

SOLAR AND BIOGAS RESOURCES AS ALTERNATIVE ENERGY SOURCES

Application for agricultural
development and rural
revitalization

AGRICULTURE — QUICK FACTS

Irrigation water transportation and pumping expenses

- 21% of electricity is used by agriculture sector (*IEA, 2017*)
- 4 billion cubic meters of water – 2 billion kWh – **180 UZS/m³**
- About 70% of UzMWR expenses corresponds to electricity used by pump stations (*Khamraev, 2011*)

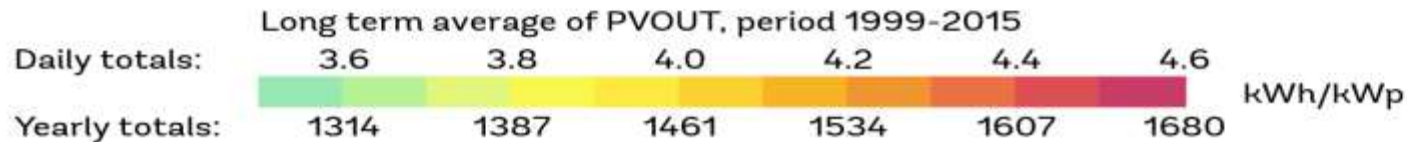
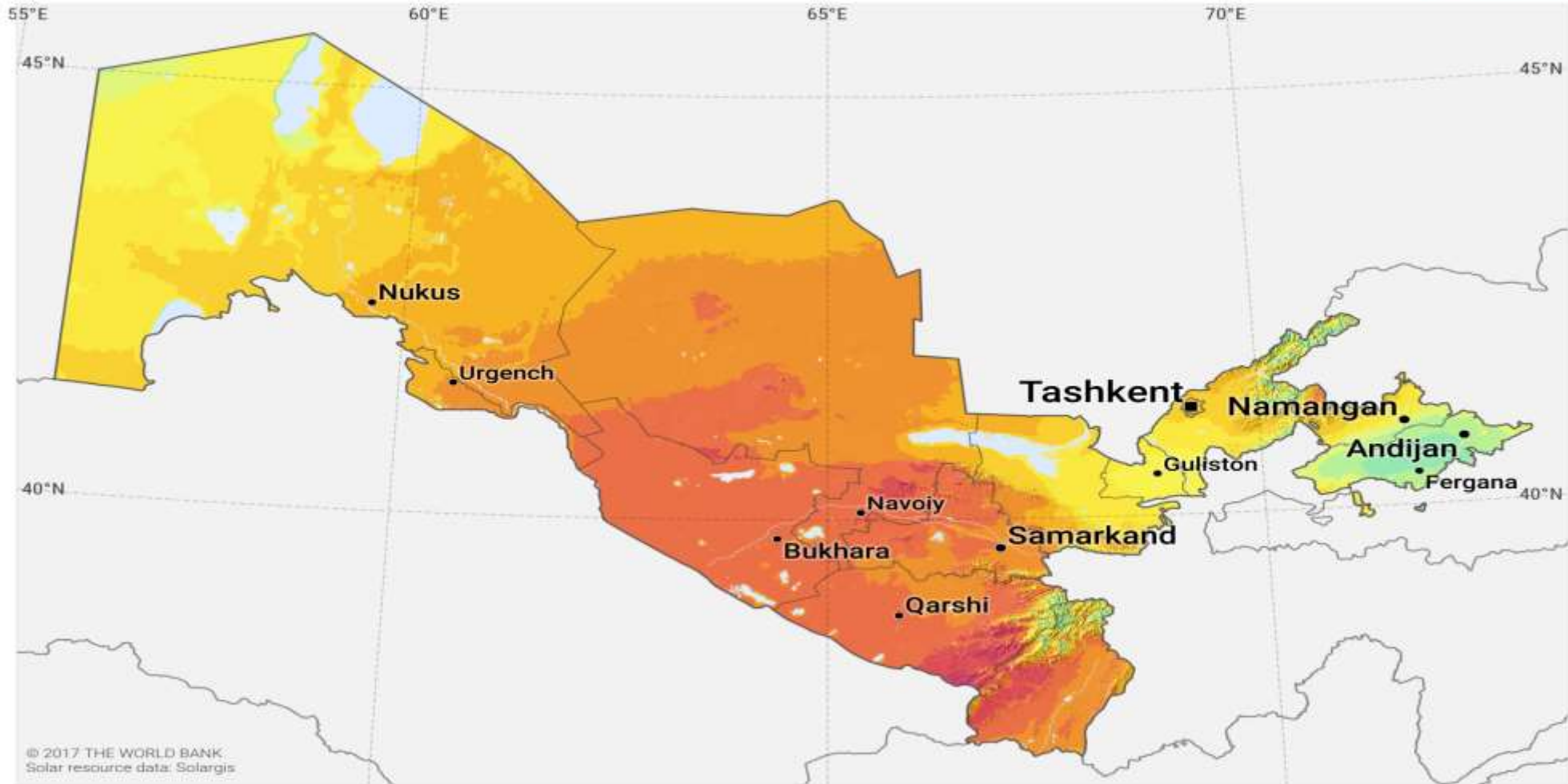
SOLAR-PV POWERED PUMPING

