

RECP BUSSINESS CASES IN DEMONSTRATION COMPANIES

STATUS REPORT 2015

UNIDO RESOURCE EFFICIENT AND CLEANER
PRODUCTION DEMONSTRATION COMPONENT
EaP GREEN PROGRAMME OF THE EU
IN ARMENIA

EaPGREEN



Partnership for Environment and Growth



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Editorial:

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RECP SUCCESS STORIES

Resource Efficient and Cleaner Production (RECP) applies proven preventive environmental approaches and productivity concepts for the triple benefits of improved resource productivity (reduced operational costs and reduced use of materials, energy and water), reduced environmental impacts (less waste, emissions and pollution) and improved occupational and community health and safety. The RECP demonstrations under the EaP GREEN programme are aimed at improving resource efficiency and environmental performance in particular in the prioritized agro-food, chemicals and construction materials' sectors, through the widespread adaptation and adoption of RECP methods, practices and techniques.

Publication contains series of business cases and success stories elaborated as a result of RECP Assessments conducted by project and national team of RECP experts in Armenia in 2014. RECP assessments and consequent methodology advice and guidance were provided by Mr. Rene VAN BERKEL, PhD. Chief, Industrial Resource Efficiency Unit (PTC/ENV/IRE), UNIDO.

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Resource Efficient and Cleaner Production Demonstration component project was implemented by UNIDO in co-operation with Armenia National Office of the Regional environmental center for Caucasus.

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The views expressed in this publication do not necessarily reflect the views of the European Commission nor of the United Nations Industrial Development Organization

About the EaP GREEN programme

The “Greening Economies in the European Union’s Eastern Neighbourhood” (EaP GREEN) programme aims to support the six Eastern Partnership countries to move towards green economy by decoupling economic growth from environmental degradation and resource depletion. The programme is structured around three components:

- (1) Governance and financing tools for sustainable consumption and production (SCP) and green economy;
- (2) Strategic Environmental Assessment and Environmental Impact Assessment accompanying SCP policy implementation; and
- (3) Demonstration projects. Governments and the private sector are the key target groups of EaP GREEN.

The programme is financially supported by the European Union and other donors, and is jointly implemented by four international organizations – OECD, UNECE, UNEP, and UNIDO. Although the programme is regional, many of its activities will be implemented nationally and the results shared in various regional forums.

The **European Union** is the world’s largest donor of official development assistance. As a global actor, the EU plays a key role in international efforts to promote sustainable development globally, including protection of the environment and maintaining a competitive EU presence on the global market. Environment policy can play a key role in creating jobs and stimulating investment. ‘Green growth’ entails developing integrated policies that promote a **sustainable environmental framework**.

EU has identified three key objectives in its **Environment Action Programme 2020**: 1) to protect, conserve and enhance the Union’s natural capital, 2) to turn the Union into a resource-efficient, green, and competitive low-carbon economy, 3) to safeguard the Union’s citizens from environment-related pressures and risks to health and wellbeing.

UNIDO

UNIDO is the specialized agency of the United Nations that promotes industrial development for poverty reduction, inclusive globalization and environmental sustainability

The mandate of the United Nations Industrial Development Organization (UNIDO) is to promote and accelerate inclusive and sustainable industrial development in developing countries and economies in transition. In recent years, UNIDO has assumed an enhanced role in the global development agenda by focusing its activities on poverty reduction, inclusive globalization and environmental sustainability. The Organization draws on four mutually reinforcing categories of services: technical cooperation, analytical and policy advisory services, standard setting and compliance, and a convening function for knowledge transfer and networking.

REC Caucasus

The Regional Environmental Centre for the Caucasus (REC Caucasus) is an independent, not-for-profit organization, established in 1999 within the framework of the “Environment for Europe Process” by the governments of three South Caucasus countries and the European Union. RECC’s main aim is to assist in solving **environmental problems, promote green growth as well as develop civil society and support SMEs** in the countries of the South Caucasus. To achieve its mission REC Caucasus facilitates cooperation among environmental stakeholders by supporting exchange of information, offering advice and technical expertise, and promoting public participation in environmental decision-making.

Green Economy

“Green economy” is the economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In particular, “green economy” is a model based on sustainable development and knowledge of environmental economics. OECD has developed and introduced the concept of “green growth”, defined as maximizing economic growth and development while avoiding unsustainable pressure on the quantity and quality of natural assets and harnessing the growth potential that arises from transitioning towards a green economy. The concept of “green economy” or “green growth” also includes the notions of resource efficiency and cleaner production serving as a basis for sustainable development of industrial sector. RECP creates a linkage in between economic development/benefits generation and business sectors and environment where production, distribution and consumption of goods and services increase human welfare in the long run, without exposing future generations to significant environmental risks or environmental deficit.

“Resource Efficient and Cleaner Production” (RECP) Project

The objective of the RECP Demonstrations under the EaP GREEN Programme is to improve resource productivity and environmental performance of businesses and other organizations in the target industry sectors of the Eastern Partnership Economies, including Armenia and thereby contribute to sustainable industrial development and generation of employment and incomes. This will be achieved through the widespread implementation of RECP concepts, methods, techniques and policies by businesses and other organizations, governments at all levels, and providers of business services, including advisory and financial services.

Resource Efficient and Cleaner Production (RECP) applies proven preventive environmental approaches and productivity concepts for the triple benefits of improved resource productivity (hence reduced operational costs and reduced use of materials, energy and water), reduced environmental impacts (less waste, emissions and pollution) and improved occupational and community health and safety.

SMEs and other organizations will get a chance to switch to the more efficient practices of using raw materials, energy and water, which will lead to increased resource efficiency and will improve cleaner production practices within SMEs. As a result, business companies could benefit from support in elimination or diminishing of the quantities of waste and emissions, as well as getting a chance for more stable and competitive products/production, possibilities to create more working places and increase their economic benefits. Application of RECP concepts, methods and tools will enable business organizations to expand green business activities within their companies, make the use and organization of production more environmentally friendly and efficient, save funds and develop alternative business ideas.

Activities

The RECP programme is structured in three work-streams.

1. RECP human and Institutional Capacity Development: Competent network of Armenian experts who deliver value-adding RECP services to Armenian enterprises and other organizations, in particular in the priority industry sectors;
2. RECP Implementation, Dissemination and Replication: Implementation of RECP concepts, methods and techniques by Armenian businesses with verified environment, resource use and economic benefits; and
3. RECP Technology Support: to improve access to appropriate and affordable RECP practices and techniques



Project expected results

The expected project result is awareness increase of RECP concepts, methods and tools in Eastern Partnership Economies (EaP), particularly in Armenia.

