Project Management Project

Thermal Power Plant Modernization

Narrative Statement Charter:

a. Project purpose or justification – Electricity and heating are two major concerns of any resident, city or rural. If a regional power plant fails to deliver enough energy for these utilities, it will gravely affect the quality of life in the region. The list of stakeholders includes regional residents, private, business and governmental entities. In the case of this project, a regional private-owned coal-fired power plant built in 1961 has not been renovated ever since. Recently, the plant experienced multiple short-term malfunctions, temporarily affecting its energy output and threatening the stability of power and heat supply in the region in the long run. These issues have made it crystal clear that a critical level of equipment wear calls for a systematic and complex reconstruction of the power plan. The purpose of this project is to implement all actions necessary for thermal power plant modernization. It is suggested that the project is of high significance to the aforementioned stakeholders due to an unpredictable nature of technical malfunctions and the devastating consequences of a highly-possible fatal failure of the plant, including, but not limited to, an indefinite disruption of business and governmental activities relying on access to electricity, infrastructural collapse, a forced necessity to import energy from other regions or countries, and civil unrest. When the project is finished, the renovated power plant will be producing more energy, following an increase in reliability and a decrease in environmental impact. The negative consequences of worst-case scenarios will also most definitely be averted. Additionally, the project would indirectly create new workplaces in the region for the duration of the renovation works and potentially lower the price of utilities for all consumers.

b. Measurable project objectives and related success criteria:

1. Conduct a full inspection of the power plant. It is considered successful if, as a result of the inspection, accurate, relevant and complete information regarding the current state of the power plant (performance, capacity, equipment wear, number and qualification of employees, etc.) and of its components is received.
   1. The inspection must answer the question of whether the best available technologies are utilized on the power plant.
   2. A list of legacy, outdated and inefficient components and practices must be composed. This includes any problems found in the functioning of the plant.
2. Analyze the data received and come up with solutions to fix, improve or replace existing practices, components and processes based on the analysis. This step is considered successful if a plan is created for systematic resolution of all identified flaws. The proposed renovation plan must commit to most high-level requirements mentioned in this project charter.
3. Implement the developed plan. The plan is implemented successfully if it results in the installation of best-available power generation technologies, including advanced combustion system, high-efficiency turbines and emission control systems, increasing the plant efficiency by at least 65% by the end of the project.
4. The capacity of the power plant must be increased by at least 150MW of power by June 1, 2025.
5. Ensure that safety precautions are taken. The estimated chance of an incident happening in one year must be less or equal to 5% after the renovation works are over.
6. Ensure 99.5% uptime after the renovation works are over.
7. Calculate the plant's environmental impact and decrease it by 50%, including a decrease in air, water and soil pollution.

c. High-level requirements:

1. Ensure the installation and implementation of best available technologies in the field of thermal power generation.
2. Increase the maximum capacity of the power plant.
3. Prevent future incidents.
4. Increase reliability of the power plant.
5. Decrease environmental impact of the power plant.

d. Assumptions and constraints:

1. The project is scheduled to start on June 1, 2027. It will take time to get approval and financing of the project from the government and the company that owns the power plant. At the current moment, the regional budget has already been planned for 2024-2026.
2. Approximate duration of renovation works is 30 months.
3. The project is scheduled to end on December 1, 2029.
4. The project should cost no more than 50 million dollars, including the overhead (contingency) budget.
5. The renovation works may be delayed due to weather conditions. They may not be delayed for longer than one week, unless force majeure circumstances take place.
6. The renovation works must not interfere with the functioning of the plant. The plant must stay functional at all times during the project.
7. The power plant output and its overall state should gradually improve over the course of the project.
8. When resources are procured, the preference is given to the local ones, but only under the condition that their quality is identical or higher than that of the same kind of resources bought globally.
9. The duration of activities includes official days off and holidays.

e. High-level risks:

1. Corruption: delays or obstacles in obtaining necessary permits or approvals; larceny of government property, embezzlement of project funds.
2. Technological deficiency: lack of local expertise or skill required for renovation works, which may require additional expenses on foreign workers and technologies.
3. Budget overruns: unforeseen challenges, changes in scope and price fluctuations.
4. Political instability: changes in governmental policies, financing cuts, impacting project's feasibility.
5. Natural disasters: the local river in the region is prone to spring floods; in winter snowstorms are possible.
6. Vendor and supplier underperformance: delays and quality issues from vendors and suppliers providing services, materials and equipment.
7. Resource allocation and management: insufficient use of personnel and equipment, slow and inefficient management practices.

f. Summary milestone schedule:

1. The Inspection stage finished – September 1, 2027. Duration: 3 months.
2. Plant Modernization Plan and resource procurement completed – January 1, 2028. Duration: 4 months.
3. Modernization Plan realized – September 1, 2029. Duration: 20 months.
4. Work evaluated and project complete – December 1, 2029. Duration: 2 months.

g. Summary budget: The expected budget should not exceed 50 million dollars. This budget includes a 20% contingency budget of 10 million dollars.

