

ENERGISING MAHARASHTRA

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Sustainable power in socially responsible manner



MAHAGENCO has played an important role in the progressive development of this State since years. I wish all my best compliments to Mahagenco for its eighteenth anniversary. To give human face to the development, Electricity should reach up to the last element of the Society. Our State has contributed lot for the overall growth of the Country and consistently excelled in the field of Power Generation. State owned company Mahagenco has made

remarkable contribution towards infrastructural development of Power sector. Using State-of-the-art technology, Mahagenco has changed its operations with time. It is a matter of satisfaction that as per its Vision Document-2030, the company is going for vast expansion program and business diversification. At one end where Mahagenco has maintained its traditional thermal generation at optimum level, in parallel the company is taking all efforts towards expansion through non-conventional clean energy sources especially Solar power. Moreover, Mahagenco has speed up the pace of prestigious Solar project like CHIEF MINISTER SOLAR AGRICULTURAL FEEDER SCHEME, which is appreciable. It is a history now that, at one

time our State was suffering from load shedding problems. All our three power companies have freed the State from load shedding in a very challenging situation and our State is power surplus State now with all their vigorous efforts. Mahagenco's thermal, hydro, wind and solar power generation plays a major role in achieving the journey from load shedding to power surplus. As usual Maharashtra will retain its leading status in this era also. All power employees who are working hard and taking tremendous efforts deserves special applaud. Finally once again I wish all my best compliments to Team Mahagenco on this special occasion.

Eknath Shinde,
Chief Minister

Laying greater emphasis on Green Power



If the dream concept of our Hon'ble Prime Minister "Self-reliant India" (Atmanirbhar Bharat) is to be materialized in true sense, it is essential to be self-sufficient. In view of this in the last 18 years our all power companies have proved by achieving excellent performance. Considering State power demand, power generation process was continuously made as per the demand of the State. I am fully aware that our electricity workers are working round the clock facing challenges of natural hazards such as heavy rain, floods, storms and even braved the COVID-19 pandemic. Since power generation is a

continuous process, it is necessary to always be alert and vigilant. However, not only as the Deputy Chief Minister of the State but also as the head of the family being Energy Minister of all the three power companies, I heartily congratulate all the engineers, technicians, officers and employees of the Mahagenco Company on the occasion of its 18th anniversary. Interestingly, even after the introduction of the Electricity Act 2003 and subsequent entry of many private players into the power generation sector, our State-owned power company have been consistently achieving record performance in the interest of end consumers. As the calamity of global warming is emerging at rapid pace, we have to move towards ecofriendly non-conventional power generation in the future. In this regard, I am sure that my dream scheme namely "Chief Minister Solar Agriculture Feeder" will get fur-

ther momentum in near future along with other upcoming Solar projects with different modes. Even though our State is leading in Thermal power generation, in future we have to enhance our non-conventional power capacities in geometrical scale. However, for coming few years, Thermal power generation will continue to play a vital role to maintain reliability in terms of electricity supply. Let us all be committed for ecofriendly power generation by using the best available technologies and thereby conserving natural resources. Since long, our country has been categorized as a developing country. In this regard all our earlier national campaigns like "Make in India, Magnetic Maharashtra, or the recently launched "Ujjwal Bharat Ujjwal Bhavishya", campaign on the occasion of Amrit Mahotsav of Independence have resulted into positive gain. We are moving towards a new future with new hope. Each of our employees should be aware of this. On the occasion of this special day, I appeal all employees of Mahagenco to take full advantage of such opportunity of being a part of growth story of Mahagenco.

Devendra Fadnis,
Deputy Chief Minister and Minister of Energy

Vision 2030 – towards becoming a 25+ GW behemoth

OUR VISION

"Generating adequate power for Maharashtra on a sustainable basis at competitive rates in a socially responsible manner"



By the end of the ongoing decade, Maharashtra State Power Generation Co. Ltd. (MAHAGENCO) seeks to assist in the grand objective of the Government of Maharashtra (GoM) to become a 1 trillion dollar economy, by turning itself into an electricity generation behemoth, satisfying the power needs of Maharashtra State to the extent of 25+ Gigawatts (GW). It will also strive to reduce its carbon footprint through the development of its renewable energy portfolio. The emerging scenarios of the power sector in India provide significant risks to conventional generators, and at the same time, provide ample opportunities for growth through integration of technologies with renewable power. Based on the SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis, MAHAGENCO has identified its areas of weakness that requires consistent improvement, coal availability and its competitive sourcing being one of the top priority elements. At the same time, the company needs to plan its O&M (Operations and Maintenance) initiatives in order to reduce disallowances and ensure full fixed cost recovery. Towards meeting the above ends, MAHAGENCO has drawn

up a comprehensive 'Vision 2030' document that outlines the development of new projects, Renewable Energy projects and consulting opportunities that need to be pursued in an aggressive manner so as to achieve a generation capacity of over 25,433 MW within the next seven years, which will be almost double. The following table shows the vision of a steadily increasing generating capacity (in MW) over the course of the decade, with special emphasis on solar and Hydro PSS: The company has drawn up strategic theme/ pillars to achieve the mission – sustainability, timely completion of projects, growth and IT enablement. Each of these themes have strategic action points, which are to be undertaken by respective departments in a time bound manner. In order to realise its Vision 2030 objectives, MAHAGENCO has framed the following Mission

- Endeavour to fully meet the future energy needs of the State and create sufficient spinning reserves through Organic Value enhancing
- Commit to affordable energy rates through cost minimization and consistent Operational excellence and energy efficiency.
- Value enhancement to the stakeholders by being nimble and resourceful in the economic environment, increase business scope and scale to succeed throughout the economic cycles and adapting business and portfolio to the dynamic energy market place.
- Strive to improve the quality of life for the people who live and work in the company's operational territory and power plants vicinity.



- Diversify the energy portfolio to include solar, wind, gas, hydroelectric and responsible fossil generation directed towards shrinking our carbon footprints.

