Sl. No	Description	BHEL Specifications	Vendor Specifications/Deviations
		GUI based Simulation Software Toolkit for Power Plant applications	
1	General Description	Software to carry out steady state heat and mass balance for various types of power plants generation technologies namely, Thermal power, Combined cycle, Solar power and Coal Gasification. The software shall have the facility to generate Heat balance diagrams and study various design alternatives and propose optimised design based on constraints specified.	
2	Features:	The required software features are listed below:	
2.1	Conventional Thermal power plants	1. The software shall be able to build complete steam power plant cycle for different pressure and load ratings inclusive of both sub-critical and supercritical applications. 2. The software shall have the ability to model and simulate complete power plant cycle by including typical equipment models listed in Annexure -1. However, the software shall also include any other equipment models needed to build a typical Thermal power plant system model.	
2.2	Combined Cycle power plants	1. The software shall be able to build complete combined cycle power plant for different gas turbines and steam cycle ratings. 2. It shall have ability to model and simulate all equipment of combined cycle power plant as mentioned in Annexure-1. However, the software shall also include any other equipment models needed to build a typical combined cycle power plant system model.	
2.3	Solar thermal Power plants	1. The software shall be able to build complete solar thermal power plant. 2. The software shall have ability to model and simulate all equipment of various solar fields as mentioned in Annexure-1. However, the software shall also include any other equipment models needed to build a typical solar thermal power plant system model. 2. The collector model shall include optical and geometrical inputs to reflector and receiver technologies. 3. The software shall have the ability to simulate thermal storage facility for various heat transfer fluids.	

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2.4	Integrated Gasification combined cycle plants(IGCC)	1. The software shall be able to build IGCC power plant for different gas turbines and steam cycle ratings. 2. It Shall be able to simulate various IGCC components as mentioned in Annexure-1. However, the software shall also include any other equipment models needed to build a typical IGCC plant system model. 3. It shall have extensive physical property libraries to simulate gas clean up system (i.e. acid gas (CO_2 and H_2S removal).	
2.5	Technical features	1. The system shall generate the models from the first principles by using appropriate Mass and Energy balance. 2. The user shall be able to define the process interactively by selecting the desired components from the library provided by the software using Graphical User Interface (GUI), configure and connect these components to build a reference plant. 3. The software shall have the flexibility to configure a plant with different combination like solar & thermal, solar & combined cycle, Solar & IGCC. 4. The models will be able to be developed under different Unit systems (FPS, SI systems) and system shall allow the user to convert from one unit system to the other. 5. The software shall have facilities to generate multiple scenarios in the power plant via What if analysis tool. 6. The software shall have optimization tool to simulate optimal conditions under specified constraints. 7. The user shall be able to import data and export data, results to different interfaces like excel. 8. The software package should work on Windows-XP/Windows 7(or latest). The software shall be able to operate in both *design mode* as well as *prediction/simulation mode*. In the *design mode*, the software shall be able to compute the heat/mass balance for a given load. In the *prediction/simulation mode,* the software shall be able to compute heat/mass balance and performance of the equipment for different load conditions. (eg. Efficiency, TTD,DCA etc.)	

Sl. No	Description	BHEL Specifications	Vendor Specifications/Deviations
		GUI based Simulation Software Toolkit for Power Plant applications	
3	License	Vendor to offer TWO licenses, preferably network based, to enable concurrent development by TWO users for different projects.	
4	Software Training	The scope to include training of BHEL engineers for complete software at BHEL R&D's premises. Complete details of the proposed training shall be provided.	
5	Warranty & Support	All supplied items to be provided with warranty for one year from the date of dispatch .During this warranty period all the necessary software patches and upgrades will be provided at no additional cost to BHEL. Also during this period Technical support will be provided without any additional cost to BHEL.	
6	Pre-Qualification requirements	The offered Simulation Software Toolkit should have been supplied/under supply to at least ONE customer or used by at least ONE Customer for each type of the following power plant application: 1. Conventional sub-critical/super critical Thermal Power plant 2. Combined Cycle Power Plant 3. Solar thermal Power plant 4. Integrated Gasification Combined cycle power plant(IGCC) The following list should be furnished along with the offer 1) Customers/Users for each plant 2) Power Plant Type, Configuration & Rating for each plant Offers from vendors not meeting this pre-qualification requirement, will not be considered for technical evaluation and rejected.	

