

First Arab Cleaner Production Workshop

April 4 - 6, 2006
Cleaner Production Unit
Royal Scientific Society
Amman - Jordan



Program	Introduction	مقدمة
<p>4 April 2006</p> <p>Opening Ceremony <i>Under the patronage of</i> <i>H.E. Minister of Environment</i></p> <p>Background and objectives of the workshop <i>Prof. Dieter Mutz</i> <i>Dr. Bassam Hayek</i></p> <p>5 April 2006</p> <p>Introducing cleaner production (CP) <i>Dr. Bassam Hayek</i> <i>& Prof Dieter Mutz</i></p> <p>CP methodology <i>Rafat Assi, Mohamad Mosa, Muheydeen Tawalbeh</i></p> <p>Benchmarking <i>Jihan Haddad</i></p> <p>Options generation and evaluation <i>Mohamad Mosa</i></p>	<p>The First Arab Workshop on Cleaner Production (CP) took place at the Royal Scientific Society (RSS) in Amman from 4 to 6 April, 2006.</p> <p>The workshop was officially opened in a ceremony by HE Khaled Irani, Minister of Environment, Dr Khaled Kahhaleh, Vice President of RSS and Mr Werner Dill, Deputy of Ambassador, Swiss Embassy - Amman.</p> <p>The workshop aimed at introducing the concept of CP, CP tools and methodology, the benefits of CP in improving the economic and environmental efficiency of the enterprises. The workshop also aimed at reaching a better understanding of the specific needs of Arab industry towards CP and to set a frame for future work on CP.</p>	<p>عقدت الورشة الإقليمية العربية الأولى في الإنتاج الأنظف في الجمعية العلمية الملكية في عمان خلال الفترة ٤-٦ أبريل ٢٠٠٦ ، حيث قام وزير البيئة بافتتاح الورشة وبحضور نائب رئيس الجمعية ونائب السفير السويسري في عمان.</p> <p>هدفت الورشة إلى تقديم مفهوم الإنتاج الأنظف، أدواته، منهجيته وفوائده في تطوير وتحسين الكفاءة الاقتصادية والبيئية للمؤسسات وكذلك هدفت الورشة إلى الوصول إلى فهم وإدراك أفضل إلى الاحتياجات المحددة في المنطقة في مجال الإنتاج الأنظف وتطبيقه.</p> <p>يتكون هذا التقرير من ستة أجزاء، يقدم الجزء الأول والثاني نبذة عن مفهوم الإنتاج الأنظف وعن مشروع الإنتاج الأنظف في الجمعية وقد ركز الجزء الثالث والرابع والخامس على توضيح مفهوم الإنتاج الأنظف ومنهجية تطبيقه وأدواته، أما الجزء السادس فقد أبرز أهمية التعاون الإقليمي العربي والتواصل في مجال الإنتاج الأنظف.</p>
<p>6 April 2006</p> <p>CP action plan and follow up <i>Rafat Assi</i></p> <p>Introducing CP excellence model <i>Nael Mulki</i></p> <p>Clean development mechanism (CDM) <i>Rafat Assi</i></p> <p>Environmental Economics <i>Karim Zein</i></p> <p>Fostering application of CP in the Middle East & North Africa (Group Work)</p>	<p>This report is composed of six sections. The first and second sections give background about the CP concept and an overview about the CP project at the Royal Scientific Society. The third, fourth and fifth sections focus on the CP methodology in practice and other related tools. The last section addresses Arab cooperation and networking in the field on CP.</p>	

1. Background to cleaner production

The United Nations Environment Programme (UNEP) defines CP as the continuous application of an integrated preventive environmental strategy applied to processes, products, and services in order to increase eco-efficiency and reduce risks to humans and the environment.

- **For production processes:** CP conserves raw materials and energy, eliminates toxic raw materials, and reduces the quantity and toxicity of all emissions and wastes;
- **For products:** CP includes the reduction of negative impacts along the life cycle of a product, from raw material extraction to its ultimate disposal; and
- **For services:** CP incorporates environmental concerns into designing and delivering services.