GENERATION CAPACITY - VISION 2030			
Station	Capacity FY 21-22	Capacity FY 25-26	Capacity FY 30-31
Coal	9,540	10,200	12,180
Hydro	672	850	850
Gas	2,580	2,580	2,580
Solar	242	6,643	8,293
Hydro PSS	0	330	1,530
Total Capacity	13,034	20,603	25,433

MAHAGENCO's foray into solar power laudable



After taking charge as Principal Secretary (Energy), I visited Koradi and Khaparkheda Thermal Power Stations of Mahagenco during winter assembly session at Nagpur and later visited Chandrapur Super Thermal Power Station. Power generation is a complete engineering organisation with risk, complex, tough and round-the-clock hard work. Although Mahagenco is a government company, it is renowned in the energy sector of Thermal, Hydro, Gas and Solar power plants. Although coal, water and machine parts are the important factors, technically skilled and experienced manpower are the real assets of Mahagenco. There is a dual responsibility as a supervisor towards the day-to-day operations of Mahagenco to provide uninterrupted power at fair rates to the electricity consumers in the State and increase overall efficiency. State-of-the-art sets based on Supercritical technology of 660 MW capacity. Coal Pipe conveyor system supplying coal directly from Coal mine to Power Station, using treated wastewater in the Power Station. Central Electricity Authority "A" rated Training center cultivating social awareness through developmental activities under Corporate Social Responsibility within a 10 km radius of the Power Station. Although there is an installed capacity of 371.42

megawatts of Solar Power efforts are being made by the Mahagenco team to add 1,000 megawatts in the coming year. There are many challenges in the Maharashtra power sector, like competition with private power producer companies. Electricity Regulatory Commission and constantly changing environmental norms. Future electricity demand. In place of old outdated units, modern technology units, and financial management will have to be done along with it. In this rapidly changing power sector, effective planning, vision for far-reaching development, and adapting oneself in time according to the situation has become the need of the hour. In this regard, it is only a modest hope that on this anniversary, we should all resolve for the all-around progress of the Great Creation. Best wishes to all the officers, engineers, technicians, employees, and family members on the occasion of the anniversary of Mahagenco.

Abha Shukla,
Principal Secretary Energy



Vision 2030 is the "Growth in Renewable Installed Capacity including RE Bundling". The RE Bundling

scheme was introduced by the Government of India (GoI) for flexibility in Generation and Scheduling of power stations through the integration of Renewable energy generation with the existing conventional plant sites. Almost exactly a year ago, on 26th May 2022, GoI had targeted the trajectory for the replacement of thermal energy with about 30,000 MW of Renewable Energy, resulting in reduction of 60.2 MMT carbon emissions by 2025-26. MAHAGENCO has decided to adopt the RE bundling scheme for thermal units in a phased manner. The company will also make a foray into Energy Storage Solutions, an emerging area which can play an important role in grid integration and balancing of variable generation sources. MAHAGENCO needs to explore the prospects to gain early advantage in this space. The company will also consider supplying power under bilateral transactions or on power exchanges from the sources which were not scheduled by MSEDCL. The current RE power trading license can also be utilised to explore these possibilities. The Vision document lays emphasis on the development of clean energy, development of Battery Solution as well as pump storage plants, which provides immense opportunities going forward, given the significant unmet Renewable Purchase Obligation (RPO) targets for the State distribution company.



SUPPORTED BY



(A Maharatna Company)

Our aim is to make MAHAGENCO reach for the sky” – Dr. Anbalagan

The reins of Maharashtra State Power Generation Co. Ltd. (MAHAGENCO) were handed to Dr. P. Anbalagan in October last year. Keeping in mind current scenario of state power generation sector he truly recognized the need of hour to give momentum to Mahagenco's future plans vide its VISION – 2030 Plan. With the intention to tap all possible opportunities and territories in power sector in near future, he has succeeded to bring in efficiency and reliability within Mahagenco's power generation and under his able guidance Mahagenco has given relief to state consumers with its substantial and consistent generation especially this summer. At the same time, he is playing a vital role in widening Mahagenco's span of activities with future business diversification plans. As an end result of this, Mahagenco will certainly reach to new heights and will set new standards in Power sector.

MW, including pump storage, by the year 2025-26, and over 1,500 MW by 2030-31.

The company will also make a foray into Energy Storage Solutions, an emerging area which can play an important role in grid integration and balancing of variable generation sources. MAHAGENCO needs to explore the prospects to gain early advantage in this space.

Q We are told that you have taken concrete steps towards moving MAHAGENCO out of its comfort zone, and into the fast lane. Could you elaborate on these measures?

A We could identify five transformational points that pulled MAHAGENCO out of its comfort zone. One was changing our strategy at the corporate level by framing a roadmap consisting of short and long term strategies for bringing improvements on a sustainable basis.

A second step was adding to our advanced technology and efficient thermal capacity with 660 MW super critical coal-based units at Bhusawal and Koradi thermal power stations (TPS), and getting our own coal mine, as a form of backward integration – the Gare Palma-II coal mine in Chhattisgarh. It is

expected to be operational in FY. 2023-24.

Thirdly, our concentration on the Renewable Energy (RE) solar sector which is the future need of the country as India possesses a huge potential of RE power, especially in solar. We have commissioned 371.62 MW of solar power projects, out of which India's first agri feeder pilot projects with a capacity of 130 MW have been completed under the Chief Minister Agriculture Feeder Scheme.

MAHAGENCO is planning to execute under UNREPP a 250 MW solar plant, which is the highest solar power generation plant in Maharashtra State; and also a 105 MW floating solar power plant at Erai dam in Chandrapur. We have, in addition, formed 'Mahagenco Renewable Energy Ltd.', a subsidiary company, with the objective of becoming a 'Green Maharashtra' by using non-conventional green energy and energy services facilities.

Fourthly, we are looking seriously at environmental safety and improvement by installing pipe conveyors for transporting coal from the mines to our power stations in Chandrapur, Koradi and Khaperkheda. ESP retrofitting work is being done at several of these thermal stations



Dr. P. Anbalagan
Chairman and Managing Director

to fulfil environment norms. Finally, we are monitoring the proper working of our thermal power stations, and recently achieved the distinction of having all 27 thermal power units operational at one time. There has also been an improvement in the PLF (plant load factor), from 56% to 61%, and there has been additional generation of 3,251 MUs in FY. 2022-23, compared to FY. 2021-22. Even the small hydropower plants have achieved record performance this year. We have also succeeded in reducing transit losses of coal and demurrage charges.