Target Group(s)

- State authorities (i.e. Ministries of Environment, Economy, Energy, Agriculture, Territorial administration and Emergency situations of the Republic of Armenia)
- Local authorities/self-governance
- Sector related CBOs (SMEs, farmers associations, business units)

Activities implemented

- Series of **capacity-building trainings** to aimed at "Resource Efficient and Cleaner Production" (RECP) concepts, methods, techniques and policies were

implemented to strengthen Armenia's national capacities and expertise on RECP throughout 2014 – 2015. RECP project has undertaken capacity-building trainings targeting assessment of SMEs at the national level which will help improve resource efficiency and cleaner production within demonstration companies.

- The national experts' group has provided consultation for Armenian business companies and organizations, particularly in areas like: agricultural / food, beverage, chemicals and construction materials production.

Web Page on RECP in Armenia www.recp.am

Bilingual English-Armenian website has been created in the frames of the project available at: www.recp.am. Website contains a comprehensive coverage of project activities (in Armenian and in English), RECP resources, methodologies and training materials, RECP assessment tools for SMEs and companies interested in Green business and resource efficiency/cleaner production.

Co-operation with Demonstration Companies / SMEs

RECP project has cooperated with the following organizations:

- ✓ "Ashtarak Dzu" LLC / Aragatsotni Region, village Aghdzq
- ✓ "Arame & Sofi" LLC / Ararat Region, village Lusagyugh
- ✓ "Ararat" food factory / Yerevan
- ✓ "Marila" LLC / Syunik Region, city Kapan
- ✓ "Unifish" LLC / Ararat Region, village Sayat-Nova
- ✓ "Lukashin agricultural association" CC / Armavir Region, village Lukashin
- ✓ "Yervandashat agricultural association" CC / Armavir Region, village Yervandashat
- ✓ "HATM" LLC / Shirak Region, village Maisian
- ✓ "Kashi" OJSC / Yerevan
- ✓ "M&Mavr" OJSC / Ararat Region, city Artashat

RECP Business Cases

Based on RECP assessments, RECP national experts and the project team developed and presented RECP success stories on RECP practical application within selected demonstration companies covering food/ beverage, chemical and construction sectors.



BUSINESS CASES

FOOD PRODUCTION

BUSINESS CASE ASHTARAK DZU LLC

“Ashtarak Dzu” LLC started implementing cleaner production and resource efficiency measures in 2014. The benefits achieved by “Ashtarak Dzu” an egg production facility, after continuously applying RECP measures include production-process optimization, installation of new equipment for recycling of resources and reduction of energy use, potentially amounting to USD 78,400 per year. Additional benefits, comprising social and environmental aids were improvements in working practices and a reduction of the company's carbon footprint.

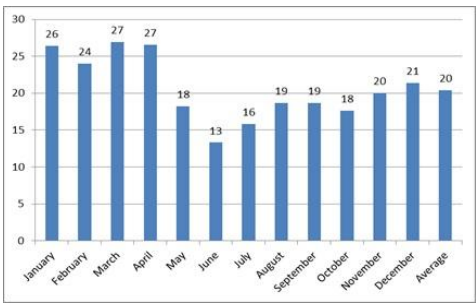


Ashtarak Dzu LLC*

“Ashtarak Dzu” LLC is one of the leading companies in egg production industries of the republic, occupying over 8% of the market. Annual egg production is 43,464,694 eggs or 3,622,057 eggs monthly average, and meat 61.8 t per year. The factory buys a livestock of 1-day-old chickens or 13-week young hens, which are kept in the aviary for the young (in cells) until reaching 13-14-week-old.

All necessary measures are being conducted in accordance with the vaccination schedule. Then the bird is placed in a pre-prepared (disinfected) free aviary for adult birds. All aviaries are cell-based. All aviaries have a fairly high level of automation and are equipped with feed dispensers, water supply and manure removal systems, light, ventilation, heating, automatic egg collection, climate control.

Specific egg production on average (eggs/hen per month)



After reaching certain age (around 90-week-old) a bird is evacuated and sent for slaughter. Cleaning and disinfection of

the aviary are being performed (during 4 weeks). Then the cycle repeats.

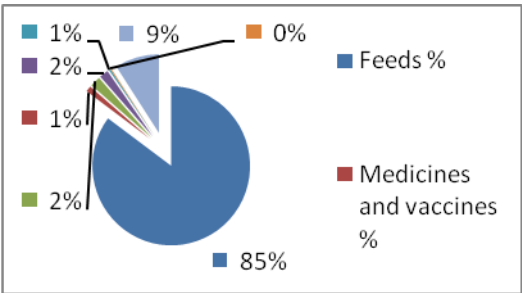
Material and energy indices of the production

Egg production: 43,464,694 (eggs in 2013), 3,622,057 (eggs monthly average), meat 61.8 (t per year). Livestock by aviaries 177,497 (hens in 2013), average mortality per day 37.25, % of mortality 0.021 (the norm is 0.017% ± 0.002). The deviation is related to an acquisition of 13-week-old young hens. Additional veterinary measures have allowed ceasing the enhanced mortality. Egg return in numbers: 206,579 (eggs in 2013, 0.047% of the production), monthly average 17,215 eggs.

Volume of manure generated: 327 (t per year), monthly average 27.25. In average, manure per laying hen is 160 g/day, that of the young - 50 g/day. Purchase of packaging: boxes - 112,691, plastic boxes per 10 egg: 256,480 pcs, per 15 egg: 94,415 pcs, per 6 egg: 347,628, egg cells: 1,425,274 pcs.

Purchase and acquisition of feeds: for preparation of a high-grade balanced feed for birds about 20 types of feed are used, 6,898 (t per year), monthly average 575 t. Purchase of medicines and vaccines: 19,382,713 AMD, monthly average 1,615,226 AMD. The factory is equipped with two independent power supply lines and two diesel-based electricity generators. Purchase of electricity: 1,089,293 (kWh per hour per year), monthly average 90,774 kWh. Natural gas supply: 63,386 (cub. m per year), average per month 5,282 m3. Water supply: 22,450 (cub. m per year), average per month 1,871. Water use: cleaning and disinfection of two aviaries were done. Water is used for refreshing air and maintaining humidity level in aviaries. Transportation costs: 34,790,252 AMD, monthly average 2,899,188 AMD.

Percent cost-shares



AREAS OF IMPROVEMENT

The RECP results were achieved through the implementation of the following measures:

- ✓ Material management.
- ✓ Energy management.

* RECP National Lead Expert: Tigran Sekoyan
RECP National Support Experts: Bardukh Gabrielyan, Merujan Galstyan

Materials

- ✚ Egg powder production organization is recommended as an RECP measure based on overproduction and reuse of returned eggs with food or technical quality
- ✚ Purchase of special equipment for waste materials utilization (dead chicken recycling) and flour forage fodder production.
- ✚ Optimization of chicken feed distribution regime due to maintaining relevant internal climate, i.e. temperature and relative humidity favorable conditions.

