

Business plan

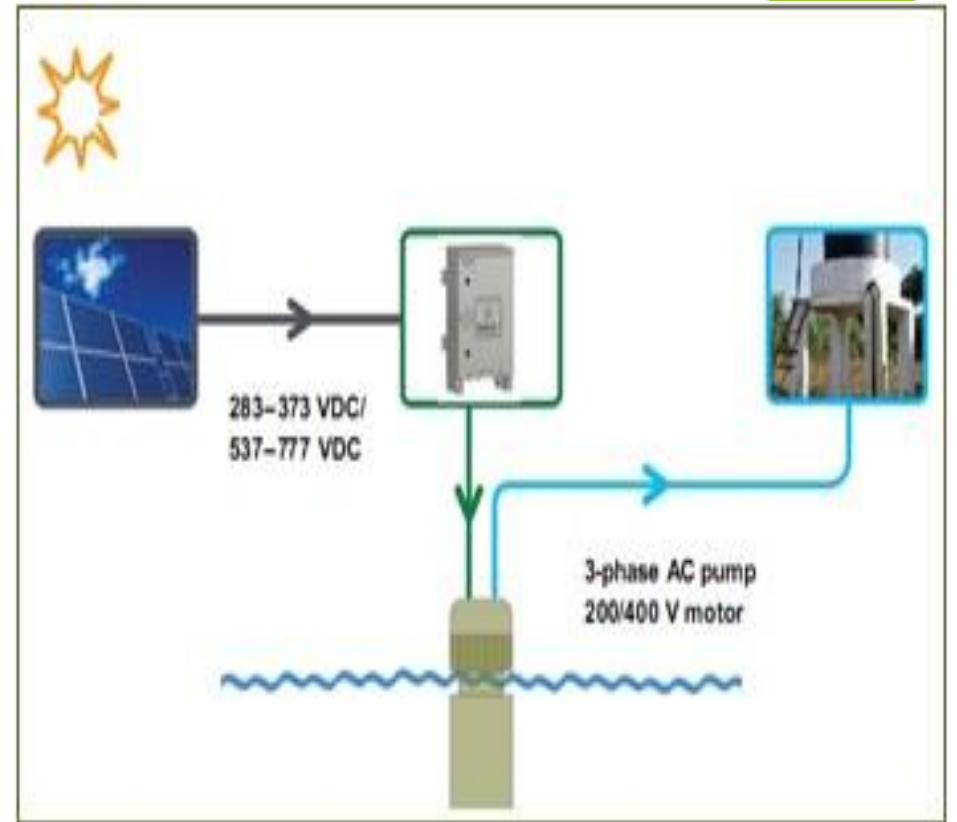
Presented by:

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AgroSolar Ltd.
(A limited company
Business plan in
Bangladesh).



