Business Plan

Hydropower plant Disi/Aqaba

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Project Description

- Construction of a medium scale hydropower plant (60 MW) along the Disi-Aqaba main water pipe line, benefitting from the elevation difference of 846m
  → 10–15 % of Aqaba city electrical domestic consumption

- Possible Users
  - Sea water desalination plant
  - Electricity company
  - Local rural farmers without electricity
  - Regional market (Saudi Arabia, Egypt, Israel)

Project Area

City of Aqaba

- Strategically located at the crossroads of three continents and a crossroads of four countries (Saudi Arabia, Egypt, Israel and Palestine).
- Located at Gulf of Aqaba/Red Sea
- Total population of130,000 people.
- Total water demand of 21 million m^3 p.a.
- Potable water is transported from the Disi aquifer (846m) Aqaba (NN).

Source: http://www.bugbog.com/maps/asia/jordan_map.html

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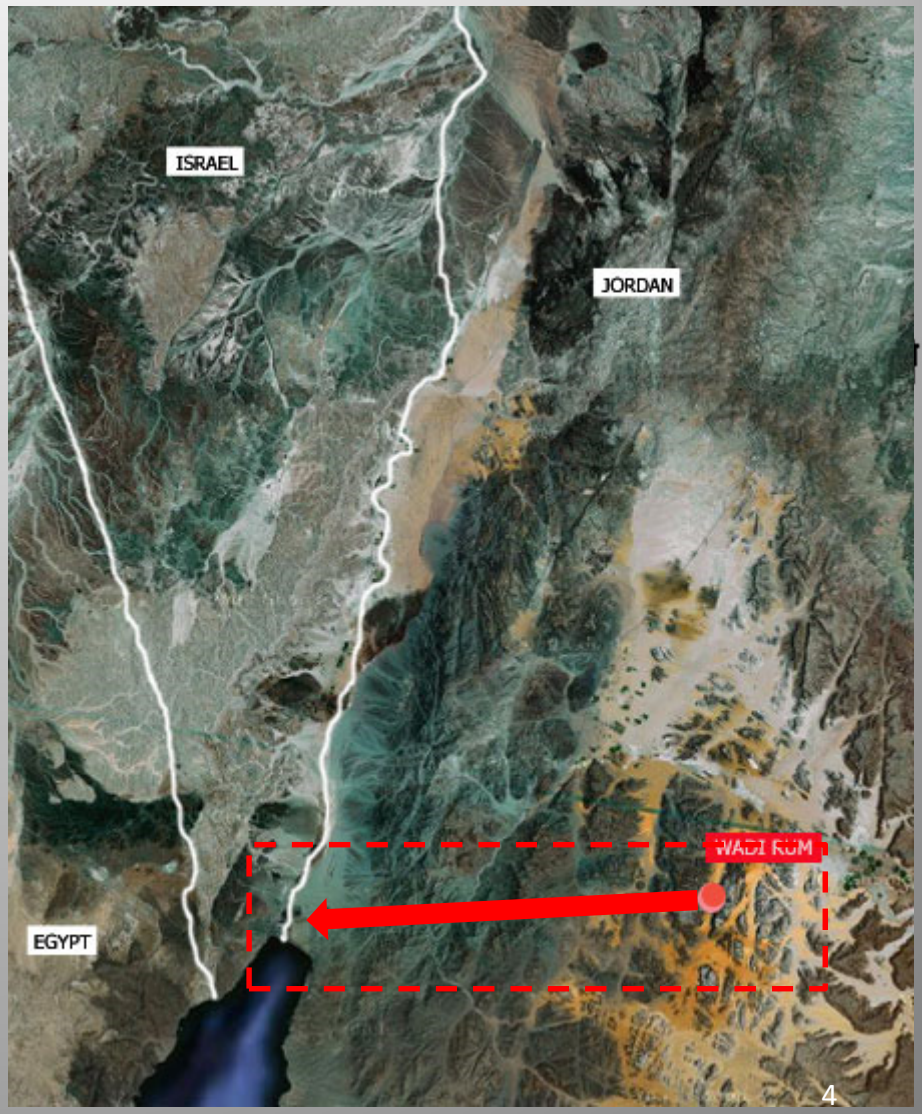


Source: http://www.ouroboros-team.org/projets-realises/jordanie-oued-rom/

Market Analysis

- Jordan is a non-oil producing state, unlike its neighboring countries, with steadily increasing oil prices.
  → high need for internal alternative ressources.

- Renewable energy use is a new technology in Jordan.
  → Ratification of the law to allow commercial use of renewable energy in Feb 2012.
  → No competition so far, and none in the near future.