Energy

- ✚ Recovering heat from the ventilation system of aviaries through recuperation options.
- ✚ Replacement (fuel switch) of electrical energy heaters with natural gas ovens (heaters) in the aviaries.
- ✚ Reducing the electricity bill by changing the internal inefficient incandescent lamps with more efficient LED bulbs.
- ✚ Decreasing the heat losses from the aviaries envelope by thermal insulation options.
- ✚ Reducing electricity consumption by the replacement of external lighting system from metal halogen luminaries to high pressure sodium or LED ones.



Approach taken

Awareness raising, capacity building and knowledge management measures for the “Ashtarak Dzu” LLC with respect to RECP principles and concept, was aimed at improving the efficiency of resources used and achieving cleaner production, which can also increase competitiveness of the company in the local market.

Due to RECP ongoing programme, “Ashtarak Dzu” LLC has significantly excelled in product quality, occupational health and safety and the general environmental performance. The company has improved its energy efficiency through the EE recommended measures suggested by the RECP assessment, helping to balance the air temperature and save energy during the production cycle. Organization of egg powder production, waste materials utilization, flour forage fodder production, systematically optimization of chicken feed distribution regime due to maintaining relevant internal climate, upgrading of energy consumption systems and implementation of predicted measures “Ashtarak Dzu” LLC will occupy larger markets, achieve benefits in Business, Social and Environmental aspects.

EXPECTED RESULTS

The following RECP results were suggested for company:

Principal Options Implemented	Benefits		
	Economic, Savings AMD (kUSD)/ year	Resource Use	Environment al Impact
Egg powder production organization	9 700 000 (20.7)	Material recycling	Reductions in waste material of 25 ton (per annum)
Waste materials utilization	8 500 000 (18.3)		
Optimization of chicken feed distribution regime	16 000 000 (34.1)	Reductions in material use	
Recovering heat from the ventilation system	550 000 (1.2)	Reductions in energy use	Reductions in CO ₂ emissions of 24 ton CO ₂ (per annum)
Fuel switch for heating in the aviaries	750 000 (1.5)		
Changing the internal incandescent bulbs with LED	550 000 (1.2)		
Aviaries envelope thermal insulation	330 000 (0.7)		
Replacement of external metal halogen luminaries to high pressure sodium or LED ones	330 000 (0.7)		



BUSINESS CASE “ARAME & SOFI” LLC

“Arame & Sofi” LLC started implementing cleaner production in 2014. Within the RECP programme, the pilot project focused on water, material and energy efficiency, and improvement of production technique to reduce energy, water and raw material consumption, recycling of waste and reduction of greenhouse gases emissions. The RECP pilot project at “Arame & Sofi” LLC will result in the increase of efficient use of resources by the company leading to cleaner production with less environmental impact.

Arame & Sofi LLC*

The organization is founded at July 2014, based on former “Karakhach dairy” and at the period of observations it was still in formation stage and construction too. Main accent is being done on cheese production, developing possibilities of matzoun too. Despite of the production is currently on-going and during summer months (the most overloaded) it was processing 2000 – 3000 kg of milk per day, it has 6000 – 7000 kg possible capacity. Cheese production was chosen to conduct RECP study within this pilot project.



AREAS OF IMPROVEMENT

The following critical aspects have been considered to implement RECP:

- ✓ Energy management.
- ✓ Water management.
- ✓ Material management.

The RECP results to be achieved through implementation of the following measures:

Energy

- ✚ Changing a heating system/source of energy of pasteurization and its modernization in cheese production
 - Remove existing heating system, which currently needs 250qm of gas for heating two reservoirs (1100l and 2500l) until 30-32°C – necessary for pasteurization for cheese production and a new electric heating system can be also installed inside 2-layer metal walls of reservoirs, which will allow to pass pasteurization evenly (Accepted RECP principle – Equipment modification, Input material change).
 - The reservoirs needs additional insulation from outside, including pipelines (Accepted RECP principle – Good housekeeping).

- A lid covering the whole surface of reservoirs will contribute in preserving heat and evaporation pipelines (Accepted RECP principle – Good housekeeping).
- Preliminary investments 1000-1500 Euro (500000-750000 AMD). Cost saving 150 Euro (75000 AMD) / month.
- Burning process of Propane (C_3H_8) gas it creates 3 times more CO_2 (in volume) than it was used propan, so this renovation first of all has an environmental importance as a way of cutting greenhouse gas emissions.

- ✚ Minimize the use of air conditioners (energy) by restructurization of refrigerator-warehouses
- Regulate temperature balance of warehouses by only one air conditioner – using a special door between these two divisions pipelines (Accepted RECP principle – Good housekeeping).
- Using a removable wall within warehouse. It will decrease the space for air conditioning, automatically cutting working period of the system pipelines (Accepted RECP principle – Good housekeeping).
- Making possible natural lighting and ventilation pipelines (Accepted RECP principle – Good housekeeping).
- Activities taking some investments mainly on construction of the wall (approximately 800 Euro – 400000 AMD) will carry out savings in 80-100 Euros (40000-50000 AMD) / month.
- We consider less use of air conditioners in 20-30% will decrease energy consumption and Freon emissions.

Water

- ✚ Further use of a wastewater (whey).
 - For fats (butter) production it needs to be processed one more time by separator and pass additional treatment (Accepted RECP principle – Onsite reuse and recycling).
 - For animal feeding as a source of protein during several hours after production pipelines (Accepted RECP principle – Production of useful byproducts).
 - For improvement of soil quality (pH reaction) – its acidification, in case of using as an irrigation water pipelines (Accepted RECP principle – Production of useful byproducts).
 - Company has capacities to produce approximately 4000kg of fed/year – which will provide 8000 Euro additional profit in case of fat production. It only needs modernization or restructurization of existing equipment creation of a market for this product. Alternative ways of using whey are more cost-effective, needs only transportation.
 - In case of fats production, it again generates approximately 1600l of liquid, which should be disposed anyway, so it is also possible combining these approaches.

* Lead Expert: Areg Karapetyan, Support Expert: Ani Haykuni

Materials

- ✚ Improvement of sanitary-hygienic conditions, as a way of decreasing risks of raw material/product possible spoilage.
 - Installation of air ionizers (Accepted RECP principle – Good housekeeping).
 - Installation of Germicidal UV Systems for Air & Water Disinfection (Accepted RECP principle – Good housekeeping).
 - This considers as non-chemical method of disinfection, which creates also favorable conditions for doing cooling in 1-2 OC higher temperature.
 - New equipment should be bought and installed. They are working by electricity, so needs connection to electric network too.

- Installation of this equipment will cost 50-100 Euro (25000-50000 AMD) per each one, its value of positive influence should be observed additional.
- It prevents further distribution of microbes within territory and products for sale.