CP is not simply a question of changing equipment; it is a matter of changing attitudes and behaviour in doing business, applying know-how, and improving production processes as well as the product itself. Under future market conditions, companies will have to deliver competitively priced products, which meet customer satisfaction and are produced in an environmental sound manner. CP helps to protect the environment by reducing pollution and waste at the source. This minimizes the environmental impact, improves production efficiency and reduces costs. CP is a proactive approach, "anticipate and prevent philosophy". Prevention is always better than cure.

2. RSS cleaner production project

In 2004, an agreement was signed between the Governments of Jordan and Switzerland to implement a 3-year cleaner production project in Jordan. A Swiss consortium consisting of the University of Applied Sciences of Northwestern Switzerland (FHNW), Sustainable Business Associates (SBA) and Carbotech was selected by the Secretariat for Economic Affairs (seco) to be the Swiss Reference Centre (SRC) for the project implementation. The Environmental Research Center (ERC) of the Royal Scientific Society (RSS) was appointed the project partner.

The overall objective of the CP project is to contribute towards a sustainable industrial production mode in Jordan increasing the long-term competitive position of enterprises while reducing their environmental pollution by applying cost-effective measures and technologies. Jordan shall thus be also in a better position to benefit in a sustainable manner from a global economy.

As of April 2004, a specialized CP Unit has been established at RSS serving the industrial sector in Jordan by providing training and CP assessment and services with the support of the SRC. A number of assessments has been implemented and positive improvements have been realized at the enterprise level, see www.cp.org.jo.

3. Opening session

H.E. Khaled Irani, Minister of Environment, said that the Environment Ministry is highly appreciating the work being implemented on CP in Jordan. He also thanked the Swiss government for their support to such an important project in Jordan and confirmed that the Ministry would support the creation of a regional center to be based in Jordan. He has also pointed to the new strategy of the Ministry which tackles the environmental issues at the industrial level.



H.E. Mr Werner Dill provided a briefing on the Swiss – Jordan cooperation and presented figures of how better management practices improved specific performances in Switzerland. Mr Dill also pointed to the importance and the success the CP project is making in Jordan.



Background and objectives of the workshop were introduced followed by an overview about RSS-CP project and the undertaken activities during the last two years. The results showing main economic and environmental benefits of implementing CP in 5 Jordanian industries were presented.

Arabian Steel Pipes Manufacturing Co. Ltd.	Environmental benefits	Economic savings		
	Water, materials or energy consumption reduction [Unit/yr]	Savings [JD/yr]	Investment [JD]	Payback [years]
Option 1 – Minimize energy and water losses from degreasing bath By using blower instead of compressed air, installing temperature control device, and using plastic balls to cover the bath surface.	260 m ³ of water/ year 19400 L of diesel/ year 9100 KWh/ year	2920	2550	0.87
Option 2 – Minimize energy consumption of boiler By repairing isolation of the steam pipes and preventing steam leakages from valves and junctions of the boiler.	66 m ³ of water/ year 13100 L of diesel/ year	1860	1160	0.62
Option 3 – Prevent ash formation A new additive material is used to reduce ash formation and energy consumption.	80 ton of ash/ year 1150 L of diesel/ year	18760	13790	0.74
Option 4 – Use of organic passivation material instead of chromium	This organic material has been used to support environmental commitment in the company.			

Modern Aluminum Industries Co.Ltd. (MODAL).	Environmental benefits	Economic savings		
	Water, materials or energy consumption reduction [Unit/yr]	Savings [JD/yr]	Investment [JD]	Payback [years]
Option 1 – Rinsing At Anodizing Line All anodizing rinses shall be done with recycled water (after wastewater treatment unit).	5.5 m ³ of water/hour.	12000	300	0.03
Option 2 – Install a sensor/ temperature controller Install a sensor/ temperature controller for observation and better temperature control of extruded profiles.	Increase productivity at a minimum of 3%. Reduce scrap quantity. Product quality improvement.	16900	4830	0.29
Option 3 – Dripping off into the anodizing baths Optimize the dripping off and drag out from the Aluminum profiles.	Reduce consumption of chemicals and water at a minimum of 3%.	7180	700	0.10
Option 4 – Install inverter Slow down the speed of dust collection fan of the cold saw machine.	Reduce electrical consumption.	1200	800	0.67

The workshop was attended by engineers and professionals from different industrial sectors, environmental consultants, academicians, and governmental and non-governmental officials from several Arab countries including Egypt, Palestine, Syria, Lebanon, Libya, Morocco, Algeria and Tunisia.



