

Types of Power Plants O&M Contracts

It is imperative that for power plants owner, either utility, industrial facilities with power generation or power generation developers, to consider the cost and liabilities associated with securing the operation and maintenance (O&M) services through reputable subcontractor to minimize the cost associated with such services.

The key issues which should be considered in such process of operation and maintenance (O&M) subcontracting should include defining the scope of the services to be provided, performance warranties, payments and incentives, caps and limits on liability and the interface with other project contracts, if any.

Also, it should be noted that the social aspects for government owned generation facilities and maximizing the local contents for such O&M subcontracting shall be considered.

The key elements that be considered in securing the O&M contractors are:

1. Power Plant Load
 - a. Grid connected or captive power plant,
 - b. Sensitivity of load,
 - c. Load profile.

Grid connected plants allow the O&M contractor to maximize generation subject to the dispatch requirements. It also allows the O&M Contractor to get compensated for availability factor. Captive power plants limits the energy generation (kWh) to load demand and accordingly limits the benefits to both owner and contractor from availability factor.

2. Type and capacity of generating units
 - a. Internal combustion reciprocating (diesel engine) units
 - b. Gas Turbines Simple Cycle
 - c. Gas Turbine Combined Cycle
 - d. Steam Plants (Gas, HFO, LFO or Coal fired).
 - e. Renewable (Solar, Wind, Geothermal, Biogas, ,,)
 - f. Emergency power generation facilities

Each type of the above power generating units has a special characteristic, manpower requirement and spare parts requirements. All of the above reflects on the contract conditions and economics of the O&M Contract.

The above factors, and others, are considered as key part of the development of power plant O&M contract terms and conditions.

Typically, O&M Contracts would be one of the following:

1. Cost plus fixed fee contract, with a ceiling contract price.

In this type of contract, plant owner and O&M contractor negotiate a win-win balanced contract that meets the owner's need for a reasonable cost consistent with reliability and safety, in addition to O&M contractor's need for profitable operation that pays for its responsibilities and carried risks.

O&M Contractor shall provide all items and services required for the operation and maintenance of the Plant (including without limitation, spare parts) at the best available price and cost, on a life cycle cost basis, taking into account quality and safety and after written approval of the Owner.

Owner pays directly the property, fuel, legal and taxes, permits, capital improvements, environmental requirements, site facilities and offices for O&M Contractor.

In relation to the O&M services, owner pays to the O&M Contractor:

- **Mobilization**
A fixed one time mobilization fee.
- **Services:**
Monthly cost based on agreed upon minimum manpower requirements and actual used manpower during the month, for the compensation of labor costs.
- **Materials Cost**
Cost of tools, parts, equipment, consumables and other supplies and materials necessary for the operation and maintenance of the Plant, which have been purchased by O&M Contractor upon Owner's approval.
- **Water Treatment Cost**
Cost of chemical for water treatment and chlorination facilities maintenance.
- **Maintenance Cost**
Owner pays O&M contractor for supporting Long Term Services Contractor conducting units overhauling tasks (typically applied on Gas Turbines).
- **Administration Cost**
Training, office supplies and O&M computerized System
- **Yearly Management fee (MF)**

A management fee (MF), based on the readiness of the plant to support plant annual Capacity Factor. Following is an example of such arrangement:

Target Capacity Factor shall be:

Hours	Plant Capacity
XXXX hrs	100%
XXXX hrs	75%
XXXX hrs	50%
XXXX hrs	Zero

Total 8760 hrs

A bonus/penalty program can be applied as an incentive for O&M contractor to maintain the required availability and reliability of the power plant to support the plant capacity factor.

The bonus/penalty program can be structured as follows:

Support of Plant Capacity Factor	Yearly Management fee (MF)
>75%	2 × MF + 10% of annual labor cost
70-75%	1 × MF + 5% of annual labor cost
65 – 70%	0.5 × MF
<65%	Zero

- **Heat Rate Penalty**

In addition to this program, a deduction of management fee in 2% increment can be applied for each 100 BTU offset in calculated Heat Rate after degradation adjustment (in according to ASME code or equivalent) for every single Tariff Year, with a cap of 10%.

2. Delivered energy (in \$Cent/kWH) contract, with take or pay arrangement.

In this type of contract, plant owner and O&M contractor negotiate a win-wing balanced contract that meets the owner’s need for a reasonable price of energy (in kWH) with reasonable reliability and safety, in addition to O&M contractor’s reasonable profit that compensates for his responsibilities and carried risks.

- O&M contractor shall provide all items and services required for the operation and maintenance of the plant (including without limitation, spare parts) at the best available price and cost on a life cycle cost basis taking into account quality and safety with reasonable flexibility to act without owner's approval on procurement decisions.
- Owner pays directly the property, fuel, legal and taxes, permits, environmental requirements,
- Capital improvements, site facilities and offices for O&M Contractor costs are covered by O&M Contractor.

In relation to the O&M services, owner pays to the O&M Contractor:

- **Mobilization**
A fixed one time mobilization fee.
- **Delivered Energy in \$Cent/kWh:**
Monthly cost based on agreed upon minimum kWh and actual used kWh delivered to Owner during the month, for the compensation of:
 - o **Labor Costs**
Including management, operation, maintenance and administration manpower
 - o **Materials Cost**
Cost of tools, parts, equipment, consumables and other supplies and materials necessary for the operation and maintenance of the Plant, which have been purchased by O&M Contractor based on his own decision.
 - o **Water Treatment Cost**
Cost of chemical for water treatment and chlorination facilities maintenance.
 - o **Maintenance Cost**
Long Term Services Contractor conducting units overhauling tasks.
 - o **Administration Cost**
Training, office supplies and O&M computerized System
- **Yearly Reliability And Reliability Bonus**
A bonus/penalty program can be applied as an incentive for O&M contractor to maintain the required availability and reliability of the power plant to support the plant capacity factor.

The bonus/penalty program can be structured as follows:

Support of Plant Capacity Factor	Yearly Reliability And Reliability Bonus
>75%	100% x Bonus Value
70-75%	50% x Bonus Value
65 – 70%	25% x Bonus Value
<65%	Zero

- **Heat Rate Penalty**

In addition to this program, a deduction of XXX USD increment can be applied for each 100 BTU offset in calculated “Average Yearly Calculated Heat Rate” after degradation adjustment (in according to ASME code or equivalent) for every complete year, with a cap of --% of the Bonus Value.

During the Handing Over period, plant Heat Rate to be calculated based on recorded variables by both OWNER’s and O&M Contractor’s representatives as a reference for Contractor’s improvements / deteriorations.

3. Delivered Energy in \$Cent/kWh, with take or pay arrangement, excluding GTs LTSA cost.

This type of contract utilizes the advantages of the above contract model, while keeping the costs related to the major maintenance of the Gas Turbines (GTs) Long Term Services Agreement (LTSA) and associated spare parts (typically performed by GTs OEM) under plant owner’s responsibility. Accordingly, O&M Contractor’s \$Cent/kWh price does not include this component of plant GTs maintenance.