# *Experience of Renewable Energy Sources use in Uzbekistan*

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**Athens, October 2010**

# Introduction

- Renewable Energy Sources (**RES**) applications **are currently widely discussed** in the Central Asian countries

- In this presentation a brief overview of the RES policy and experience of RES usage in Uzbekistan is presented through the example of an on-going RES project financed under a Europe Aid programme

- This project involves an integrated approach through the use of various RES technologies for sustainable development, creation of jobs and improvement of living conditionsin Kamar village of Shahrisyabz region in Uzbekistan

# Brief overview of the RES policy and projects in Uzbekistan

- **Since eighties** there are a number of important scientific and research institutes in Uzbekistan involved in development of various applications on the basis of RES.

  Leading Research Institutes in the field of RES are:

  - The Institute Phisika-Solntse (Phisics-Sun)
  - The Physical Technical Institute

- There are a few industrial enterprises that started production of RES equipment, such as:

  - Kurilishgelioservcice LLC
  - Zenit,
  - Foton
  - Algorythm

# Brief overview of the RES policy and projects in Uzbekistan

Since 2000 some demonstration projects were implemented with participation of international donors

- **Lessons learned as a result of RES implementation projects:**

1. The majority of the territory of Uzbekistan is considered as territory with wind speeds lower than 3-5 m/sec. However there are some areas which possess quite high wind energy potential
2. Solar energy is not a feasible source of energy in Uzbekistan. Nevertheless, **there are some policy measures that could change the situation** and make solar energy more attractive

# Brief overview of the RES policy and projects in Uzbekistan

***Suggested policy measures:***

- *Development of legal basis and initiatives for* ***participation in Clean Development Mechanism***
- *Cooperation with donor organizations for* ***development of RES technologies affordable by local consumers***
- *Increase of awareness among entrepreneurs about emerging opportunities*

3. Uzbekistan possesses quite big resources of gas, however, it is important that measures directed at gradual introduction of solar systems in district and water heating as well as energy supply from RES installation at the remote locations can free additional amounts of gas for export

# Brief overview of the RES policy and projects in Uzbekistan

- **Barriers for RES Implementation in Uzbekistan:**

1. Low prices of conventional energy sources and existing power and fuel balance in the country
2. Lack of legislative support
3. Low purchasing power of population
4. Lack of financing and absence of investors interested in investing in these technologies
5. Absence of a united coordinating state body responsible for RES development in the country and lack of information and public awareness

# Description of the on-going RES project

The Kamar Project is different from other projects, as it is aimed not only at demonstrating of the possible technical solution for operation of RES equipment in a remote village, but it attempts to introduce an integrated solution for improvement of life conditions in the whole village

The partial provision of electricity from RES to the village will enable the development of economic activity and increase in employment that will lead to the improvement of living standards, and will ensure sustainable economic growth and the reduction of poverty

The use of RES will also have beneficial effects on the levels of health, and potentially education and literacy of the local population and will also contribute to the protection of the environment