7	**Deliverables: The following items (7.1 ,7.2,7.3) to be quoted separately with price break up**		
7.1	Software Tool Kit	GUI based Simulation Software tool kit with TWO Licenses preferably network based, to enable concurrent development by TWO users for different projects.	
7.2	Training	The scope to include training of BHEL engineers for complete software at BHEL R&D's premises. Complete details of the proposed training shall be provided.	
7.3	Reference Models	In the scope, the bidder shall include at least one typical reference model for each type of the plant for the following configurations • Conventional sub-critical/super critical Thermal Power plant • Combined Cycle Power Plant • Solar thermal Power plant • Integrated Gasification Combined cycle power plant(IGCC) Vendor can deliver the above reference models within three months from the date of supply of simulation software tool, if it is not immediately available.	
8	General terms	1. AMC charges shall be quoted on yearly basis up to 5 years. AMC to include technical support and upgrades of the software. 2. The vendor shall submit offer in two parts consisting of Technical and price bids separately. 3. a) The price bid shall include cost for single user basis. b) Cost of additional user license should be quoted separately. 4. Technical bid shall also contain a copy of price bid without figures / values. 5. For any technical clarification, the bidder may contact the following persons: a) Mr. M. R. prabhakarh, prabhakar@bhelrnd.co.in b) Mrs.V. Jyothi, vjyothi@bhelrnd.co.in.	

Annexure – 1

A) Thermal Power Plants	
Heat exchangers	Steam-Steam, steam-water, steam-Air, Gas-Steam, Air-Air, Gas-Gas, Gas-Water, Water-Water, Steam coil air heater, Gas-Air (Tri-sector and Bi-sector Air heaters), Attemperator, Radiative heat – transfer heat exchangers
Steam Turbines and Auxiliaries	High Pressure, Intermittent Pressure, Low Pressure for Sub-Critical and Super-Critical boiler Main steam parameters, Drive turbine for Feed pumps
Fans	Axial, centrifugal with constant speed and variable speed
Furnace	Boiler Furnace, Stoker Furnace, Cyclone Furnace, Oil fired, coal fired, Dual sided once through, once through single furnace, Tangentially fired and Front wall fired furnace
Condenser	Air cooled, Water cooled
Motors	single phase and three phase induction motors with constant speed and variable speed drive
Pumps	Centrifugal, positive displacement, Oil and Vacuum pumps
Valves with or without actuators	Gate, regulating , diverter, air, gas, steam, water, two phase
Transmitter	Flow, Pressure, Pressure difference, Temperature
Boiler Drum and Deaerator	
Pulverisers	Ball, Tube and Bowl type
Circulating Systems	Natural circulation, Forced Circulation and Once through
Combustor model	
Miscellaneous	ESP, Coal nozzles, Oil burners, Bunkers, Gravimetric feeders, Ducts, Headers, Junctions
B) Combined Cycle Power Plants	
	Gas Turbine, Evaporator, all heat exchangers with convection heat transfer (HRSG components)
C) Integrated Gasification combined cycle power plants(IGCC)	
	Gasifier, Gas clean up system, Coal handling system, Evaporators, Ash handling system and gas-gas, gas-liquid heat exchangers, Gas turbine for Syn gas , compressors and gas turbines from various vendors.
D) Concentrated Solar Power Plants	
	Parabolic Trough, Heliostat, Storage Tank, Related pipes, joints, Heat transfer fluid- molten salt, Therminol VP-1, Water/Steam