- Increasing demand for energy due to high population and economic growth.

- Marketing is not needed on a large scale.

- Clean and relatively cheap energy

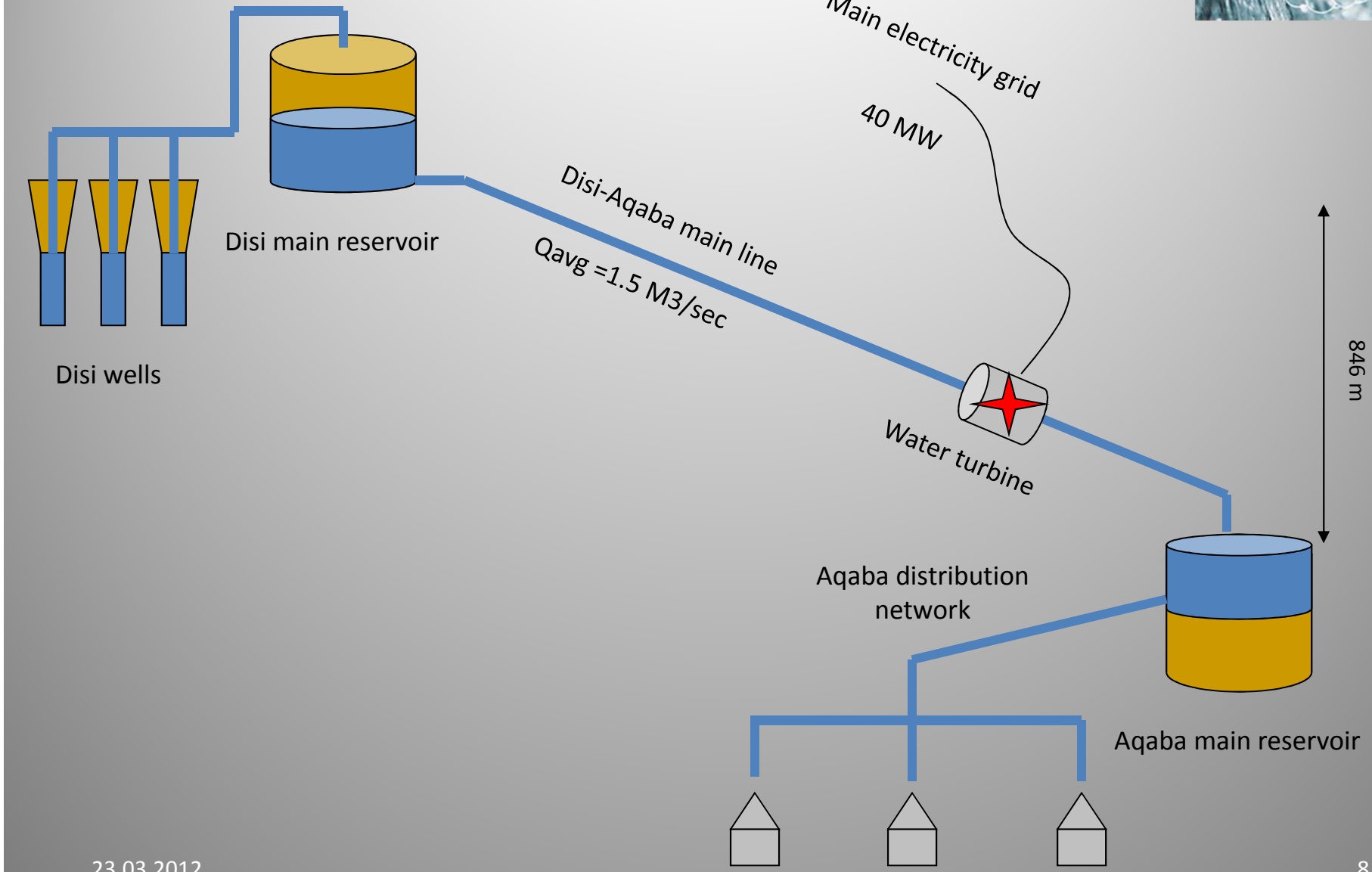
Project Feasibility

- Project infrastructure already implemented.
- No raw material costs, no land investments.
- Usage of green technology is supported by international funding.
- National subsidies granted on costums.
- No tax for 20 years (Jordan Investment Board Law).
- Environmentally friendly (CO_2 emission-free) → Emission Reduction Credits.
- Interstate Cooperation.