Q Are there any other sub-areas into which MAHAGENCO is foraying?

A Apart from the growth in renewable installed ca-

capacity with the RE Bundling scheme to save coal during the daytime and maximise thermal load during peak and night hours, we have plans to get an early advantage in Energy Storage Solutions, an emerging area which can play an important role in grid integration and balancing of variable generation sources.

The company will also consider supplying power under bilateral transactions or on power exchanges from the sources which were not scheduled by MSEDCL. The current trading license can also be utilised to explore these possibilities.

Q Is it true that MAHAGENCO has actually been paying some municipal corporation for acquiring sewage water?

A It is true enough! It is now seven years since the first joint pilot sewage recycling plant between MAHAGENCO and Nagpur Municipal Corporation (NMC) was commissioned in 2016 at Bhandewadi, Nagpur, with a capacity of 130 million litres per day (MLD).

In addition, MAHAGENCO uses 190 MLD of recycled water of NMC's sewage recycling plant. Hence, a total capacity of 320 MLD of recycled water is used for ash handling at Koradi and Khaperkheda thermal power generation stations of MAHAGENCO, thereby reducing the requirement of fresh water.

The ash water from the thermal power plant is recycled through the ash water recovery system. The DM water emitted from the plant as well as the softener plant is treated in the effluent plant, and the water is used

again in the water treatment plant. The sewage generated at the power station and colony is treated by the sewage treatment plant and the water is reused for the ash handling plants.

The commissioning of a 45 MLD capacity of sewage recycling plant at Chandrapur is also in process.

Q Can you mention details of other systems that you have for environmental protection?

A We strongly believe in conservation of natural re-

sources through maximum recycling of resources. Towards this propose, MAHAGENCO has ash water recovery systems, effluent treatment plants, and the like. Rainwater harvesting is also being practiced to support water criticality.

A Green belt has been developed by planting a large number of trees in the power station colony area of MAHAGENCO. Tree plantation is one of the most effective tools for elevation of deteriorated environmental conditions. All TPSs of MAHAGENCO meet the norm of minimum 33% tree plantation in open areas.

While conserving the environmental aspects, a sincere effort is being made by MAHAGENCO to bring the carbon footprint from its power stations to zero or negligible levels. A carbon footprint study has been carried out at Koradi TPS as a model TPS. The system of continuous monitoring of air quality has been installed at different places in the vicinity of thermal power stations. Believe me, caring for the environment is a top priority for us.

CHAIRMAN & MANAGING DIRECTOR THREE-POINT PROGRAMME

- 1 Efficiency improvement (by adopting newer technology/process)
- 2 Environment protection (Reduction of Carbon Footprint)
- 3 Enhancing capacity and Expertise, Energy Services & Consultancy

Q What are your short and long term goals for MAHAGENCO?

A My objective is to unlock the full potential of this wonderful company. And to do it while being socially responsible and conscious of the effect that the company's activities would have on the environment.

I have been given charge of this company at a time when the power sector in India is going through a crisis, and there are major risks associated with conventional players of power generation, in particular with coal issues and regulatory norms. Renewable energy would seem to be the way forward; and we have drawn up a Vision document that envisages

the direction that the company would need to take if it is to reach for the sky by generating over 25 GW of power by the year 2030.

So, while my short-term plan is to modernise the existing infrastructure and replace the units that have outlived their usefulness, I would be simultaneously looking at ways and means to increase our solar capacity from a level of just 242 MW in the year 2021-22 to an estimated 6,643 MW by 2025-26, and further to 8,293 MW by the year 2030-31, the terminal year of our Vision plan.

We also didn't have any Hydro PSS stations until 2021-22, but we are hoping to have hydro stations generating 330

Blast From The Past From small acorns do mighty oaks grow



First, there was the Maharashtra State Electricity Board (MSEB). Formed on 20th June 1960, the Board was constituted to supply uninterrupted electricity to the consumers of Maharashtra State. Several power plants and hydro power stations, ranging from 10 MW to 62.5 MW capacity, were commissioned by MSEB, and served the State 24/7, 365 days a week, for the next 63 years.

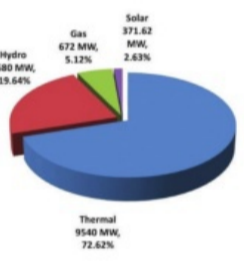
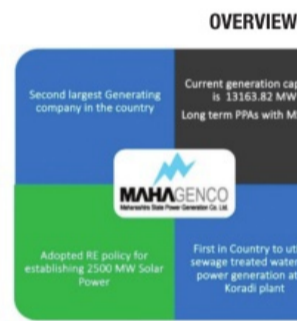
However, MSEB as an entity remained intact only till 2005,

previous highest figure of 54,476 MUs. The total highest peak load above 10,000 MW was achieved on 27th March 2023, when 10,102 MW were generated.

The company has been constantly adding capacity by pressing new efficient units into service and retiring aged ones which have exceeded their service life. Simultane-



ously, there has been renovation and modernisation of old units with improvement in energy efficiency.



Director. There are also daily sectional performance reviews chaired by the Director (Operations). From 2022-23, an Annual Overhaul Planning and Monitoring meeting is being taken with the utmost seriousness.

In addition, measures have been taken for improvement in the performance of Thermal

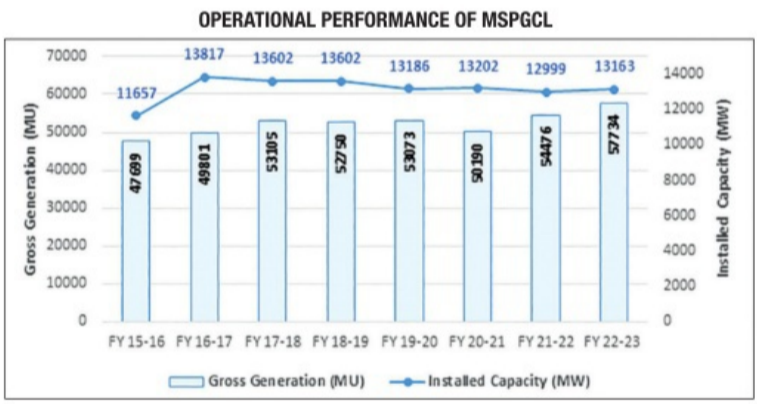
units. An Expert Support Team has been established for monitoring performance improvement and suggesting measures. Various committees have been established for performance improvement, including BTL committee, Heat Rate improvement/POG committee, Electrical Protection Committee, Coal Mill Improvement Committee, CHP Improvement Committee, Turbine Task Force Committee, MPD Committee and Water Chemistry Committee.

when it was broken up into four companies, with one offshoot, Maharashtra State Electricity Generation Co. (MAHAGENCO), being given the task of generating electricity for the State of Maharashtra.

