

## **Achievements and Future Plans of the Regional Industrial Pollution and CO<sub>2</sub> Abatement Project for Arab Countries**

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### **Abstract**

RIPECAP (Regional Industrial Pollution & CO<sub>2</sub> Abatement Project) is funded by the Government of Finland, supervised and coordinated by the United Nations Environment Program/Division of Technology, Industry and Environment (UNEP/ DTIE), Implemented by the Finnish Environment Institute (SYKE) and hosted by Egypt-Japan University for Science & Technology (E-JUST). The project has focal points in Egypt, Ministry of State of Environment (MoSE), Jordan Ministry of Environment (MoE) and in Morocco Centre of Cleaner Production (CMPP). The main objective of the project is to provide support to arab countries in achieving the principles of the Declaration of the Arab Ministries of Environment, promote the use of Cleaner Production (CP), Energy Efficiency (EE) and Renewable Energy (RE) in the Arab Countries and open the door for projects which reduce GHG emissions. This is being done through assisting industrial establishments in RIPECAP countries (Egypt, Jordan & Morocco) to improve their environmental performance by providing technical and financial assistance and support to enable them to apply in the first place relevant CP and EE measures and use RE in industry. The activities of the preparatory phase included: Collecting reliable information on the situation & needs of industry in Egypt, Jordan & Morocco, quantifying benefits & applicability of CP, EE & RE, Quantifying the technical and financial needs of each industrial establishment to improve its environmental performance and comply with the environmental laws, quantifying other institutional needs of each country to undertake the implementing stage of RIPECAP. This Phase was followed on the request of Focal Points by Capacity Building Phase which ended in autumn 2011. The activities and outcomes of these phases will be summarized. RIPECAP is starting now the Fund Raising and implementation phase, the goals and the plan of which will be also summarized.

**Keywords:** *Arab country, energy efficiency, cleaner production, renewable energy, climate change, CP, BAT, REACH*

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### **1. Introduction**

The Division of Technology, Industry and Economics (DTIE) of the United Nations Environment Program. (UNEP) has initiated a proposal for "Regional Industrial Pollution and CO<sub>2</sub> Emission Abatement Project for Arab Countries (RIPECAP). Egypt, Jordan and Morocco are the beneficial countries of the project.

The proposed project was planned to be implemented in three stages: a Preparatory Stage, Capacity Building Stage and then a broader Implementation Stage. The main objective at the preparatory stage was to develop amongst UNEP/DTIE and the other partners a joint plan for the implementation stage, based on reliable information on the real situation and needs of the

participating industries. In addition, the benefits and applicability of cleaner production, energy efficiency and renewable energy approaches for industries were to be quantified (for example: the current situation of industrial pollution and emissions, preliminary estimates of the amounts and costs of abating GHGs in the industries that are potential participants in the Implementation Stage, case studies for cleaner production and energy efficiency; solar thermal systems for industrial applications; industry energy technologies applicable for use in project countries and relevant environmental financing mechanisms and institutions). This Phase started in Nov. 2007 and was completed successfully in Nov. 2009.

Before the end of the Preparatory Phase, the focal points in the three countries requested organizing a Capacity Building Phase

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for training technical and advisory staff available in the project countries and those who likely to get involved in the Implementation Phase. The topics in which they requested for Training of Trainers (ToT) Seminars and Workshops were:

- (a) REACH (Registration, Evaluation, Authorization and Restriction of Chemical Substances)
- (b) CP (Cleaner Production), BAT (Best Available Technology) & BREF (BAT Reference Documents)
- (c) CC (Climate Change) including vulnerability, accommodating and alleviating actions
- (d) EE (Energy Efficiency) including, Auditing, Modern Tools and Renewable Energy
- (e) Solid Waste Management; Waste Recycling & Minimization
- (f) Monitoring and Recycling & Treatment of Wastewater

The Capacity Building Phase ends in Oct. 2011. After which the Implementation Phase should start.

Summary of the results of these two Phases will be presented together with the preliminarily plans of the Implementation Phase.

