



## Annual Report

2012

**“Promoting the adaptation and adoption of RECP (Resource efficient and cleaner production) through the establishment and operation of a Cleaner production Centre (CPC) in Ukraine”**

### UNIDO PROJECT NUMBERS:

UE/UKR/11/001

UE/UKR/11/002

### FUNDED BY:



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Confederation



The Republic of Austria

GOVERNMENT OF SWITZERLAND,  
GOVERNMENT OF THE REPUBLIC OF AUSTRIA

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## List of abbreviations

<b>CPC</b>	<b>Cleaner Production Centre</b>
<b>CP</b>	<b>Cleaner Production</b>
<b>ChL</b>	<b>Chemical Leasing</b>
<b>IE</b>	<b>International Expert</b>
<b>IPA</b>	<b>In-plant assessments</b>
<b>ISO</b>	<b>International Organization for Standardization</b>
<b>NE</b>	<b>National Expert</b>
<b>NEFCO</b>	<b>Nordic Environment Finance Corporation</b>
<b>NTUU “KPI”</b>	<b>National Technical University of Ukraine “Kiev Polytechnic Institute”</b>
<b>RECP</b>	<b>Resource Efficient and Cleaner Production Programme</b>
<b>RECPC</b>	<b>Resource Efficient and Cleaner Production Centre</b>
<b>SAEE&amp;EM</b>	<b>State Agency of Energy Efficiency and Energy Management</b>
<b>SECO</b>	<b>The State Secretariat for Economic Affairs (SECO) is part of the Swiss Federal Department of Economic Affairs</b>
<b>SRC</b>	<b>Swiss Reference Centre</b>
<b>UAH</b>	<b>Code of Ukrainian currency (Hrivna) according to ISO 4217</b>
<b>ULIE</b>	<b>Ukrainian League of Industrialists and Entrepreneurs</b>
<b>UNDP</b>	<b>United Nations Development Programme</b>
<b>UNEP</b>	<b>United Nations Environment Programme</b>
<b>UNIDO</b>	<b>United Nations Industrial Development Organization</b>

## Summary

In the framework of the global Cleaner Production Programme, the United Nations Industrial Development Organization (UNIDO) together with the Ministry of Economic Development and Trade of Ukraine initiated the National Cleaner Production Programme in Ukraine for improving the competitiveness and environmental performance of the industrial sector and promoting sustained social advance in a way compatible with environmental protection.

The Programme was established in 2007 at the National Technical University of Ukraine - Kiev Polytechnic Institute (NTUU KPI). The Ukrainian Cleaner Production Centre (CPC) was established in June 2009. It is hosted by the NTUU KPI and located at its premises.

November 28, 2011 the project 'Promoting the adaptation and adoption of RECP (Resource Efficient and Cleaner Production) through the establishment and operation of a Cleaner Production Centre (CPC) in Ukraine' was officially signed by UNIDO and the Government of Switzerland. This project started in the second half of 2012 and the level of its operations has increased significantly.

During the first half of 2012, the CPC performed the following preparatory activities such as:

- company monitoring process;
- raised awareness and information dissemination;
- established contacts with national stakeholders;
- selected potential national experts (NE);
- revised of CP&ChL toolkit materials; companies selection in target sectors and regions, etc.

In the second half of 2012 the CPC staff:

- carried out 12 training workshops (WS) for potential NE in three target regions (6 WS in Kiev, 4 WS in Vinnitsia and 2 WS in Zaporizhzhya);
- selected potential NE in regions (6 in Vinnitsja, 16 in Zaporozhje) and created the NE database (about 50 people);
- initiated CP projects in 19 companies (11 companies in Kiev region, 6 – in Vinnitsia, 2-in Zaporizhzhya);
- organized several rounds of brainstorming and discussions related to development of the Centre business strategy (please see annex 5);
- developed the legal entity of the Centre and prepared Centre's Statute;
- selected the regional coordinator in Vinnitsa and Kiev
- organized Stakeholder Coordination and Steering Committee meetings together with UNIDO and the Ministry of Economic Development and Trade of Ukraine (January 12th; October 11th); The regulations of the Steering Committee were approved by the Ministry of Economic Development and Trade of Ukraine;
- selected the new name of the CP Centre as "Resource Efficient and Cleaner Production Centre" (RECPC), developed its new logo;
- Centre's office space is occupied, organized a purchase for the office equipment and special equipment for in-plant measurement
- recruited new office staff (3 persons: PR and Information Manager, Coordinator on RECP in Kiev Region, ChL Coordinator);

- worked on informational materials to promote the Centre's activities (3 articles on RECP, 1 article on ChL);
- established new contacts with national stakeholders and company representatives (State Agency of Energy Efficiency, 2 Universities in Zaporozhje, 2 Universities in Crimea, international institutions: GIZ - The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Swiss Reference Centre (SRC)).

In addition to the above, the RECPC of Ukraine has participated in the Global UNIDO Chemical Leasing (ChL) project. During 2012 two training sessions for national ChL experts were organized, ChL project work was continued (3 projects); one case study in agricultural sector was prepared (the case received the UNIDO certificate during the Global ChL Award in Germany); preparation of the database of producers, distributors and users of chemicals was initiated.

In Attachment A the details on the "Timeline of the Activities" of the Project Document are presented.

Following UNIDO recommendations, three regions were targeted for CP project: Kyiv, Vinnytsia and Zaporizhzhya regions.

Target sectors are represented by:

- Chemical
- Agro-processing
- Metallurgical
- Metal processing

#### **The CPC team members during 2012:**

- 1) Mr. Igor Shylovych - Ph.D., Acting Director of the CPC
- 2) Mr. Valeriy Pavshuk - Ph.D., Deputy Director National
- 3) Ms. Irina Fedorchuk - Master of Ch. Engineering, ChL Coordinator (left the centre due to the family reasons in September 2012)
- 4) Mr. Alexander Uzunov – Dr.Tech.Sci., ChL Coordinator
- 5) Mr. Alexey Tchaykovsky – Ph.D., Coordinator on RECP in Kiev Region
- 6) Mrs. Olena Rudenko – Dipl.Eng., PR and Information Manager
- 7) Valery Redchik - Dipl. Eng., Coordinator on RECP in Vinnitsja Region
- 8) Andrey Khraban – Director of the RECPC (during 4 months)

## Background

The Cleaner Production Centre started in 2007 within the framework of the UNIDO program of National Cleaner Production Centers.

2007-2010 CPC activities were supported by the government of the Republic of Slovenia through UNIDO as executing agency. The Centre is hosted by the NTUU KPI and located at its premises. Results of this period are reflected in the Table 1 and Table 2 (Annex 1).

During the past five years (2007-2011), existing RECPC implemented the CP pilot projects based on UNIDO CP Programme in different companies from different sectors and regions.

The CP Programme was split into two major implementation cycles:

- Cycle 1: the period from 2007 until the end of 2008;
- Cycle II: the period from 2009 until the end of 2010.

### Overview of the achieved results during Cycle I (2007-2008)

Location	Kyiv region
Sectors	<ul style="list-style-type: none"> <li>- Food processing</li> <li>- Construction materials</li> <li>- Metal processing</li> <li>- Agro processing</li> </ul>
Companies involved	<ul style="list-style-type: none"> <li>- Agronomic Research Station, National University of Life and Environmental Sciences of Ukraine</li> <li>- JSV Kiev Glass Container Plant</li> <li>- State Enterprise Darnitsa Railway Carriage Repair</li> <li>- Joint Venture Ukrinterm</li> <li>- KMP Magistral JSC</li> <li>- OJSC Wimm-Bill-Dann Ukraine (Kyiv dairy plant no.3)</li> <li>- State Enterprise VO "KyivPrylad"</li> </ul>
Trained in CP	- 13 experts
Completed IPAs	- 7
Achieved results (savings and benefits)	Annual savings, euro: ~ 250,000 per year Necessary investments, euro: ~ 70,000; Reducing CO2 emissions: ~ 2000 tons/year

### Overview of the achieved results during Cycle II (2009-2010)

Location	Vinnytsia	Zaporizhyya
Sectors	<ul style="list-style-type: none"> <li>- Food processing</li> <li>- Construction materials</li> <li>- Metal processing</li> </ul>	<ul style="list-style-type: none"> <li>- Metallurgic</li> <li>- Construction materials</li> <li>- Metal processing</li> </ul>
Companies involved	<ul style="list-style-type: none"> <li>- 'Mario' production enterprise (stainless steel radiators)</li> <li>- Vinnytsia Grain Mill Factory</li> <li>- Gaisyn Dairy Ltd.</li> <li>- LLC Decor Concrete (artificial stones, exposed concrete)</li> <li>- Gaisyn Sugar Mill</li> <li>- LLC Podillya reinforced concrete</li> </ul>	<ul style="list-style-type: none"> <li>- BIAS JSC</li> <li>- Zaporizhyya Ferroalloy plant JSC</li> <li>- Kran Ltd.</li> <li>- Public corporation Steel-Rolling Plant</li> </ul>
Trained in CP	- 10 experts	- 9 experts

Completed IPAs	- 6	- 4
Achieved results (savings and benefits)	Annual savings, euro: ~ 8,4 mio; Reduction of electricity consumption: 1373 MWh; Reduction of water consumption: 91200 m3; Reduction of natural gas consumption: ~ 15,4 mio m3; Reducing CO2 emissions: 24259 tons	Annual savings, euro: 723940; Reduction of electricity consumption: 1007 MWh; Reduction of water consumption: 1800 m3 Reduction of natural gas consumption: ~ 1,5 mio m3 Reducing CO2 emissions: 10145 tons

Overview of the achieved results shows that pilot projects have been successfully implemented in Kiev, Vinnytsia and Zaporizhya regions. After the first round of CP Assessments participated companies in all regions have achieved very positive results. Overall results of the project are outlined below:

Annual savings, euro:	more than 9 mln
Necessary investments, euro:	more than 30 mln
Reducing CO2 emissions tons/year:	more than 36,000

A list of needed investments was developed for companies. The biggest investment is needed for Gajsin Sugar Plant: biogas plant implementation is estimated as 28 mio Euro of investments.