Over the 17 years since its independent charge of power generation, that small acorn has grown into a mighty oak, with a generating capacity of 13,163 MW, broken down into 9,540 MW of Thermal, 672 MW of Gas, 2,580 MW of Hydro and 371 MW of Solar.

In the financial year 2021-22, MAHAGENCO surpassed its own record by generating 57,734 MUs, compared to its

Performance Improvement Programmes have been regularly adopted by MAHAGENCO through various weekly, monthly and quarterly review meetings chaired by the Chairman and Managing



Total service, Unceasing Service

On Mahanirmitti's (MAHAGENCO) Foundation Day, I wish to praise all the officers and employees of the company, who have been continuously generating electricity for their consumers. Thanks to these officers and employees who work according to the mantra 'Akhand Seva, Avirat Seva' (Total Service, Unceasing Service), the electricity consumers of Maharashtra have been getting exemplary services. The electricity generation from MAHAGENCO is enhancing and adding value to the economic development of the state.

In the year 2006, MAHAGENCO, a public power generation company, was established from the power corporation formerly named Maharashtra State Electricity Board (MSEB).

The power generation capacity of MAHAGENCO is 13,163 MW, including a capacity of 9,540 MW of thermal power generation. There are seven thermal power generation projects of Mahanirmitti at various places, including Koradi, Nashik, Bhusawal, Parli, Chandrapur and near Nagpur.

Apart from this, MAHAGENCO has set up a gas-based power generation project at Uran with a capacity of 432 MW. The total gas-based power generation capacity of MAHAGENCO is 672 MW. The company also produces hydro



Vishwas Pathak
Independent Director

power. The Koyna Dam hydroelectric project is famous and its capacity is 1,956 MW.

The company has set up solar power generation projects at Chandrapur, Sakri Taluka, and Baramati. So far, MAHAGENCO has set up 371 MW of solar energy projects. Considering the total power generation capacity and especially the installed thermal power generation capacity, MAHAGENCO is the largest among the power generation companies of other states in the country.

One complaint about thermal power plants is that they cause pollution. The government's policy is to phase out thermal power generation projects in the country, and put more focus on environment-friendly renewable energy generation projects.

The economic development of Maharashtra is growing rapidly. Along with that, the standard of living of the people is improving. As a result, the electricity demand is increasing day by day. Keeping this in mind, MAHAGENCO is committed to increasing the power generation capacity.

However, thermal power generation currently has no alternative options due to the large-scale power generation in thermal power plants and the opportunity for demand-driven power generation.

As a responsible power generation company, MAHAGENCO has planned measures to reduce pollution caused by thermal power generation plants. The company has used flue-gas desulfurization technology, known as FGD, in the projects. This technology reduces the amount of sulfur dioxide in the smoke coming out of the plant.

Similarly, MAHAGENCO has used the supercritical technique, as this technique requires less coal to heat water. As a result, less coal is burned, and power generation becomes more cost-effective.

MAHAGENCO is retiring the old projects based on outdated technology, and replacing them with modern power generation projects based on modern technology, thus helping to increase efficiency while reducing pollution at the same time. Due to such various measures, MAHAGENCO has earned the reputation of being the company that produces electricity at the lowest cost.

By continuously generating electricity in any of the environmental conditions, MAHAGENCO has helped the state's economy to prosper. The company's work is a matter of great pride. I wish that the company continues to progress in this manner.

Transformation into a sleek, fast-moving entity

Among the dangers of running a state-owned organisation is over-decision-making. MAHAGENCO has avoided falling into this trap by overhauling its systems and transforming itself into a sleek, fast-moving entity on five fronts:

1 STRATEGY AT CORPORATE LEVEL
The company has framed "MAHAGENCO Vision 2030", a strategic roadmap consisting of

temporary basis to produce innovative ideas for performance improvement at Thermal, Hydro, Gas and Power plants.

2 THERMAL CAPACITY ADDITION AND MINING
The installation of a 660 MW super critical coal base unit at Bhusawal TPS is in progress, and is expected to be operational later this year. It is an extremely eco-friendly project that has Selective Catalytic Reduction (SCR) and Flue



gas Desulphurisation (FGD), which removes nitrogen oxides (NOx) from flue gas emitted by power plant boilers and other combustion sources.

This cleaner supercritical technology will increase the efficiency of the unit, reduce emission levels and make electricity available at reduced

variable cost. In addition, two more sets of 660 MW have been proposed at Koradi TPS. The coal mining agreement for Gare Palma-II coal mine in Chhattisgarh has been signed, and both Forest and Environmental Clearances have been received. The mine is expected to start operations in FY. 2023-24.

3 RENEWABLE ENERGY SOLAR/WING/ PSS ETC
MAHAGENCO has so far commissioned a total of 360 MW of solar energy projects, out of

net the company 1,250 MW as its share.

The draft policy for Pump Storage Project was submitted by the Water Resources Department, and MAHAGENCO submitted immediate feedback on it.

Among other Renewable Energy (RE) projects, MAHAGENCO has formed "Mahagenco Renewable Energy Ltd.", a subsidiary company with the objective of becoming a 'Green Maharashtra', using non-conventional green energy. The company is also in process with Satluj Jal Vidyut Nigam Ltd. for development of RE projects up to 5,000 MW.

The company has collaborated with Circular Economy Alliance Australia, and formed Maharashtra Australia Sustainable Energy Alliance (MHAUSEA) to establish a platform for forging a strong technology and knowledge partnership between Maharashtra and Australia.