SE Asia – India

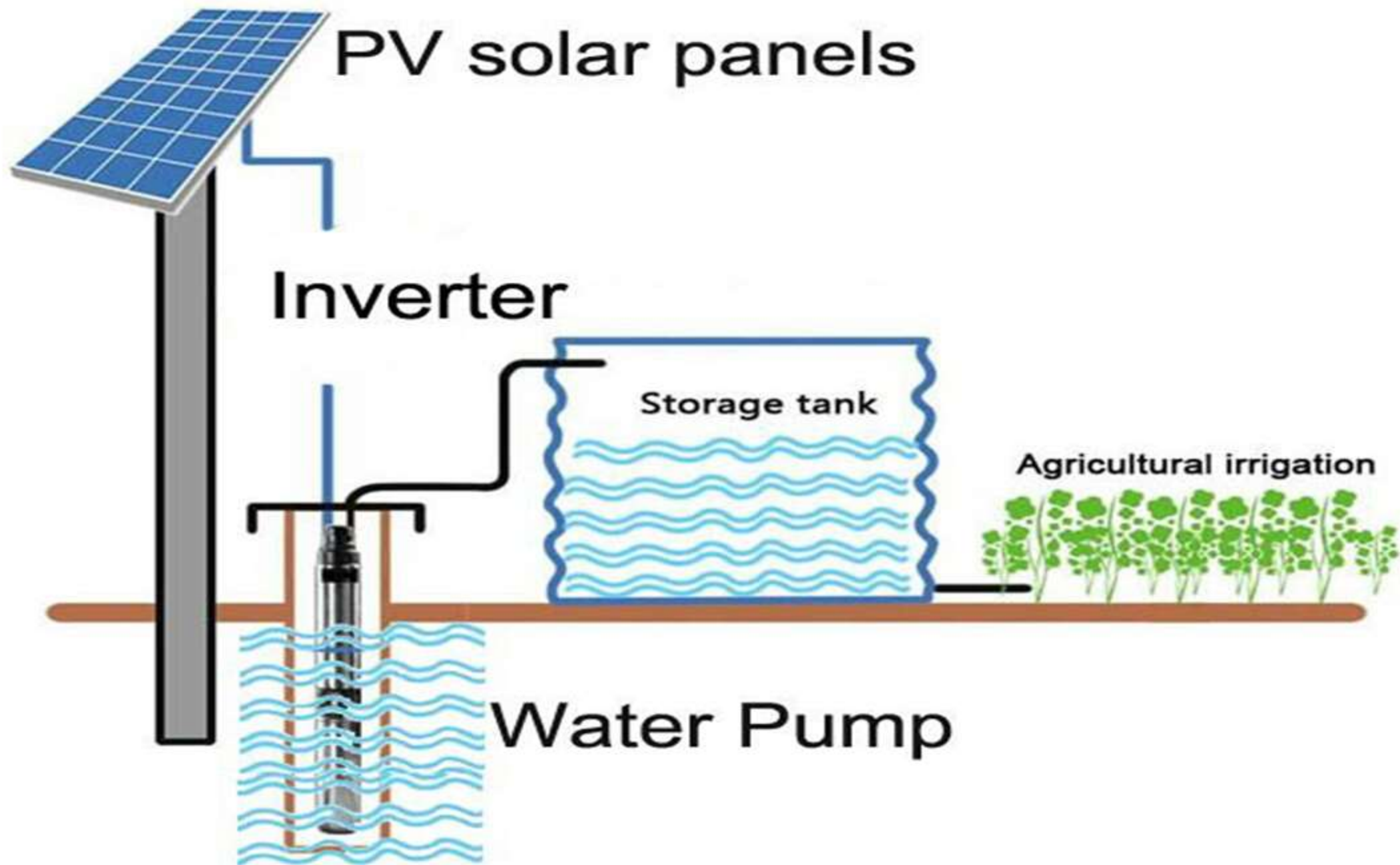
- Mid 2000ies
- Peasant farmers
- Small plots
- Donor funded