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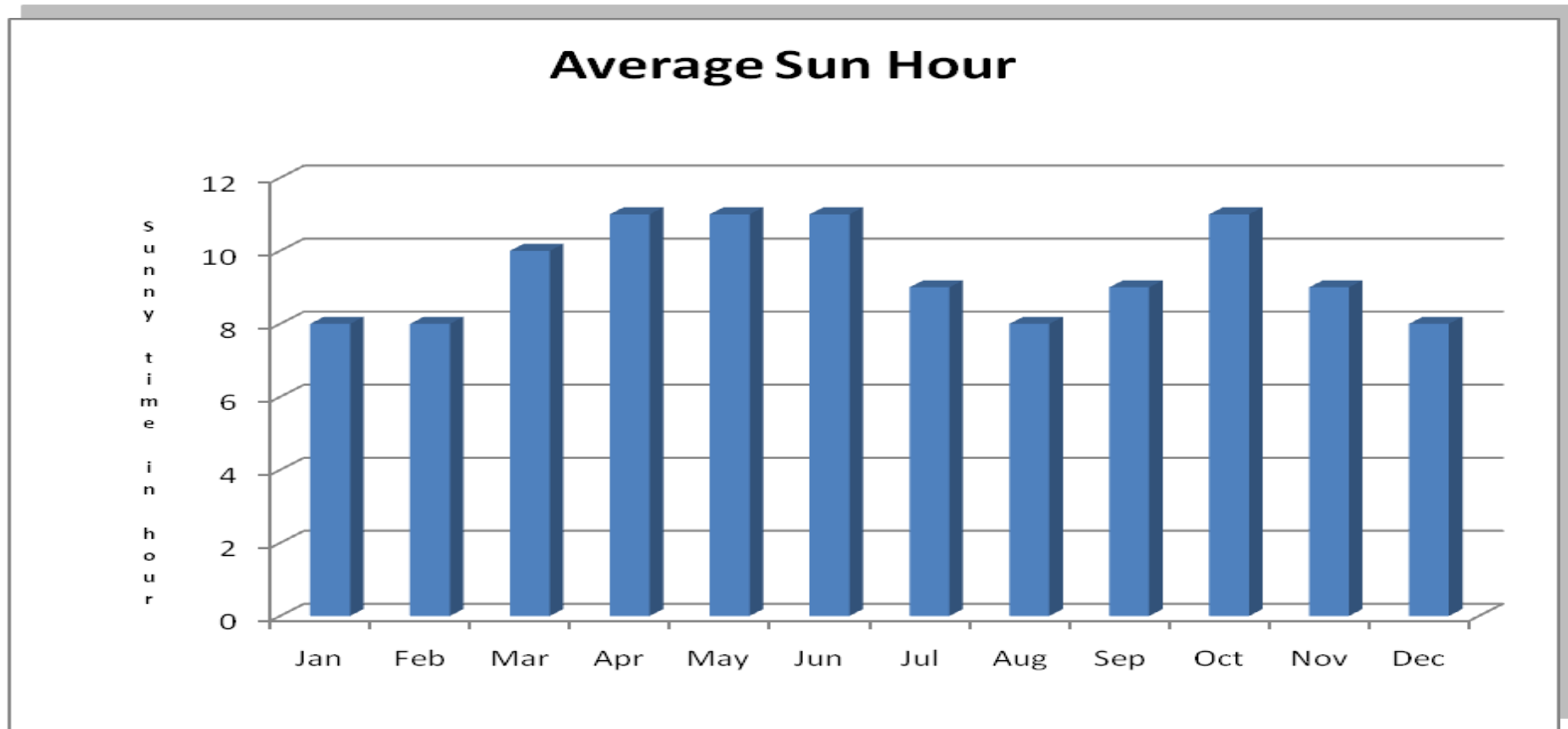
Company VISION

- ▶ “To obtain profitability and sustainability by replacing the convention irrigation means of agricultural system depending on diesel and electricity, with renewable means of solar pumping system, ”.

Market Analysis

- ▶ Bangladesh has suitable average annual solar radiation intensity through out the country.
- ▶ High irradiation annual flux around 1830 kwh/m².
- ▶ Power supply demand for agriculture is 1000 MW out of which 20% is served by electricity and rest 80% is met by 1.158 million diesel pumps.
- ▶ Currently irrigation cost comprises 44% of production cost.
- ▶ Diesel prices have gone higher by 43% whereas subsidy from government is almost 10%.

Monthly average sun hours in Bangladesh



Irrigation cost by our system per hecter per year

- ▶ Flow rate of 7.5 HP pump = 70m³/hr
- ▶ Time required to fill 1 hectr to 15cm hight = $1500/70 = 22$ hrs
- ▶ Cost of the complete system (for 10 years) = 16500 euros
- ▶ Total working days of the system per year= 120 days
- ▶ Solar hours per day = 8
- ▶ So total hecter irrigated in one year by the system = $120/(24/8) = 40$
 $16500/40 = \mathbf{41\text{Euro/hectr}}$

Cost effectiveness and customer satisfaction

- ▶ Total rice production cost = **365.18** Euro/hectare/year
- ▶ Irrigation cost :
 - Diesel = **160.67** Euro/hectare/year
 - Electricity = **58.72** Euro/hectare/year
- ▶ Irrigation cost by our system = **41** Euro/hectare/year

Marketing strategy

Marketing will be done by the following means:

- For the new electric connection, there is new governmental law that 5% of the electric load should come from solar means of energy, so our marketing staff will be in contact with the electricity provider (DESCo/DPDC/PBS) and collecting information about new applicants of electricity connection from rural areas.
- IDCOL, a governmental financial organization, financing to many NGO to provide micro credits to the farmers to encourage them to install the renewable solar energy system. So our marketing staff may remain in contact with the NGO to find the information about the potential farmers willing to get new solar energy system.
- Our sales and marketing staff will visit “village to village” to spread awareness among the farmers.
- Workshops will be organized where farmers will be invited and there they can be made aware and motivated.