Approach taken

Through raising awareness and capacity building at “Arame & Sofi” LLC, exchange/management of knowledge in regard to RECP principles and concept was applied in practice. This program served as good incentive for entrepreneur to start own observations and make the system “smart” to ensure profitable production as soon as possible.



BUSINESS CASE “Ararat Food Factory”

The UNIDO RECP project supported a comprehensive assessment of Ararat Food Factory LLC with respect to efficient use of different types of material and energy resources in the production processes, as well as assessment of potential environmental impact, in order to increase the resource-use efficiency and to achieve cleaner production.



Ararat Food Factory LLC*

The Ararat Food Factory LLC belongs to Karolina Group LLC and is located in Yerevan, Armenia. The Plant was founded in March 2011 – currently is the largest factory for the production of natural juices and soft drinks. The plant is provided with modern equipment and laboratories worth more than 6 million Euros. Juices from the Armenian fruit without added sugar will wear brand name “Ararat”. It was 100% fruit juice. Currently, the factory already produces not only juice, but also tea, conserves, fruit and vegetable concentrate puree. The management strives to follow the new technologies. Most of the products intended for export to the CIS countries and Europe. ISO 2200:2005 quality and safety standard, including HaCiCiP. The company is in process for kosher certification. Export is currently held to Georgia, Russia, Kazakhsan, Iraq, Kyrgyzstan, Belarus, France, USA, Germany, Poland. Overall, about 47% of output is exported. The company



also invests in philanthropy: – 1 AMD of every bottle of “Armenium” juice goes to support orphanages. Juice production was chosen to conduct RECP study within this pilot project.

AREAS OF IMPROVEMENT

The following critical aspects have been considered to implement RECP:

- ✓ Production Efficiency
- ✓ Environmental Management

SUMMARY RECOMMENDATIONS

Based on the assessment of resource use, waste generation, energy consumption and material balance (without in-depth economic assessment), RECP review recommended end the following RECP options:

Good housekeeping

- ✚ Planning the squeezing and juice production process schedules to produce single fruit or vegetable line (from highest concentration quality first to the lowest – last, e.g. 1. juice, 2. juice drink, 3. nectar) to minimize washing, discharge of highly organic and high temperature washing fluids.

Better process control

- ✚ Exclude or minimize use of synthetic detergents in washing processes as well as chemical conservation means to minimize pollution, while reducing the production costs.
- ✚ Replace the procedure of washing the fruit with caustic soda solution by washing with warm water at 60-70°C temperature.

Onsite reuse & recycling

- ✚ The water leaks must be eliminated and the condensate – returned to primary wash or any other water use cycle,

* Lead Expert: Meruzhan Galstyan, Support Expert: Astghine Pasoyan

where it is qualitatively acceptable. Similarly, all water used for washing or other technological processes, that do not contain caustic soda or other detergents, including the water used for washing buckthorn, can be returned for primary washing processes.

Production of useful byproduct

- ✚ Consider utilizing organic waste for returning into production, selling for forage or other agricultural purposes, or production of bio-humus/compost.

Equipment modification

- ✚ The teabag boxing equipment had a regular failure in each box (one out of every 20 teabags gets dropped on the floor by the machine). This required a person standing by the machine and taking that potential teabag manually off the line before it dropped on the floor. The equipment requires tuning to eliminate the extra irrational demand for labor.

Technology Change

- ✚ Install a two-tier tariff meter (1 kWh = 31,85 AMD instead of 1 kWh = 41,85 AMD)
- ✚ Carefully analyze the steam system to calibrate it for minimizing excess pressure and overheating.

EXPECTED RESULTS

If the company implements only the low-cost and no-cost recommendations, the expected immediate results can be as follows:

Productive output per water consumption

- ✚ Development of juice production shifts by phases of the same-fruit drinks (1. juice, 2. juice drink, 3. nectar) will allow to reduce 290 liters of hot water and fruit content discharge into sewage by merely exercising a planning approach.

Energy cost intensity per unit of output

- ✚ Installation of two-tier tariff meter for electricity will reduce the average energy cost of the company will reduce by 0,8 %. Elimination of hot water and steam discharges into sewage will minimize use of gas for hot water and heat generation

Waste generation per unit of productive output

- ✚ Utilization of the squeezed fruit waste for production of bio-humus with application of Californian Worms can produce additional income from realization of organic fertilizers to local farmers (bio-humus increases the fruit production by 30%). If Ararat supplies the fertilizer to its fruit suppliers, the purchase cost can be reduced as well.

Approach taken

The Ararat Good company has acknowledge the recommendations and underlined, that to this date, they have not been aware of the potential solutions to reduce resource inefficiencies, while in other cases they had not been able to find remedies for the large volumes of waste. Nonetheless, for embarking on a committed path of resource efficiency and clean production per avoided cleaning of equipment, the company would need in-depth cost analysis which would monetize not only the expenditures of technical and procedural upgrades, but also monetize the resource savings to the benefit of the company.



BUSINESS CASE “Agricultural Association Lukashin” Consumer Cooperative

“Agricultural Association Lukashin” started implementing cleaner production in 2014. In its RECP programme, the pilot SME focused on water, material and energy efficiency, and enhancement of production technique to reducing the energy consumption, utilization of waste and elimination of harmful emissions and effluents. The RECP demonstration project achieved a saving of 13% per year or 1,533 USD per year (within one production season), improvement of environmental performance and product marketability

“AGRICULTURAL ASSOCIATION LUKASHIN” CC*

“Agricultural Association Lukashin” CC was founded in 1995 as a community-based small enterprise (SME) of 42 farmers. The main activity of the SME is production of dried fruit from technical grade and table sorts of fruits (apricots, peaches, plums, apples, pears, figs and grapes) and melons grown on the lands of Lukashin rural community located in the heart of Ararat valley, famous for the taste qualities of its fruits and vegetables. Average production capacity is 14,000 kg/year of finished produce (dried fruit) that are mainly consumed in the internal

* Lead Expert: Vardan Tserunyan, Support Expert: Dshkhuhi Sahakyan

market and partly exported to Russian Federation and EU countries. Dried Fruit production was chosen to conduct RECP study within this pilot project.

AREAS OF IMPROVEMENT

Several critical aspects have been considered to implement RECP, among others:

- ✓ Prudent housekeeping
- ✓ Non-use of harmful materials and elimination of harmful emissions and effluents
- ✓ Reduction in the energy consumption by improving the process technique / equipment modification
- ✓ Utilization of waste and wastewater effluents
- ✓ Improvement of product marketability.

The RECP results to be achieved through implementation of the following measures:

Energy

- ✚ Installation of a two-tier electric meter, resulting in 8% annual saving on the electricity cost;
- ✚ Shortening the length/heights of ventilation pipes (for water vapour removal) twice, speeded up the drying process by 20%, and thus reduced energy (gas, electricity) consumption by 20%.