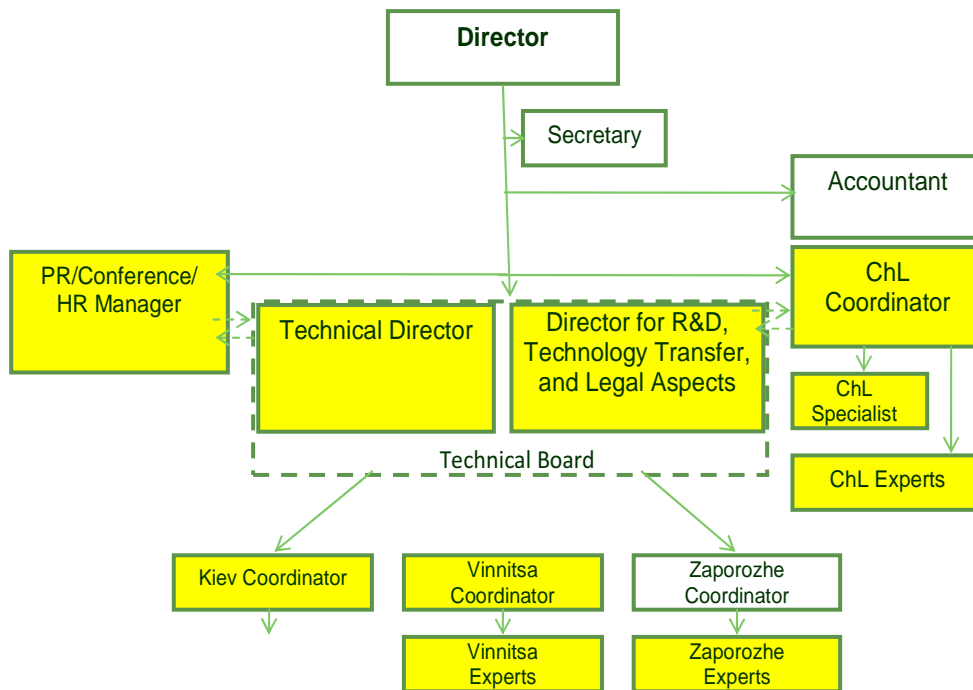
During 2011, RECPC staff and team of trained NEs visited all companies in Vinnitsia, and Zaporizhya with the main purpose of monitoring achieved results after implementation of recommended technical decisions. The monitoring process showed that companies implemented a lot of recommended options and already achieved app. 10% of planned savings during the half a year after the finalization of the project (total savings from all companies was around 707,200 €; investments 860,120 €; reduced CO2 emissions by 47,945 tons).

### ***Achieved results in 2011:***

- RECPC team had 13 company visits in Vinnitsia, Zaporizhya and Kiev regions;
- Monitoring Report of participating companies was completed;
- Meetings with potential host organizations were held in Vinnitsia and Zaporizhya;
- The criteria for CP experts selection was elaborated by the CPC team and some CVs of potential experts were collected for the database;
- Previous materials for CP training were revised and elaborated in the structure of a training course;
- Information letters were prepared and sent for participating companies.

## The RECP Centre organization and management in 2012

The organizational structure of the RECPC staff in 2012 is presented below:



In 2012 one of the main topics related to the organization and management of the Centre was to strengthen the managerial capacities.

UNIDO in cooperation with RECP Centre and SC members organized a recruiting process of the Director. As result of this recruiting process Mr. Khraban was selected for this post but his 4 month probation contract was not extended due to unsatisfactory overall results. Mr. Shilovich, who was the Technical Director of the Centre in this time, was nominated as an Acting Director and from October 2012 until the end of the year, he was leading the Centre.



In addition to the Director recruitment, the project had following management priorities:

### 1) Staffing of the Centre

- ✓ New team members
- ✓ New functional areas
- ✓ Distribution of work
- ✓ Institutionalization and formalization of working relations (regular team meetings,



- reporting, schedules, etc)  
✓ Team building and coaching

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*“The team members should share the common values and understand the nature of the project”*

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## **2) Selection and work with the junior experts in target regions**

*“Young and talented are the future of the project. They should learn from more experienced colleagues and while learning by doing adopt the RECP mind set. The Centre should motivate them and coach”*

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## **3) Relationships with companies established**

- ✓ Careful selection of new companies. Individual approach to every client. Creating good reputation, credibility, and trust.

*“References and recommendations should become the solid fundament for our business success”.*

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## **4) Partnerships enhanced**

- ✓ Enhancing cooperation with the League of Industrialists and Entrepreneurs (ULIE) in Regions  
✓ Negotiations with the financial organizations, and first agreements (NEFCO and IFC)  
✓ Enhancing relations with the Universities in regions

*“We see that critical factor of success in such a challenging project as ours is to build the relationships and networks, based on mutual understanding, common interest, and trust”.*

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## **5) Business planning initiated**

- ✓ Brain storming in August/September and in November (2 employees of NCPC visited GIZ capacity building workshop in Berlin)

*“We should know who we are, where we are, what are we going to, in order to communicate efficiently with our partners and clients.”*

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## **6) Knowledge management initiated**

- ✓ Collection of the initial information for databases (companies, clients)  
✓ Monitoring  
✓ Regular meetings and minutes  
✓ Systematization of documentation

*“Knowledge creates understanding and increases productivity of work”.*

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## **7) Legal status developed**

- ✓ Development of the statute, internal approval by all founders  
✓

*“The organization needs an appropriate legal status to ensure its sustainability in the future, as well as transparency and flexibility”.*

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## Information dissemination and awareness raising

The RECPC continues to organize awareness raising activities on RECP and ChL (e.g. information seminars) and to promote the dissemination of the CP concept.

**On March 1, 2012**, the RECPC together with the Vinnitsia Regional Administration organized an information seminar for company representatives. The seminar took place at the Department of Economy. Mr. Valeriy Pavshuk and Ms. Irina Fedorchuk gave presentations about the activities of the Centre and explained main concepts of CP&ChL. Fifteen company representatives attended this informational seminar. As a result of the seminar, 5 company visits and meetings with top management were organized.

Another awareness raising seminar was organized on **October 7, 2012** at Vinnitsia Regional Administration. The main topic was “Green Economic Grows”. It consisted of 2 parts and had a positive feedback from participants. The second part took place at the same premises on November 7, 2012. Mr. Valeriy Pavshuk, Mr. Irog Shilovych, Mr. Alexandr Uzunov gave their presentations. Seminar was attended by 69 people. Main topics of the agenda were:

- RECP UNIDO&UNEP concept;
- Presentation on RECP Centre, its goals and activities;
- Presentation of ChL concept;
- Presentation of ChL case study in agricultural sector (2 speakers from Enzym company shared their experience).

As a result of seminar and discussion round, participants agreed to develop a joint CP strategy for Vinnitsia region; to organize specific trainings for Regional Administration staff.



*Participants during the seminar*

A number of meetings were conducted with management of Zaporizhya National University.

Awareness raising seminar for representatives of Companies and Candidates for National Experts from University was organized on **April 19, 2012** by Prorektor Volkov V.P. (Prorektor of Science and Pedagogical Activity).



*An awareness seminar in Zaporizhja National University for representatives of Companies and experts.*

Mr. Igor Shilovych participated in the regional conference ‘Investment Policy in Crimea 2012’ organized by the Crimea Ministry of Economy **on October 17, 2012** in Simferopol. Other participants were from different Crimea universities. Mr. Igor Shilovych gave a presentation on the behalf of the RECPC and discussed the potential of CP activities in Crimea region. Some participants expressed their interest to participate in CP projects there.

Another awareness raising seminar in Tavria National University (Crimea, Simferopol) was organized on **December 18, 2012**. Presentation on introduction into CP concept was performed by I.Shilovych



*Participants during the conference “Investment Policy in Crimea 2012”*

On November 6, 2012 Mr. Alexandr Uzunov gave a presentation on the behalf of the RECPC and discussed the potential of CP&ChL activities in the Vinnitsia National Agrarian Academy.

Besides the organization of the awareness raising seminars, RECPC staff have contacted about 50 companies (in three regions) via mail and phone and visited about 35 of them. As a result, 19 companies got involved in the RECP&ChL project. A number of meetings was organized with Regional Administrations, regional branches of ULIE and Chambers of Commerce, institutions and academies, financial organizations (NEFCO, IFC), banks, etc.

## Partnerships

### *Partner institutions*

#### Ministry of Economic Development and Trade of Ukraine

Ministry of Economic Development and Trade of Ukraine is a Government Coordinating agency of the Project.

In 2012 Ministry of Economic Development provides an efficient support of RECP establishment and development.

Ministry provided such a main steps in RECPC establishment:

- start up meeting of the Project in Ministry (Round Table) with stakeholders (January);
- elaboration references of Ministry to ensure the Ministry governance of the Project;
- establishment of the Steering Committee Board;
- organization of Steering Committee start up meeting (October);
- organization an information support on RECPC activity in regions;
- coordination and governance support in RECPC relationships and communications.

#### ULIE

Ukrainian League of Industrialists and Entrepreneurs (ULIE) is one of the founders of the legal entity of RECPC. Numbers of meetings were conducted with Deputies of President of ULIE focused on establishment of the CPC as a legal entity.