4. Cleaner production concept and methodology

The first lecture presented the definition and principles of the cleaner production. It was explained that CP is a proactive approach aiming at minimizing and reducing pollution at source and optimizing natural resources uses which ultimately will improve the eco-efficiency of the enterprises. Step wise approach for applying CP and the benefits were outlined.

A lecture was given to explain the eco-inspector software that is used as a "quick scan" tool to identify wasteful units and processes i.e. potential areas for improvement and saving.

Two lectures about material and energy flow analysis with examples and exercises were presented. Material and energy flow analyses are crucial steps in the cleaner production in plant assessment since they provide the following:

- In-depth understanding about:
 - ✓ Production processes and detailed process steps
 - ✓ Place of material and energy inputs and their consumption
 - ✓ Place of generation of waste and emission and their quantities
 - ✓ Weak points (inefficiencies)
- A basis for the definition of measures for optimization (CP options)
- The basis for assessing improvements of the CP options after implementation

A lecture about benchmarking was then presented. It was illustrated that benchmarking is used as a process for comparing performance among companies of a same industrial sector in order to help identify areas of improvement. Benchmarking figures for some industrial sectors were presented with potential sources of data.

In a separate lecture, CP options generation as well as technical and financial evaluations were explained. This step is usually undertaken after the preparation steps (quick scan, material and energy flow analysis, collection of data). In identifying CP options, the following eight principles are used: good housekeeping, segregation, input material change, process / production change, process control, on site recycling or recovery, production of useful by-product and product modification.

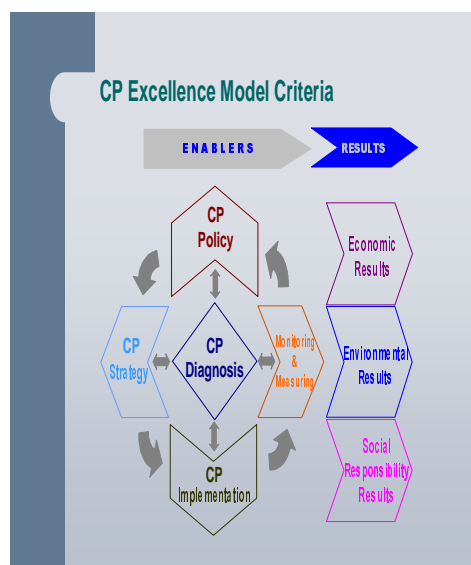
Finally, a lecture was dedicated to explain the implementation and monitoring of CP options. The lecture illustrated that the low or no cost simple options are usually directly implemented. Other options that need considerable resources are prioritized and action and monitoring plans are prepared for their implementation.

5. Tools to enhance the application of CP

Three lectures were dedicated to explain tools and mechanism for enhancing the application of CP. These were:

- CP excellence model and award
- Clean Development Mechanism
- Environmental economics

The first lecture addressed the CP excellence model which was initiated by the CP-Unit. Its objective is to encourage enterprises to adopt cleaner production as an approach for improvement in addition to having a framework to measure their environmental and economic performance. The CP model is inspired from the European Foundation for Quality Management (EFQM) and based on the environmental management system elements and principles and the CP philosophy. CP criteria including enablers and results are explained as depicted in the figure.



The second lecture focused on the clean development mechanism (CDM). It was explained that CDM is one of the three flexibility mechanisms emerged of Kyoto Protocol to lower the overall cost of achieving green house gases (GHG) emission reductions. This mechanism should help developed countries to meet their mandatory limits by financing projects reducing or avoiding GHG emission. Those projects would be undertaken in developing countries and at the meantime should benefit developing countries in achieving their sustainable development plans. The link between CP and CDM was clarified where some CP options such as fuel switch or heat recovery could be considered as CDM projects.