Water

- ✚ Tertiary rinsing water is re-used (30% saving) for primary washing of raw material (fresh fruits);
- ✚ Effluent wastewater from primary washing process is used for irrigation / watering of the infield

Materials

- ✚ Use of new technique of packaging in the atmosphere of nitrogen for preservation of finished produce, substituted the use of 25 kg/year sulphur as fumigation agent, and thus reducing the SO₂ emissions and the product cost;
- ✚ Non-use of caustic soda, for preliminary processing of some fruits, reduced the harmful effluents and the product cost.

Production Technique / Equipment Modification

- ✚ Shortening the length/height of the ventilation pipes (for water vapour removal) twice, speeded up the drying

process by 20%, increased the production efficiency, and reduced the energy consumption;

- ✚ New packaging technique in the atmosphere of inert gas (nitrogen), is more effective for long-term preservation of finished product and improved product marketability.

Emissions / Effluents

- ✚ Non-use of sulphur as fumigant eliminated the 37 kg/year emissions of SO₂ into the atmosphere;
- ✚ Non-use of caustic soda eliminated the discharge of 20 kg/year harmful effluents, and made possible to reuse for irrigation;
- ✚ Non-use of synthetic liquid detergents eliminated the discharge of 20 kg/year non-biodegradable organics, and made possible to reuse the effluents for irrigation.

Waste

- ✚ The unavoidable plant waste (stalk, peel, pit, seeds, pulp), is used as fresh forage for livestock.
- ✚ The kernel of apricots is used locally in confectionary;
- ✚ The pits / stones and other agricultural solid waste are utilized by composting.

Approach taken

RECP has chosen the following options for improvement of resource efficiency/use and cleaner production practices within "Agricultural Association Lukashin" Consumer Cooperative: prudent housekeeping, non-use of harmful materials and elimination of harmful emissions and effluents, reduction in the energy consumption by improving the process technique / equipment modification, utilization of waste and wastewater effluents and improvement of product marketability.

The RECP Demonstration Project in Armenia, besides the economic and environmental benefits, brought improvements in working practices and overall image of the pilot company. Moreover, assisted by the RECP experts, a concept-proposal for a follow-on project on high-cost RECP recommendations, namely, installation of three convective solar dryer and a solar water heater has been developed, to be implemented under GEF/UNDP Small Grants Program 2015. This successful case created a precedent for a RECP model that can be replicated in other dried-fruit-producer SMEs of Armenia, by disseminating the proven RECP practices and building capacities to bring in "green" production culture.



BUSINESS CASE “Agricultural Association Yervandashat” Consumer Cooperative

“Agricultural Association Yervandashat” started implementing cleaner production since 2011. In its RECP programme (2014), the pilot SME focused on water, material and energy efficiency. The RECP demonstration project achieved a provisional saving of about 80% per year (within one production cycle), improvement of environmental performance and product marketability.

“AGRICULTURAL ASSOCIATION YERVANDASHAT” CC*

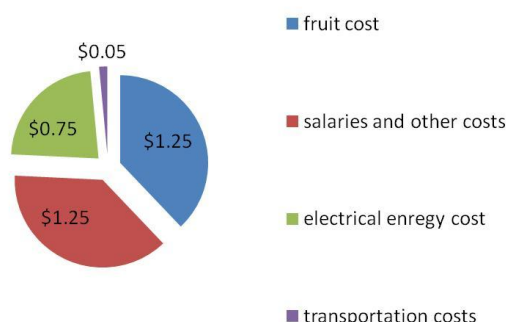
“Agricultural Association Yervandashat” CC was founded in April of 2005 as a community-based small enterprise of 42 farmers. Now it unites 124 community farms from Lukashin, Khandjan and Noravan communities of Armavir region, RA. The main intention and objective of the Association, is to support the member farmers to develop their economic activities, and resolve their legal, financial, social and technical issues. Dried fruit manufacturing process includes the following main stages: transportation of raw material, washing, processing, drying, sorting and packing. The cooperative owns 7 solar and 2 electric dryers located in the territory of Yervandashat.

Material and energy indices of the production

It should also be noted that the company operates in a competitive environment with Turkish and Persian producers and survives only due to high quality. Wholesale price of dried apricots Turkish and Persian manufacturers is about 2 USD/kg, while the cost of production of the cooperative exceeds 2.80-3.30 USD/kg. The cost price of 1kg final product according to data of cooperative:

- ✓ Fruit cost – 1.25 USD,
- ✓ salaries and other costs - 1-1.25 USD,
- ✓ transportation costs - 0.05 USD,
- ✓ electrical energy costs 0.5 – 0.75 USD depending on the product type.

Assessment of the cost of production



Thus, the cost ranges from 2.8 to 3.3 USD/kg.

* Lead Expert: Mkrtich Jalalyan, Support Expert: Artur Tsughunyan

During the years of average yield the cooperative possesses large volumes of raw material. However there are limitations of production capacity and product storage areas.

The solution of these two issues will enable the cooperative to have sufficient reserve for producing during the whole year.

During the production process no waste is generated, fruit stones are being sold; the water used for washing the fruit is used for irrigation.

AREAS OF IMPROVEMENT

Several critical aspects have been considered to implement RECP, among others:

- ✓ Reduction in water and energy consumption by improving efficiency of irrigation system, and modification of electric dryers
- ✓ Improvement of product marketability.

The RECP results to be achieved through implementation of the following measures:

Energy and water

The technology of dried fruits production is not energy consuming. Electrical energy is mostly used by electric dryer, which discharges from 40°C to 75 °C humid air.

For this reason it is necessary to construct a trunking from aluminum sheet (40x40 cm) which connects the output of the hot air with cold air at the inlet and deliver it to the convective heat from the vehicle (in which the water circulates 10-12 °C), and a container for accumulation of condensate. Investments make USD 350 for two electric dryers. Energy savings is about 75%, or 4 725 kWh/year electrical energy. Annual savings are about 4 725 kWh/year*0.097125 kWh/USD, which is about 460 USD, The simple payback period is 0.8 years.

Cooperative owned orchards irrigated via furrows using 8000 m³ of water per year:

Implementation of drip irrigation (4 600 m rubber hose, 3.5 m³ and 6.5 m³ tanks) for irrigation of about 650 trees on three acres of apricot orchards require about 65 m³ (a total of 100 litres of water per tree) of water per week, but in fact is used by more than 400 m³ water. As a result, both water and electricity consumption will be reduced by about 85%. Investment: rubber hose is about 800 USD and tanks are about 750 USD. Energy savings is about 83%, or 3 700 kWh/year of electrical energy. As a result, 3 700 kWh * 0.097125 USD/kWh annual savings, amounting to about 360 USD, and the simple payback period is 4.3 years.

Taking into account that the operation of an electric dryer is held on 48 hour schedule (including night), and that it is cheaper to pump water into the tanks at night.