ULIE representatives participated in the most important events with UNIDO and stakeholders of the CP Project.

- 1) Round table in Ministry of Economic Development and Trading of Ukraine (January 12, 2012). Minutes of the meeting is in Attachment 1.
- 2) Steering Committee first meeting (October 11, 2012). Minutes of Meeting is in Attachment 2.

The RECPC organized several meetings with ULIE representatives during the period of reference. As a result, ULIE is one of the main Centre's partner. During the year ULIE provided its premises and facilities in Vinnitsia and Zaporizhya for NEs trainings. ULIE lawyers took an active part during the elaboration of the legal status of the RECPC.

Meetings were focused on establishment cooperation with Companies which are partners of ULIE.

#### Steps of cooperation:

- meetings with vice-presidents of ULIE: Ternjuk M.E. (responsible for cooperation with metallurgical sector); A.Blavdzievich (responsible for energy saving programmes in ULIE);
- information dissemination and invitation on cooperation for companies in Zaporozhe and Vinnitsja regions are accomplishing by the central ULIE office;

#### Necessary improvements:

- more information and PR materials development and delivery;
- to stress a monitoring of the communications with companies;

- establishment of the links with companies by using ULIE capability.

#### How to achieve:

- IPA activity enchantment by advanced technical analysis (20 participants of the project);
- information materials with benchmarks and cases description development (at least 1 case per company);
- information dissemination, awareness seminars, site visits to companies.

#### **NTUU "KPI"**

NTUU "KPI" is a Host country counterpart and is one of the founders of RECPC legal entity. RECPC is located at the premises of NTUU "KPI" and uses University's infrastructure. A number of activities are supported by NTUU "KPI" authorities.

During 2012 such kinds of activities were supported by University:

- administrative support (organization a number of meetings with representatives of UNIDO, international and national institutions);
- participation in events on international and national level (preparing jointly materials for presentations on international and national level);
- RECPC participation in events organized by University for industry and business representatives (awareness seminars, meetings etc.)
- provision of infrastructure capacities (communications, conference halls etc.)

In 2012 RECPC used a NTUU "KPI" account Department to provide payment for some services.

RECPC uses a NTUU "KPI" hosting to enhance a validity of information dissemination

#### **Swiss Agency for Development and Cooperation**

In 2012 Swiss Agency for Development and Cooperation provides a support for RECPC establishment and development.

Swiss Agency for Development and Cooperation provided:

- an information on SECO running projects in Ukraine;
- establishment links with Organic Certification Center in Ukraine to enhance a business area of RECPC;
- participation in Annual meeting of SECO Projects representatives in Ukraine (December);
- support in communication with Swiss representatives (September training with Swiss interns)

#### **SAEE**

Cooperation with State Agency of Energy Efficiency (SAEE) started in December of 2012. Meetings were organized with press service of the Agency. A Memorandum of cooperation with Agency was developed. Signing of the Memorandum is in progress.

Memorandum includes a following cooperation:

- participation in SAEE events (conferences, round tables etc.);
- information exchange concerning potential energy saving projects and programs.

## *Financial institutions*

### NEFCO

This year a close cooperation was established with NEFCO. Promgaztechnology Ltd Company is one of participants of CP project in Kiev region started with an application of official requirement of the investments to NEFCO.

RECPC staff is keeping communications with NEFCO representatives. During a couple of months in 2012 RECPC experts developed options at Promgaztechnology Ltd in close cooperation with authorities of the Company. Options development and preparation of application documents for investments were supervised by RECPC deputy director. Requirements documents for application were developed by joint efforts of Promgaztechnology Ltd authorities (director, financial manager) and RECPC representatives. Application was submitted for NEFCO on the subject of investment. In advance of CP options development at the Company level was proposed to reduce a flaming gases consumption at the shop of metal cutting by replacement existing plant for metal cutting on modern laser cutter. Using a new equipment provides an enhancement of cutting accuracy. It also provides a more thinning metal sheets apply. Both options result a material and energy sources reducing.

#### History of submission:

- number of preliminary assessments and financial estimations;
- preparation of financial reports from the company side;
- application documents development in the line of financial institution requirements;

#### Problems of the submission:

- necessity of the company strong striving for investments;
- company director clear management on financial reports preparing;
- lack of experience how to prepare the understandable for financial institution application;
- long period of negotiations (both participants are responsible: Company and NEFCO);

#### How to improve:

- documents for submission should be preparing by CP experts after IPA and CP options development to make this process short;
- include in the CP experts training course an example how to prepare application for investments;

### IFC

Number of meetings had place in 2012 with IFC representatives at CPC office as well as at IFC. UNIDO prepared an official cooperation agreement with IFC.

In the frame of the current activity and previous project a list of potential borrowers is developed (ANNEX B).

Cooperation RECPC with IFC is starting now.

#### Benefits of cooperation with IFC:

- relationships with companies could be easier established;
- simple access for technical and another information related to company's activity;
- RECPC good image and recommendations in the case of successful accomplishing project.

Problems of cooperation:

- lack of experience in cooperation with financial institutions;
- banks requirements would be adapted for Ukrainian companies (rate, payback period...);
- size of investments would be acceptable for borrower.

Steps forward:

- IPA advanced development for a potential borrowers;
- business planning development;
- RECPC activity improvement on development of financial part of CP options;
- advanced training for companies and CP experts on investments benefits for borrower.

## ***Universities***

### ***Zaporizhzhya National University (ZNU)***

Zaporizhzhya National University is nationally accredited the highest 4th level and is among the most renowned leading universities in Ukraine The University body is made of 17 faculties and 59 departments. It incorporates Foreign Languages Intensive Study Center, Department of graduate education and extended educational services, Business Education Center.

The ultimate goal lies in providing high-quality education after 31 specializations.

With over 600 teaching staff, among them 72 professors and doctors, 343 associate professors and PhDs. University is strong in teaching and research work.

At present over 14.000 full-time and part-time students study in ZNU.

It was established a links with Department of Economy taking into account Departments knowledge on Companies in region.

### ***Zaporizhzhya National Technical University (ZNTU)***

ZNTU keeps a leadership as a technical university in the region. It incorporates 5 institutions, 11 Departments. There are about 10 000 students and more than 500 teachers.

Research Department of University is focused on science and technical investigations in machine building industry.

At present time links are established with Science Research Department (Pro-rector Vnukov Ju.M.) and Science and Educational Department Pro-rector Yarymbash S.T.).



## Trainings

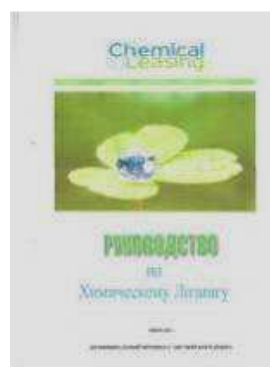
Within the 2012 the RECP-C organized **twelve workshops** for experts and companies in Kiev, Vinnitsia and Zaporizhya regions. Training activities<sup>1</sup> were combined with IPAs activities, so that participants gained practical experience in Cleaner Production Assessments. The total duration of all CP trainings were 24 days of classroom training (12 days – in Kiev, 4 days - in Zaporizhya and 8 - in Vinnitsia) and more than 80 days of practical work in companies.

Lecturers for training sessions were: Mr. Igor Shilovich (CP topics), Mr. Valeriy Pavshuk (CP&ChL topics), Mr. Olexiy Tchaykovsky (CP topics), Mr. Alexandr Uzunov (ChL topics), Ms. Irina Fedorchuk (CP&ChL topics).

In order to increase the efficiency of training the toolkits materials of UNIDO were translated and published for NE's training sessions



*Toolkit on Cleaner Production (Parts 1-4)*



*Toolkit on Chemical Leasing*

### Training features:

- candidates on NE have a quite different level of experience in IPA, knowledge on companies structure, technology processes;
- candidates in NE have a limited experience in measuring equipment application;
- workshops topics follow to the UNIDO Toolkit.

### Problems:

- there is no clear CP service market in Ukraine; NE trainees do not feel the market demand;
- NE trainees have no close and professional links with companies;
- NE trainees do not understand clear advantages of UNIDO certificate;
- NE trainees have not experience in technical measuring and data collection; NE trainees have a uneven skills in collected data proceeding;
- individual trainings with NE to improve their reports take a time.

### Lessons learnt:

- to improve the selection of candidates in NE;
- to enhance the site visits with NE at company level;
- to include in training courses special subjects: balances calculation, measuring technique;
- to develop the award and bonus scheme for the best NE;

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<sup>1</sup> A specific train-the-trainer program has not been started in 2012. But is planned to develop it together with the Swiss Reference Center in April 2013.



- RECPC should charge the best NE on conditions of part-time employment with regular salary; to provide the financial support of NE activity RECPC should purchase RECP services for companies.

Advantages:

- there is no another CP Centers and CP Program except UNIDOs' in Ukraine;
- national market is clear for CP approach implementation;
- there are not another CP experts in Ukraine certified by UNIDO.

### *Kiev region trainings*

**CP coordinator in Kiev region is Mr. Olexiy Tchaykovsky.**

The listed below table shows the schedule of training sessions for NE. All sessions took place at NTUU KPI premises.