PHOTOVOLTAIC POWER POTENTIAL UZBEKISTAN



system



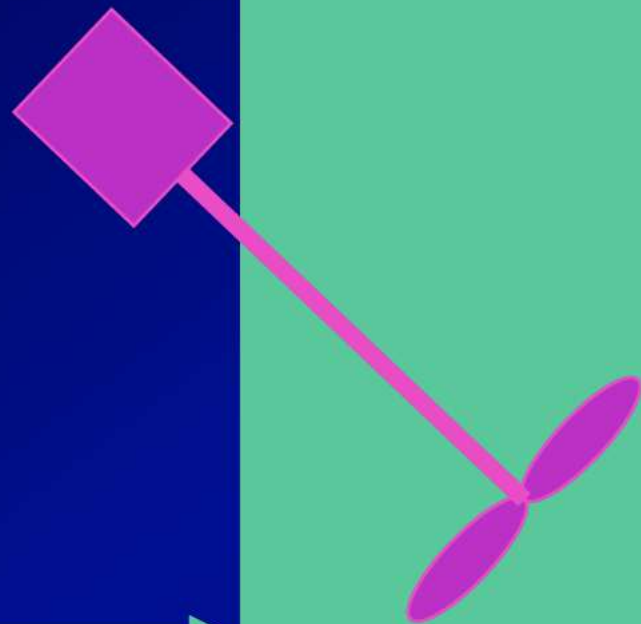
ECONOMIC ESTIMATIONS AT A GLANCE

Complete 10 kWp solar irrigation system	10000
Pump	2500
Reservoir	4000
Transportation	1000
Operations	2400
Project manager	1000
TOTAL	USD 20900

For 15-20 ha orchard with max 60 m deep-pump water lifting requirement, solar-PV system investments breaks-even when distribution grid extension is 3-5 kilometers.

input.

input



biogas



output



output

DRY BATCH DIGESTER



ECONOMIC ESTIMATIONS

Year	Capital invest.	O&M	Total exp	Gas (c.m./year)	Gas price (USD/c.m)	Gas price factor	Revenue
1	17706	2580	20286	19710	0.04	0.1	788.40
2	60	2580	2640	19710	0.04	0.15	867.24
3	60	2580	2640	19710	0.05	0.15	997.33
4	510	2580	3090	19710	0.06	0.15	1146.92
5	1260	2580	3840	19710	0.07	0.15	1318.96
6	60	2580	2640	19710	0.08	0.15	1516.81
7	60	2580	2640	19710	0.09	0.15	1744.33
8	510	2580	3090	19710	0.10	0.15	2005.98
9	60	2580	2640	19710	0.12	0.15	2306.88
10	1260	2580	3840	19710	0.13	0.15	2652.91
11	60	2580	2640	19710	0.15	0.15	3050.84
12	510	2580	3090	19710	0.15	0.15	3050.84
13	60	2580	2640	19710	0.15	0.15	3050.84
14	60	2580	2640	19710	0.15	0.15	3050.84
15	1260	2580	3840	19710	0.15	0.15	3050.84
16	510	2580	3090	19710	0.15	0.15	3050.84
17	60	2580	2640	19710	0.15	0.15	3050.84
18	60	2580	2640	19710	0.15	0.15	3050.84
19	60	2580	2640	19710	0.15	0.15	3050.84
20	1710	2580	4290	19710	0.15	0.15	3050.84
			77496				45854.18

SOCIAL BENEFITS OF BIOGAS



OTHER RURAL RE PROJECTS

- residential application of solar-thermal systems and solar-PV systems
- resource saving and energy efficiency in agriculture
- aquaculture
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