A lecture about environmental economics at micro, meso and macro levels was introduced with examples from Middle East and North Africa (MENA) countries. The methodology to estimate the environmental economic was explained. First, cost of damage and inefficiencies is usually calculated by identifying how much of the value added is lost as a result of inefficient use of raw materials and energy. Second, cost of remediation is calculated by identifying how much it costs to decrease the pollution so that the damage is vanish. Third, the ratio between the damage cost and remediation cost is calculated to show how much damage is avoided in investing in remediation.

6. Fostering application of CP in the Middle East and North Africa

The afternoon session of the second day was devoted to the objective of fostering application of CP in the Middle East and North Africa. For this purpose the participants were divided into three working groups. The three groups focused on three main themes:



- justification for regional networking,
- CP related subjected and / or sectors for the region,
- setting cooperation among institutions in the region.

The workshop ended by a plenary session where the results of each group were presented and discussed. Following are the results and recommendations of the three groups:

Group 1: Justification for regional networking

The networking among the region countries that include Middle East and North Africa could be established (encouraged and fostered) due to fact that these countries share common cultural background (language, communication, etc.), environmental resources and interregional markets.

Justifications for regional networking

- Collaborating and joining efforts and sharing know-how among different stake holders (establish a regional database, etc.)
- Possibility of implementing joint projects
- Better access to neighboring markets
- Integrating and harmonizing the standards, legislations and policies among countries of the region
- Establishing technical and financial incentives (e.g. eco-labeling scheme or CP excellence model and award)
- Minimizing trans-boundary environmental impacts

Group 2: CP related subjects and / or sectors for the region

CP related subjects for the region

- Management of toxic hazardous materials
- Solid waste management
- Liquid waste management
- Energy efficiency
- Water demand management
- Education on CP, occupational health, communication (benchmarking)
- Renewable energy

CP related sectors for the region

- Food (dairy, meat)
- Textile

- Tanning
- Paper
- Mining industries
- Tourism (hospitality)
- Hospitals
- Buildings and construction

Group 3: Setting cooperation among institutions in the region

- Construct Arab network related to cleaner production
- Re-build cooperation links among the institutions of the participating countries for the following:
 - ✓ Information and experience exchange
 - ✓ Follow up the recommendations and results of this workshop
 - ✓ Make further regional workshops and training courses on cleaner production in cooperation with RSS
- Publish the case studies of the Arab countries regarding CP on the web page of CP project, www.cp.org.jo
- Improve cooperation on CP issues among governmental institutions of the participating countries
- Communication between the governmental institutions of the Arab countries related to environmental issues to develop and enforce the legislations regarding CP
- Form a regional committee for consultation about CP technology transfer to the industries (E-consultation)
- Find a mechanism for promoting and providing incentives to the industries in order to implement the CP program, as CP excellence award

As a final word and in concluding the session, few actions were pointed for immediate pursuance, these include:

- ✓ setting a dedicated Arab forum for CP to exchange ideas and case studies;
- ✓ prepare for more work on the regional level through training and CP assessments; and
- ✓ setting a tentative date for the 2nd Arab Regional Workshop at which case studies from Arab institutions will be presented in addition to a specialized training session.