Expected growing market

- ▶ After the government has introduced a new regulation that new applicant of grid power connection will have 5% of load from solar energy system at the time of application, the market of solar energy pumping is expected to grow fast in near future.
- ▶ Central bank of Bangladesh (Bangladesh bank) and infrastructure company ltd (IDCOL) is financing more and more day by day on the sector of renewable energy to mitigate present energy crises and also to develop energy infrastructure in rural areas with indirectly providing micro credits to farmers. So in these consequences market for solar energy pumping system has chances to grow.
- ▶ Due to the energy crises by the power grid companies, there is frequent power cut off that is effecting the agricultural out put adversely. So the farmers are looking for some independent and uninterrupted energy solution. So solar irrigation system is a big hope to the farmers.

The Company

- ▶ Law: private company act (1994) of Bangladesh.
- ▶ Owner/owners: at least one.
- ▶ Minimum capital required : 250 Euro
- ▶ Liability: Limited .
- ▶ Incorporation: must be registered and approved by Bangladesh ministry of industries.
- ▶ Company name: the company name should be incorporated by one of the shareholders of the company or by the business object and in all cases must include the company form
- ▶ Accounting obligation: Yes.
- ▶ Management: at least one director.

Partners

- ▶ Muhammad Arif
- ▶ M. Nawfel Talukder
- ▶ Mohammad Sumon

Required Documents

- ▶ Memorandum and articles (constitution of company).
- ▶ Registration/joint stock company registration.
- ▶ Trade license.
- ▶ IRC and ERC certificates required for export and import.
- ▶ TIN and VAT/AIT certificate.
- ▶ Board of investment approval.
- ▶ Factory/warehouse inspection certificate from “Labor ministry”.
- ▶ No objection certificate from local area authority.
- ▶ Environmental certificate from Environmental ministry of Bangladesh.

Technological features and benefits



Features

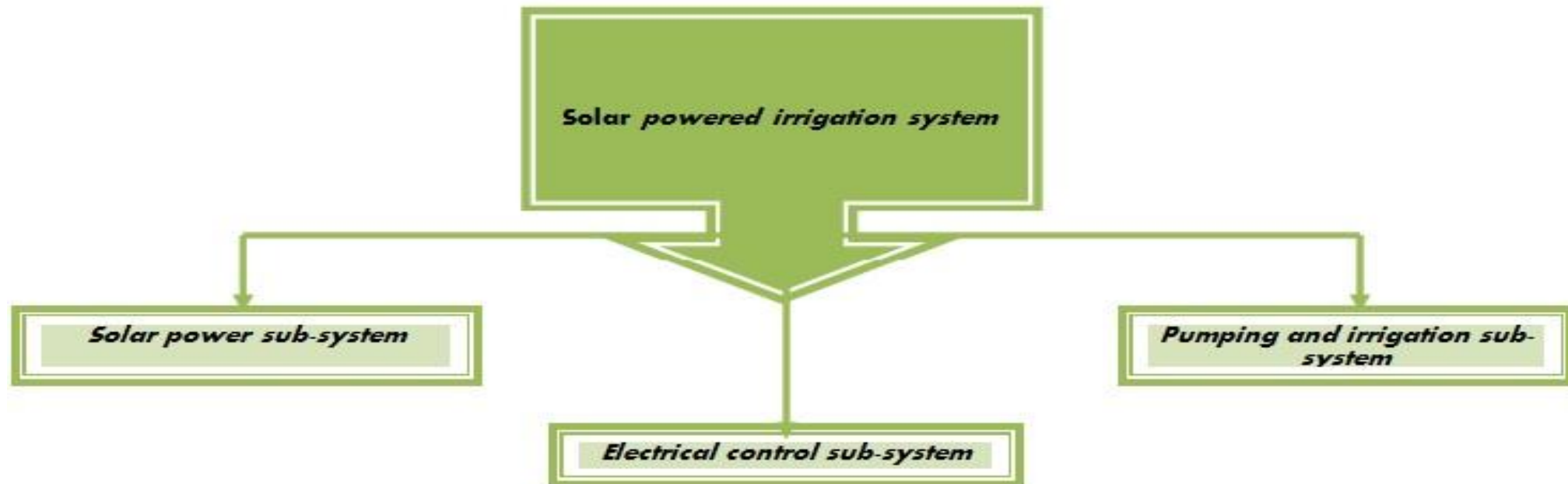
- Harvests maximum solar energy to run the pump for maximum duration in a day by controlling the speed of the motor based on the power available from the solar panel.
- Suitable for 1 HP to 7.5 HP surface mount and submersible pumps with 3-phase AC asynchronous motors.
- Need solar panel capacity 1.2 kW to 9.6 kW to drive 1 HP to 7.5 HP , 3-phase AC pumps for deep well and shallow well.
- Automatic start-run-stop through out the day with water level detection in the tank and pump overload and under-load protection,
- Simple and faster installation and commissioning with ready to use pre-wired solar drive enclosure.

