



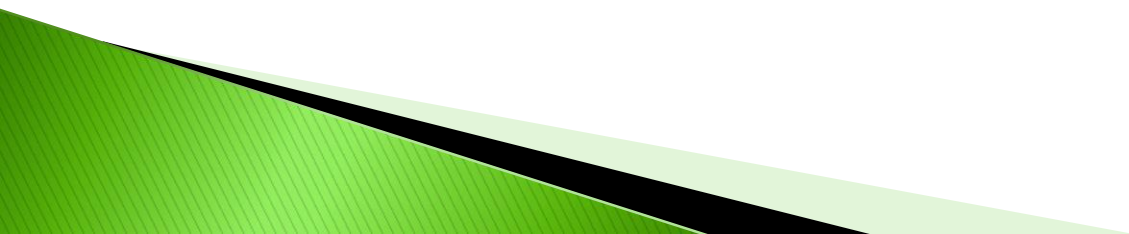
BUSINESS PLAN

Business Administration


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Semester: WS 2011/2012

ARKHANGELSK
GENERATING
COMPANY



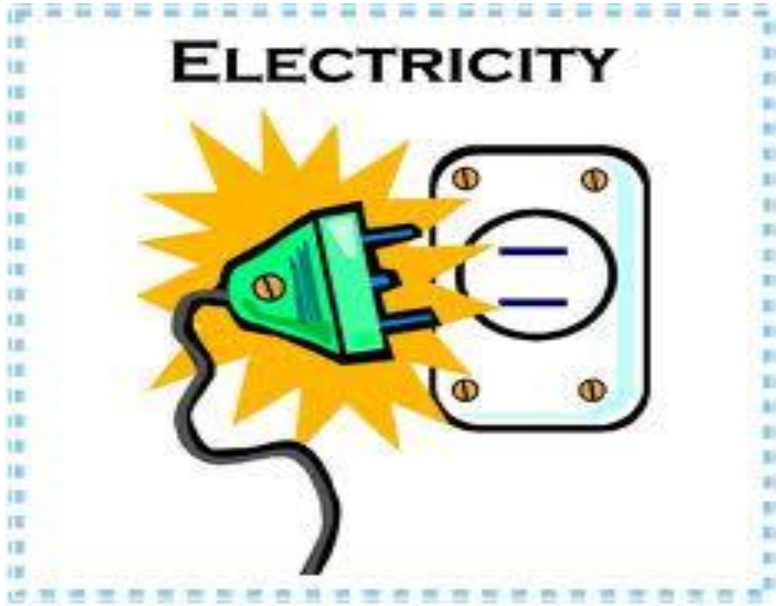


- ▶ Company overview:
 - Location
 - Description of service
 - ▶ Business concept
 - ▶ The need of the Power Plant
 - ▶ Technical background
 - ▶ Modern equipment (modern types of gas turbines)
 - ▶ Calculations
 - ▶ Final Graph
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Company overview

- **Location**: Arkhangelsk, the Russian Federation
 - Strong legal protections for investors
 - Employer–friendly labor regulations
- **Service**
 - Power Plant of electricity production
- **Target**
 - Sustainable supplying with electricity

▶ Business concept



Business concept


- 1) Selling of electrical energy produced on the gas turbine power plant;
 - 2) Almost environmentally free technologies;
 - 3) Uninterrupted supply of all consumers.
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The need of the Power Plant

- ▶ Power Plant supplying the city right now is quite old, built in 1971



The need of the Power Plant

- ▶ Power Plant is working on expensive fuel: fuel oil (mazut) = 250 euro/ 1 ton that is much more expensive than gas.
 - ▶ Gas is more environmentally friendly than fuel oil: lower CO₂ emissions.
 - ▶ The capacity of the old Power Plant is not enough for further development of the city.
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Technical overview

- ▶ The city is supplied with the gas from other regions of Russia.
- ▶ Pipelines are built and the gas-distributing station is built therefore no problems of supplying the power plant with gas.




Technical overview

- ▶ Enough space for building a new Power Plant: the territory of the city is 294,42 km² with the population 355,7 thousand people.
- ▶ 35 km along the Northern Dvina river, good and enough water supply.