Work Breakdown Structure:

Responsibility Assignment Matrix:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Work Package \ Resource | Expert Team | Management Department | HR | Engineers | Workers | Purchasing Department |
| Evaluate the current state | R | A | R | I | I | I |
| Modernization Plan creation | R | A | C | C | I | C |
| Resource procurement | A | R | C | C | R | A |
| Install BAT | C | A | I | R | R | I |
| Effective management and work practices | C | A | R | C | C | C |
| Ensure 99.5% uptime | C | A | C | R | I | I |

Project Activity Sequence:

|  |  |  |
| --- | --- | --- |
| WBS ID | Task Name | Predecessor |
| 1.1.1 | Hire experts | None |
| 1.1.2 | Inspect the power plant | 1.1.1 |
| 1.1.3 | List deficiencies, outdated and inefficient practices | 1.1.2 |
| 2.1 | Modernization Plan creation | 1.1.3 |
| 2.1.1 | Resource estimations | 2.1 |
| 2.1.2 | Cost estimations | 2.1.1 |
| 2.2 | Resource procurement | 2.1.2 |
| 3.1 | Install BAT | 2.2 |
| 3.2 | Implement efficient management and work practices | 2.2 |
| 3.2.1 | Restructure the workforce | 2.2 |
| 4.1 | Ensure 99.5% uptime | 3.2.1, 3.2, 3.1 |

Project Schedule:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Task Name | Predecessor | Duration | Start | Finish | Resources |
| Hire experts | None | 1 month | June 1, 2027 | July 1, 2027 | HR |
| Inspect the power plant | 1.1.1 | 1 month | July 1, 2027 | August 1, 2027 | Experts |
| List deficiencies, outdated and inefficient practices | 1.1.2 | 1 month | August 1, 2027 | September 1, 2027 | Experts |
| Modernization Plan creation | 1.1.3 | 2 weeks | September 1, 2027 | September 14, 2027 | Experts |
| Resource estimations | 2.1 | 2 weeks | September 14, 2027 | September 28, 2027 | Experts |
| Cost estimations | 2.1.1 | 2 weeks | September 28, 2027 | October 12, 2027 | Experts |
| Resource procurement | 2.1.2 | 2 months, 20 days | October 12, 2027 | January 1, 2028 | Purchasing Department |
| Install BAT | 2.2 | 20 months | January 1, 2028 | September 1, 2029 | Engineers |
| Implement efficient management and work practices | 2.2 | 20 months | January 1, 2028 | September 1, 2029 | Management Department, Experts |
| Restructure the workforce | 2.2 | 20 months | January 1, 2028 | September 1, 2029 | HR, Experts |
| Ensure 99.5% uptime | 3.2.1, 3.2, 3.1 | 2 months | September 1, 2029 | December 1, 2029 | Engineers |

Project Budget:

Overhead (contingency) budget is 10 million dollars. The sponsors of this project are the regional government and the company that owns the power plant.

|  |  |  |  |
| --- | --- | --- | --- |
| Resource | Category | Time Period | Price, millions of dollars |
| Experts for inspection and analysis | Inspection, Analysis and Work Evaluation | For the entire duration of the project | 5 |
| Resource procurement | Preparation | Milestone 2 | 15 |
| Equipment installation and worker's pay | Plan implementation | Milestone 3 | 20 |

Project Risks:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Risk | Mitigation | Contingency | Impact | Possibility | Priority |
| Government corruption | Robust monitoring and reporting procedures | Engage with local authorities and use contingency budget | Medium | High | Medium |
| Technological deficiency | Hire professional local workers, set higher standards of employment | Hire external specialists and access foreign technologies | High | High | High |
| Budget overruns | Regular budget reviews, discuss propositions of scope change, develop a system for change management | Set aside contingency funds for unforeseen expenses | High | Medium | Medium |
| Political instability | Maintain and monitor relationships with key stakeholders | Use contingency funds or find new sponsors | Very high | Low | Low |
| Natural disasters | Develop emergency response plans | Use contingency funds for recovery | Low | Medium | Low |
| Vendor and supplier underperformance | Conduct a careful selection of trustworthy vendors, establish clear contractual agreements | Use contingency funds or find new vendors | High | Medium | High |
| Resource allocation and management | Restructure management practices, monitor resource allocation closely | Use contingency funds to avoid activity delays | Low | Medium | Medium |