## **2. The Stakeholder of the project**

The stakeholders of the project were the Ministry for Foreign Affairs of Finland as the Funding agency, UNEP as the Supervising and Agency, the Finnish Environment Institute as the Implementing Agency and Alexandria University as the Hosting Agency. In addition, the project has three Focal Points, viz., the State Ministry of Environment in Egypt (SMoE), Ministry of Environment (MoE) in Jordan and the Centre of Cleaner Production in Morocco (CMPP).

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### **2.1. The Preparatory Phase (Phase I)**

#### **Objective of the Preparatory Phase**

The objective was to develop amongst UNEP/DTIE and the other partners a joint plan for the implementation stage, which was based on reliable information on the real situation and needs of the participating industries and other partners. In addition, the benefits and applicability of cleaner production and energy efficiency approaches for industries are to be quantified. Egypt, Jordan and Morocco are the beneficiary countries of the project.

### **2.2. Identification of polluting industries**

The first step was to ask the each focal point in the three countries to form National Expert Teams (NET). Following that, the NET was requested to identify the polluting industries in their countries. Table 1 shows the industries considered pollutant by each country.

**Table 1. Identification of Polluting Industries**

In Egypt	In Jordan	In Morocco
Cement & Ceramic Industry	Mining, Cement, Ceramic & Phosphate Industry	Mining & Ceramic Industry
Food & Dairy Industry	Food & Dairy Industry	Food Processing Industry
Chemical & Pharmaceutical industry	Chemical & Pharmaceutical Industry	Pharmaceutical Industry
Pulp & Paper	Pulp & Paper	Pulp & Paper
Petro-chemical & Fertilizer Industry	Petroleum & Energy Generation	Fertilizer, Painting & Stick Industries
Textile & Tanning Industry		Textile & Tanning Industry
Metallurgic Industry		Metallurgic Industry
Surface Finishing		Surface Finishing

### **2.3. Designing Questionnaires and Collecting of Information**

Following the identification of polluting industries the next step was to design a Questionnaire, translating it into Arabic and French and arranging site visits by the NET to collect the information on the real situation and needs of the participating industries. This formed Part I of the Questionnaire Copies of the Questionnaire are found in RIPECAP site ([www.ripecap.net](http://www.ripecap.net)).

### **2.4. Verification and Analysis of Information Collected**

The information collected was verified by an expert team, who sent any doubtful or incomplete information back to the information collection team through the internet. Fig. 1 shows the flow of the information. The verified information was sent to another expert team who analyzed this information and suggested Cleaner Production (CP), Energy Efficiency (EE) or Renewable Energy (RE) projects to improve the environmental performance of the Industrial Facility under consideration. The team also estimated the costs of the environmental projects suggested and the technical requirements of the Industrial Facility to undertake these projects. This information formed Part II of the Questionnaire.

### **2.5. Establishment of the Knowledge Management System (KMS)**

The data collected, verified and analyzed on industrial facilities, their emissions, pollution prevention and energy saving options has to be stored in a database. For this reason a Knowledge Management System (KMS) was established. This information is protected by usernames and passwords. Other information on relevant Case Studies on CP and EE were added to the KMS. The KMS also contains freely available data on technical guidelines, energy efficiency tools and software, technical services etc. All the training material used in the Seminars and Workshops was also uploaded to the KMS ([www.ripecap.net](http://www.ripecap.net)). The project has thus created a two-piece questionnaire through which consistent data on industries in the three countries was collected. Part 1 contains general data on the plants and part 2 detailed information on the production,

energy consumption, raw materials, chemicals, natural resources, air emissions, waste waters, wastes, energy efficiency and pollution abatement options.