Training session	Date	Topic
Awareness and the first training workshop (WS1)	April 20, 2012	Introduction to CP; CP strategy&metodology; UNIDO/UNEP CP program; how to start CP project; team building at company level; pre-assessment approaches and data collection.
Pre-assessment training workshop (WS2)	June 7, 2012	Getting started in an in-plant demonstration unit; list process steps, flow sheets; practical examples of pre-assessment; data collection and measurements; introduction to material and energy flows.
Assessment training workshop + business planning (WS3)	August 30, 2012	Activities at company level; business planning (conducted by M. Grineva)
Energy and material flows analysis (WS4)	September 27, 2012	Energy and material flows; necessary calculations; Sankey diagram; benchmarking system
Junior experts reports on pre-assessments and data collection at the Company level (WS5)	October 25, 2012	First results of pre-assessment at Companies were represented (9 Companies); discussion of problems of data collection; consultations and recommendations on energy and material flows building
Junior experts reports on pre-assessments and IPA(WS6)	December 13, 2012	Revising of presentations regarding the results of pre-assessment and IPA; selection solutions for possible implementation; how to prepare final assessment report; discussion of further steps.

Training sessions were visited by more than 30 potential NEs, but only 18 were selected to work with companies. That's because of lack of involved companies.

The list of potential NEs with their respecting companies is shown below:

#	Name of potential NE	Respecting Companies, Kiev region
1	Dmitrij Belanovsky	State Enterprise "Railway Carriage Repair Works of Darnitsya"
2	Jurii Gaidaenko	Trypillya Cardboard Packing Factory
3	Vira Gaidar	NTUU KPI, hostel No. 15

4	Vladimir Zadvernjuk	Zhazhkov Dairy Plant
5	Evgenii Litvinec	Brovary Concrete Plant
6	Elena Pushna	Dolce Vita Ltd (Cakes and Cookies)
7	Taras Nizhnik	Zhazhkov Dairy Plant
8	Natalia Olinevich	Boguslav Agriculture Machinery Production
9	Ekaterina Petushkova	NTUU KPI, sport-complex No. 24
10	Pavel Poznyakov	Boguslav Textile Factory
11	Ekaterina Pryjmak	Dolce Vita Ltd (Cakes and Cookies)
12	Konstantin Radchenko	Brovary Concrete Plant
13	Alexander Sokolsky	Trypillya Cardboard Packing Factory
14	Elena Shevchenko	NTUU KPI, sport-complex No. 24
15	Marina Shovkaljuk	NTUU KPI, study complex No. 18
16	Taras Chirka	JSC Vetropack Gostomel Glass Factory
17	Alla Zuza	Promgaztechnology Ltd
18	Zahar Maletsky	Ecosoft Ltd



*Potential NEs during training sessions in Kiev, premises of the NTUU KPI*

### ***Vinnitsia region trainings***

**CP coordinator in Vinnytsia region is Mr. Valeriy Redchyk.**

The listed below table shows the schedule of training sessions for NE. All sessions took place at Vinnitsya Technical University premises.

Training session	Date	Topic
Awareness seminar for potential NEs (WS1)	April 18, 2012	Introduction to CP; CP strategy&metodology; UNIDO/UNEP CP program; presentation of experience of previous years
Awareness and first training workshop (WS2)	April 26, 2012	Introduction to CP; CP strategy&metodology; UNIDO/UNEP CP program; how to start CP project; team building at company level; pre-assessment approaches and data collection.
Assessment training workshop (WS3)	August 22, 2012	Getting started in an in-plant demonstration unit; list process steps, flow sheets; practical examples of pre-assessment; data collection and measurements; introduction to material and

		energy flows.
Junior experts reports on pre-assessments and data collection at the Company level (WS4)	November 6, 2012	Energy and material flows; necessary calculations; Sankey diagram; benchmarking system

Training sessions were visited by more than 10 potential NEs, but only 7 were selected to work with companies. That's because of lack of involved companies.

The list of potential NEs with their respecting companies in Vinnitsia region is below:

#	Name of potential NE	Name of respecting company
1.	Bailo Oleksiy	JSC "Mayak" (produces domestic heaters)
2.	Bazalytskyy Vadim	Illincy Sugar mill factory
3.	Dahnovska Olga	Seasonings and Kvas Factory Company (spices, beverages)
4.	Kolos Igor	Bakery Unit (Factory) "Phoenix"
5.	Lebedev Igor	Aggregate Plant (produce parts to pumps, etc)
6.	Rumiantseva Tetiana	Aggregate Plant (produce parts to pumps, etc)
7.	Foliushniak Olena	State Owned Company "Vinnitsatranspribor", Metal Processing



*NEs during the WS2 session in Vinnitsia*

### ***Zaporizhya region trainings***

**CP coordinator in Zaporizhya region is not defined.**

The listed below table shows the schedule of training sessions for NE. All sessions took place at ULIE premises (regional branch).

Training session	Date	Topic
Awareness seminar for potential NEs (WS1)	June 7, 2012	Introduction to CP; CP strategy&metodology; UNIDO/UNEP CP program; presentation of experience of previous years
First training workshop (WS2)	July 18, 2012	Introduction to CP; CP strategy&metodology; UNIDO/UNEP CP program; how to start CP project; team building at company level; pre-assessment approaches and data collection.

Participants submitted their CVs to Kiev RECPC office. The list of potential candidates to NEs is below:

#	Name of potential NE	Organization, position
1.	Elena Barishevskaya	ZSEA, assistant professor, Heat Processes Department
2.	Victoria Rachuba	ZSEA, assistant professor, Heat Processes Department
3.	Irina Ovchinnikova	ZSEA, assistant professor, Heat Processes Department
4.	Nadezda Kislova	Titanium Research Institute, Engineer
5.	Maxim Batashow	Steel Rolling Plant “Zaporozhstal”, Engineer
6.	Anatolij Kononenko	Titanium Research Institute, Chief Specialist
7.	Alexander Yaroshenko	Zaporozhenergo (Energo distribution Company), Engineer
8.	Yurij Yurjev	JSC “Ukrgraphit”, Energy Engineer
9.	Natalja Batashova	German Society for International Cooperation (GIZ), Consultant
10.	Irina Kulish	ZSEA, PhD of Metallurgical Department
11.	Natalja Chernjanskaya	Zaporozhenergo (Energo distribution Company), Engineer
12.	Anton Mnich	ZSEA, Department of Electricity and Electro energy, Assistant Professor
13.	Evgenija Manidina	ZSEA Department of Ecology, Teacher
14.	Lesja Terechova	Private Company, Manager
15.	Victoria Luchanina	ZSEA, Department of Energy Management, Teacher



*Participants during WS1 and WS2 in Zaporizhya*

## In-plant assessments

The objective of the IPAs is to show benefits of Cleaner Production when implemented in Ukrainian regional industries. The IPAs started in April 2012 with eleven companies in Kiev region, 6 in Vinnitsia region and 2 in Zaporizhyya. Companies were selected and got involved into CP projects after undertaking awareness raising seminars, sending official letters, making presentations at company level.

### *Kiev region*

The following companies got involved in the project:

1. State Enterprise “Railway Carriage Repair Works of Darnitsya”
2. NTUU KPI (hostel No. 15, sport-complex No. 24, study complex No. 18)
3. Zhazhkov Dairy Plant
4. Brovary Concrete Plant
5. Dolce Vita Ltd (dough, pastry production and baking cookies)
6. Boguslav Agriculture Machinery Production
7. Boguslav Textile Factory
8. Trypillya Cardboard Packing Factory
9. Promgaztechnology Ltd
10. JSC Vetropack Gostomel Glass Factory
11. Ecosoft Ltd

### Description of companies' main activities



#### **State Enterprise “Railway Carriage Repair Works of Darnitsya”**

This state enterprise was founded in 1935. Since then, it had several renovations; the last one was in 2002. It employs around 1600 workers. The scope of enterprise’s activities” is production, repair and maintenance of railway carriage equipment, etc. Enterprise had already participated in CP programme in 2008.



#### **NTUU KPI (hostel No. 15, sport-complex No. 24, study complex No. 18)**

These university buildings were built in 1970-1980. Sport-complex has 2 swimming pools and employs 347 workers. The study complex has its territory of 36,927 m<sup>2</sup>, 234 teaching and operating staff and around 2500 students. The hostel building No.15 has its capacity of 770 people to live. All of these buildings consume a huge amount of electricity, heat and water.





### **Company “Zhashkov Dairy Plant”**

Location – Zhashkov city (app. 150 kilometers from Kiev). Now it employs 60 workers. Main productions of the company are butter and dry powder milk. The company produces 1,650 tons of dry powder milk and 300 tons of butter per year.



### **Brovary Concrete Plant**

The Company is located in Brovary city (25 kilometers away from Kiev). Now it employs 472 people and has its territory of 400,000 m<sup>2</sup>. The company produces a wide range of concrete products of various size and shape. Annual productivity is 57,700 m<sup>3</sup> of concrete items.



### **Dolce Vita Ltd (dough, pastry production and baking cookies)**

The Company was founded in 2003. It employs 300 workers. The scope of activities is dough, pastry production and baking (cookies, croissants).



### **Boguslav Agriculture Machinery Production**

The Company was founded in 1996. It is located in Boguslav city, Kiev region (100 kilometres from capital). Now it employs 90 people. Main product lines are agriculture machines for spraying fungicides and agriculture equipment for dry fertilizers. Company has its own painting department.



### **Boguslav Textile Factory**

The Company is located in Boguslav city, Kiev region (100 kilometres from capital). Now it employs 189 people. Annual textile production is 697,900 m<sup>2</sup>. During the whole production cycle company consumes a huge amount of paint and chemicals thus may be subject for ChL project.



### **Trypillya Cardboard Packaging Factory**

Location- Ukrainka city (40 kilometers from Kiev). Now it employs 300 workers. Annual production is 70,000,000 m<sup>2</sup> of cardboard packaging. There are a lot of recycled cardboard wastes. CP team at the company counts 6 members.