4 ENVIRONMENT SAFETY AND IMPROVEMENT

MAHAGENCO has taken up the projects of installation of Pipe Conveyor for transportation of coal from coal mines to Chandrapur, Koradi and Khaperkheda TPS. It has also taken up the work of installation of FGD system and ESP retrofitting for thermal power stations. LoAs have been issued for FGD installation at select

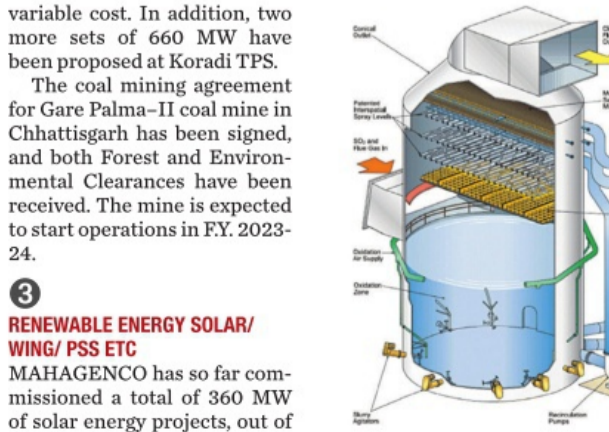


nuity in the generation of sufficient electricity. For the first time in its history, the company managed to have all its thermal power units operational



short and long term strategies for bringing over-all improvements on sustainable basis, and a roadmap for implementation. Several State-level committees have been formed for performance improvement in various areas in power stations. A number of "research assistants" have been appointed on

Gas Desulphurisation (FGD), which removes nitrogen oxides (NOx) from flue gas emitted by power plant boilers and other combustion sources.



units in Paras, Khaperkheda and Koradi, and ESP retrofitting work at two Chandrapur 500 MW units is in progress.

5 PERFORMANCE IMPROVEMENT OF THERMAL POWER STATIONS
MAHAGENCO has played an important role in meeting the peak demand for electricity, while maintaining the conti-

and set new records of power generation. Even the small hydropower plants have achieved record performance this year. MAHAGENCO has achieved saving by implementing improvements in fuel management, proper coal grading system, successfully reducing transit losses and demurrage charges in coal transportation, to a great extent.

Caring for the environment a top priority for MAHAGENCO

MAHAGENCO has a dedicated department, Environment & Safety (E&S), responsible for implementation and integration of various environmental rules and regulations within the different power plants and projects taken up by the company.

A Green belt has been developed by planting a large number of trees in the colony area of MAHAGENCO's power stations. Tree plantation is one of the most effective tools for elevation of deteriorated environmental conditions. All TPSs of MAHAGENCO meet the norm of minimum 33% tree plantation in the open areas.

It is now seven years since the first joint pilot sewage recycling plant between MAHAGENCO and Nagpur Municipal Corporation (NMC) was commissioned in 2016 at Bhandewadi, Nagpur; it has a capacity of 130 million litres per day.

In addition, MAHAGENCO uses 190 million litres per day of recycled water of NMC's



sewage recycling plant. Hence, a total capacity of 320 million litres per day (mld) of recycled water is used for ash handling at Koradi and Khaperkheda thermal power generation stations of MAHAGENCO, thereby reducing the requirement of fresh water.

Similarly, the commissioning of a 45 mld capacity of sewage recycling plant at Chandrapur is in process.

MAHAGENCO is in the process of utilization of biomass briquettes/ pellets through co-firing in pulverized coal-fired boilers for power plants,

as per new biomass policy, which will lead to reduction in CO2 emission.

While conserving the environmental aspects, a sincere effort is being made by MAHAGENCO to bring the carbon footprint from its power stations to zero or negligible



levels. To estimate the total amount of greenhouse gases emitted during electricity generation and to quantify the amount of CO2 emitted and thereby achieving reduction or neutrality of carbon, a carbon footprint study has been carried out at Koradi TPS as a model TPS.



The system of continuous monitoring of air quality has been installed at different places in the vicinity of thermal power stations. MAHAGENCO is committed to maintain the standards set by the pollution control boards regarding air pollution in the area to the minimum level.

In addition, MAHAGENCO TPPs always try to keep the noise level within permissible limits.

The process of transportation of coal from Bhatadi coal mine to Chandrapur Super thermal Power Station through state-of-the-art pipe conveyor or belt system has been implemented. Work on a similar system is also in progress for Koradi and Khaperkheda power stations from the coal mines of Gondgaon, Bhanegaon and Singori.

There will be a significant reduction in the pollution of coal

particles caused by large-scale road-rail or ropeway transportation. There is also a reduction in the amount of coal loss during this transportation.

In order to ensure that natural resources are always used with utmost responsibility, three R's (Reduce, Reuse & Recycle) are effectively adopted in

the power stations. The goal of MAHAGENCO is to ensure maximum recycling of water through the concept of "Zero Water Discharge" by inculcating a good work culture in all thermal power generating stations.

The ash water from the thermal power plant is recycled through the ash water recovery system. The D.M water emitted from the plant as well as the softener plant is treated in the effluent plant, and the water is used again in the water treatment plants. The sewage generated at the power station and colony is treated by the sewage treatment plant and the water is reused for the ash handling plants.

Due to such measures, there has been a significant reduction in water consumption in all TPSs. The average specific water consumption of MAHAGENCO TPS is well within prescribed limits.

Solar Energy set to make a huge leap

Solar energy, which is the most environment friendly form of power, has become a big priority for MAHAGENCO in recent years. The company has so far commissioned 367.42 MW capacity of solar projects; and another 964.58 MW capacity are at the commissioning stage. In addition, tenders for a further 607.5 MW capacity of solar project are in the process of being floated.

To provide electricity to farmers during the day, MAHAGENCO is effectively implementing the "Chief Minister Solar Agriculture Feeder Scheme", which was put in place in 2017. The company also commissioned 4 MW solar projects at Ralegaon Siddhi in 2018; these are India's first Solar Agricultural feeder projects.

During the period 2021 to 2023, MAHAGENCO commissioned 175 MW Solar Agricultural feeder projects. Recently, the company commissioned 11.76 MW Solar Agricultural feeder projects at Nalekhindi, and Sangaoon.