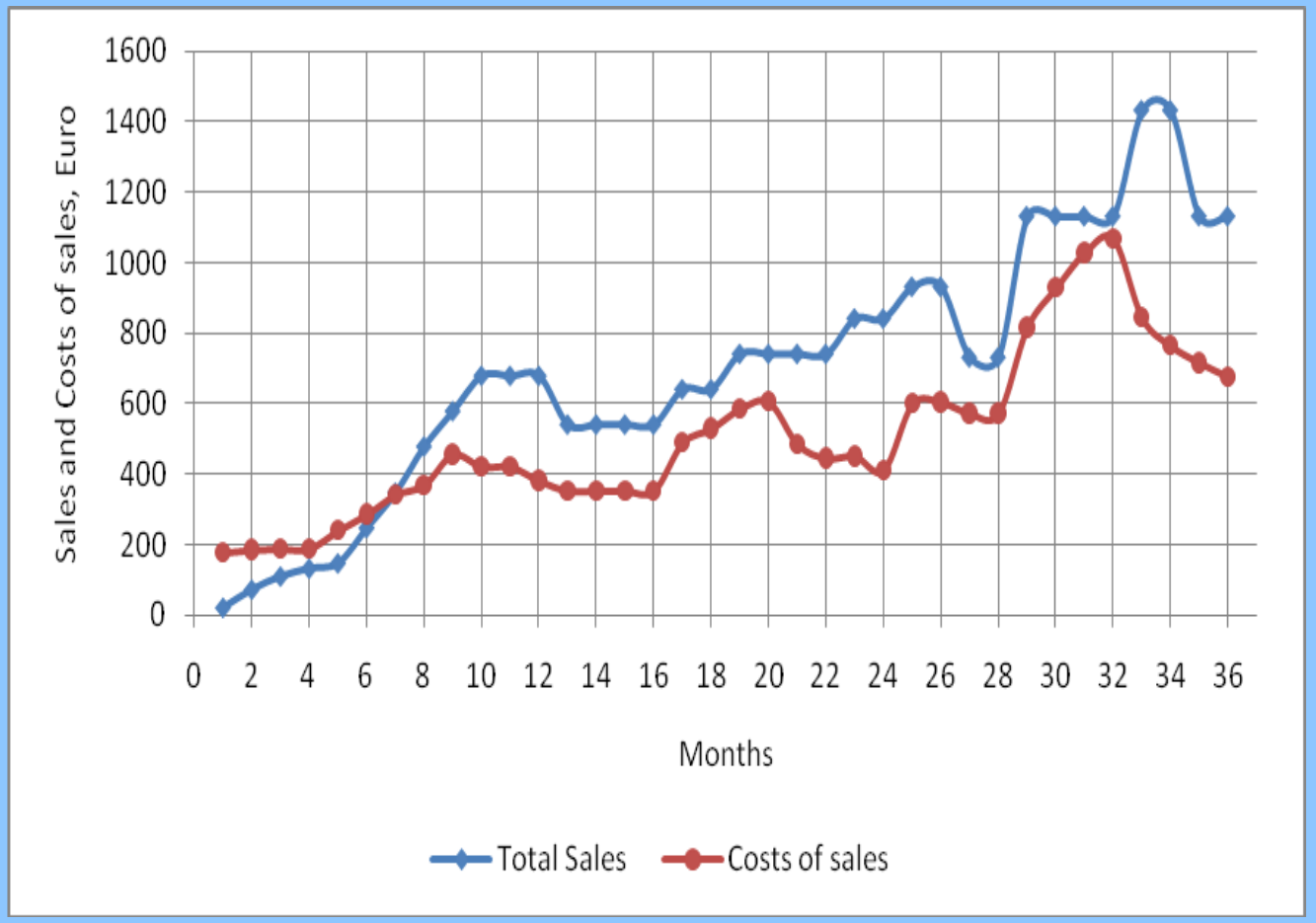
A Cooperative has been created on the 11th of March 2010 which functions under the auspices of the Administration of the Kamar Citizens General Meeting (AKCGM) and received the RES equipment from the project and concluded individual contracts with the members (small enterprises or cooperatives) on the targeted use of this equipment

# Investment needs for the Cooperative start up

| Investment | Amount Euro | Sources of funding |
|---|---|---|
| **Total start up investment** | **85,300** | |
| Full members | 2,000.00 | |
| Dried fruits production | 1,000.00 | costs of equipment covered by the cooperative members |
| Photographic shop | 300.00 | |
| Hairdressers | 100.00 | |
| Sewing workshop | 500.00 | |
| Phone payment point | 100.00 | |
| Legal/professional fees | 40 | paid by the project for one month involvement of a local legal expert |
| Equipment | 60,000.00 | provided by the project |
| Equipment Installation | 20,000.00 | |
| Associated Members | 2,700.00 | |
| Bathhouse | 1,000.00 | pre-establishment costs of repairs/construction and others are covered by the members/owners; legal/professional fees are included in the costs for full members |
| Canteen | 500.00 | |
| Vegetable oil production | 300.00 | |
| Flour mill | 400.00 | |
| Fertilisers | 500.00 | |
| Additional cash for covering first six months deficit | 560 | Was secured prior the start of operations of the Cooperative |