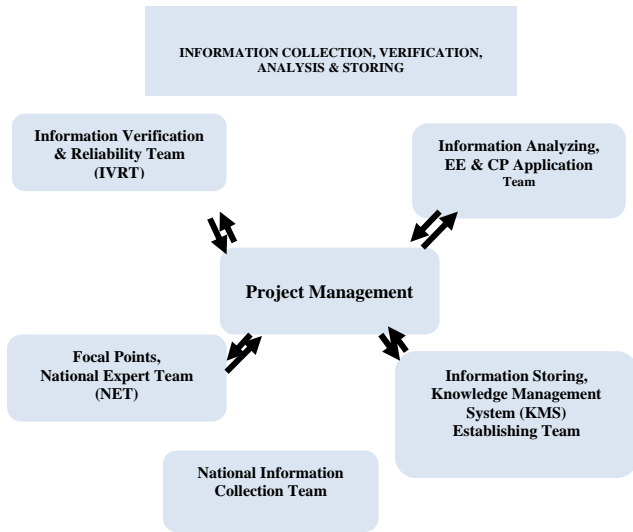


Figure 1: The Different Working Groups in Phase I

The KMS has thus information on 100 Egyptian, 24 Jordanian and 17 Moroccan industrial plants with a relatively high pollution load or high energy consumption. The activities, approaches and outcomes of Phase I are summarized in Fig. 2

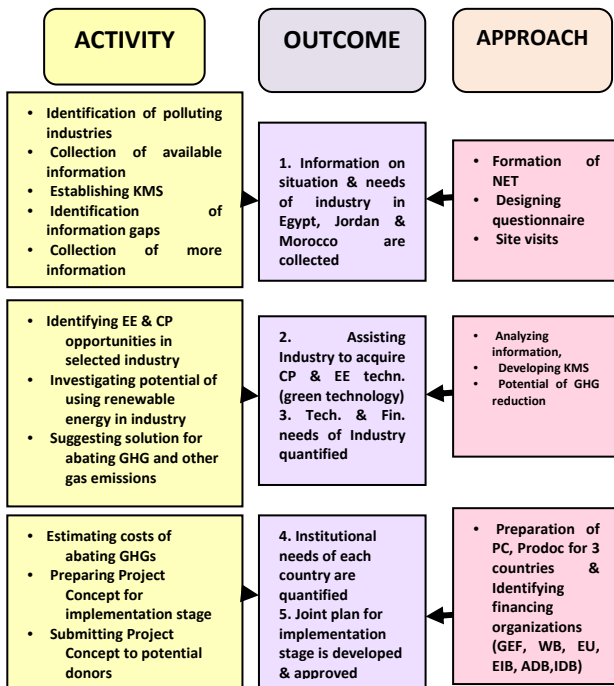


Figure 2: The activities, approaches and outcomes of Phase I

2.6. The Financial Needs of the Industry in the Three Countries

The three tables below give the number of projects studied in the three countries and the investment needed for each industrial sector in order to improve their environmental performance. It also gives indication to the type of project planned: Energy Efficiency (EE) or Cleaner Production (CP), End of Pipe treatment (EoP) or Self Monitoring (SM).

Table 2: Financial needs in Egypt

Industrial sectors		EE-CP	E-O-P	SM	Total
Cement	Cost (LE)	495,250,000	147,600,000	2,250,000	645,100,000
	projects	7	11	3	21
Textiles	Cost (LE)	42,060,000	12,129,000	30,000	54,219,000
	projects	7	4	1	12
Food	Cost (LE)	261,980,000	103,350,000	-	365,330,000
	projects	9	11	-	20
Pulp & paper	Cost (LE)	104,000,000	10,000,000	-	114,000,000
	projects	4	1	-	5
Metals	Cost (LE)	170,000,000	276,700,000	-	446,700,000
	projects	7	6	-	13
Chemical	Cost (LE)	240,100,000	69,000,000	-	288,600,000
	projects	5	4	-	9
Fertilizers	Cost (LE)	78,600,000	20,000,000	-	98,600,000
	projects	2	1	-	3
Glass	Cost (LE)	85,000,000	-	-	85,000,000
	projects	1	-	-	1
Petroleum	Cost (LE)	103,250,000	25,000	-	103,275,000
	projects	1	1	-	2
Total	Cost (LE)	1,580,240,000	638,804,000	2,280,000	2,200,824,000
	projects	43	39	4	86