It is recommended to purchase and install two-tariff meter and to use electric equipment at night, which will lead to additional financial savings. Investment of about 125 USD. Installation of a two-rate meter will allow to save 2375kWh/year*0.025 USD/kWh = about 60 USD/year. Simple payback period is 2.1 years.

Materials

- ✚ Flavored water from electric dryer (condensation) may be used for the purpose of sale (manufacture of perfumes) etc.
- ✚ Stored water (about 6 700 m3) can be used, for example, for water supply, fisheries, irrigation and other purposes.

Approach taken

As a result of RECP assessment the company has benefited from reduction in water and energy consumption by improving

efficiency of irrigation system, and modification of electric dryers. Options regarding improvement of product marketability, development of the side products (flavored water to be used in manufacture of perfumes), as well as alternative use for water for supplying other industries were suggested. Besides the economic and environmental benefits mentioned above, the RECP programme brought improvements in working practices and overall image of the company.



BUSINESS CASE MARILA LLC

“Marila” LLC started implementing cleaner production in 2014. Within the RECP programme, the pilot project focused on water, material and energy efficiency, and improvement of production technique to reduce energy, water and raw material consumption, recycling of waste and reduction of greenhouse gases emissions. The RECP demonstration project can provide a saving of about 20% per year and improvement of environmental performance. The RECP pilot project at “Marila” LLC will result in the increase of efficient use of resources by the company leading to cleaner production with less environmental impact.

- ✓ Waste recycling
- ✓ Improvement of market assessment

The RECP results to be achieved through implementation of the following measures:

Energy

- ✚ Sensors should be set up on lamps to reduce electricity consumption for general lighting by about 20%.
- ✚ Operations of refrigerators should be improved to ensure savings in both electricity and natural gas consumption during heating season.
- ✚ There should be provided thermo isolation and light hole covering of the exterior wall to reduce electricity consumption by about 6500 kWh.
- ✚ Thermo regulators should be installed on the radiators of the heating system. Possible annual savings are about 10% of consumed thermo energy.



MARILLA LLC*

“Marila” LLC is based in Kapan, Syunik region, Armenia. It was established in 2010. Since then, “Marila” has been one of the most demanded and successful diary and meat production companies in Armenia. The

company pays lots of attention to the quality of the product, and has set up high standards of operations. 70% of “Marila: dairy products, such as matzoun, cheese, curd, sour cream, milk and tan are consumed in Syunik region, and the rest 30% in Yerevan.

Dairy production was chosen to conduct RECP study within this pilot project.

AREAS OF IMPROVEMENT

The following critical aspects have been considered to implement RECP:

- ✓ Elimination of harmful emissions
- ✓ Reduction in the energy consumption through equipment modification
- ✓ Prevention of water and raw material loss through equipment modification and introduction of new technologies

Water

- ✚ Water recycling systems were studied in order to propose a water recycling system for recycling water that is consumed for production purposes (including cleaning the system). However, those systems are quite expensive and return on those investments the company can have only after 10 years, which does not sound reasonable for “Marila” LLC yet.
- ✚ Through modification of the production equipment, 210 liters of water will be saved per year. The same recommendation of modification will also prevent loss of raw material from the production system (refer to the recommendation under ‘Materials’)

Materials

- ✚ 25 200 liters/year loss of raw milk will be prevented through modification of production equipment.

Waste

- ✚ The packaging of dairy product is made with plastic bottles (matzoun, tan, milk, and sour cream) and materials (cheese). Plastic recycling is done in Armenia, but it is not well regulated, and therefore inefficient. Thus, the

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consumption of dairy product leads to huge amount of waste. Replacement of plastic packages with ecological cleaner packages should be considered;

- ✚ “Marila” LLC should be seeking cooperation with a company to do recycling of plastic the factory in Kapan in order to avoid sending plastic into waste dumps.

Emissions

- ✚ The amount of reduction of greenhouse gases emissions as a result of recommendations on energy efficiency is 8.37 tons.

Market assessment

- ✚ Implement detailed consumer market analysis based on returned product data and coordinate the results with Kapmat Company. The study should also include transportation conditions by Kapmat and storage conditions at stores. It is desirable to find a second company for cooperation to avoid consumption downturn and financial damage led by the return of product.

Technology change

- ✚ There is a loss of final product (matzoun, sour cream, and milk) during packaging phase. Thus, the packaging system should be replaced with a more efficient one.

Approach taken

RECP assessment has suggested the following options for improvement of resource efficiency/use and cleaner production practices within Marila company: elimination of harmful emissions, reduction in the energy consumption through equipment modification, prevention of water and raw material loss through equipment modification and introduction of new technologies, waste recycling options, improvement of market assessment. Company could potential improve co-operation schemes and its marketability trough the reduction of waste and unitization to be reduce the loss of produce (matzoun, sour cream and milk).



BUSINESS CASE UNIFISH LLC

The administration of “UNIFISH” LLC fish farm provides a significant interest to the results of analyzes implemented in the fish farm by the experts of RECP project as well as to the suggestions about the economy of resources: particularly water, food, electricity consumptions, shrink of organic waste and raising of profit. The raising of embezzlement of food due to stabilizing of oxygen saturation of water and possibilities of weight growth of fish has been substantiated by the experts as well. Due to mentioned activities and as a result of food economy the profit of UNIFISH can be additional 95t of fish and saving of electricity equal to 17.448.6 US dollars. The oraanization has started



UNIFISH LLC*

Fish farm “UNIFISH” is the biggest fish farm in Armenia. The farm was constructed in 2006-

2007 and soon, in a few years, it has become well known not only in Armenia, but also in many countries.

The company realizes production, processing and selling of fish food, sturgeon and trout, eggs, fingerlings, brood stock.

“UNIFISH” LLC is a unified system consisting of 4 hatcheries for fry breeding and 2 facilities for rearing fish and brood stock of different species. It accommodates 396 basins. Water supply is realized by means of 29 artesian wells. Water temperature in the wells is constant from 14-18 C and does not dependent on weather conditions. This allows a year around operation of the farm. The production cycle begins with egg incubation, which is grown to fingerlings. A portion of the fingerlings is sold as a primary material to other fish farms; the rest is sorted by weight and grown to the commercial size. Before commercial farming, sturgeon species are echo-scanned for separating males and females. Males are grown to the commercial size while females are kept for black caviar production.

The company has also a processing facility, after which the fish product is frozen. The company uses sturgeon and salmon fish feeds which are in compliance to the European certification. They do not contain biological stimulators and genetically modified additives.