Benefits

- Helps to provide water to the people who have limited access or no access to electricity.
- Existing pumps operated from grid supply can also be powered by solar panels using ATV312 Solar Drive.
- Women can save their time spent in collecting and transporting water. Farmers can irrigate their land using solar power instead of diesel generator,
- During rainy season or cloudy weather, the water pumping system can be powered by grid supply.
- Long term, environment friendly , economic solution with proven technology based on variable speed drive.

Technology

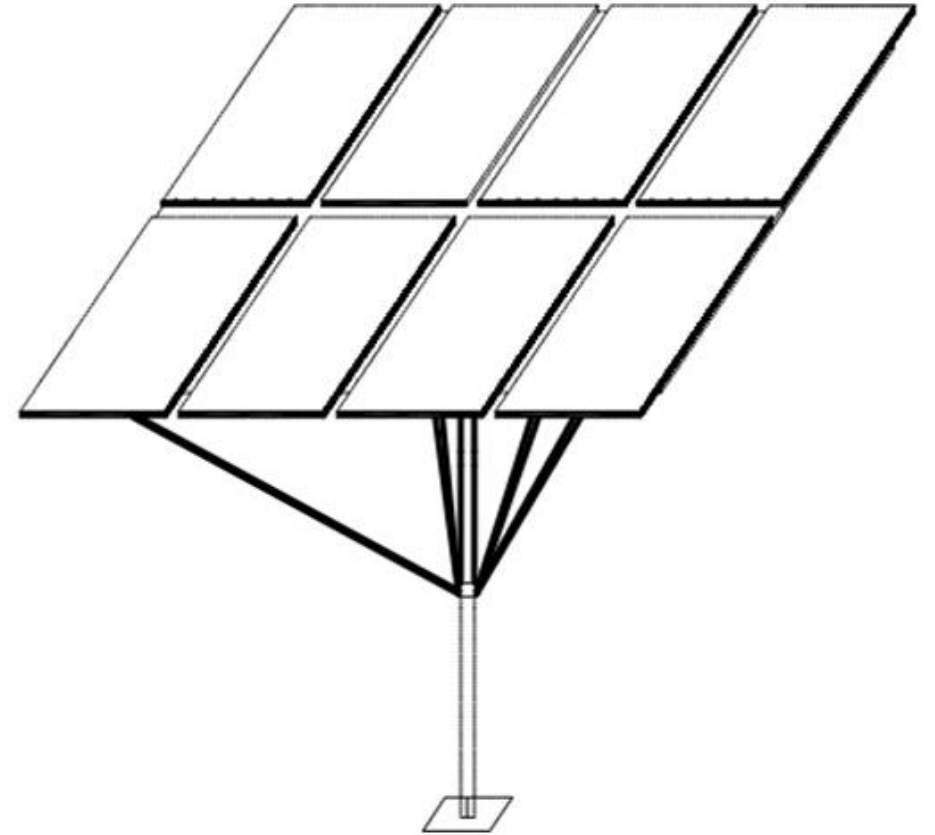
Pumping water using PV technology is simple, reliable, and requires almost no maintenance. Solar powered water pumping systems are similar to any other pumping system, only the power source is solar energy. The solar power irrigation system consists of three major sub-systems