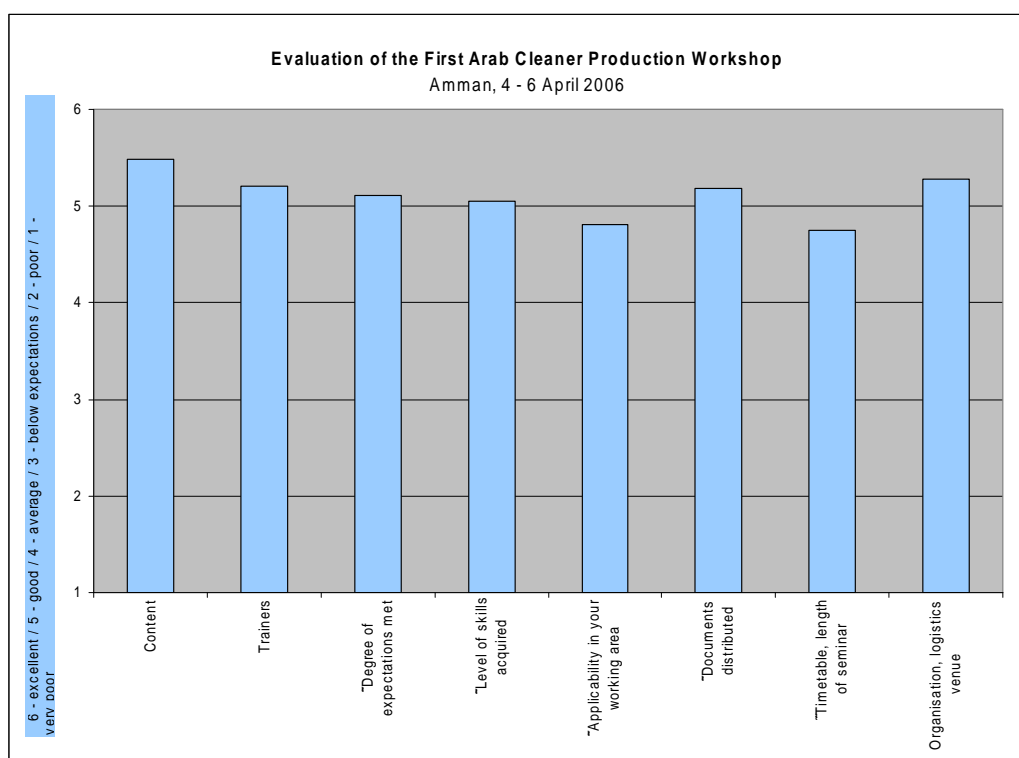
7. Workshop evaluation

During the workshop a good dynamic group was observed. Many questions, comments and ideas were raised from the participants during the lectures. The solutions presented by the participants for the exercises were creative and proactive, thus showing that the participants understood the subjects presented. The figure below shows participants evaluation of the training.

In addition, participants expressed their views concerning many issues such as:

- The contents of the workshop
- Applicability of the workshop contents
- What was good in the workshop
- What could be improved in the next workshop

The feedback is presented in annex (2), the major comments revealed that the workshop was a good one and participants were happy with the performance, participants expressed that future sessions ought to be longer (3-5 days) with more exercises and case studies.



ANNEX 1

List of Participants

A. International Participants, Middle East North Africa (MENA)

<i>Name</i>	<i>Company /Organization/ Country</i>	<i>email</i>
1. Samar Khalil	Ministry of Environment /UNDP Lebanon	s.khalil@moe.gov.lb
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7. Rouida Nahar	General Commission for environmental affairs Syria	Nahar@ses-Net.org rouidanahar@netscape.net
8. Maher Al Jabari	Hebron University Palestine	maherj@hebron.edu
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17. Anwer Almontaser	Environment Group Association Libya	anwar62@yahoo.com

B. Participants from Jordan

<i>Name</i>	<i>Company / Organization</i>	<i>email</i>
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26. Georgina Talhami	King Hussein Cancer Centre	gtalhsmi@yahoo.com
27. Ibrahim Malkawi	Water Authority of Jordan (WAJ)	

<i>Name</i>	<i>Company /Organization</i>	<i>email</i>
28. Samir Abu Tarbuh	<i>Household and Toiletries Manufacturer Company - Sukhtian</i>	ipm@sukhtion-htm.com
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31. Waleed Al- Zoubi	<i>Zarka Chamber of Industry</i>	info@zci.org.jo
32. Bashar A. Dhiyab	<i>RSS / Mechanical Design and Technology Centre (MDTC)</i>	b_dhiyab@maktoub.com
44. Yazan Zawahreh	<i>RSS / (MDTC)</i>	yazanzh@rss.gov.jo

In addition to a large group of senior level management who attended the opening session.