* Lead Expert: *Evelina Ghukasyan*, Support Expert: *Bardukh Gabrielyan*

AREAS OF IMPROVEMENT

Several critical aspects have been considered to implement RECP, among others:

- ✓ The rise of food embezzlement intensity
- ✓ Economy of electricity consumption
- ✓ Economy of water consumption
- ✓ Shrink of organic waste

The RECP results to be achieved through implementation of the following measures:

Materials

- ✚ Place the fish in an automatic feeding system, which would increase the efficiency of assimilation of food to save a certain amount of feed.
- ✚ Fish processing of organic residues can be used in the production of compost as an organic component.
- ✚ The use of secondary waste will limit the volume of waste production.
- ✚ Fish processing organic residues can be used for combined food production.
- ✚ Re-use of water resources will contribute to the efficient use of natural resources.

Energy

- ✚ Installation of water oxygen saturation automatic recording devices in aquariums will allow working out air-conditioning equipment using the optimal regime for avoiding unnecessary energy use.



EXPECTED RESULTS

<u>Principal Options Implemented</u>	<u>Benefits</u>		
	<i>Economic, Savings USD/year</i>	<i>Resource Use</i>	<i>Environmental Impact</i>
The fish feeding regime optimization	Saved for the cultivation of commercial fish feed will be 126 tons per year, 105 840 000 AMD	Reduce the quantity of the used feed	Limitation of organic pollution in effluent waters
Reduction of work time of compressors	The saved electricity will be 194 000 kw / year or 7153920 AMD / year,	Electricity savings	Reductions in CO ₂ emissions

EXTENDS OF IMPROVEMENT

Mainly recommended the following RECP options:

- Consider selling of the organic residues originated from processing to poultry or pig farms (Non-cost proposal).
- Install dissolved oxygen concentration readers in aquaria, which will allow selection of the optimal feeding and aerating regimes (Low cost proposal).
- Install automatic feed dispensers and aerating devices, which will control the feeding process in accordance with oxygen saturation levels (High cost proposal).
- Move to water re-use system (High cost proposal)
- Establish compound feed production units which can make use of the residues from processing (High cost proposal).

Approach taken

The RECP Demonstration Project in Armenia, besides the economic and environmental benefits, brought improvements in working practices and overall image of the pilot company. Besides that, the implementation of suggestions will provide the decrease of fishery products price, the rise of fish growth rates, decrease in water discharge, and production growth due to embezzlement of photosynthetic oxygen in the pools.

PRODUCTION OF CONSTRUCTION MATERIALS

BUSINESS CASE “HATM” House Components Manufacturing Factory LLC

The REC experts conducted the RECP review of the “HATM” LLC (the former Armenian - American Housing Manufacturing entity) in 2014 with the purpose of identifying potential inefficiencies and losses in companies operations, and recommendation of potential improvements which may enhance the company’s economic and environmental performance, while cutting down operational costs and strengthening their competitiveness.

“HATM” House Components Manufacturing Factory LLC*

“HATM” House Components Manufacturing Factory LLC (the former Armenian-American Housing Manufacturing entity) of “Hayastan” All-Armenian Foundation was established in 1991 by joint efforts of the Government of Republic of Armenia and Armenian Assembly of America. Gyumri, as a most damaged area in the 1988 Spitak earthquake, was chosen as a place for construction of the enterprise. The goal was a production of the high quality and earthquake resistant construction materials for the Earthquake Zone. Block-producing and woodworking shops were formed and were provided with American and European equipments. From the very day of the start the enterprise has provided the construction companies not only in Shirak Marz, but also in other regions of Armenia with high quality construction materials. One of the main directions of production of the enterprise is considered to be the production of school, office and kitchen furniture. Elite furniture for apartments also produced here. Since 1999 HATM” Ltd. has been managed and controlled by Armenian Foundation, which has expanded the area of its work. The enterprise has also inculcated ISO 9001:2000 international standard of the system of the quality management.

AREAS OF IMPROVEMENT

The following critical aspects have been considered to implement RECP:

- ✓ Production Efficiency
- ✓ Environmental Management
- ✓ Human Development

SUMMARY RECOMMENDATIONS

Based on the assessment of resource use, waste generation, energy consumption and material balance (without in-depth

economic assessment), RECP review has recommended the following options:

Introduce overall good housekeeping with

- ✚ Metering of energy resources by production facility!
- ✚ Concentrating production, where possible, to compact space and limit heat demand
- ✚ Rethinking the need to occupy large spaces, potentially consider selling out, downsizing the space to limit the maintenance cost

Better process control

- ✚ Calibrate the electricity system to current operational facilities (eliminate the 250kVA transformer)
- ✚ Organize space by heating regimes (separate production and storage)
- ✚ Downsize administrative quarters occupancy to eliminate heat waste (700m2 houses 9 people, effectively utilizing 15-20% of space, but heating it completely)

Equipment modification

- ✚ Convert lighting and heating technologies to modern, energy saving, high efficiency solutions
- ✚ Convert the heating system to higher efficiency and smaller capacity while downsizing heated space

EXPECTED RESULTS

If the company implements only the low-cost and no-cost recommendations, the expected immediate results can be as follows

Reduce annual energy use and air emissions

- ✚ Reduce administrative heated space from 700m2 to 420m2 resulting in annual saving of AMD 1,700,000, and over 26 tons of avoided CO2 emissions per year
- ✚ Reduce energy waste of idle transformer run by 10,000kWh annually resulting in AMD 370,000 cost saving per year, and over 4 tons of CO2 emissions annually. This would allow reducing the greenhouse gas emissions per unit of output per production.
- ✚ More cost intensive measures starting from introduction of an energy accounting and management system to introduction of new heating and lighting technologies and space optimization can bring down companies resource use and GHG emissions by 30-40% and increase the competitiveness in the market efficiency will not suffice as there is need to advance company’s market position.

* Lead Expert: Astghine Pasoyan, Support Experts: Mkrtich Jalalyan, Artashes Tadevosyan

Approach taken

The HATM enterprise management was very enthusiastic about the received recommendations. As the company has downsized operations, the operational procedures have followed the same routine, which due to lost scale effect, has resulted in major inefficiencies. The Company management has started implementing recommendations and has seized some of the lowest cost opportunities first and foremost as a way to increase cost-competitiveness and reduce operational losses. Should affordable financing become available, the proposed

measures will help the enterprise not only improve resource efficiency and stem for cleaner production, but also improve economic viability of the firm. RECP assessment has suggested the following options for improvement of resource efficiency/use and cleaner production practices within HATM company: Improved housekeeping (metering of energy resources by production facility, to compact space and limit heat demand), improvement of energy efficiency within the building (downsize of administrative quarters occupancy to eliminate heat waste), equipment modification measures.