Solar power sub system

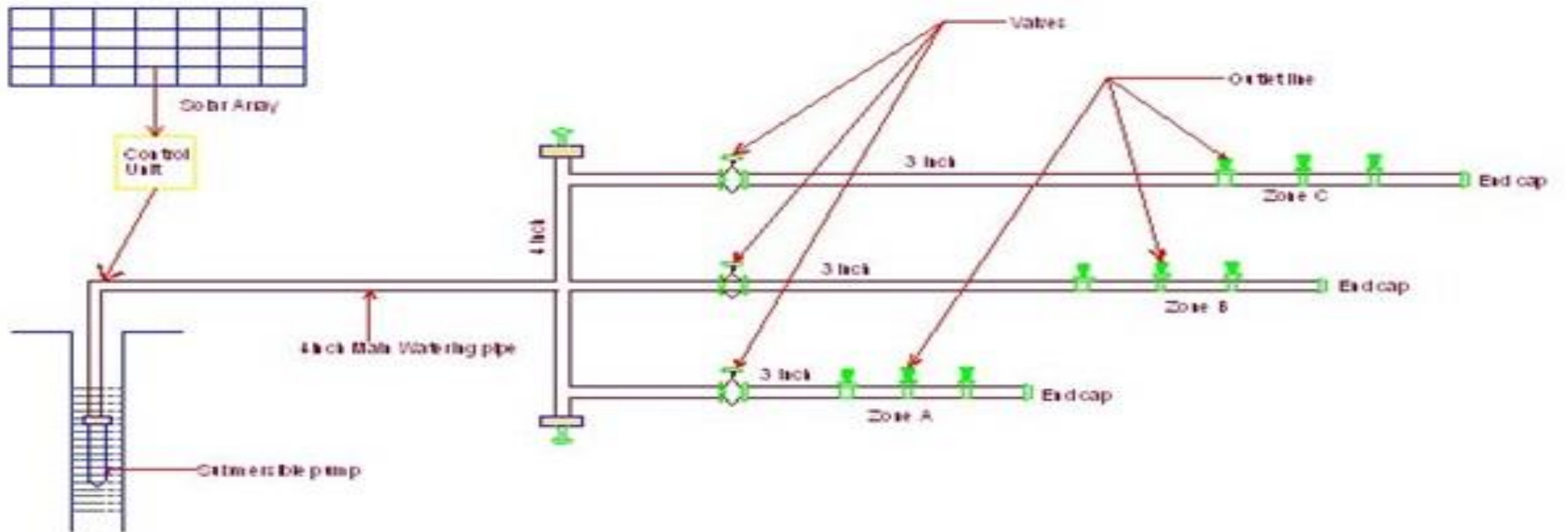
- ▶ The solar power sub-system contains only photovoltaic module or array of photovoltaic module and system is without battery bank.
- ▶ The PV panels generate electricity, which is transferred to electrical control unit.
- ▶ The panels are mounted on manual tracking frame structure where as the PV module can produce height amount of power to operate the pump from 7.30 am to 5.30 pm at summer as well 7.30 am to 4 pm at winter session.
- ▶ In order to get maximum sunlight intensity, the PV panels are oriented on manual tracker frame which can manually shifted 180 degree at X axis in order to produce height amount of power as well as height amount of water delivery per day.

Solar panel and its structure



- Schematic Structure of solar panel (can be rotated manually n 180 X-axis)