Another example of the strong move forward on the solar energy front is the Letter of Award (LoA) for the commissioning of a 250 MW solar project, which is the highest power Solar Power generation

plant, at Dondaicha, in Dhule district. A Solar Park Implementation & Support Agreement has also been signed in June 2022.

Under the CMAGF scheme, MAHAGENCO has published Expressions of Intent (EoIs) for 600 MW of solar power, and has plans to publish EoIs for another 1,000 MW under this scheme.

The Government of Maharashtra has given clearance to form a joint venture between National Thermal Power Corporation (NTPC) and MAHAGENCO for 2,500 MW Solar Park Projects, from which the latter's share will be 1,250 MW.

The State Government has also approved 187 MW solar power projects, which are being developed with a loan amount of 72.81 million Euros from KfW Bank of Germany. More solar projects are being developed at Latur (60 MW),

Sakri-I (25 MW), on TPS land (52 MW), at Yavatmal (75 MW), Washim-I (130 MW), Washim-II (40 MW) and Kachhala (145 MW).

Further, MAHAGENCO is planning to develop 390 MW by support from KfW Bank.

Mention must also be made of the 2 MW rooftop solar project at Koradi and Chandrapur, Green Hydrogen (500 kW of solar power) at Bhusawal, a 105 MW Floating Solar power project on Erai Dam, in Chandrapur district, and a 62 MW Bundling at Paras Thermal Power Station.

Finally, a whopping 2,500 MW will be generated at Ultra Mega Renewable Energy Power Parks (UMREPP), following the signing of a pact with NTPC Renewable Energy Ltd. In short, over the next five to six years, MAHAGENCO's solar energy portfolio will shoot up by more than 5,000 MW capacity.

Allocated Govt of Maharashtra Rs. 750 cr under special assistance scheme to support the Renewable Capacity addition for FY 2023-24.



MAHAGENCO's outstanding modus operandi for coal



This is the story of how MAHAGENCO has been successful in increasing coal stock at its power stations from a mere two to three days at its most critical point in 2021 to a level of 15 days during the summer of 2023.

During the two years 2020 and 2021, the widespread COVID-19 pandemic had a harmful effect on the production of coal. In addition, the general economic slowdown during the financial year 2021-22 adversely affected the demand for electricity, and resulted in a serious calamity on the coal front. The coal stock at MAHAGENCO's power stations came down to a critical extent, and was sufficient for just two

to three days' demand for electricity.

In the month of July 2021, the maximum total coal stock of MAHAGENCO TPS was 17 lakh metric tonnes (LMT). The lifting of lockdown restrictions by the Maharashtra Government and the onset of summer in 2022 caused a huge spike in the demand for power, and escalated the coal crisis.

The peak demand during the month of August 2021 touched 21,500 MW due to the prolonged dry spell. This increase in power demand led to higher daily coal consumption, from 75,000 metric tonnes (MT) to 1,20,000 MT during the monsoon.

However, daily coal receipts

remained at around the 75,000 MT mark. This resulted in faster depletion of coal stock, leading to critical/ super critical coal stock position at all power stations.

MAHAGENCO remedied the situation by going in for RCR, RSR and imports, and also by using the Order Booking Program (OBP) to get coal companies to provide sufficient coal to meet the increased generation demand and to build up stock at the plants.

The company ensured increased coal movement by Rail, and has further planned to increase coal supply by other transport modes such as Road, UTS and Ropeway. To improve the movement of coal by Road, MAHAGENCO took steps such as GPS Tracking, Secure Sealing and other environment-friendly measures, including efforts towards reducing grade slippage of coal.

Purchases from coal suppliers have risen from a level of 73% in fiscal 2020-21, and after a drop to 70% in FY. 2021-22, to a historically highest level of 82% during FY. 2022-23.

Thus, through judicious management and foresight, MAHAGENCO has ensured that the burgeoning demand for coal in Maharashtra has not affected the company's working, and that it has secured sufficient coal stocks to meet the daily generation of 8,010 MW of power.

The lone warrior at Uran

MAHAGENCO has a solitary gas-based power station that utilizes natural gas as fuel - the Uran Gas Turbine Power Station (GTPS Uran) stands out as the company's solitary warrior in this field.

All the equipment and systems installed in this facility are fully automatic, and run with the help of the DCS control system. Four gas turbines of 108 MW each are at the heart of the system, with two steam turbines of 120 MW each which operate on waste heat coming from the gas turbines.

GTPS Uran is fuelled by natural gas, which is free from dust, ash and sulphur, thus providing en-

vironmental friendly power generation. Units can be taken up in service within a space of a mere 13 minutes. In addition, there is massive saving on water, as air-cooled condenser system is used instead of cooling towers.

The most noteworthy factor of the UGTPS is the Local Area Islanding feature, which is extremely important in case of A.C. failure or a total blackout, or in case there is a high demand surge emerging from the Mumbai Metropolitan Region.

Keeping it in mind MAHAGENCO have planned for capacity addition of Uran GTPS by means of renovation and modernisation (R&M).



Paving the way for getting own coal

One of the most exciting initiatives undertaken by MAHAGENCO in recent times is to pave the way to getting its own coal, to supplement the coal purchased from external sources. This has taken the shape of the Gare Palma Sector II Mine (better known as GP-II Coal Mine). This will create self-sufficiency to the extent of its expected production.

The mine, allotted to the company by the Government of India in March 2015, is located at Mand Raigarh Coalfield, Tehsil-Tannar, District Raigarh, in Chhattisgarh State. MAHAGENCO signed the Allotment Agreement on 30th March, 2015, with an

amendment being signed on 31st August the same year.

The total area of the mine is 2583.486 hectares, covered under 14 villages, and the total coal Extractable Reserves amount to 655.152 Million Metric Tonnes (MMT). Of these, the open cast reserves are 553.177 MMT and the underground reserves 101.975 MMT. The life of the mine is 29 years for the open cast section and 77 years for the underground section. Its peak rated capacity is 23.6 million tonnes per annum (MTPA).

MAHAGENCO, through the international competitive bidding process, appointed Gare Palma II Collieries Ltd. as Mine Developer and Operator.