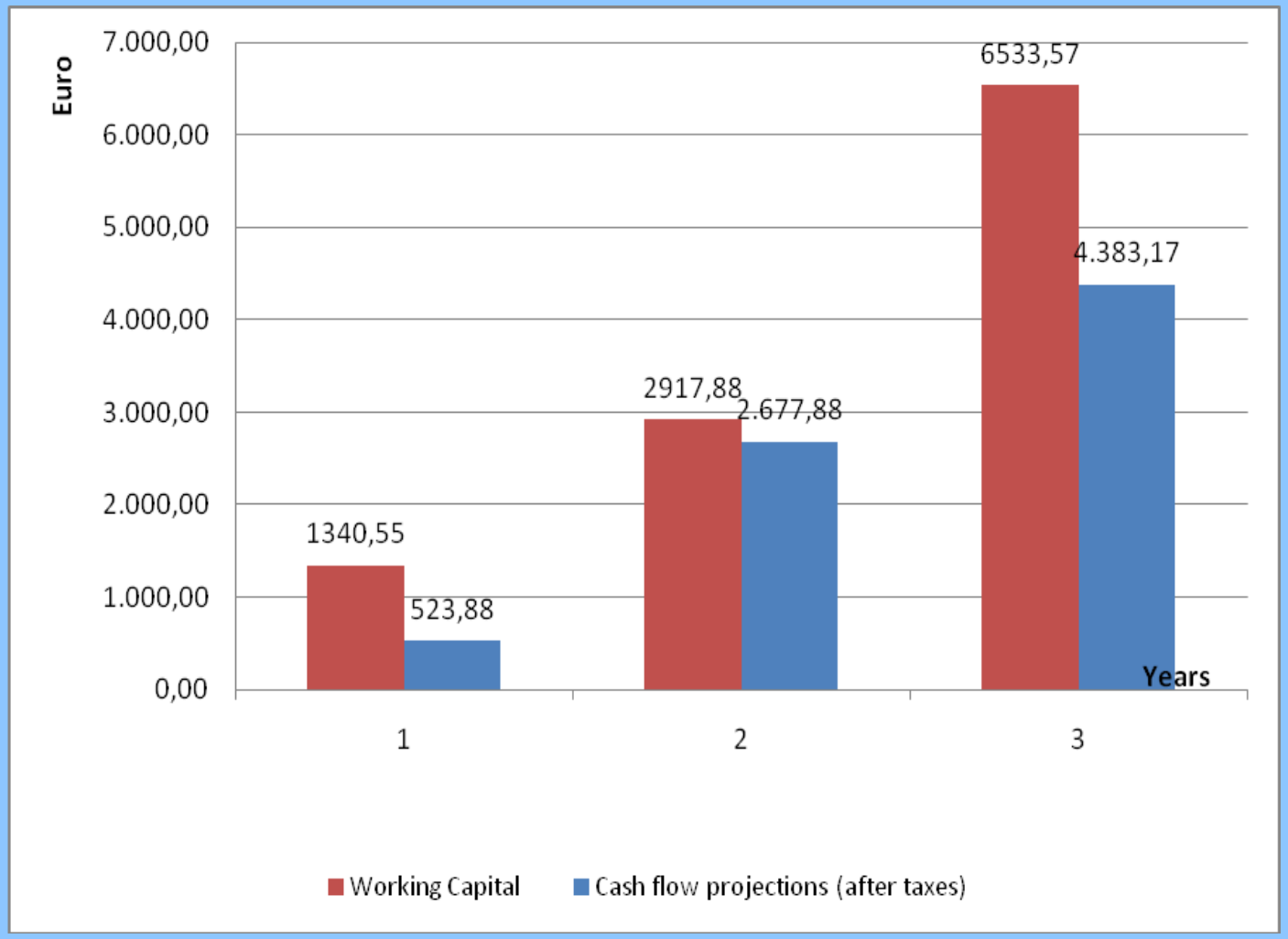
# Projected financial and economic results for the Cooperative