Company Form and Contracts

- batch5 Ltd.
- BOT (Build-Operate-Transfer) with MWI (Owners of pipe & land), 20 years.
- Contract with Aqaba Water Company (operators of the Aqaba water sector).
- Contract with electricity distribution company (operators of the power grid).
- Contract with potential costumers.

Technology

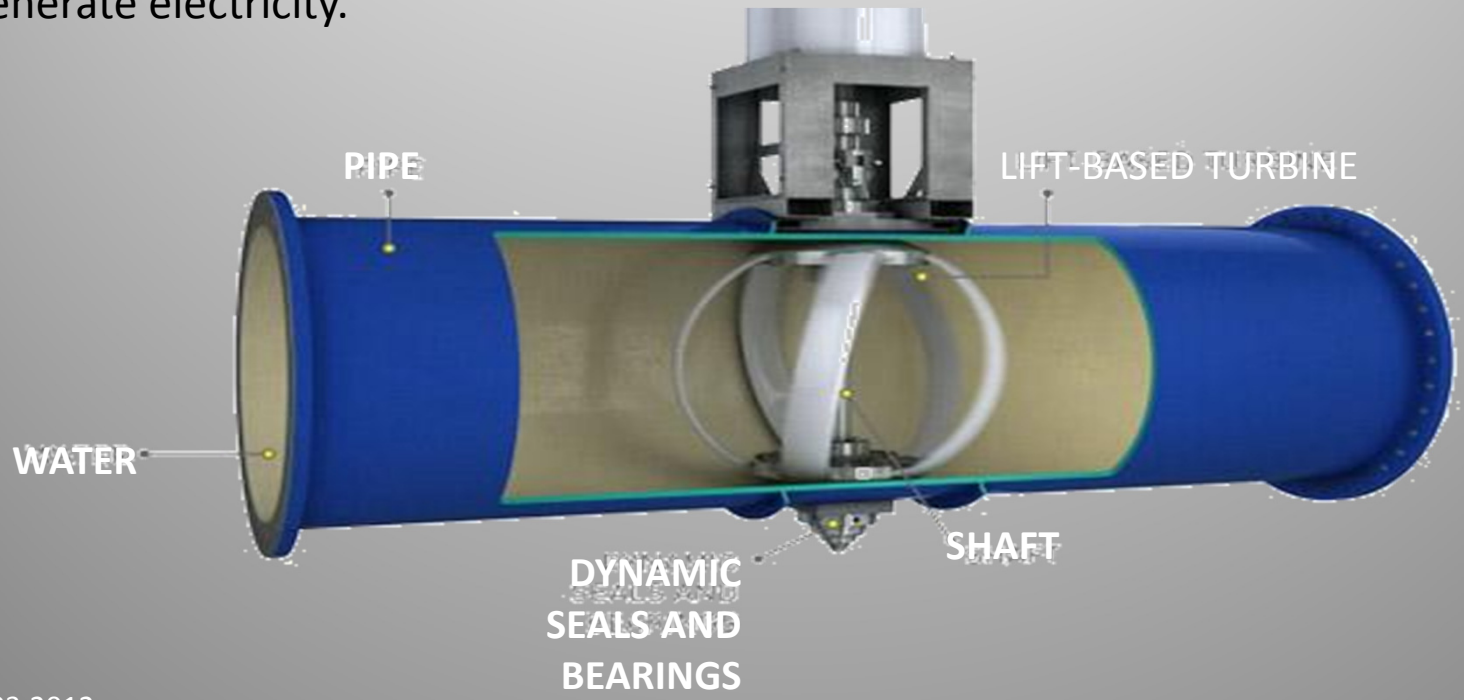

Main electricity grid
40 MW
Disi main reservoir
Disi-Aqaba main line
Qavg =1.5 M3/sec
Disi wells
Water turbine
846 m
Aqaba distribution network
Aqaba main reservoir

Technology

Energy cannot be created or destroyed, it can only be changed from one form to another.

Albert Einstein

Very simple technology:
Hydropower is using water flow “as fuel” to power the machinery (turbine) to generate electricity.



Financing

- Own capital: 40%, divided as:
  - 10% private capital,
  - 30 % international grants for Green Technology use.
- Bank loan: 1,909,590.00 (JOD).
- Interest rate: fixed 7 %, 10 years loan period

Labour

- 24/7 operation,
- 5 shifts, 8 hr/shift,
- Two technicians & one engineer per shift,
- Two managers,
- One administrative employee,
- One utility service personnel.

Selling Price

- Projected average production (first year): 3,985,800.00 kW

- Potential Sale Price: 0.45 JOD
  - State sells electricity to the electricity distribution company for 0.5562 (JOD/kW),
  - Price determined to 80% of state price.