### **Promgaztechnology Ltd**

It employs 60 workers. Company produces boilers, heat generators (heat capacity up to 2 MW) and natural gas furnaces.



### **JSC Vetropack Gostomel Glass Factory**

The Company is one of the leading manufacturers of packaging glass in Ukraine and a part of Vetropack Holding. It is located in Gostomel City, Kiev region. The annual production is around 164 million units of packaging glass. Company staff is around 700 people.



### **Ecosoft Ltd**

Company is a local producer of water filters for domestic and commercial water usage. It has been operated since 1991, certified according to ISO 9001:2009. Annual production around 340,000 units.

## ***Vinnitsia region***

The following companies got involved in the project:

1. JSC “Mayak” (produces domestic heaters)
2. Illincy Sugar mill factory
3. Seasonings and Kvas Factory Company (spices, beverages)
4. Bakery Unit (Factory) “Phoenix”
5. Aggregate Plant (produce parts to pumps, etc)
6. State Owned Company “Vinnitsatranspribor”, Metal Processing

### **Description of companies’ main activities**



#### **JSC “Mayak” (produce domestic heaters)**

The company is located in Vinnitsia and employs 230 peoples. Average company production capacity is 500,000 units (different types of domestic heaters and radiators). Company has galvanic and painting divisions and has a huge potential for ChL activities.



#### **Illincy Sugar mill factory**

Production at sugar mill plant is organized seasonally. During the pick of the production process, company employs 230 people. Production capacity is 17,686 tons in one shift (2.5 months). During the CP pre-assessment consumed chemical were also analysed.



#### **Seasonings and Kvas Factory Company (spices, beverages)**

The Company is located in Vinnitsia and has been operating since 1999. Its products are distributed to 19 regions of Ukraine. It employs 101 people. The annual production of kvas is 190 thousand tons. Company also participates in ChL project.



#### **Bakery Unit (Factory) “Phoenix”**

It is a small size private bakery. Annual production of bread products is 463,230 kg, confectionary – 1,448 kg.





### **Aggregate Plant (produces parts to pumps, etc.)**

The Company was founded in 1880. Since then, it had several renovations; the last one was in 2008. It has employed around 230 workers. Company produces gear type pumps, pumps' parts, hydraulic cylinders, etc. Company obtained a certificate ISO 9001:20 in 2003.



### **State Owned Company “Vinnitsatranspribor”, Metal Processing**

It is located on 3.2 hectares of land. Company shops were built in 1952 and renovated in 2000. The number of employees is 350. The main products are locking valve devices for carriage cars and containers.

## ***Zaporizhya region***

The following companies got involved in the project:



### **JSC “Ukgraphite”**

The company was founded in 1931. It is a leading Ukrainian manufacturer of graphite electrodes for electric steel furnaces, submerged-arc furnaces and other types of electric furnaces, etc. Annual production is 120,000 tons. The number of employees is 2300.



### **JSC “Zaporizhstal”**

The company was founded in 1931. It produces high-quality metal products, such as pig-iron, steel, sheets of carbon, low-alloy, alloy and stainless steel, cold-rolled formed sections, tinplate, building materials and consumer goods. Annual production is 5.5 mil tons. The number of employees is 5000.

Company is one of the biggest polluter and inefficient energy consumer in Zaporizhya. It is one of the main suppliers of rolled sheets and cold-rolled formed sections for the Ukrainian machine-building industry and tinplate for the food industry.

Each of assigned NEs visited assigned company minimum 5 times for work team build-up, pre-assessment and data collection:

- a) site visits are supported by RECPC: communication with companies to assign the visit; providing with transportation to far located companies;
- b) technical and methodical assistance of the IPA and options development by RECPC experts (previously certified, specialists from University related Departments etc.);
- c) support with measuring equipment.

Meantime, all main production data was successfully collected and pre-assessments carried out at each company. During pre-assessment at each company, a number of CP opportunities were identified. Next step for NEs will be to complete material, energy and water flow diagrams and to work on CP options.

Status of CP projects is outlined in the table below:

Activity	Companies																				
	KIEV													VINNITSIA					ZAPORIZHYA		
	JSC Vetropack Gostomel Glass Factory	JSV Zhaskov Dairy Plant	JSV Concrete Plant of Brovary	Dolce Vita Ltd	Promgaztechnology Ltd	Boguslav Agriculture Machinery Production	Trypillya Cardboard Packing Factory	State Enterprise “Railway Carriage Repair Works of Darnitsya”	Boguslav Textile Factory	ECOSOFT Ltd	NTUU KPI			Seasonings and Kvas Factory	Aggregate Plant	JSC Illinec Sugar Mill Plant	State Owned Company “Vinnitsatranspribor”	Bakery Unit (Factory) “Phoenix”	JSC “Majak”	JSC “Ukgraphite”	JSC “Zaporizhstal”
											Sport Complex, No.24	Hostel No.15	Study complex No.18								
Project start-up (contract signed, CP team built)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pre-assessment compliance status	+	+	+	+	+	+	+	+	+/-	+	+	+	+	+	+	+	+	+/-	+	+/-	-
IPA compliance status	+/-	+/-	+/-	+/-	+/-	+/-	+/-	+/-	-	+/-	+/-	+/-	+/-	+/-	+/-	+	+/-	-	+/-	-	-
Number of company visits	7	3	5	5	8	3	5	4	3	3	5	4	4	6	3	4	4	3	5	6	1

“+” – completed;

“-” – not started;

“+/-” – already started, needs some details, such as data verification, performance calculation; measurements, etc.

Main issues of IPA start are represented in the table below

Highlights of IPA	Issues identify during the IPA	Saving potential
JSV Vetropack	<p>Glass kiln: Natural gas consumption per 1 kg melted glass actually is 0.141 m<sup>3</sup>/kg; heat losses of the kiln are equal to 0.06 m<sup>3</sup>/kg melted glass</p> <p>Sanitary water consumption actually is 24408 m<sup>3</sup>/year; calculation of the target consumption (regarding standard of consumption per person) takes 6153 m<sup>3</sup>/year</p> <p>Considerable contain of the dust in raw materials (up to 20 %); dust is removed by water flushing</p>	<p>Pre-heating of raw materials provides 2..3% of natural gas saving;</p> <p>Controlling devices installation, automatic valves implementation allows to reduce water consumption; potential of saving is about 18000 m<sup>3</sup>/year (in money expression it is ~6000 Euro)</p> <p>Considerably money-losing unit; estimation takes at least 15% of the raw materials cost (closed information).</p>
Zashkow Dairy Plant	<p>High temperature of the outlet hot air behind the drying tower (80...85) °C</p> <p>High water consumption per 1 l of fresh milk (9.3 l of water per 1 l of fresh milk)</p>	<p>Heat potential is ~ 3 MWt (hot air flow rate is ~93 m<sup>3</sup>/sec); it could be utilized by heat exchanger for pre-heating inlet air for drying. Saving potential is equal to ~70000 USD</p> <p>Best practice shows a (1...4) l per 1 l of milk; saving potential is (at least 5,3 l/l); it means that water saving will be ~47000 m<sup>3</sup> (in money expression ~ 14000 Euro)</p>
Brovary Concrete Plant	<p>High cost of water utilization (waste water)</p> <p>High losses of raw materials (clinker)</p>	<p>Big part of this water takes a condensate from the steam treatment chambers. It could be used for concrete mixture preparation. Saving potential is 45 % of consumption; it takes ~4500 Euro</p> <p>Losses is ~ 14 % of incoming raw materials; saving potential takes ~155000 Euro</p>
Promgaztechnology	Old-fashioned equipment and technology for metal sheets cutting (flame cutting) is used	Replacement of old equipment by new one makes it possible to refuse of flaming gases mixture and to reduce a metal cuttings; estimation shows that saving could be ~14000 Euro

Boguslav woolen Comp	<p>Considerable painting agents losses during drying process</p> <p>Obsolete equipment at acids treatment shop</p>	<p>More than 30% of paint agents is lost (~20000 Euro);</p> <p>Acids consumption is not controlled; replacement a new equipment (with pressurized vessels) makes possible to reduce acids losses on ~20 % and to improve an operation conditions; in money expression ~ 6000 Euro/year</p>
Boguslav Agriculture Machinery	<p>Metal losses due to the flame cutting method</p> <p>High liquid gas consumption (cost is about 4 000 Euro/year)</p>	<p>Metal losses is about 9...10 % of incoming metal (~35000 Euro)</p> <p>Replacement new cutting equipment takes the saving ~ 4000 Euro/year)</p>
Dolce Vita	<p>High consumption of diesel</p> <p>High expenditures on package materials (polyethylene film and pasteboard boxes)</p>	<p>More than 42 % of total energy consumption (124600 Euro); GPS implementation provides at least 20...25 % of fuel saving; ~30000 Euro</p> <p>Adjustment of package machine (sizes of cutting parts optimization) takes at least 10...20% of saving or ~18000 Euro</p>
Ecosoft	In progress	
Tripillja Pack Fact	<p>Too high quantity of rejection carton and paper (cuttings, trimmings); rejection carton and paper (cuttings) are about 17 % of incoming carton;</p> <p>High losses of paints and colors</p>	<p>Replacement a regulation shaft provides a uniform movement of carton parts; reducing of cuttings will be ~2 %; in money it will be about 150000 Euro/year</p> <p>Saving potential is about 40 % of incoming paints and colors; in money – 120000 Euro</p>

