

Renewable energy projects Urgench State University (Uzbekistan)



Olimjon Saidmamatov

Lecturer, Urgench State University

Economist, Khorezm Electric Power Company

The Basin, its climate and the biogas challenge



1) Biogas Production from Agricultural Wastes in the Aral Sea Basin

- Funded by REPIC (Renewable Energy Promotion in International Cooperation)
- Project duration: 2016-2018

Location specifics:

- Continental cold arid desert climate
- Mean annual temperature **13.4°C**
- 320 sunny days per year
- Agriculture oriented region

Objectives

- ✓ Environmental degradation and its impact on population welfare
- ✓ Diminishing access to energy (natural gas and electricity)
- ✓ Limited public awareness of low-emission technologies
- ✓ Low adoption of biogas technologies by farmers
- ✓ Humble technological knowledge

Project phases

- 1) Evaluation of the local situation:** agricultural production, local needs, energy supply, local industry
- 2) Evaluation of local technology producers** and definition of best adapted biogas production system
- 3) Implementation and pilot testing** of three to five biogas systems
- 4) Dissemination** of the gained experience

Field-trip to farms

- Situational analysis and data-mining trips to livestock famers



The solution must be:

- **Practical:** manure is mixed with stones and sand in stables
- **Flexible:** organic wastes are heterogeneous (solid, dry, liquid, mixed with inorganic...)
- **Well isolated:** it is a sharp-continental climate zone
- **Simple and cheap:** farmers have limited technical knowledge and finances.

Bottlenecks

- **Sedimentation and clogging**
- **Temperature fluctuations** due to poor insulation
- **Very short retention period**
- **Extensive water use** (CO₂ production rather than methane)
- **Air-compressed loading of the biomass**
- **Poor circulation and mixing in the digester**

Options under revision

a) enhancement



c) Plug flow



b) Container solution



Future plans on biogas technologies:

- **Course on biogas production for engineers**
- **Launch a competence centre**
- **Pilot-run of the selected option**
- **Handbook of biogas introduction for farmers**
- **Bio-fertilizer can be a new business for livestock farmers to install biogas plants**

2) Hybrid Wind-Solar Water Desalination in Aral Sea basin (project development stage)

- Continental cold arid desert climate
- Mean annual temperature **13.4°C**
- 320 sunny days per year
- Total mineralization = 1800 mg/liter
- Ground water toughness =
- 10-25 mg / liter
- Water salinity 10-fold increase (from 10 to >100 g)
- Hydrogen parameter pH = 8.5

Local needs:

- 1) Clean water** with low level of salinity
- 2) Green energy** generated from solar – wind power in a decentralized way
- 3) Socio-economic model** – choosing the best matching technology to ecological conditions of Aral Sea basin

Current experiments:



Chemical Technology faculty, Urgench State University

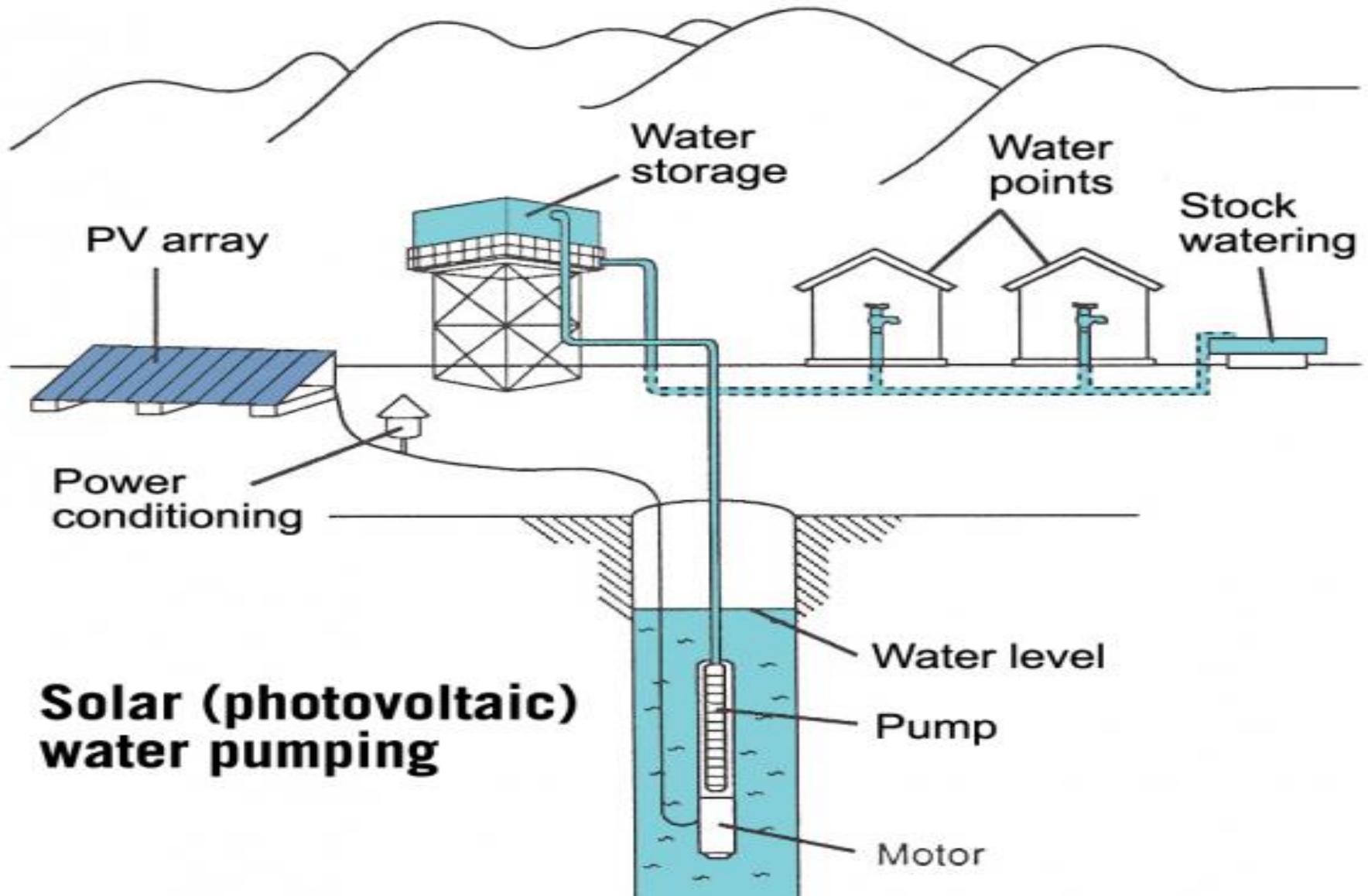
Research specifics

- **3 step desalination process**
- **36 litres/hour ground water desalination**
- **sediments, salts, microbes are removed**
- **Salinity decreases from 20 to 1 mg-eq/l**
- **Easy to apply in households**
- **wind-solar energy should be integrated with ground water pump**

Objectives:

- Development of **technically feasible** and **economically viable** solar water desalination systems
- **Evaluation** of the technology screening in a global/local market
- Contributing to **capacity building** in adaptation and use of **solar energy technologies**
- Establishing **water kiosks** in rural communities in **Aral Sea basin**

Options under revision



Impact

- **Clean drinking water for community**
- **Increased human well-being in rural communities**
- **Tackles medical diseases resulting from ecologically un-clean water**
- **better socio-economic life conditions**

Expectations:

- **Course on water-energy nexus for engineers**
- **Launch a competence centre of groundwater desalination**
- **Pilot-run of the selected options**
- **Laboratory of energy efficient technologies**

Project partners:



Urgench State University

Thanks for your attention !