*Monthly Sales and Costs of Sales of Kamar Cooperative for the first three years*



# Projected financial and economic results for the Cooperative

***Kamar Cooperative working capital and cash flow projections for the first three years***



# Energy production from the RES installations

| RES technologies | Capacity | No of units | Average annual electricity production |
|---|---|---|---|
| **Micro hydro power plant** | 10 kW | 1 | **51,840 kWh** |
| **Solar photovoltaic systems** | 0.16 kW | 23 | **6,182 kWh** |
| **Wind-driven generators** | 1 kW | 2 | **7,200 kWh** |
| **Solar water heaters** | 500 liters<br>200<br>100 liters | 1<br>1<br>1 | **2,400 kWh** |
| | | | **Annual saved equivalent electricity use for cooking** |
| **Small biogas plants** | 3 $m^3$/day | 10 | **64,800 kWh** |

# RES installations and their impact on Climate Change

| Electricity Production from RES | |
|---|---|
| **Annual Avoided Electricity Consumption from Grid** | **Annual Avoided $CO_2$ Emissions** |
| **67,622 kWh** | **46 metric tons of $CO_2$** |

| Heat Production from SBPs | |
|---|---|
| **Annual $CO_2$ Emissions from 10,800 $m^3$ of Biogas use** | **Avoided $CO_2$ Emissions from equivalent use of Electricity** |
| **17,3 metric tons of $CO_2$** | **44,04 metric tons of $CO_2$** |

# Specific Technical, Economic and Environment Protection Related Conclusions

## *Technical*

- Due to budget limitations the selected equipment does not cover completely the existing energy needs in Kamar village. The selected RES installations are used in parallel with the existing problematic electricity supply grid. The project is a good demo site where the advantages of RES utilisation in the rural areas can be demonstrated fully.

- The installation and operation of RES is at the final stage and proper conclusions will only be possible after the equipment are monitored for a year or so. For that reason the cooperation with Tashkent State Polytechnic University has been secured. The results of the monitoring are important, because **this is the first example of sustainable use of practically all RES technologies in a rural area of Uzbekistan**.

# Specific Technical, Economic and Environment Protection Related Conclusions

***Economic and social***

- With the additional electric power from RES the quality of life of inhabitants of Kamar is improved and new working places are created boosting the business development.

- With start of operation of biogas installations the sanitary conditions should be improved drastically.

# Specific Technical, Economic and Environment Protection Related Conclusions

***Environment protection***

- With RES technologies in full operation in Kamar village, 67,622 kW will be saved annually along with the estimated annually avoided $CO_2$ emissions of 46 tons.
- With SBPs a renewable source of energy (biogas-methane) is captured, which has an important climatic twin effect:
  - Reduction the $CO_2$ emissions through a reduction of the demand for fossil fuels as well as branches of trees, bushes, leaves and dried dung.
  - By capturing uncontrolled methane emissions from dung the second most important greenhouse gas (methane) emissions are reduced.
- The SBPs in the ten households with an annual production of 28.8 tons of bio-fertilizer result to a considerable reduction of $CO_2$ emissions from the avoided production of chemical fertilizer.

# The overall Conclusion

- ✓ The RES installations in the Kamar village have shown that **are not feasible from the conventional economic point of view**; however, the social needs, sustainable development and environment protection issues are strong enough arguments that can help find the solutions to the economic problem.