KPI	<p>At laboratory building and hostel there are the similar problems:</p> <p>a) high sanitary water consumption</p> <p>b) “season” electricity consumption exceeding</p> <p>Input ventilation does not operate sufficiently at the swimming-pool</p>	<p>replacement a new taps and leakages elimination makes it possible to reduce water consumption on (at least) 50% (~ 2000 Euro/year)</p> <p>adjustment the heating system (inlet water temperature, circulation enhancement) allows to reduce electrical heaters in the cold period; saving potential is calculated as 3500...4000 Euro</p> <p>Input ventilation repair makes it possible to reduce a bath water extra-heating on 7...8 % of total heat consumption</p>
Darnitsja Repair Carriage	Out-dated equipment at the hammer and stamp shops; efficiency of pre-heating ovens is very low (not higher than 10...12 %)	Pre-heating process and ovens optimization (heat insulation improvement, time schedule of ovens operation optimization) takes a saving potential at least 40% of natural gas consumption; in money expression ~ 4350 Euro
Illincy sugar Palnt	Pressed organic substance is not used sufficiently	It is possible to get 70000 t (humidity 65%) or 35000 (humidity 23%) of pressed organic substance; this substance would be used as a fuel it could provide about 35 t/h of the steam (35 MWt) which could be used in technology process directly
Seasonings and Kvas Factory Company	<p>Diesel and gasoline considerable consumption</p> <p>Considerable consumption of water; high expenditures per water utilization</p>	<p>Cost of the fuel for cars is 67 % of total expenditures for energy sources; GPS implementation makes it possible to reduce diesel and gasoline consumption</p> <p>Saving potential is ~5600 Euro</p>

Aggregate Plant	<p>Considerable losses of aluminum (waste)</p> <p>Small temperature drop of inlet/outlet cooling water of the ovens cooling system</p>	<p>Materials saving potential is about 30 t; it is equal to ~ 42000 Euro</p> <p>Actual temperature drop between inlet and outlet flows is higher on 10% compare with technical requirements; saving potential is ~ 8...10%</p>
Vinnitsjaprylad	<p>Considerable losses of the discharge cutting coolant (emulsion)</p> <p>Cuttings parts of metal</p>	<p>Replacement of the refreshing equipment takes about 20 t; cost of utilization is ~ 10000 Euro (saving could be 10000 Euro)</p> <p>Waste metal is about of 10 % (100 t);</p>
Bakery Unit "Phoenix"	In-progress	
Majak	<p>Too many cutting parts of metal</p> <p>Technology warm water losses (evaporation)</p>	<p>About 200 t: cutting process optimization</p> <p>Saving potential is about 19% of incoming fresh water; saving potential in money expression ~4860 Euro</p>
Ukrgrafit	<p>High natural gas consumption at the baking process</p> <p>Ecological problems (aromatic hydrocarbons, carbon monoxide high concentration)</p>	<p>Over rate consumption is estimated as at least 7...8% (~1500 USD per 1 technology campaign of the kiln; ~ 41300 USD annually); optimization: ratio of the billets surface charging into the kiln and heat supply surface should not be bigger than 1,1...1,2</p> <p>Measurements show that CO concentration exceeds 7...12 g/m<sup>3</sup> in waste gases. Options: a) burning; b) water sprinkling at high temperature to oxidize CO to CO<sub>2</sub>.</p>

## Chemical Leasing activities

In 2012, Ukrainian Resource Efficiency and Cleaner Production Centre was focused on following activities:

- Promotion of ChL model (dissemination activities);
- Capacity building for national experts;
- Promotion activities: translation of ChL toolkit materials into Russian, updating of a web-site, publishing an article, communication about the project, etc.;
- Site visits in order to identify and select potential Chemical Leasing projects during this period of reference;
- Startup of demonstration projects in the agricultural, agro-processing, metal-processing and glass industries.
- Organization of two national workshops on ChL;
- Organization of national working group meetings;
- Signing of letters of intent with companies;
- Signing of a ChL contract with user and supplier in agricultural sector;
- Screening new directions of the ChL business model application;
- Creation of database of national enterprises-producers of metal goods;
- Awareness ChL raising activities (meeting with Association of Farmers in Vinnytsia region);
- Participation in Global ChL Award;
- Preparation of contract agreements in metal-processing sector;
- Providing analysis and creating a database of potential companies for ChL activities.

### *Summary of status and results of the Chemical Leasing projects*

The Ukrainian Resource Efficiency and Cleaner Production Centre continued to establish contacts with national companies from different sectors in order to promote the Chemical Leasing concept and recruit companies for pilot projects. Therefore, meetings and site visits were organized by CPC staff to identify the potential for the implementation of the Chemical Leasing business model. Furthermore, training workshops for enterprises and national experts were held. The goal was to disseminate the Chemical Leasing business model and to present international success stories for the application of the concept. As a result of above mentioned activities, four ChL cases started.

The following table summarizes the main activities conducted by the Ukrainian CPC in 2012 for the promotion and implementation of the ChL business model in Ukraine:

#### **Summary of activities**

Activities	January - December 2012
Company contacts	46
Company visits	35
Training sessions	2
Presentations on ChL project status and results of the Chemical Leasing projects	6
Signed Letters of intent	7
Ongoing projects	4



## Ongoing projects

### Enzim-Interagroskvyra

«Enzim» Company (supplier) specializes on development and production of enzymatic preparations. Enzim is the biggest biotech company in Ukraine. In 2011, 520 tons of microbiological and enzymatic preparations (19 types) were produced. The company has about 190 employees, and is certified by IMO.

The German-Ukrainian JS Company “Interagroskvyra”, the user of microbiological preparations, is a farming company with 1,200 hectares of land and 45 employees. Company has around 400 hectares under winter grain crops.

Enzim proposed an innovative approach by substituting some of the essential chemical fertilizers by organic preparations. By applying its know-how, the supplier developed and introduced the user with both the new preparations and the plan for their application. In the future, it is expected that the chemicals will be mostly replaced by organic preparations because cultivation of wheat generates considerable amounts of biological residues. The efficiency of the substitution depends not only on the lower quantity and lower cost of the organic preparations, but also on its environment benefits.

The ChL contract was signed in February 2012. It was agreed that the unit of payment is UA hryvnya (UAH) per 1 ha of arable land with application of organic preparations, where 1 ha of arable land includes land under temporary crops with the application of organic preparations as fertilizers as well as fungicides and with the average yield of winter grain crops of 400 kg/ha. The project is ongoing and seems to face no particular problems. Enzim is planning to extend the model to plant protection processes and fertilizer application.

#### Estimated results:

Before ChL	After ChL
In general on its territory (400 ha) covered with winter grain crops company applied 140 tons of chemical fertilizers and around 1,504 litres of chemical fungicides.	Applying a new method of fertilizing and biological fertilizers as well as biological fungicides on the territory of 300 ha, the company reduced on 53% of chemical fertilizers and substituted 75% of chemical fungicides.
<p>In Ukraine around 1,260 m<sup>3</sup> of natural gas needed for production of 1 ton of NH<sub>4</sub>NO<sub>3</sub>.</p> <p>✓ 300 kg of ammonium fertilizers per ha*300 ha = 90 tons</p> <p>90 tons of applied NH<sub>4</sub>NO<sub>3</sub> = 113,400 m<sup>3</sup> of a natural gas. Production of 1 ton of NH<sub>4</sub>NO<sub>3</sub> needs around 120 m<sup>3</sup> of technical cooling water; generates 1.08 m<sup>3</sup> of ammonium condensate and 75 m<sup>3</sup> of demineralise water.</p> <ul style="list-style-type: none"><li>• 106,388 tons of CO<sub>2</sub> emissions produced;</li><li>• 6,848 m<sup>3</sup> of waste water (needs special water treatment);</li></ul>	<p>Production of 1 ton of organic preparation needs 11,938 kWh of electricity; 504 m<sup>3</sup> water.</p> <p>✓ 0.0035 tons*300 ha = 1.05 tons</p> <p>During the production of 1.05 tons of organic microbiological products the following were generated:</p> <ul style="list-style-type: none"><li>• 10,028 tons of CO<sub>2</sub> emissions produced (a 90 % reduced);</li><li>• 529 m<sup>3</sup> of waste water (non toxic needing no special treatment);</li><li>• safe transportation and storage of preparations;</li></ul>

<p>Production of 50 tons of phosphorus fertilizers generates:</p> <ul style="list-style-type: none"> <li>• 210 tons of sulphur concentrate which cannot be recycled;</li> <li>• 30 tons of sulphur sludge;</li> <li>• 271 tons of phosphorus mineral white;</li> <li>• 13 tons of 10% liquid H<sub>2</sub>SiF<sub>6</sub>.</li> </ul>	<p>Production of 0.0015 tons of biological analogue generates:</p> <ul style="list-style-type: none"> <li>• 14 tons of CO<sub>2</sub> emissions produced;</li> <li>• 0.76 tons of waste water (non toxic needing no special treatment);</li> <li>• safe transportation and storage of preparations.</li> </ul>
<p>For the field fertilizing:</p> <ul style="list-style-type: none"> <li>• the spreader device for fertilizer (dry process with granular fertilizers) with this concern a lot of manual operations on the field;</li> </ul>	<p>For the field fertilizing:</p> <ul style="list-style-type: none"> <li>• the spaying machine reduces manual operations (it consumes an extra 90 m<sup>3</sup> of water for dissolving the liquid organic product in water), but the process was atomized; and there are better working conditions in the field;</li> <li>• organic biological preparations have accumulative effect and in future less volume of preparations needed for soils;</li> <li>• a stable long term commercial relationship is developed between user and supplier.</li> </ul>

#### Economic benefits

Before ChL	After ChL
<p>0.3 tons* 300 ha * \$ 421 USD = \$ 37,890 USD (for ammonium fertilizers)</p> <p>0.05 tons*300 ha * \$ 524 USD = \$ 7,860 USD (for phosphorus fertilizers)</p> <p>\$ 94 USD * 300 ha = \$ 28,200 USD (chemical fungicides for seed and plant protection)</p>	<p>The farmer will pay \$ 100 USD per 1 ha of arable land.</p> <p>\$ 100 USD per ha * 300 ha = \$ 30,000 USD</p>
Total: \$ 73,950 USD	Total: \$ 30,000 USD

This case study was awarded with the ChL certificate in Frankfurt, Germany (June, 2012) during the Global ChL Award Ceremony. The certificate confirmed that the case presented by companies was in line with UNIDO ChL requirements.