Investment & Depreciation Cost

Investment Description	Investments (JOD)	Depreciation Rate (year)	Depreciation Rate (%)	Depreciation Costs (JOD)
Plant Units Machinery				
Turbine (60) MWh (Transport Included)	330,000.00	10	10	33,000.00
Control Panels	30,000.00	10	10	3,000.00
Generator (60) MWh	1,000,000.00	10	10	100,000.00
Accessories & Addional Works	5,000.00	10	10	500.00
Total Machinary	**1,365,000.00**			**136,500.00**
Other				
Internal and External Furniture	5,000.00	10	10	500.00
Marketing Costs	3,000.00	10	10	300.00
Research Costs	3,000.00	10	10	300.00
Emergency Electrical Storing Batteries	170,000.00	10	10	17,000.00
Power lines (Cable 110 mm Brass)	10,000.00	10	10	1,000.00
Field Tools	50,000.00	10	10	5,000.00
Licenses (Softwares & Regulatory Commissions)	5,000.00	10	10	500.00
Company Establishment & Transaction Fees	5,000.00			
Contingencies (Unexpected)	810,000.00			
Total Other	**1,061,000.00**			**24,600.00**

Investment & Depreciation Cost

Investment Description	Investments (JOD)	Depreciation Rate (year)	Depreciation Rate (%)	Depreciation Costs (JOD)
Project Construction & Plant Installation				
Building Construction (Civil,Elect,Mech)	24,000.00	20	5	1,200.00
Surveyance & foundation	5,000.00	20	5	250.00
Civil Exterior Works (Roads,Tar)	7,500.00	20	5	375.00
Elect. & Mech.Exterior Works	3,750.00	20	5	187.50
Fence (Steel)	20,000.00	20	5	1,000.00
Landscaping & Irrigation	3,000.00	20	5	150.00
Installation Crew (Plant Units)	150,000.00	10	10	15,000.00
Total Construction & Installation	**213,250.00**			**18,162.50**
Electronics				
Office Computers	5,000.00	4	25%	1,250.00
Printer, Scanner, & Stationary	400.00	4	25%	100.00
Security & Monitoring system	2,000.00	4	25%	500.00
Electricity Charge Meters	1,000.00	4	25%	250.00
Total Electronics	**8,400.00**			**2,100.00**
Vehicles				
Maintenance Truck (4WD)	25,000.00	5	20%	5,000.00
Company Car (2WD)	15,000.00	5	20%	3,000.00
Total Vehicles	**40,000.00**			**8,000.00**
TOTAL INVESTMENT COSTS (JD)	**2,687,650.00**	**TOTAL DEPRICIATION COSTS (JD)**		**189,362.50**

Annual Costs

Personal Cost	Number	Salary JD/Year	Personnel Direct Costs JD/Year
Technicians	10	6,000.00	60,000.00
Engineers	5	9,600.00	48,000.00
Managers	2	18,000.00	36,000.00
Administrative employee	1	4,200.00	4,200.00
Utility Service Personnel	1	3,000.00	3,000.00
Total Personal Cost (JD/Year)			**151,200.00**

Expendable Material	Cost JD/Year	Cost (100% cap) JD/Kw
Utilities		
Operation & Maintenance Costs	636,530.00	0.1597
Administrative Overhead Costs	6,000.00	0.0015
Total Expendable Costs	**642,530.00**	**0.1612**

Financing Costs

Total Investment (JD)		3,182,650.00	
Own Capital Funds (JD)	40%	**1,273,060.00**	10 % Own Funds, 30 % International Technology Grants
Bank Loan (JD)	60%	**1,909,590.00**	7 % Interest Rate, 10 Years Loan Period

Year	Balance of Dept (JD)	Interest Rate (%)	Interest Cost (JD)	Repayment (JD/Year)
1	1,909,590.00	7	133,671.30	190,959.00
2	1,718,631.00	7	120,304.17	190,959.00
3	1,527,672.00	7	106,937.04	190,959.00
4	1,336,713.00	7	93,569.91	190,959.00
5	1,145,754.00	7	80,202.78	190,959.00
6	954,795.00	7	66,835.65	190,959.00
7	763,836.00	7	53,468.52	190,959.00
8	572,877.00	7	40,101.39	190,959.00
9	381,918.00	7	26,734.26	190,959.00
10	190,959.00	7	13,367.13	190,959.00
Total Interest Rate (JD)			735,192.15	
Total Repayment (JD)				**1,909,590.00**