Solar power sub system



System compatibility

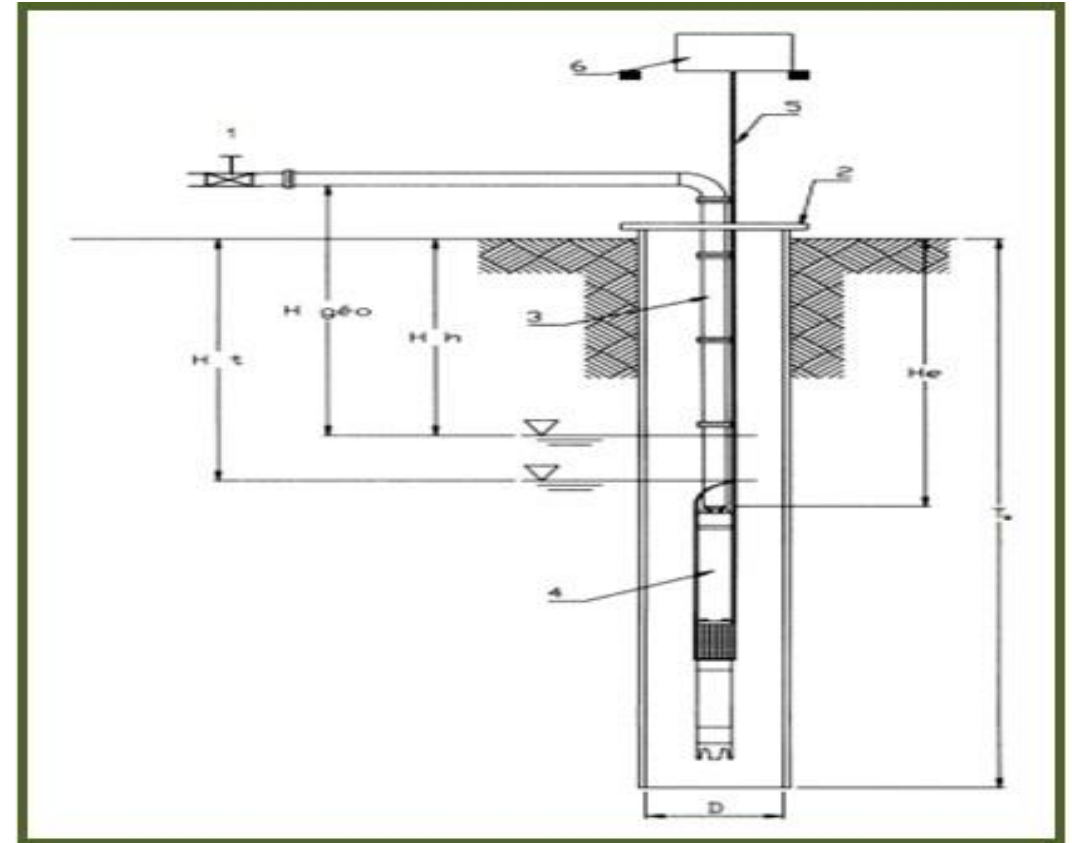
- ▶ Solar Water pumping system is compatible with both 200V and 400V, 3-phase AC motors.
- ▶ The pump can be either surface mount or submersible in the range 1HP (0.75kw) to 7.5 HP (5.5kw).
- ▶ The use of solar drive ensures improved system reliability, simplified pipe systems and reduced system maintenance.
- ▶ Water level Sensor is used only when the water is pumped to overhead tank.

Pumping and irrigation sub system

- ▶ The pumping and irrigation sub-system comprises a submersible pump, motor device, pump end, water tank, sprinklers and the associated water pipes.
- ▶ There is no more electronic device inside of the motor. The submersible pump, which is housed in a stainless steel case, is placed in a sump pit at the junction of the natural stream course.
- ▶ Pump end is centrifugal multistage direct-coupled pump end with non-return valve which ensures high expectancy of the motor and pump end unit.
- ▶ The submersible pump pumps water at a specified time period as set in the control unit.

Pumping and irrigation system

(submersible pump and its installation)



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Cost calculations

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Investment and depreciation cost

Description		Investments(Euro)	Depr.(Years)	Depr./Year(Euro)
Land Cost	Land for office	95000.00	0.00	0.00
	Land for warehouse	120000.00	0.00	0.00
	Registration fee(2%)	4300.00	0.00	0.00
	Dealer's fee(2%)	4300.00	0.00	0.00
Total Land Cost=		223600.00		

Investment and depreciation cost

Description		Investments(Euro)	Depr.(Years)	Depr./Year(Euro)
construction Cost	Building for office	75000.00	20.00	3750.00
	Building for warehouse	105000.00	20.00	5250.00
	Landscape	1850.00	20.00	92.50
	Drains	600.00	20.00	30.00
	Electricity connection+lighting	2450.00	20.00	122.50
	Exterior wall+gates	5800.00	20.00	290.00
Total Construction cost=		190700.00		9535.00

