonia (NH3) and non-methane volatile organic compounds (NMVOC). "*As in previous years, the most commonly breached ceiling was nitrogen oxide (NOx), with nine Member States exceeding their designated levels*." (EEA, 2014).

"Approximately 300 large coal-fired power plants are in operation in the EU, producing a quarter of all electricity consumed. These power plants are responsible for over 70% of the EU's sulphur dioxide emissions and over 40% of nitrogen oxide emissions from the power sector. They account for approximately half of all industrial mercury emissions, and a third

of industrial arsenic emissions into the air. These coal-fired power plants are also responsible for almost a quarter of Europe's CO2 emissions."

Despite the generally high standards in regulating levels of air pollution, the EU still has a large healthcare bill as a result of air pollution, a situation partly caused by coal fired generation.
"In 2010 22,000 deaths were attributable to pollution from coal-fired power plants" with a total "shortening [of] the lives of Europeans by an estimated total of 240,000 lost life years…". "The 11% increase in coal burning in Europe from 2009 to 2012 will have caused a similar increase in the negative impacts on the populations health, amounting to a potential increase of more than a thousand deaths throughout the EU."

The Egyptian Environmental Affairs Agency (EEAA) has estimated the health impact in Egypt to be in the range of $3.2 Billion/year. If the effects of CO2 are included, the health bill would increase to ~$3.95 billion/year provided European standards for pollution control are abided by.

3. Emissions from coal
"It is to be noted that coal/petcoke have lower emission performance values (e.g NOx, CO, etc) than natural or other basic fuels as the combustion process is more efficient within the cement production process." (EBRD Letter)

We would like to see the evidence that supports this statement, as it is contrary to the evidence collected below and raises further questions:
- Do these technologies also address the mercury and heavy metals, and their treatment in the wastewater before being put back into the Nile?
- What are the costs of such technologies?

In Europe, despite the mitigation measures installed, stringent pollution standards and the development of emissions monitoring systems, emissions remain much higher for coal powered cement factories than for cement factories that use natural gas, demonstrated in Figure 5 below, suggesting coal has a higher emission performance value.

Figure 5: Current Emissions in the European Industry after applying mitigation measures for Gas fuels (Natural Gas) and Solid fuel (Coal, petcoke etc) (EMEP/EEA, 2013).

Pollutants	Gas Fuels	Solid Fuel	Ratio of emissions of Solid Fuel/Gas Fuels	Comment
NOx (g/GJ)	74	173	2.3	Gas emissions
SOx (g/GJ)	0.67	900	1,343	
TSP* (g/GJ)	0.78	124	159	Particulates
PM10 (g/GJ)	0.78	117	150	
PM2.5 (g/GJ)	0.78	108	138	
Pb (mg/GJ)	0.011	134	12,182	Heavy metals and other metals
Cd (mg/GJ)	0.0009	1.8	2,000	
Hg (mg/GJ)	0.54	7.9	15	

Cr (mg/GJ)	0.013	13.5	1,038	
PCB (µg/GJ)		170		Other organic pollutants
PCDD/F (ng I-TEQ/G)	0.52	203	390	

*TSP (total suspended particulates)

The reduction of atmospheric emissions of SOx and NOx is usually achieved by "transferring the burden to the wastewater system which leads to significantly higher levels of NO3 and So4 which could have environmental consequences depending on the nature of receiving waterway" (Falcke et al., 2011).

Further to the atmospheric emissions of SOx, NOx and CO2, coal contains heavy metals such as mercury, lead, cadmium and chromium which are not entirely captured in the cement-making process, thus to deal with the pollution they are 'fixed' in water for their disposal, disposed of as polluted waste water to be treated.

The Nile is currently the main receiving waterway for industrial wastewater in Egypt. Despite its status as the lifesource of the country - 55.5% of Egypt's water resources are directly sourced from the Nile - it is already heavily polluted and causing health issues from the heavy metals concentrated in the fish for human consumption and in the untreated drinking water of Egyptians - renal diseases are taking a particularly heavy toll (Bottoms, Mada Masr).

Egypt's industrial track record in treating polluted industrial wastewater's is dire: in 2008, the Egyptian Environmental Affairs Agency officially recorded that there was 50 percent more wastewater being discharged into the Nile polluted beyond the legal levels than discharged within the legal levels; the situation has not improved in the intervening years. Moreover, Mercury is not currently tested for in Egypt's waterways, as the Government says it lacks funding and capacity. Yet mercury is a toxic heavy metal that causes brain damage and heart problems. Activated carbon injection (ACI) technology can reduce emissions by up to 90% when combined with bag-house filters, though under certain conditions such as when high sulfur coals are used, the effectiveness of ACI decreases. The remaining 10% of emissions can cause disastrous impacts: 1/70th of a teaspoon of mercury deposited on a 25-acre lake can make the fish unsafe to eat (UCS, 2012). To imply that importing such heavily polluting substances and state they will be regulated to EU standards ignores the current monitoring and regulatory capacity in Egypt, causing deep concern over the feasibility of such targets.