Table 3: Financial needs in Morocco

Industrial sectors		EE-CP	E-O-P	SM	Total
Textile	Cost US\$	2,490,000	1,000,000	-	3,490,000
	No of projects	4	1	-	5
Pulp & paper	Cost US\$	3,580,000	6,150,000	-	9,730,000
	No of projects	1	1	-	2
Food (Olive oil & Fish canning)	Cost US\$	14,090,000	1,400,000	-	15,490,000
	No of projects	7	2	-	9
Civil & Mining Engineering	Cost US\$	20,233,945	3,479,000	-	23,712,945
	No of projects	7	2	-	9
Electronic & Elelrical Insutry	Cost US\$	27100,000	-	-	2,710,000
	No of projects	1	0	-	1
Pharmaceutica l & Chemical	Cost US\$	-	428,000	-	428,000
	No of projects	0	2	-	2
Total	Cost US\$	43,103,945	12,457,000	-	55,560,945
	No of projects	20	6	-	26

**Table 4: Financial needs in Jordan**

Industrial sectors	EE-CP	E-O-P	SM	Total	
Metals	Cost US\$	950,000	150,000	-	1,100,000
	No of projects	3	1	-	4
Food	Cost US\$	200,000	-	-	200,000
	No of projects	1	-	-	1
Petroleum & Petrochemicals	Cost US\$	16,200,000	-	-	16,200,000
	No of projects	3	-	-	9
Electronic & Electrical Insutry	Cost US\$	450,000	150,000	-	600,000
	No of projects	1	1	-	2
Pharmaceutical & Chemical	Cost US\$	300,000	150,000	-	450,000
	No of projects	1	1	-	2
Total	Cost US\$	18,100,000	450,000	-	18,550,000
	No of projects	9	3	-	12

From these tables we can see that the sectors that need highest investments are Cement and Metal Industries in Egypt (about \$108M and \$80M, respectively), Civil and Mining Engineering in Morocco (about \$24M) and Petroleum and Petrochemical industries in Jordan (about \$16M). We can also notice that the largest number of projects and investments were allocated for CP, EE and RE projects except in the Metal Industry in Egypt, where the investments in the EoP solutions are almost double that in CP and EE.

### 3. The Capacity Building Phase (Phase II)

Just before the end of Phase I, the focal points and the hosting organization in Egypt, Jordan and Morocco requested UNEP to arrange for Capacity Building (CB) Phase.

#### 3.1. The reasons why CB Program was undertaken are summarized in the following:

- i. To fulfill the requests from participating countries for specific capacity building needs before the actual implementation of RIPECAP.
- ii. To ensure the good operation and success of RIPECAP by trained staff who will manage and operate the implementation phase of the Project.
- iii. To prepare lecturing materials and Manuals/Guidelines for participants by International Experts.
- iv. To arrange and conduct Seminars and Training Workshops in the subjects request by the project countries and Focal Points in Egypt, Jordan and Morocco. The subjects selected were:
  - REACH (Registration, Evaluation, Authorization and Restriction of Chemical Substances)
  - CP (Cleaner Production), BAT (Best Available Technology) & BREF (BAT Reference Documents)
  - CC (Climate Change) including vulnerability, accommodating and alleviating actions.
  - EE (Energy Efficiency) including, Auditing, Modern Tools and Renewable Energy
  - Monitoring and Treatment of Wastewater
  - Waste Recycling & Minimization
- v. To promote RIPECAP approach to other Arab countries from ROWA's region (ROWA is UNEP's Regional Office for West Asia comprising of 12 countries).
- vi. To extend the project duration by one and half years in order to undertake the Capacity Building Program required.