ANNEX 2

Comments given by participants

What was good in the workshop

The trainers experience is good
Tools (Quick Scan), Benefits for enterprises, All exercises, Environmental Economics
To share experience and knowledge with other Arab people is a highly appreciated efforts
All ideas and subjects are very important but not applicable without the software
The presenters capabilities, the regional participation
Organization, sharing expertise among participants, contents and finally the hospitality of the organizer. A big thank
Organization, Diversity of participants, Topics, Having local trainers, Hospitality
Regional contribution, Willing to work in CP in all countries
Organization
Content, organization
Increase the case studies
Introducing the CP-concept, show case study, explore sources of information, meet colleagues from different countries and different background, well done workshop-good work. Thanks to RSS & CP-Unit
The subjects of training are beneficial & very important to implement. The organization of the workshop & the organization team
It was very important to communicate with other specialized people from different countries. To focus on the CP as important topic. To deal with in different sectors. The cooperation.
The good experience of participants and trainers, the friendly atmosphere between all the participants, the scientific (academic) presentations
Ideas and how to do steps for CP
Everything was good, especially the moderation team, and I hope that you keep in touch with us
Interaction with different stakeholders, exchange of know-how

Each working sheet introduced by the trainer, Very good trainers and good experience, IT support, participation with Swiss fund
Having participants from different countries and the training was conducted by different presenters which was non-boring, having good number of exercises. Timing was also fine except for some presentations
Being exposed to an executable model i.e. CP-Unit, Noticing that CP is based on profit-concept not just eco-issue, creating opportunity for networking, providing opportunity for future activities
Exercise
A good module for CP can be followed with some expert help in future
Introduction of environment economics
Organization, Material, Method, Trainers, Spirit (team work)
Contents, presentations, hospitality
Communication between the participants, New systems applied, Applying new methodology (CP)
Everything is good
CP concepts, CDM, Study Cases were clear
Everything was good
To show to the participants the benefit of using cleaner production from the economical and the environmental way in their countries
Training manner. The subject of training course. The final recommendations
Comprehensive topics are tackled, Hot issues are presented, Good Jordanian hospitality
For me it is the first time understanding the way of thinking how to use the (CP) in my field
طريقة طرح جديدة للاستفادة القصوى من المواد الداخلة في الإنتاج وطريقة تفكيرية للتخلص و الاستفادة من مخرجات الصناعة
تقديم مادة هامة تعود بالفائدة على المواطن و المستهلك وصاحب العمل
حسن الضيافة
روح المحبة والتعاون والتكالب على معرفة الحقائق والإجابة على الاستفسارات المطروحة، شكرا للجهد المبذول من أعضاء الجمعية العلمية الملكية

What could be improved during next workshop

More case studies and practical training to be presented
The documents distributed have to be more clear and readable
Make site visits and more practical technical knowledge
More practical exercises, Adhering to the schedule
Seminar extended for 3 or 4 days, have more application on real case studies, meeting around tables and not in a conference room
The venue, More time to discuss practical case studies, More time for group work, Visit to industries applying CP concepts
Practical concern on regional projects, More training (advanced) in CP materials
Case studies in every country
A real case study that is followed step by step in details with respect to CP Methodology
Find applied training
Make it longer 3-5 days, field visit, bring factory that applied CP concept and what benefits they gain
Another workshop with more courses from different countries, Extend the time (duration of the training)
The period, The technical and practical side
Next trainings give some case studies for local industries in each country
The timing (schedule) of sessions, more group workshops & exercises. The workshop was quite useful & organized, Thanks for your effort & hope to cooperate in the future
Success story, Some movie documentary (short) from factories or station or any plant implemented of CP
Some of the presentations need more time may be more couple of hours be added 15 hr training (change to 18 hrs)
More practical cases especially our field the Pharmaceutical Industry
May be / one day longer, plan an activity to provide visitors from other Arab countries to visit other cities

Need more case studies
More time, more case studies
Detailed examples of case studies
Timing, smaller groups, hands on case studies, Quick Scan example with site-visit to a factory or institution
Round table is preferable, time should be more at least 5 days
Site visit to one of the study cases
More study cases, Should be 3-4 days workshop, More study material and handouts
To talk a little bit more in detail and to take longer time about the CP benefits in whole Arab region
Enforce the current recommendations, improve a special web site for regional data base, Make a presentation for real CP Experience in the area
Cover the water sector in details, In case you have some models, what about running such models, The material of training may be copied on a CD as well as the Web, To invite participants from other Arabian countries (Arabian Gulf area)
Everything was good
تحسين ونشر الوعي البيئي في صناعة التعدين، عن طريق ورش العمل والدورات التدريبية بالإضافة إلى الزيارات المختلفة للصناعة المحلية لطرح موضوع الإنتاج الأنظف