In summary the emissions of coal tend to be at least twice as polluting as natural gas used for the same process; the disposal of heavy metals into water sources is of deep concern in Egypt's context as it already suffers from heavy industrial water pollution; unrestricted by the regulations put in place industry are monopolising the country's natural resources for their own profit at the expense of the health of the people and the environment. It is not expected that the cement industry would be any different without sufficient capacity building, political will and funding to support an adequate regulatory enforcement mechanism by the Government.

4. Cement Technology Roadmap (CTR)
Our reading of the CTR finds there are four key steps to reducing the impact of cement production:

1. Thermal & electric efficiency
2. Clinker substitution
3. Alternative fuel use
4. Carbon Capture and Storage

Assessing all four in detail we do not find an argument for the use of coal, in fact quite the opposite.

Alternative fuel use
As stated above, Egypt has large alternative fuel opportunities, many more than coal in fact. Egyptians Against Coal[1] have put together the following roadmap for the industry using academic and industrial expertise:

1. Short to Medium term solutions (6 month to 1 year)
   - 20% Solid WDF, current prices in Egypt are between $4.5/mmBTU which is cheaper than coal
   - 30% Imported natural gas (assuming $11/mmbtu)
   - 50% local national gas (assuming $6/mmbtu)
   - Levelised imported and Egyptian mixture at $10/mmbtu

2. Medium (1 to 3 years)
   - 30% Solid WDF + biomass
   - 20% imported natural gas
   - 50% Egyptian natural gas

3. Medium to long (> 3 years)
   - 40% Solid WDF + biomass
   - 10% improvement in efficiency
   - 50% Egyptian natural gas + imported

4. Long term solutions (5 years +)
   - 60% Solid WDF + Biomass
   - 20% improvement in efficiency
   - 20% National Natural gas + imported
   - Renewable energy for electricity operational

The benefits of this roadmap include the exclusion of expensive coal importing, preservation of tourism hubs along the red sea currently threatened by coal, a solution to Egypt's nationwide solid waste problem, extra revenue for farmers, use of the highly polluting rice straw currently burnt in the open air, avoidance of further air and water pollution and CO2 emissions, energy sovereignty and a reliable supply divorced from volatile fossil fuel prices. These are targets shared by the CRT.

Carbon Capture and Storage (CCS)

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[1] Egyptians Against Coal is a civil society coalition of organisations, academics, activists and individuals organsing in opposition of coal entering Egypt: https://www.facebook.com/NoCoal | @NoCoalEG

According to the CTR “Carbon Capture and Storage (CCS) is a new technology, not yet proven at the industrial scale in cement production, but potentially promising.”

There are three main arguments against justifying the move to coal with the prospect of CCS:
1. Cost and Efficiency
2. Suitability to the Egyptian market
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1. Cost and Efficiency
Cost is still a large factor in making CCS unviable at this point in time, as recognised by the IEA and cement industry in the Roadmap and EBRD’s Energy Policy:
“...CCS remains some way from becoming a mainstream technology and there is no clear timetable for this, nor a clear sense of the costs involved. The IEA Technology Roadmap for Coal-Fired Generation does not envisage deployment of CCS beginning before 2020 and anticipates that this is likely to happen first in the US, EU, Korea or China.” (53, EBRD).

Lord Browne, former chief of British Petroleum (BP) and now director of Cuadrilla - a fracking company - has himself stated:
"CCS is a very interesting idea – I tried to do the first CCS [in the UK] but there was a gap between what it would cost and what we could afford. There are very few places in the world where CCS could be made to work. I would not rule it out but I would not rule it in." (Guardian, 2014). Lord Browne’s statement on lack of affordability of CCS relating to his position in BP (a multinational company making over $11billion in profit annually) and within the UK (a highly developed country) rules out the viability of CCS as an affordable option for Egypt and its cement industry.

CCS creates a 30% decrease in electricity production for coal fired power stations (43, Falcke et al.). Egypt already suffers from electricity shortages, and given that electricity makes 30% of total energy use of a cement factory, increasing their reliance on electricity would not aid their production levels. According to Franco and Diaz, “...this technology requires a great amount of energy to achieve CO2 capture, with a great impact on the thermodynamic performance of the plant, seriously decreasing power generation efficiency. The CO2 capture systems demand a significant amount of energy for their processes, requiring more fuel per kWh generated, reducing net plant efficiency and increasing other environmental pollutants.” They estimate a reduction in efficiency of up to 8% (353, Franco & Diaz).