- vii. To conduct a comprehensive "training of trainers" program and to train industry managers and engineers on CP, EE and best available industrial techniques (BAT)
- viii. To create a network of experts in the recipient countries, to carry the RIPECAP knowledge and experience further.
- ix. To update and undertake all kind of improvements in RIPECAP website

### 3.2. Planned Activities

Accordingly, the main activities of the Extension Period concentrated on Capacity Building of the staff who will manage and operate the Implementation Phase (Phase III) of the Project. The CB Program was based on Training of Trainers (ToT) in Three Regional Seminars, thus creating comprehensive network of trained personnel in the three countries. The training topics are divided into six Modules. It was planned to cover two modules in each Seminar. The Modules were grouped in such a way that for each two Modules the Trainees have as much as possible relevant background and interest. The contents of the modules are given in RIPECAP site ([www.ripecap.net](http://www.ripecap.net)).

Each of the training Seminars was followed by three National Workshops each in one of RIPECAP Country. The Trainees trained in the Regional Seminars were themselves the Trainers in the National Workshops (NWS), with assistance from International Experts, whenever needed. A Study Tour in Finland was also arranged for the Trainers to visit the Facilities working on or in charge of the subjects discussed in the TOT Seminars and NWS.

The feedback from the participants in the Seminars, National Workshops and Study Tours was encouraging as it was in the range of excellent and very good.

### 4. The Implementation Phase (Phase III)

The Implementation Phase is planned to start as soon as funds become available, sometime in 2012. There will be three main components in the Implementation Phase.

#### 5. Industrial Energy Assessments and Auditing

The purpose of this component is raising funds to undertake Energy Auditing (EA) for selected Projects identified in the Preparatory Phase of RIPECAP in the three countries. These projects are selected in a way that EA could be used as demonstration for other similar industries and an introduction to CP, EE and SHIP (Solar Heat for Industrial Process). The Leading Agent in this component is UNEP and the Potential Funding Organizations are GEF and Donor Countries.

#### 5.1. Deploy and Demonstrate Small Scale Projects on CP, EE and SHIP Technologies.

The purpose of the component is raising funds to demonstrate modern cleaner technologies on small scale to act as pilot plants for large scale projects and the strategy is deployment, demonstration, and commercialization of CP, EE and SHIP technologies based on the knowledge gained in the Preparatory Phase. The leading agent in this component is also UNEP, and the potential funding organizations are GEF, Donors, AFDB, JICA and WB.

## **5.2. Large Scale Projects identified in the Preparatory Phase of RIPECAP**

The purpose of this component is to launch RIPECAP Projects identified in Preparatory Phase, and the strategy is using the country's own established mechanism for the fund raising, establishing of Supporting Team Focal Points (FPs), UNEP, National Figures, PM. The Leading Agent in this component are the Focal Points and Potential Funding Organizations could be AfDB, AsDB, BADEA, IDB , EIB, KfW , WB and donor countries.

## **6. Conclusion**

This project provides support to Arab Countries in achieving the principles of the Declaration of the Arab Ministries of Environment to promote the use of Cleaner Production (CP), Energy Efficiency (EE) and Renewable Energy (RE). It also opens the door for projects which reduce GHG emissions. This is being done through assisting Industrial Establishments in RIPECAP countries (Egypt, Jordan & Morocco) to improve their environmental performance by providing technical and financial assistance and support.

Key issues are i) collecting reliable information on the situation & needs of industry in Egypt, Jordan & Morocco, ii) Quantifying benefits & applicability of CP, EE & RE, iii) Quantifying the technical and financial needs of each Industrial Establishment to improve its environmental performance and comply with the Environmental Laws, iv) Quantifying other institutional needs of each country to undertake the Implementing Stage of RIPECAP. This Phase was followed by Capacity Building Phase which ended in autumn 2011. The CB phase succeeded in Training of Trainers (ToT) from the three countries who trained after that Industrial Engineers and Managers in Workshops in their countries.

The subjects trained on were REACH, CP, BAT & BREF, CC, EE & RE and finally WWT & SWM. The next planned phase is the Implementation Phase. The total numbers of trained trainers were about 45 and the engineers were about 360.

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