Technical overview


- ▶ A new building for the power plant with 4 units: 4 **Gas Turbines SGT-800 produced by Siemens**
 - ▶ **Modern auxiliary equipment for the Gas Turbines, good controlling system**
 - ▶ A new diversion unit in the mouth of the river
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Technical specification of the equipment (GAS TURBINES)

- ▶ Power generation: 47.0 MW(e)
- ▶ • Frequency: 50/60 Hz
- ▶ • Electrical efficiency: 37.5 %
- ▶ • Heat rate: 9,597 kJ/kWh
(9,096 Btu/kWh)
- ▶ • Turbine speed: 6,608 rpm
- ▶ • Compressor pressure ratio: 19.9:1
- ▶ • Exhaust gas flow: 131.5 kg/s (289.9 lb/s)
- ▶ • Exhaust temperature: 544° C (1,011° F)
- ▶ • NO_x emissions:
(with DLE corrected to 15 % O₂ dry)
- ▶ – Natural gas: ≤15ppmV
- ▶ – Liquid fuel: ≤42ppmV
- ▶ Fuel System
 - ▶ • Natural gas – Liquid fuel – Dual fuel
 - ▶ • On-load fuel changeover capability
 - ▶ • Load-rejection capability
 - ▶ • Gas-supply pressure requirement:
27–30 bar(a) (390–435 psi(a))



Technical specification of the equipment

- ▶ Auxiliary equipment:
 - 1) pipelines inside the plant (for steam, exhaust gases); approximately 2 km of pipelines
 - 2) 8 water pumps;
 - 3) slide valves (approximately 100 valves);
 - 4) distributors (20);
 - 5) 4 fans for exhaust gases;
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Starting investement

Investment Goods	Investment Expenditures, €
Infrastructure (auxiliary equipment)	2000000,00
Buildings	4000000,00
Equipments and Machinery (Gas turbines+generators)	4000000,00
Vehicles	1000000,00
Renting a land	300000
Furniture	100000,00
First year salary	300000,00
Gas supply for the first year	1327034,88
Informatics	300000,00
Total Investment	13327034,88

Total investment and Calculation of Financing cost: Interest paid on debt

Total Investment	13327034,88		Year	Balance of Debt, €	Interest Rate (%)	Interest costs paid per year, €	Repayment / Paying back loan per year, €
50% city government	6663517,44		1. Year	6 663 517,44 €	7	466 446,22 €	666 351,74 €
			2. Year	5 997 165,70 €	7	419 801,60 €	666 351,74 €
			3. Year	5 330 813,95 €	7	373 156,98 €	666 351,74 €
			4. Year	4 664 462,21 €	7	326 512,35 €	666 351,74 €
50% Outside financing (Bank Loan)	6663517,44		5. Year	3 998 110,46 €	7	279 867,73 €	666 351,74 €
			6. Year	3 331 758,72 €	7	233 223,11 €	666 351,74 €
			7. Year	2 665 406,98 €	7	186 578,49 €	666 351,74 €
			8. Year	1 999 055,23 €	7	139 933,87 €	666 351,74 €
			9. Year	1 332 703,49 €	7	93 289,24 €	666 351,74 €
			10. Year	666 351,74 €	7	46 644,62 €	666 351,74 €
own capital	200000,00	uses only as unexpected	Total Interest Paid			2 565 454,21 €	
				Total Repayment			6 663 517,44 €

Labor costs

Personnel in cost center	Number	Personnel Direct Annual Costs, €
Permanent Contract		
Maintainence	4	40000,00
lead operator	4	60000,00
operator	4	50000,00
electrical engineer	1	20000,00
automative engineer	1	25000,00
accountant	1	20000,00
general engineer	1	30000,00
director	1	40000,00
bonuses for workers		15000,00
Total (all shifts)		300000,00

Investment in gas per year for supplying the Gas Turbines. This price was calculating according to the gas price in the Arkhangelsk region, Russia.

$$131,5 \cdot 0,6 + 131,5) \cdot 60 \cdot 60 \cdot 24 \cdot 365 \cdot 0,2 / 1000 = 1327034,88 \text{ (euro per year)}$$