Investment and depreciation cost

Description	Investments(Euro)	Depr.(Years)	Depr./Year(Euro)
Company Foundation cost	Name uniqueness Varification fee	6.00	0.00
	Pay Stamp duty at a designated bank	25.00	0.00
	Approval from Board of Investment	35.00	0.00
	Company Registration fee	50.00	5.00
	Company Seal Approval fee	10.00	0.00
	Electricity Demand notice fee	60.00	5.00
	TIN and VAT crtficate	30.00	0.00
	Limited company Share Capital	20000.00	0.00
Total Construction cost=	20216.00		22.00

Investment and depreciation cost

Description	Investments(Euro)	Depr.(Years)	Depr./Year(Euro)	
Licenses Cost	Import/Export Licences	450.00	5.00	90.00
	Building construction Licences	80.00	0.00	0.00
	Trade licence fee	60.00	5.00	12.00
	Licence from Environmental department	185.00	5.00	37.00
	Quality assurance licence	380.00	5.00	76.00

Investment and depreciation cost

Description		Investments(Euro)	Depr.(Years)	Depr./Year(Euro)
Vehicle Cost	1 Truck	38000.00	5.00	7600.00
	2 Company Car	40000.00	5.00	8000.00
	3 Motorcycle	3000.00	5.00	600.00
Total Vehicle cost=		81000.00		16200.00
Description		Investments(Euro)	Depr.(Years)	Depr./Year(Euro)
Miscellaneous	Contingencies	11500.00	10.00	1150.00
	Furniture	3500.00	10.00	350.00
	Rack for warehouse	2000.00	10.00	200.00
	Tools	3000.00	5.00	600.00
Total Miscellaneous cost=		20000.00		2300.00

Investment and depreciation cost

Description		Investments(Euro)	Depr.(Years)	Depr./Year(Euro)
Electronics	Computers/Laptops	4000.00	4.00	1000.00
	Printer/scaner	1000.00	4.00	250.00
	Fire fighting system	4000.00	4.00	1000.00
	Cell Phone & land phone	500.00	4.00	125.00
Total Electronics cost=		9500.00		2375.00

Investment and depreciation cost

Description		Investments(Euro)	Depr.(Years)	Depr./Year(Euro)
Unexpected & inventory	Unexpected	50000.00	0.00	0.00
	warehouse inventory	122860.10	20.00	6143.01
Total=		172860.10		6143.01

Total investment and depreciation cost

Total Investment cost=	719031.10
Total Depreciation cost=	36790.01

Annual direct cost

Annual direct cost		Units	Cost
Labor Cost	Engineers	2.00	12000.00
	Sales Parsonnel	2.00	12000.00
	Technical	3.00	7200.00
	Driver	3.00	5400.00
	Peon	2.00	2400.00
	Security Guard	2.00	2400.00
Administrative Cost	Utility	1.00	4800.00
	Land Tax(define by per square feet)	1.00	3700.00
	Building maintenance	1.00	2000.00
Total Annual Cost=			51900.00

Unit cost of 7.5 HP solar pumping system

Material Description	Unit/Capacity	Qty	Unit Price	Total Amount
Solar Module	Watt	9450.00	0.65	6142.50
Pump Controller	7.5 HP	1.00	698.31	698.31
Pump	7.5 HP	1.00	1485.20	1485.20
Boring	Feet	80.00	12.00	960.00
Transport	set	1.00	150.00	150.00
Frame Structure	Set	9.40	150.00	1410.00
Cable	set	1.00	400.00	400.00
Administrative overhead	set	1.00	520.00	520.00
Service during warranty	set	1.00	520.00	520.00
Total Material Cost=				12286.01

Financing

Total Investment=	719031.10
Bank Loan(60%)=	431418.66
Venture Capital(40%)=	287612.44

Bank interest rate = 12%

Repayment period = 10 years

Repayment of bank loan

Year	Balanced Debt.	Interest Rate(%)	Interest Costs paid(p.y)	Repayment(p.y)
1.00	431418.66	12.00	51770.24	43141.87
2.00	388276.79	12.00	46593.22	43141.87
3.00	345134.93	12.00	41416.19	43141.87
4.00	301993.06	12.00	36239.17	43141.87
5.00	258851.20	12.00	31062.14	43141.87
6.00	215709.33	12.00	25885.12	43141.87
7.00	172567.46	12.00	20708.10	43141.87
8.00	129425.60	12.00	15531.07	43141.87
9.00	86283.73	12.00	10354.05	43141.87
10.00	43141.87	12.00	5177.02	43141.87
Total Interest Paid=			284736.32	
Total Repayment=				431418.66