*Companies “Enzym” and “Interagroskvyra” were awarded with the Chemical Leasing Certificate*

### *The current status of the project*

There were several meetings with both partners. The German-Ukrainian JS Company “Interagroskvyra” also participates in RECP project and works together with trainees on developing a methodology of soils estimation and risk reduction. It is planned a scientific research about estimation of the soil quality.

#### **The results of the first year of collaboration are:**

- signed contract between partners;
- agreed unit of payment and calculations performed for partners;
- estimated results were achieved for both partners after one year of cooperation;
- both partners agreed to continue common cooperation in the frame of ChL&RECP projects;
- presented case study was awarded with a certificate on the Global ChL Award;
- both partners continue to meet on a regular basis also they plan to continue substitution of chemical fertilizers to biological ones as well as to distribute biological protection to existing plants.

### **State Owned Company “Vinnitsatranspribor”**

The Company is located in Vinnitsia Region. It is located on 3.2 hectares of land. Company shops were built in 1952 and renovated in 2000. The number of employees is 350. The main products are locking valve devices for carriage cars and containers. The company has galvanic area and consumes around 9 tons of different types of chemicals per year as well as 48 tons of lubricants for metal-processing operations and 6 tons of metal working coolants. CPC experts have already collected all the necessary data and defined main potentials in process optimization. It was discussed with the Director of the company that the following areas of plant operations will be addressed:

1. Optimization of galvanic area with applying of an analogue Ukrainian chemical additive; The galvanic process was carefully analyzed, data collected and material flow diagrams prepared, as well as the chemical analysis of chromating solution was carried out by the ChL trainee from the Chemical Engineering Department of KPI. According to the results, there were number of options proposed.



*Chromating area at Vinnitsatranspribor*

One of the most environmentally-not-friendly process in galvanic division is chromatazing using Cr(VI)-containing reagent. The decision of the technical specialists showed that the plant’s staff is not ready to change the technology and chemicals in this process. From our point of view the reasons are following:

- the quantity and cost of chemicals that have to be changed are low, so shift to more safe chemical will not give a tangible economic effect;
- the payment for chemical waste is low;
- specialists do not want to change the galvanic process; it could be explained as follows: usually the technology is a most conservative part of the plant process – changing of the process could take a considerable time for adjustment; it means a risk of productivity reducing.

In order to get practical result and to be sure that recommended change of chemicals is positive for the quality of final product, we proposed to run corrosion test of the galvanized details with different covering. The Director and Chief Engineer of the plant confirmed the agreement. The ChL experts of the RECPC designed the method, prepared and made the required tests. To perform tests, the negotiation with the chemical supplier - company Ecol (Dnepropetrovsk) was carried out and required chemicals were obtained.

The corrosion test results (Annex 1) confirmed the efficiency of proposed chemicals. So, proposed chemicals can be used in galvanic processes and it allows substitution of Cr (VI)-containing chemical for chromating by less hazardous chemicals, containing Cr (III).

The negotiations with company technical specialists show that proposed ChL business model can be used if the volume of required chemicals is bigger. It means to use ChL business model we need to search for a company-partner that has larger volume of the detail production.

2. Optimization of metal-processing operations by reduction of usage of metal-working coolants and lubricants and applying of a new unit of payment;
  - The data was collected, analyzed and defined a general consumption of metal-working coolant and lubricants. The unit payment was defined as UA HRN per working hour of coolant/lubricant. Estimation and calculations are ongoing and round of negotiations was conducted with providers of equipment and coolants. So, the project is in the pipeline. The different technologies and equipment were considered to reduce the coolants usage. Such technologies are: cleaning of the coolant (oil) and spraying of the coolant. As result of searching, several contacts with the companies of cleaning and spraying equipment were found. Now we are collecting information about efficiency of the technology of the coolant cleaning.
3. Substitution of cutting tools and applying a new service agreement.
  - Several stages of negotiations have been conducted between a supplier of cutting tools and ChL CP Centre team. It was preliminary discussed that the new type of cutting tools will be tested. Vinnitsiatranspribor Management wants to test the cutting tools first, and then implement the ChL business model. The unit of payment may be UAH per working hour of a cutting tool and preliminary calculations are already made. As a result, two joint meetings between Vinnitsiatranspribor management and Rapidinstrument Management were organized. One of them was organized at the National CPC premises and other at the Vinnicatranspribor location. The results of negotiations are to prepare and test cutting tools of the Rapidinstrument Company (Kyiv). The application of the ChL business model was confirmed as a basis. At this stage the preparation to the test is ongoing.

**The results of the first year of collaboration are:**

- Prepared and discussed contracts between different partners;
- chromating area was fully analyzed and options of optimization were presented to the Company Director;
- local Ukrainian supplier was proposed instead of foreign to optimize process of chromating and organize business in a new way with a new defined unit of payment;

- discussed and agreed tests of new cutting tools and closing loop with used tools (company supplier will take back all used tools for recycling);
- it is planned to sign all contracts during next year and obtain benefits of ChL business model.

### **JSC Vetropack Gostomel Glass Factory**

The Company is one of the leading manufacturers of packaging glass in Ukraine and a part of Vetropack Holding. It is located in Gostomel City, Kiev region. The annual production is around 164 million units of packaging glass. The company annually consumes 665 tons of pigments and 13 tons of lubricants for conveyer lines and forming machines. The project started with data collection and preparation of flow diagrams with the main focus on some processes where lubricants and pigments are applied in order to optimize processes, and reduce quantity of chemicals used.

Trainees collected and analyzed data and production processes. A project on lamp substitution was preliminary developed (substitution of mercury lamps to lamps with lower mercury content). The calculations were prepared and forwarded to company's management. There were several lamp providers who wanted to participate in ChL model with an option of closing loops (to take care of used lamps). The unit of payment might be UAH per working hour of a lamp.

But unfortunately the proposed project was not considered by UNIDO as Chemical Leasing and so the project was stopped.

### **Seasonings and Kvas Factory Company**

The company is located in Vinnitsia and has been operating since 1999. Its products are distributed to 19 regions of Ukraine. It employs 101 people. In the course of negotiation process, it was discussed that analysis of kvas production will be undertaken in detail, including packaging lines and then a ChL project will be ready to start. The annual production of kvas at the company is 190 thousand tons.

Meantime, our trainee works on comprehensive data collection, flow diagrams and analysis of technological processes. At the same time the possibilities of ChL model application are analyzing in the area of cleaning tanks (cleaning machine with cleaning liquids). The unit of payment may be UAH per cleaned tank.

The other direction of ChL business model may be technological process of attaching labels to packaging glasses. The company uses the special equipment for the process. The special glue is used in technological process. The glue (Comparis) includes modified krohmals, dispersions, inhibitors and technological adds (non hazardous chemicals). In order to optimize technological process it is necessary to involve the glue supplier. The glue supplier was found. The data was collected to calculate the economic benefits and chemical reduction. We plan to discuss the ChL model possibilities with the glue supplier (Company "Victoria", Cherkassy, Kyiv region).

## ***Market analytics and potential for ChL in Ukraine***

### **Analysis of chemical industry in Ukraine**

According to Ukrainian statistic for 2011, about 52% of Ukrainian chemical industry products are exported. Ukraine ranks third for the production of fertilizers in Europe, behind only Germany and Russia, and the fifth largest in the world (after Germany, Russia, the U.S. and China). Ukrainian chemical enterprises export their products to 180 countries, fertilizers - to 70 countries. Fertilizers occupy 26-28% in the general structure of export. This is, in fact, makes the country one of the world's leading exporters of nitrogen fertilizers. Another most



demand chemical abroad is a titanium dioxide. Ukraine has 20% of the world reserves of titanium ore.

There are following numbers available for chemical industry in Ukraine:

- 6,500 chemical enterprises are operating in Ukraine;
- 155,000 people are employed in the chemical industry (compare to 22 mil. people worldwide);
- 120,000 chemical products produced in Ukraine;
- 7.2% of Ukrainian export goes from chemical industry.

According to mentioned above, Ukraine has a huge potential for developing, introducing and implementing of the ChL business model. The main important step forward will be to disseminate information about ChL worldwide success among chemical industry and to involve local suppliers (producers) of chemicals in ChL projects.

Besides potential and good background, there are some constraints in moving forward, such as:

- List of chemical suppliers (companies-producers of chemicals) is quite long; but most of these companies are owned by several owners what make the market not liberal and not flexible;
- Not stable economical situation in the country; lack of awareness among employees;
- Ukrainian chemical companies (producers) skeptically perceive importance, positive aspects and economical benefits of the application of ChL business model; they have to think about future generations and environment;
- The Ukrainian CPC needs positive image in the implementation of ChL projects as well as contribution to negotiations between producers and users.

### Analysis of a metal processing industry

The metal processing industry is widely distributed in Ukraine. There are different metal coating processes that applied in order to protect metals from corrosion.