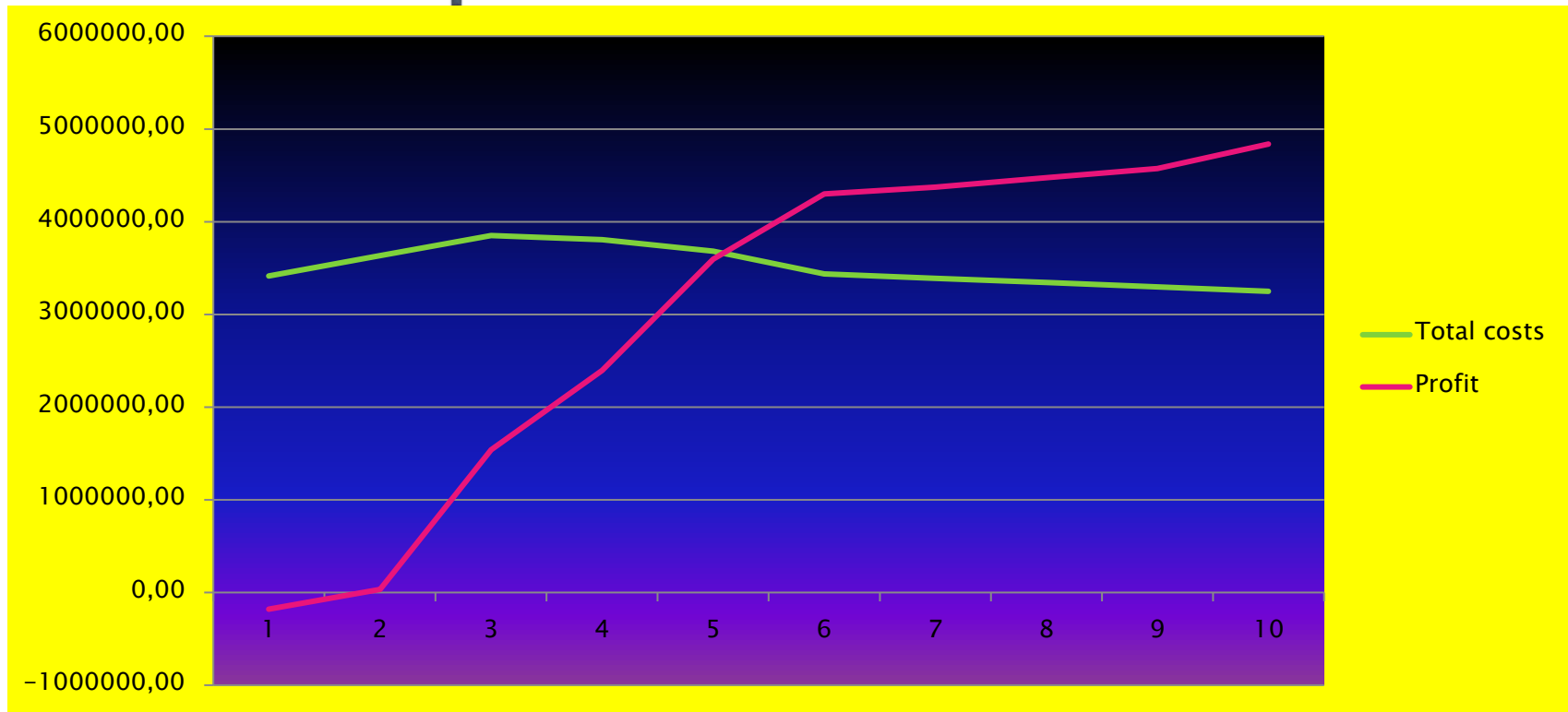
Depreciation costs

	1 year	2 year	3 year	4 year	5 year	6 year	7 year	8 year	9 year	10 year
Depreciation Costs for machines	400000	400000	400000	400000	400000	400000	400000	400000	400000	400000
Depreciation Costs for building	200000	200000	200000	200000	200000	200000	200000	200000	200000	200000
Depreciation Costs for informatics	75000	75000	75000	75000						
Depreciation Costs for vehicles	200000	200000	200000	200000	200000					
Depreciation Costs for furniture	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
total depreciation costs	885000	885000	885000	885000	810000	610000	610000	610000	610000	610000

Costs calculation

Cost	Costs per year	Costs 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 Costs	885000,00	885000,00	885000,00	885000,00	810000,00	610000,00	610000,00	610000,00	610000,00	610000,00
Financing Costs	1132797,96	1086153,34	1039508,72	992 864,10	946 219,48	899 574,85	852 930,23	806 285,61	759 640,99	712 996,37
Labour Costs	300000,00	300000,00	300000,00	300000,00	300000,00	300000,00	300000,00	300000,00	300000,00	300000,00
gas consumption in euro	796221	1061628	1327035	1327035	1327035	1327035	1327035	1327035	1327035	1327035
renting a land	300000	300000	300000	300000	300000	300000	300000	300000	300000	300000
Total of Costs	3414018,89	3632781,25	3851543,60	3804898,98	3683254,36	3436609,73	3389965,11	3343320,49	3296675,87	3250031,25
Self Costs per 1MW of electrical supply per day	81,19	64,80	54,96	54,29	52,56	49,04	48,37	47,71	47,04	46,38
Profits										
price of 1 MW of electrical energy per day	65,00	65,00	65,00	65,00	65,00	65,00	65,00	65,00	65,00	65,00
Money flow	3234816,00	3843543,00	5391360,00	6200064,00	7278336,00	7736601,60	7763558,40	7817472,00	7871385,60	8087040,00
Loss carried forward		-179202,89								
Profit before tax	-179202,89	31558,86	1539816,40	2395165,02	3595081,64	4299991,87	4373593,29	4474151,51	4574709,73	4837008,75
Tax	0,50									
Profit after tax	0	15779,43024	769908,1997	1197582,511	1797540,822	2149995,933	2186796,644	2237075,755	2287354,866	2418504,377

Final Graph



Deficit of the budget during the first year will be compensated from the own investment, which can be used only as unexpected.