Self Costs

Year	1	2	3	4	5	6	7	8	9	10
Capacity Utilization (%)	80	82	84	86	88	90	92.5	95	97.5	100
Produced (Kw)	3,188,640.00	3,268,356.00	3,348,072.00	3,427,788.00	3,507,504.00	3,587,220.00	3,686,865.00	3,786,510.00	3,886,155.00	3,985,800.00

Costs	Cost JD/Kw	Cost (1st) JD/Year	Cost (2nd) JD/Year	Cost (3rd) JD/Year	Cost (4th) JD/Year	Cost (5th) JD/Year	Cost (6th) JD/Year	Cost (7th) JD/Year	Cost (8th) JD/Year	Cost (9th) JD/Year	Cost (10th) JD/Year
Depreciation Costs	0.06	189,362.50	189,362.50	189,362.50	189,362.50	189,362.50	189,362.50	189,362.50	189,362.50	189,362.50	189,362.50
Financing Costs	0.04	133,671.30	120,304.17	106,937.04	93,569.91	80,202.78	66,835.65	53,468.52	40,101.39	26,734.26	13,367.13
Labour Costs	0.05	151,200.00	151,200.00	151,200.00	151,200.00	151,200.00	151,200.00	151,200.00	151,200.00	151,200.00	151,200.00
Utilites Costs	0.16	510,182.40	522,936.96	535,691.52	548,446.08	561,200.64	573,955.20	589,898.40	605,841.60	621,784.80	637,728.00
Total Costs		**984,416.20**	**983,803.63**	**983,191.06**	**982,578.49**	**981,965.92**	**981,353.35**	**983,929.42**	**986,505.49**	**989,081.56**	**991,657.63**
Self Cost (JD/Kw)	**0.31**	**0.31**	**0.30**	**0.29**	**0.29**	**0.28**	**0.27**	**0.27**	**0.26**	**0.25**	**0.25**

Cap Capacity kW/Year 3,985,800.00

Turbine effeciency (%) 85

Year	1	2	3	4	5	6	7	8	9	10
Population growth rate (2.5%)	130000	133250	136581.25	139995.78	143495.68	147083.07	150760.14	154529.15	158392.38	162352.19
Capacity Utilization (%)	80	82	84.05	86.15125	88.305031	90.512657	92.775473	95.09486	97.472232	99.909038

Cash Flow and Dividend

Year	1	2	3	4	5	6	7	8	9	10
Capacity Utilization (%)	80	82	84	86	88	90	92.5	95	97.5	100
Produced (Kw)	3188640	3268356	3348072	3427788	3507504	3587220	3686865	3786510	3886155	3985800
Cost (JD/KW)	0.31	0.30872604	0.301008712	0.293658876	0.286650893	0.279961454	0.273569324	0.266874274	0.260531595	0.254514182
Price (JD/Kw)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45

Revenue/Turnover	1434888	1470760.2	1506632.4	1542504.6	1578376.8	1614249	1659089.25	1703929.5	1748769.75	1793610
Depreciation Costs	189362.5	189362.5	189362.5	189362.5	189362.5	189362.5	189362.5	189362.5	189362.5	189362.5
Financing Costs	133671.3	120304.17	106937.04	93569.91	80202.78	66835.65	53468.52	40101.39	26734.26	13367.13
Labour Costs	151200	151200	151200	151200	151200	151200	151200	151200	151200	151200
Utilites Costs	510182.4	522936.96	535691.52	548446.08	561200.64	573955.2	589898.4	605841.6	621784.8	637728
Profit Before Tax (JD)	450471.8	486956.57	523441.34	559926.11	596410.88	632895.65	675159.83	717424.01	759688.19	801952.37
Tax (0)	0	0	0	0	0	0	0	0	0	0
Profit After Tax (JD)	450471.8	486956.57	523441.34	559926.11	596410.88	632895.65	675159.83	717424.01	759688.19	801952.37
Cash Flow (JD)	639834.3	676319.07	712803.84	749288.61	785773.38	822258.15	864522.33	906786.51	949050.69	991314.87
Credit Repayment (JD)	190,959.00	190,959.00	190,959.00	190,959.00	190,959.00	190,959.00	190,959.00	190,959.00	190,959.00	190,959.00
Dividend (JD)	**448,875.30**	**485,360.07**	**521,844.84**	**558,329.61**	**594,814.38**	**631,299.15**	**673,563.33**	**715,827.51**	**758,091.69**	**800,355.87**

Conclusion

- Plant pay back period: 6 years,
- Guaranteed prices and market for the next twenty years,
- Guaranteed market growth of 2.5% p.a.,
- Project will be successful.