BUSINESS CASE “M&Mavr” OJSC

“M&Mavr” OJSC started implementing cleaner production and resource efficiency measures in 2014. In its RECP programme, the pilot SME focused material and energy efficiency, and enhancement of production technique to reducing the energy consumption, utilization of waste and elimination of harmful emissions and effluents. The RECP demonstration project achieved a saving of 5-10% of energy per year, improvement of environmental performance. The main activity of the company is the production of ceramic building materials, non-food products trade, architectural-design and construction



M&MAVR OJSC*

“M & MABR” was established in 1999 on the basis of Artashat Porcelain Factory operating since 1968. The main activity is the production of ceramic construction materials, sales of consumer goods, engineering-structural design and construction. The company is located in Artashat. The main production is ceramic tiles, blocks, heat-soundproofing materials. The average production capacity of tiles is 2,500000 pieces a year. Primarily, the production is used in the internal market and partially is exported to Georgia. Ceramic building materials production was chosen to conduct RECP study within this pilot project.

AREAS OF IMPROVEMENT

Several critical aspects have been considered to implement RECP, among others:

- ✓ Rational use of raw materials;
- ✓ Reduction of energy usage;
- ✓ Improvement of environmental indicators;
- ✓ Improvement of technical and economic indicators.

The RECP results to be achieved through implementation of the following measures:

Energy

- ✚ The raw materials should be stored indoors (closed areas) or under cover. In these conditions, if the humidity of the raw materials is decreased up to 5-10%, about 1000kWt/year energy will be economized.
- ✚ The heat of the exhaust gases after dryers should be sent to the storage of raw materials for additional drying.

Materials

- ✚ After dryers the dusty gases should be passed via bag filters in order to economize a great deal of raw materials.
- ✚ The amount of dust makes up to 0, 5-1, and 5% of it.

Technical and economic indicators

- ✚ Due to the great amount of clay reserves in Armenia it is necessary to find clay mines with required properties in order to reduce transportation costs.
- ✚ The equipment should be replaced with modern, automated ones.
- ✚ The production areas that will lead to the reduction of the use of energy and increase productivity should be thoroughly reviewed.

Environmental indicators

- ✚ The use of bag filters will greatly improve the state of atmosphere.
- ✚ Cutting and grinding of raw materials and defective products should be done indoors (closed areas) simultaneously cleaning the air from firm particles which make about 1-3%.
- ✚ After washing the production area the dirty water should be kept in the sump.

Approach taken

Applied production technology, includes practically all acceptable processes with high level of recycling of primary raw materials and with little waste or emissions, power consumption. The

* Lead Expert: Artashes Tadevosyan, Support Expert: Tigran Sekoyan

suggested RECP project methodologically helps the company both in the stage of design and performance to handle the problem of reducing waste, increasing the efficiency of the raw materials and energy usage resulting economic and ecological achievements. Namely reduction of pollution, waste,

improvement of technology, cutting and grinding process modification and sanitation improvement measures were recommended as a result of RECP assessment.



CHEMICAL PRODUCTION

BUSINESS CASE "Kashi" OJSC

"Kashi" OJSC started implementing cleaner production in 2014. In its Resource Efficient and Cleaner Production (RECP) programme, the pilot SME focused on water, material and energy efficiency, and enhancement of production technique to reducing the energy consumption, utilization of waste and reduction of harmful effluents. The RECP demonstration project achieved a provisional saving of 7% per year (within one production cycle), improvement of environmental performance and product marketability.



KASHI OJSC*

Since ancient times, Armenia was famous for tanning and leather making, manufacturing of colored goat-skin shoes, parchment-skin books and leather book covers. To hand down the millennial tradition, "Kashi" OJSC tannery, has been founded in 1894 by Gabrielian brothers, as Yerevan Tannery, which initially used semi-domestic technique for processing of 3000 hides annually. "Kashi" OJSC, in order to improve its productivity and performance, as well as to access international markets, has received financial support from the Government of Armenia and a number of international organizations.



Particularly, in 2005, the US Agency for International Development «Sustainable Water Resources Management for Enhanced Environmental Quality," and "Agribusiness Small Medium Enterprise Market Development (ASME)" two projects

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have jointly implemented by the company's modernization program, under which the wastewater treatment plant of tannery effluents was completely rebuilt and re-equipped, thereby reducing the potential negative impact of the leather production on the river Hrazdan hydro-ecosystem and other components of the environment. Operation of the effluents treatment plant also pursued another goal, namely, to provide opportunities for "Kashi" OJSC to have its stable position in international market, and to create sales opportunities for the semi-finished materials and finished products.

AREAS OF IMPROVEMENT

Several critical aspects have been considered to implement RECP, among others:

- ✓ Elimination of harmful emissions and effluents
- ✓ Reduction in the energy consumption by improving the equipment modification
- ✓ Utilization of waste and wastewater effluents treatment
- ✓ Improvement of product marketability

The RECP results to be achieved through implementation of the following measures:

Energy

- ✚ Replacement of old inefficient boilers with modern energy efficient gas-fired hot water boiler;
- ✚ Installation of solar heaters (collectors), on the roof of production shops, for receiving of 50-60°C hot water to be used in various leather-treatment processes, which will lead to significant annual savings on gas and electricity by 20%, and thus reducing the cost of semi-finished product. Taking into account the average monthly electricity cost of 700,000 AMD, the annual saving will be about 1,680,000 AMD (\$4,097). The average monthly cost of 80.000 AMD for gas consumption will fall by 15,600 AMD, which will bring to annual savings about \$460.

Water

- ✚ The only technical water source for industrial use is the shallow groundwater well (pump-fed). Water consumption volumes are not metered in the plant. Payment is made at the fixed rates for deep-well abstraction, established according to legislation of the Republic of Armenia;

- ✚ The commissioning of the effluents treatment plant became crucial in terms of joint efforts for promoting the economic growth and resolving of environmental problems, thus being a replicable wastewater treatment model for similar industries in the region.

Materials

- ✚ Selling the raw-materials residues such twice-used salt and leather shaving, thus significantly reducing the amount of waste subject to disposal. Salt and leather shaving can be used as a food additive in livestock farms, and for producing organic fertilizers (compost) respectively;
- ✚ Small quantities of the twice-used salt can be provided to the municipality service for cleaning the streets to combat against snow build-up and icing in winter.

Waste

- ✚ Processing of the raw material residues (waste), primarily fats and grease, for producing of natural liquid soap, which can be used in cosmetics and medicine.

Production Technique / Equipment Modification

- ✚ Production of two types of finished products from the 4-mm raw leather:
 - 1.5 mm thick finished leather,
 - 2.5 mm thick suede / chamois.

Approach taken

RECP assessment has suggested the following options for improvement of resource efficiency/use and cleaner production practices within “Kashi” company: elimination of harmful emissions and effluents, reduction in the energy consumption by improving the equipment modification, utilization of waste and wastewater effluents treatment, improvement of product marketability (replacement of old inefficient boilers with modern energy efficient gas-fired hot water boiler facility, selling the raw-materials residues such twice-used salt and leather shaving, thus significantly reducing the amount of waste subject to disposal, development of secondary product line using waste residue from leather processing for liquid soap produce).



RECP National team

EaPGREEN



Partnership for Environment and Growth



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