The Coal Mining Agreement was executed on 31st March, 2021. Environmental clearance was granted in July 2022, and Forest clearance in January 2023.

Coal from the GP-II Coal Mine will be used in 2 x 500 MW Chandrapur units, 3 x 660 MW Koradi units and 1 x 250 MW Parli unit. The process of execution of the 'Mining Lease Deed' is under progress. Thereafter, the 'Land Acquisition' and 'Escrow Account' opening process will be started.

MAHAGENCO has undertaken various Corporate Social Responsibility (CSR) activities (mobile medical van, road repairing, Solar street lighting, pond deepening, etc.) in the surrounding villages of the GP-II Coal Mine project area.

Special initiatives for going green

Generating electricity for Maharashtra State may be MAHAGENCO's core activity, but there is a lot more to India's second largest State-run power generating utility - care for the environment. It is one thing to follow environmental laws because that is mandatory; it is quite another to appreciate the importance of ecological balance, and to do

everything to preserve it. Thanks to the inherent habit of self-discipline and an excellent work culture, MAHAGENCO has achieved eco-friendly power generation to this day. The company has a dedicated Environment & Safety (E&S) department responsible for the implementation and integration of various environmental rules and regulations within different Power plants and projects.

E&S mainly deals with interpretation & implementation

of Ministry of Environment, Forests and Climate Change (MoEF & CC), Central Electricity Authority (CEA), GOI's environmental laws and regulations, implementation/compliance with directions issued by Central Pollution Control Board (CPCB) and/or Maharashtra Pollution Control Board (MPCB).

MAHAGENCO strongly believes in the conservation of natural resources through maximum recycling of resources.

Towards this propose, the company has ash water recovery systems, effluent treatment plants (ETP) and sewage treatment plants (STP). Rainwater Harvesting is also being practiced to support water criticality.

As per the guidelines under a notification issued in 2015 by the Ministry of Environment & Forests for achieving new norms regarding Sulphur Oxides (Sox), Nitrogen Oxides (NOx) and Suspended Particulate Matter (SPM) for Thermal Power Plants, MAHAGENCO has already initiated action for installation of FGD, SCR and ESP retrofitting.

Similarly, the commissioning of 45 mld capacity of sewage recycling plants at Chandrapur is in process.

MAHAGENCO is in the process of utilization of biomass briquettes/ pellets through co-firing in pulverized coal-fired boilers for power plants, as per the new biomass policy - which will lead to reduction in CO2 emission.

- SPECIAL INITIATIVES**
- Green Plantation
- Waste water management
- Zero waste policy



Biomass workshop conducted by MAHAGENCO under mission Samarth

MAHAGENCO IT benchmark

Within the space of the 15 years that the Information Technology (IT) department has been functioning within MAHAGENCO, it has received several awards, amongst which the most significant has been the Elets Award from Elets Techno Media Pvt. Ltd. for the best ERP implementation under the Technology category.

There was also the Express Intelligent PSU Award, given by Express Computer, as recognition for the best implementation of Enterprise applications in Utilities.

In addition, the IT Department of MAHAGENCO was given the SAP ACE Award for Public Services; this recognises pioneering organisations across public sector undertak-

ings (PSUs), Utilities, Central and State Government agencies, which have successfully used SAP Software solutions to drive business impact in their organisations and become role models for other organisations of their industry.

Since its formation in 2008, the IT Department has established a strong IT infrastructure within the company. Amongst its initiatives were the Generation Control Room (GCR), a first-of-its-kind implementation for monitoring real-time parameter of Generation Units from all locations at the Head Office.

The SAP-ERP implementation in MAHAGENCO turned out to be a benchmark for other utilities like UPGENCO, WBGE-



MAHAGENCO Participation in Dubai Expo 2022

NCO, GUVNL, APGENCO, Haryana (HP) GENCO. Officers from Securities and Exchange Board of India (SEBI), Punjab National Bank (PNB) and Reserve Bank of India (RBI) have visited MAHAGENCO to study the ERP implementation, and initiated their own journey for implementation of SAP in their respective organisations.

The IT Department has developed in-house dashboards with SAP Analytics Cloud to provide a comprehensive analytics solution by combining business in-

telligence, augmented analytics, and planning capabilities in a single platform, making it easier for organizations to leverage data and drive informed decision-making.

Real Time Generation view is a utility implemented for management to have continuous visibility of the current status, performance, and overall health of the power generation units. The Fully Integrated Security Surveillance (FISS) system has been implemented to integrate various security components into a

unified system, so that organisations can enhance situational awareness, improve incident response times, and streamline security operations. This comprehensive approach helps to ensure the safety and security of assets, people, and premises.

Due to the critical nature of the infrastructure involved, IT has prioritised Cyber Security in MAHAGENCO to restrict cyber-attack targeting power generation facilities that might result in severe consequences, including disruptions to power

supply, potential damage to physical equipment, and compromise of sensitive information.

To safeguard against these risks, MAHAGENCO implemented various cyber security controls to achieve Network Security, Endpoint Protection, Access Control, Patch Management, Data Protection, Regulatory Compliance, etc. MAHAGENCO has implemented Security Operation Centre (SOC) functionality to monitor and detect security incidents in real-time.

Financial control an integral part of MAHAGENCO's success

For any corporation to be successful, financial management is essential; and MAHAGENCO's Finance Department has taken utmost and utmost efforts under guidance of top management to keep the organisation in good fiscal health.

The company has effected savings of more than Rs 165 crores per annum, in interest costs through Debt Substitution.

Diligent efforts were made by MAHAGENCO for reducing finance costs, e.g. negotiation with existing lenders for reduction of interest rate, pre-payment & repayment of high cost loans, and swapping of high-cost loans with low-cost interest rate loans. Efforts were also made to avail new loans from less expensive sources, by publishing 'Expressions of Interest' for loan refinancing - which resulted in savings in interest cost of Rs 1,865 crores over the total tenure of the loan.

The company has also successfully met the conditions under Special Assistance Scheme, and availed of an interest-free loan of Rs 369 crores under the scheme.

Savings of more than Rs.75 crores per annum due to adoption of concessional Income Tax Scheme.

By implementation of the flexible utilisation of domestic coal of MAHAGENCO, the benefit of Rs 364 crores has been passed on to consumers in the five years between April 2018 and March 2023.