2. Suitability to the Egyptian Market

Using the CTR essential ‘partner roles’ as a guide for what would be required for the success of CCS in Egypt (p.16) :

1. Advice on best practice from industry, government and research institutes.
   - Currently, Egypt is under a transitional government and successive cabinets since the 2011 revolution have more or less adopted the practices and policies of the Mubarak regime. Egypt was ranked 118 out of a total 176 countries in the Transparency International Corruption Percentage Index (CPI) in 2012; demonstrating a considerable drop from the 98th position it occupied in 2010 (Transparency

International, 2012). Further, Egypt loses around 40 billion Egyptian Pounds ($6 billion) annually as a result of corruption and illicit financial flows – amounting to one and a half times the health budget of 2012-2013 (LE27 billion, $4 billion) (Deccan Herald).

- The cement industry in Egypt is mostly under non-Egyptian ownership, therefore there is potential for knowledge transfer from their operations in Europe and elsewhere, but only if the Government and licensor requires it of them: Egypt's lax implementation of regulatory violations has fostered an atmosphere of impunity and corrupt co-operation between individuals in government and private industry.
- Egypt's research institutes are generally government funded, thus depending on the political will for researching best practice and the funds available, research institutes could also easily be badly equipped for such a role. The World Economic Forum's (WEF) Global Competitiveness Report 2011-2012 ranks Egypt 113th out of 142 countries on the quality of its scientific research institutions, for the purposes of informing a nascent technical industry it is suggested Egypt's research centers are not ready for such a role.

2. Technology Research and Diffusion requiring funding from industry, suppliers and government, as well technical support from universities and research institutes.

- Egypt's level of debt (roughly 12% of GDP) and persistent and growing poverty levels (40% now live below the poverty line of $2/day) are already preventing the transitional government from increasing the health budget in line with inflation, without addressing its capacity to support cutting edge research in CCS benefitting private industry. In the last 10 years the Government has never spent more than 1% of GDP on research and development (R&D); and it has even less capacity to do so now (Royal Society).
- The private sector has only contributed roughly 5% to Egypt's research budget, one of the lowest contributions in the world (p.16, Royal Society); previous experience shows that industry will not invest time and expertise until it has a stable and committed policy commitment from Government, this is not generally possible during transitional governments.
- The Global Innovation Index, an annual report published by Cornell University, ranked Egypt 108 out of 142 countries for progress in innovation in 2013. Exemplified by the fact that only 1% of Egypt's manufactured exports are high technology goods, level with world's least developed countries (49, Royal Society).
- According to Global Entrepreneurship Monitor "most nascent entrepreneurial activity is in the retail service sectors rather than research-based industries; financial support for R&D and the acquisition of new technologies is low; the transfer of knowledge from universities and research centers to new enterprises is "extremely weak"" (49, Royal Society). Add to this that the WEF also ranks Egypt 128th out of 144 countries on the extent to which universities and industry collaborate on R&D.

3. Institutional structure requiring leadership from all sectors.

- For all the reasons stated above, Egypt's research centers, governmental and non governmental, Universities and even industry itself is badly equipped to be leaders in this arena as things stand today. Without significant leaps in innovation and quality of R&D, Egypt will not be fit to meet this challenge.

In conclusion the CTR clearly advocates for a move towards more efficient cement plants and using alternative fuels as the two tangible options for improvement in the short and medium term; with the hope that CCS will become viable after 2020, but admitting it

probably won't be available outside developed countries rendering it irrelevant to the discussion on Egypt's cement industry roadmap. Removing CCS from the 4-part roadmap (in Egypt's case) removes one of the key ways to reduce CO2 emissions from coal use, implying the use of alternative fuels really is the short to long term answer to the issue of CO2 emissions: not adherence to the roadmap without considering its country-specific viability.

