

Feasibility study of the use of hybrid alternative energy systems in mountainous regions of Azerbaijan



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- There are large potential of energy efficiency in all economic sectors of Azerbaijan.
- The activities to improve energy efficiency and energy saving in agriculture should be focused on:
- Introduction of modern energy efficient technologies in all spheres of agriculture
- Upgrading of pumps and electrical equipment on irrigation and drainage systems
- Application of renewable energy technologies to use waste material (biomass) to supply electricity and gas demand of local population



Development of Azerbaijan's Legislation and Regulation Basis Relating to Renewable Energy Sources and Energy Efficiency:

- Regulations proposed for solar energy use
- Calculation of smoke protection systems for residential and commercial buildings
- Building automated management systems
- Automated single house water heating and hot water supply nodes in exchange for the centralized nodes. Standards for design
- Ventilation of hot shops in catering enterprises
- Air change norms for residential and public buildings
- Regulations on the methods and rules of energy efficiency increasing in transport



- Guidelines for the rating of economic efficiency of heat supply investment project
- Apartment heating units in multicompartment buildings
- Technical regulation proposed for increasing energy efficiency and safety of the apparatus operating with fuel gas
- Fuel gas consumption norms for a unit of electrical and heating energy
- Conditional signs for engineering design of heating, ventilation, and conditioning systems of modern buildings
- Complex intelligent systems for low-rise buildings and cottages



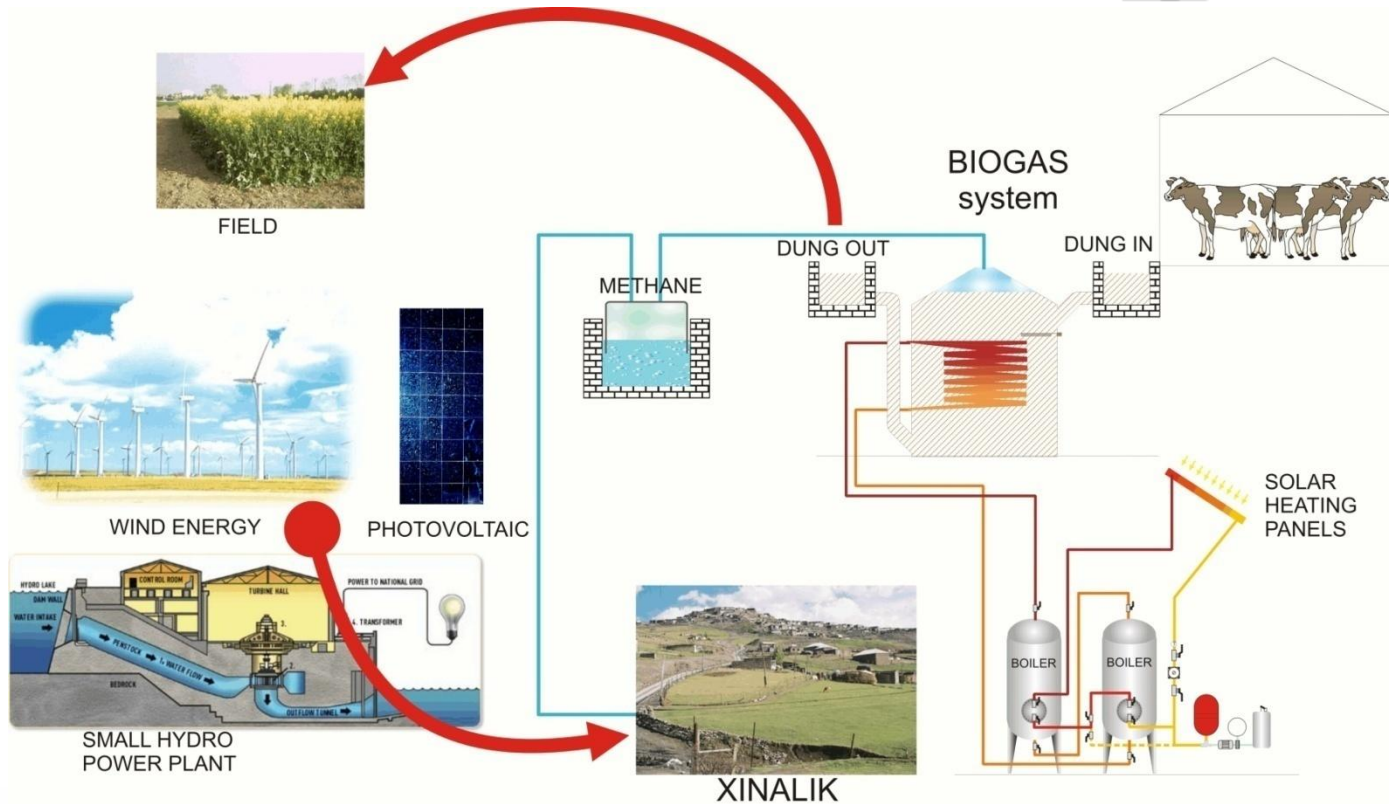
- Terms and definitions used in the legislation related to wind energy development
- Regulations on heat consumption calculation for existing residential buildings
- Regulations proposed for energy performance of buildings
- Regulations proposed for solar energy plants
- Methods proposed for energy consumption calculation of buildings
- Regulations for the increasing of energy use efficiency and energy resource saving



- Introduction of hybrid energy (solar –biomass, solar-wind and wind-biomass modules) systems to supply local electricity demand
- Increasing the employment and utilization of capacities in the introduction of renewable energy technologies
- Attraction of local funds to purchase energy efficient equipment, materials and technologies.
- According to expert estimates, 30938 thsd. tons of CO₂ and 875 thsd. tons of CH₄ can be annually reduced through application of renewable energy technologies in agriculture



Flow diagram of energy model for agricultural regions



Project goal

- Based on the Decrees of the Azerbaijan Republic's President Ilham Aliyev "On the measures of acceleration of social and economic development in the Republic of Azerbaijan" from 2003 and "About the use of alternative and renewable energy resources" from 2004 to supply energy demand in rural regions using alternative energy resources



- **Work scope:**
- Preparation of technical task
- Installation of wind modules
- Preparation and construction of solar modules
- Preparation of accumulator block
- Performing solar and wind modules' tests
- Choice and location of biogas plant
- Location and connection of solar heaters to a general system
- Construction of one small hydro power plant (SHPP) with two turbines on a small river
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- **Project duration:** 12 months



Project budget

	Alternative energy resource	Cost (AZN)
1.	SHPP (1.5 MWt)	4.000.000
2.	Wind power plant (0.2 MWt)	2.000.000
3.	Solar photovoltaic (0.1 MWt)	1.000.000
4.	Biogas plant (500 m ³)	500.000
5.	Solar water heating system	400.000
6.	Transport expenses	200.000
7.	Project preparation, feasibility study	405.000
	Total cost	8.505.000



**THANK YOU FOR YOUR
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