There are many alternatives for coating, but in any case metal degreasing and pickling are always two important stages for metal surface pre-treatment. These technological processes require a lot of aggressive and dangerous chemicals, such as HCl (concentrated, highly corrosive substance), NaOH (in concentration 5-50%; corrosive substance can decompose proteins and lipids in skin, eyes or other living tissues),  $\text{Na}_3\text{PO}_4$  and  $\text{Na}_2\text{SiO}_3$  (is an irritating substance in high concentration). Optimization of the mentioned above technological processes and reduction of dangerous chemicals usage can be provided as a basis of ChL business model application.

### Creation of a database of national enterprises-producers of metal goods

Creation of a database of national enterprises-producers of metal goods has been started. Many of them are since Soviet time and use out-to-date technologies, involving chemicals, and are not efficient in application of chemicals. Implementation of CP approach and ChL business model would make degreasing and pickling process more economically efficient and environmentally friendly. These plants work in production of, for example, pipes, stop valves, heating systems, manufacturing and maintenance of vehicles. In Kiev region there are approx. 20 plants. The most attractive and appropriate companies for ChL activities are listed below:

#	Name	Location	Type of business
1.	"Ukrsetsarmatura" Ltd.	Kyiv	Ukrainian producer of pipe fittings, stop valves
2.	Open Joint-Stock Company "Bolshevik"	Kyiv	Production of equipment for resin and plastics processing
3.	State Holding Company	Kyiv	Mechanical treatment of steel, aluminum and titanium alloys. Has large galvanic division.

	"Artemmash"		
4.	Kyiv Plant of Municipal Machine Production "Kommash"	Kyiv	"KOMMASH" is a leader in municipal machinery manufacturing and design
5.	Open Joint-Stock Company "Lenin's smithy"	Kyiv	The core business is boats, tankers manufacturing. Other products are - boiler manufacturing, which manufactured marine auxiliary automated boilers and furnaces (incinerators) for the incineration of waste and marine debris - manufacture of propeller shafts and pitch propellers
6.	DP Kyiv Pysmenny Metal Ware Plant	Fastiv, Kyiv region	The plant produces metal nettings.
7.	Open Joint-Stock Company "Magistral"	Kyiv	Manufacturing of machines and equipment for road construction.
8.	Open Joint-Stock Company "Kyiv motorcycle plant"	Kyiv	Manufacturer of motorcycles with complete production cycle.

## ***PR and awareness raising activities on ChL***

### **PR activities**

Toolkit materials on ChL were translated on Russian language and the translation was adapted to national needs. These materials were disseminated among national ChL experts for better understanding and kindly handled to Russian CPC.

One article called "Chemical Leasing – new complex approach in solving ecological problem" was published in Zaporizhya State Engineering Academy journal and it was dedicated to the VII All Ukrainian Scientific Conference on Environmental Protection, as a Platform for Sustainable Development.

Website of CPC was updated ([www.cpc-ua.org](http://www.cpc-ua.org)) and information on ChL concept added to a new category of menu as well as translated information regarding ChL Award.

### **Awareness raising activities**

Awareness seminar in ChL was conducted in November, 2012 in Vinnitsa for representatives from academia, agriculture and industry. After the presentation, there was a long discussion on whether this business model is applicable for Ukrainian economy and what would be a better way to present this idea to the Consumer (who will pay not on weight/volume but on functional basis) so it would have better chances to be accepted and implemented.

#### **Main points of discussion:**

- consumer of chemicals is not informed clear about structure of the profit share that could be returned to the chemicals supplier;
- there is a misunderstanding both consumer and supplier of the confidential degree of profit information;
- there is no comprehensive methods of calculation the efficiency of chemicals application in agro-sector.

### Conclusions:

- to enhance training and information support at the company level;
- RECP should provide jointly seminars for suppliers and consumers to clarify the benefit of ChL business model and to develop the mutually beneficial of payment unit.

A special focus was on agricultural branch and points that have to be noticed and taken into consideration while presenting ChL concept to farmers.

A workshop with national CP experts and company representatives has been conducted in December, 2012 in Kyiv (Agenda of the workshop is in Annex 2). The main focus and details of the ChL business model were presented by international ChL expert Ms. Vojislavka Staric. Main focus of this workshop was on application of the ChL business model in Ukrainian enterprises. Training session for Ukrainian ChL experts helped to get a better understanding of some points in ChL, its implementation in industry and define other possible directions for ChL in Ukraine. There were several company visits with on-site trainings for analyzing of implementation possibilities of ChL and to understand what was done in ChL in Ukrainian companies.



*Training session for national ChL experts*

### **Results**

Overall ChL project achievements can be summarized as following:

- the overall work on the project is performed according to the Annual Work Plan and quarterly plans (attached in ANNEX A);
- one case study focuses on monitoring phase, and the other cases are in the pipeline;
- there are several companies in metal processing industry interested in participation in the ChL project; some of them have already signed letters of intent;
- meetings with several farmers are scheduled in order to present them with ChL business model and share the successful Ukrainian case studies in the agricultural sector;
- database creation of producers, distributors and users of chemicals has been started. Ukraine has a huge potential for ChL. The preliminary analysis of collected data showed, that the most of national enterprises-producers of metal goods use out-to-date technologies, as a result, application of chemicals is not efficient. So, implementation of the Cleaner Production approach and Chemical Leasing business model would make degreasing and pickling processes more economically efficient and environmentally friendly.
- implementation of Chemical Leasing is reasonable at the industrial plants, using technological processes such as degreasing, washing, painting, gluing, which require large amount of chemical substances;
- an information seminar on Chemical Leasing business model was conducted, that revealed the necessity to use practical cases of successful ChL implementation in order to show achieved positive results;



- a seminar on Chemical Leasing application was held in December, 2012 with participation of the international ChL expert; it allowed to summarize features of the new business model and to determine important steps for model in-to-practice implementation at companies-suppliers, distributors and users of chemicals.
- started projects and ongoing work create perspective for successful application of Chemical Leasing business model in Ukraine.

## Stakeholders meetings and legal status

One of the main tasks of 2012 was to develop the Centre structure, define the legal entity, participate at Steering Committee Meetings and hire new people.

### *Legal status*

In 2012 RECPC developed the official Statute of the Centre and defined a legal entity as a non-governmental organization (in compliance with a new Tax Code of Ukraine). It was achieved through quite a big number of discussions and negotiations between all partner sides (UNIDO, Ministry of Economic Development and Trade of Ukraine, NTUU KPI, ULIE and representatives of donor's sides).

The Center of Resource Efficient and Cleaner Production" Kyiv City Sectoral Organization of Employers" is a City sectoral organization of employers, established under the Law of Ukraine "On Employers' Organizations, Their Associations, and Rights and Guarantees of Their Activities".

The new logo of the RECPC is below:



### *Key Stakeholder Meetings*

Two Stakeholder Meetings were organized at the Ministry of Economic Development and Trade of Ukraine during 2012:

1. Stakeholders Coordination Meeting was held on January 12, 2012. The meeting was chaired by Mr. Maistrenko, Director of the Department of Industrial Policy, Ministry of Economic Development and Trade of Ukraine. Participants consisted of UNIDO (Ms. Petra Schwager, Ms. Maria Grineva), high-level representatives of the Ukrainian Government, industry, academy, international organizations and NGOs. Minutes of the meeting are in Annex 3.
2. Session of the Steering Committee was held on October 11, 2012. The Session was presided by: Pavlyuk, V.I., Deputy Director of the Industrial Policy Department at the Ministry for Economic Development and Trade of Ukraine and attended by members of the Steering Committee, in compliance with the Order of the Ministry for Economic Development and Trade, dated May 29, 2012, № 649, and the persons who were delegated the absent members' powers: Pavlyuk V.I.; Beltrani, Guido; Johannes, Aigner; Ichenko, M.Yu.; Musina, L.A.; Schwager, Petra; Volkov, A.M. Minutes of the meeting are in Annex 4.

## Other activities

### *Strategy CPC development Workshop*

A strategy workshop was conducted during the last week of August 2012 and followed by a series of strategy meetings during the first 2 weeks of September 2012. It was organized at RECPC under supervision of UNIDO officials (P.Schwager, M. Grineva,) with partner support of CPC Serbia Director B.Dunjic.

The results of all these efforts are presented as follows. The first part deals with the factors influencing the operations of the Centre. Each of these major factors is considered in great detail. The second part is somewhat close to SWOT analysis describing the major chances and risks of the Centre operations as well as the organization growth factor tree, while the third part describes the competitors, the products/services offered, and the motivational ideas on how to sell services to the industry. The fourth part talks about ways to improve the Centre operations, and strengthen its organizational sustainability. The final part contains the essence of the Centre's strategy – the mission, vision, values, short description of the Centre, and the pricing of the products offered by the Centre. For more information regarding organizational strategy sessions, please, consult Annex 5.



*During discussion*

One of key elements of discussion session was how to find the income sources for Centre's activities.

A certain number of institutions are considered as a possible sources of income for RECPC activity support, such as:

Source of income	Services					Total (active)
	Consulting	Training	Engineering (including measurement by modern equipment)	Business planning	Other	
Companies	20%	10%	60%	10%		40%
Financial institutions	10%	80%	0	10%		10%
Government offices	10%	10%	0	0	80% licensing	20%
International projects	20%	0%	70%	10%		10%
Technical support		50%	40%			20%

Expected dynamic of income year by year is shown below

Source of income	Years				Total (active)
	2013	2014	2015	2016	
Companies	0%	10%	20%	30%	30%
Financial institutions	0%	0%	20%	20%	20%
Government offices	0%	0%	10%	10%	10%
International projects	10%	10%	20%	30%	30%
Technical support	100%	90%	80%	70%	70%