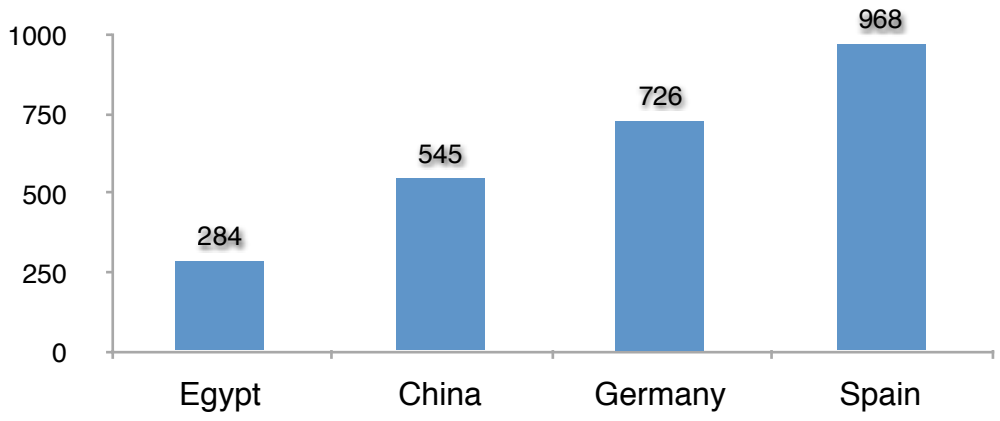
5. Egypt's Development Pathway

According to EBRD's energy policy, three main elements are core to fulfilling the Bank's mission in investing in the energy sector; affordability, security of supply, and sustainability.

Affordability:
EBRD energy policy states that supply must be "Affordable: Energy is supplied to all consumers at a price that allows them to meet their basic needs".

The pricing of natural gas for the Egyptian cement industry is $6 /mmBTU. Natural gas prices worldwide in 2011 were approximately $10/mmBTU in Europe, roughly $5/mmBTU in North America and $12/mmBTU in Asia. Thus, the price for the Egyptian industry is towards the lower end of the price range world-wide.
The cost of electricity in Egypt is 3.9 cents/kWh at off peak times (MoEE) and ~4.7 cents/kWh at peak times (according to the cement industry). This price is 50% less than electricity prices in the Chinese industry (which are also subsidized), ~40% of prices in the German cement industry and 30% of prices in the Spanish cement industry. This is clearly shown by Figure 6 below.

Figure 6: Electricity prices in the Egyptian cement industry as compared to other countries. Assuming 55 million tons of Cement produced at an average price of 33 piasters/kWh.



According to CEMBUREAU (An association acting as spokesperson for the European cement industry before the European Union and public authorities.), due to the current growth in demand for steam coal and the expected very high growth in demand over the next 5 years, "steam coal prices, and petcoke prices, will stay at very high levels. For medium/long term, the only option for world cement industry is to sharply increase its

consumption of alternative fuels" (CEMBUREAU, 2011). Compared to the stability of native natural gas and Egyptian WDF prices, if this cost variation is transferred to the consumer it will create price distortions in the Egyptian construction sector. Coal price variability will directly affect cement prices. The following graph demonstrates this variability, based on prices obtained from the Australian Coal Market (considered the global benchmark for coal prices).

Figure 7: Coal price variability (CEMBUREAU, 2011)

The infrastructure required to import, transport and use coal can take between six months to two years to construct, costing between $3.5 to $6billion. The infrastructure required includes and is not limited to the development of:

- Ports
- Ship unloading equipment + safety mechanisms
- Storage facilities within ports
- Transportation (whether rail or river transport)
- Storage facilities in factories
- Coal pulverisation facilities
- Coal treatment infrastructure
- Contaminated wastewater treatment plants (for water used in coal pre-treatment)
- Cement kiln modification

Given the large capital investment required, the return on investment/payback period will take at least 10 years. These costs will be transferred to Egyptian consumers affecting the current affordability of cement in Egypt.

Security of supply:

EBRD energy policy states "Secure [to mean]: Energy is reliably supplied, transported and delivered on an uninterrupted basis".

As is obvious from the word 'importing' Egypt will have to import all of its coal requirements now and into the future. As can be seen in cases of gas supply from Russia, international political negotiations and unforeseen situations can indeed lead to countries switching off the supply or increasing the price at any time. As a result 'energy sovereignty' is a key concept that has taken hold in the 21st century; the USA is an example of an economy

that has heavily invested in native fracking to cut down on imports promoting energy security; the countries detailed above with vast coal reserves using coal in their energy mix; Gulf countries moving towards energy sovereignty using renewables etc. In 2014, for Egypt to be considering importing coal with all its price volatility and need for capital outlay in the infrastructure when its financial situation is severe and unstable, the switch to coal does not meet the “security” element.

Moreover, as the definition of “security” states that “supply must be transported …on an uninterrupted basis”, this cannot be guaranteed in Egypt under the current plan to use industrial sized trucks and lorries running on diesel which has become increasingly rationed over the last two years.