Self costs per unit solar pumping system

	1.Year/Per System	1.Year	2.Year	3.Year	4.Year	5.Year	6.Year	7.Year	8.Year	9.Year	10.Year
Sales Percentage(%)	40.00	40.00	60.00	80.00	80.00	100.00	100.00	100.00	100.00	100.00	100.00
System Qty.	32.00	32.00	48.00	64.00	64.00	80.00	80.00	80.00	80.00	80.00	80.00

Cost	Cost Per unit system	Cost per Year	Cost per Year	Cost per Year	Cost per Year	Cost per Year	Cost per Year	Cost per Year	Cost per Year	Cost per Year	Cost per Year
Depreciation cost	1149.69	36790.01	36790.01	36790.01	36790.01	36790.01	36790.01	36790.01	36790.01	36790.01	36790.01
Financing cost	1617.82	51770.24	46593.22	41416.19	36239.17	31062.14	25885.12	20708.10	15531.07	10354.05	5177.02
Annual direct cost	1621.88	51900.00	51900.00	51900.00	51900.00	51900.00	51900.00	51900.00	51900.00	51900.00	51900.00
Material cost	12286.01	393152.32	589728.48	786304.64	786304.64	982880.80	982880.80	982880.80	982880.80	982880.80	982880.80
Sum of Cost		533612.56	725011.70	916410.84	911233.81	1102632.95	1097455.92	1092278.90	1087101.88	1081924.85	1076747.83
Cost Per unit system	16675.39	16675.39	15104.41	14318.92	14238.03	13782.91	13718.20	13653.49	13588.77	13524.06	13459.35

Calculation of cash flow, revenue and equity

Unit sales price=16500	1.Year	2.Year	3.Year	4.Year	5.Year	6.Year	7.Year	8.Year	9.Year	10.Year
Turnover/Revenue	528000.00	792000.00	1056000.00	1056000.00	1320000.00	1320000.00	1320000.00	1320000.00	1320000.00	1320000.00
Total cost	533612.56	725011.70	916410.84	911233.81	1102632.95	1097455.92	1092278.90	1087101.88	1081924.85	1076747.83
Profit before TAX	-5612.56	66988.30	139589.16	144766.19	217367.05	222544.08	227721.10	232898.12	238075.15	243252.17
Taxes(37,5%)	0.00	25120.61	52345.94	54287.32	81512.64	83454.03	85395.41	87336.80	89278.18	91219.56
Profit after TAX	-5612.56	41867.69	87243.23	90478.87	135854.41	139090.05	142325.69	145561.33	148796.97	152032.61
Cash flow(net profit+depreciation)	31177.44	78657.69	124033.23	127268.87	172644.41	175880.05	179115.69	182351.33	185586.97	188822.61
Repayment Credit	43141.87	43141.87	43141.87	43141.87	43141.87	43141.87	43141.87	43141.87	43141.87	43141.87
Dividend	-11964.43	35515.83	80891.37	84127.01	129502.55	132738.19	135973.83	139209.47	142445.11	145680.75
Total Dividend=										1014119.65
Equity	287612.44	287612.44	287612.44	287612.44	287612.44	287612.44	287612.44	287612.44	287612.44	287612.44
Interest on Equity	-4.16	12.35	28.13	29.25	45.03	46.15	47.28	48.40	49.53	50.65

Conclusion

- ▶ A highly cost effective product benefiting the farmer .
- ▶ A mega change is expected in agriculture of Bangladesh with high outcomes of sales resulting ultimately in high profit.
- ▶ Ideal and favorite solar irradiation conditions, will give high efficiency and quality.
- ▶ Venture capital is recovered after 5 years and total capital is recovered after 8 years.
- ▶ Due to quality and price/cost effectiveness, belief among customers is expected to grow and hence company value and sales will also be sustainable. So after 10 years, company business will continue with more profit.



THANK YOU