Sustainability:
Supply must be “Sustainable: Energy is delivered in a manner that does not undermine opportunities of future generations to enjoy the same level and quality of services by degrading the natural or human environment”, according to Energy Policy document.

As EBRD’s role is to support transitioning countries with funding and technical assistance for reconstruction and new development, it is worth noting that in the Egyptian context coal has not played any role in the country’s development so far; and it has negligible native coal reserves that could play a role in future development. Thus coal is neither a part of Egypt’s growth and development so far, nor part of its future unless imported into the country at great financial as well as human expense, as indicated throughout this memo.

To use coal as a source of energy requires Egypt to seek outside financing through loans. To finance significant future infrastructure through debt is initially counterintuitive to sustainability and security of energy. Bearing in mind Egypt’s financial crisis, it is not clear how Egypt’s loan-repayment plan would be sustainable.
Domestic debt as of August 2013 totalled EGP1.5 trillion and foreign debt US$44.5b, equivalent to 92% of GDP. By July 2013, the Egyptian pound had lost more than 12% of its value, a record low since 2004, while Egypt’s foreign currency reserves in turn dropped from $36bn in January 2011 to $14.4bn in April 2013, below the “critical level” set by the Central Bank of Egypt at $15bn. The budget deficit in Egypt continued to increase from 10.8% of GDP in 2012 to 11.5% in 2013. Meanwhile, public spending on basic economic and social rights and services has continuously decreased: education made up 16.2% of the total state expenditures in 2005 but dropped to 10-11% in 2012; Health spending made up 5.4% of GDP in 2000, increasing to 6.1% in 2002, but since decreasing reaching 4.8% by 2012.

Thus, to depend on debt financing Egypt’s energy future would inevitably harm the State’s ability to meet the future generations rights to economic and social services and right to adequate standards of living.

Additionally, importing coal and investing in the infrastructure will lock Egypt into using coal for the next 15 years if not more, looking to other coal-using countries as indicators. This in turn hinders the development of the native resources Egypt does have: namely agricultural waste and RDF, solar and wind power. It would seem perverse to support a decision that rejects all of Egypt’s native capacities and resources in the interests of “development” using the European model EBRD so clearly favours. It would not be a sustainable form of development if its very basis must be phased out to meet greenhouse gas emission

targets, national air pollution targets, or industry specific roadmap such as the CRT in the long term.

Supporting sustainable development in Egypt must therefore include the following:
- Job creation:
    - The Egyptian cement industry provides less than 0.09% job opportunities in the local labour market (assuming 23,000 jobs and 27.2 million job market according to Government database CAPMAS); a waste collection network would create clean jobs across Egypt, not just in the largest towns and cities, and would positively contribute to the increasingly insecure livelihoods of farmers by buying waste fuel materials from them.
    - The transportation of coal and working with coal in cement factories would inevitably create health issues amongst workers, waste fuels however contain only traces of pollutants found in large quantities in coal; job provision in Egypt should not threaten the health of employees.
    - The stability of supply of WDF should create a steady level of productivity and therefore profit enabling the industry to meet the minimum wage obligations recently enacted; as opposed to the current cost of labour being only 2% of production compared to the costs of the sacks for the cement being 6%.

- Development opportunities that do not impinge on future generations ability to live and thrive in a healthy and safe environment and climate, which necessarily includes:
    - Monitoring of water, air and soil pollution and enforcement of violations
    - Low carbon development, looking to reduce CO2 emissions in line with international standards
    - Supporting rather than compromising the poorest households ability to survive and establish a livelihood by providing access to basic services including clean water; health services; participation in their governance; an unpolluted environment and job opportunities, all of which are clearly jeopardized by the use of coal, as explained in sections 2, and 3 of this memo.

Sustainability and its assessment can only be insured through a democratic, representative process. Parliamentary approval of a detrimental decision such as switching to coal is the only way such a process can be legitimate. The future of Egyptian generations should only be decided by Egyptian people themselves, only when a representative, democratically elected parliament is in place, which has been absent should June 2012. Therefore, for the EBRD to participate in such a highly contested policy would not only be harming human and economic growth and development, but also the political and democratic development of Egypt as an Arab Country in Transition.

Article 1. of EBRD AOE states that representative democracy is a major prerequisite for the Bank's financing of public sector agreements. A decision to support coal within this context would therefore be in opposition of its very own articles of establishment and principles as a transitional bank .

Finally, such a decision would also further implicate EBRD in violating the Egyptians' constitutional rights in deciding on their future, as the 1923, 1930,1971, 2012 and 2014 constitutions state that "every agreement made by the Executive that would place burdens on the treasury for future years to come, must be voted upon, approved, and ratified by the people's assembly".

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