On behalf of REC Ltd., we extend our heartfelt congratulations to MAHAGENCO for completing 17 glorious years of operations and wish that you reach greater heights in the coming years. REC would continue to be the preferred funding partner for MAHAGENCO, in future as well.

Shri Vivek Kumar Dewangan, I.A.S. Chairman and Managing Director, REC Limited



Smt Parminder Chopra, Director (Finance) & Additional Charge CMD, PFC

Congratulations & best wishes to Mahagenco on its 18th Foundation day. PFC cherishes its long standing association with Mahagenco and looks forward for continued partnership in achievement of many new milestones in future.

During Mahagenco's incredible journey to become the largest state power generation utility in India, PFC is proud to have provided financial assistance of over Rs. 24,000 crore, supporting capacity addition of 5 GW. PFC is committed to support Mahagenco in its future endeavours to meet the ever growing energy needs of Maharashtra.



Shri Rajesh Kumar Singh, Chairman & Managing Director, Bridge And Roof Co. (I) Ltd.

Congratulations & best wishes to Mahagenco on its 18th Foundation day.

B and R cherishes its long standing association with Mahagenco and looks forward for continued partnership in achievement of many new milestones in future.

During Mahagenco's incredible journey to become the largest state power generation utility in India, B and R is proud to have associated with Mahagenco for FGD Project. B and R is committed to support Mahagenco in its future endeavours to meet the ever growing energy needs of Maharashtra.



Arun Lakhani, CMD, Vishvaraj Group

MAHAGENCO - A pioneer in Recycle and Reuse of sewage treated water in India. You are truly environmentally and socially conscious power generation company. We congratulate you on your 18th Anniversary.



Setting up a cement plant

In view of improving ash utilisation at MAHAGENCO, the possibility of setting up of a cement plant or clinker grinding unit on the company's land, in the vicinity of Koradi and Chandrapur TPS is being explored.

A tender to 'Build & Operate' cement clinker grinding units of 2 million tonnes per annum (MTPA) and minimum 1 MTPA to maximum 2 MTPA at Koradi and Chandrapur respectively, was floated in September last year. The tender sale is in process.

There is expectation of higher utilisation of fly ash, considering 30% ash content in cement.

Enhancing thermal capacities for reliable power

For a reliable powers, keeping in mind the inherent importance of thermal power, MAHAGENCO have executed 660 MW Super Critical unit at Bhusawal and is planning for 2 more such Super Critical units each of 660 MW at Koradi.

As on 15th May 2023, as much as 96% of the civil work and 77.52% of the mechanical work had been completed, and several tests, e.g. Drainable and Non-drainable Hydro Test activity and Boiler light up activity, had been successfully carried out. The project is expected to be completed by October 2023.

A second key thermal project is the 15.335 km long Pipe Conveyor system to transport 16,800 tonnes per day of coal from WCL's open cast coal mines to MAHAGENCO's Koradi and Khaperkheda Thermal Power Stations. Coal from WCL's Gondagaon mine will be delivered at an intermediate point at Bhanegaon where coal from other two mines, i.e. Singori & Bhanegaon, will also be

fed. The project is being executed by ISGEC Heavy Engineering Ltd., in consortium with Bedeschi of Italy, on 11,478 hectares of WCL land, and at a cost of Rs 595.55 crores. As much as 85% of the civil work and 77.4% of the mechanical work has been completed; and the project is looking at a completion date of

This coal conveyor system has been executed by Thyssen Krupp Industries India Pvt. Ltd. at an estimated cost of Rs 196 crores. It has been in commercial operation since October 2021, and has already transported more than 10 lakh tonnes of coal to date.

Several benefits would accrue from the two Pipe Conveyor



Achieving Mile Stone at Bhusawal Project

August 2023. Simultaneously, the 6.06 km long Chandrapur Coal Pipe Conveyor system has been built to transport 6,000 tonnes of coal per day from Bhatadi coal mines to Padmapur Wagon Loading Station of CSTPS, Chandrapur.

systems, which have been put in place by pursuing advanced technology. The systems would maintain the environmental balance and reduce coal theft, apart from avoiding pollution and road accidents that routinely take place while transporting coal by road.



Ash utilization – zero wastage

Ash, produced while generating electricity, is a by-product that can either be termed a nuisance or an asset, depending on its utilization and disposal. MAHAGENCO has looked at fly ash as an asset, and has encouraged its thermal power stations (TPS) to go in for maximum utilisation of dry fly ash.

It is a matter of some pride that MAHAGENCO has achieved 100% dry fly ash utilization at Nashik, Parli, Bhusawal and Paras TPS for the last three successive financial years.

The utilization level of Fly Ash is much lower, i.e. between 2% and 40%, at Koradi, Khaperkheda and Chandrapur TPS. Action has been taken at these three power stations to enhance ash utilization in various ways.

"Dry fly ash is allotted free of cost to ash demanding agencies

at Koradi and Khaperkheda TPS," says the Departmental Head, Dr. Nitin Wagh. "We are also exploring the possibility of transporting ash by rail from these three power stations to cities like Pune, Mumbai and Nashik, by developing a railway siding.

"In addition, we are looking at the possibility of setting up a cement plant or clinker grinding unit in the vicinity of Koradi, Khaperkheda and Chandrapur TPS. We are also exploring the possibility of backfilling of abandoned open cast mines of WCL near Chandrapur TPS, in coordination Mahatma Phule Renewable Energy & Infrastructure Ltd (MAHAPREIT) and CIMFR." MAHAGENCO officials are also

following up with various end-users for the use of fly ash on bulk basis. Tenders for e-auction are being floated, and expressions of interest (EOI) invited for the sale or disposal of dry fly ash. Long term agreements are executed with End Users like cement Industries, ash processing Industries for the bulk utilization of Dry fly ash.

- FLY ASH UTILIZATION FOR**
- Cement plants
 - Other cement concrete items
 - Mine stoving
 - Road constructions
 - Paver blocks
 - Bricks
 - Wall panels

MAHAGENCO has its own Ash Policy, whose vision is to achieve 100% ash utilization at all thermal power stations. In addition, its legacy disposal plan for pond ash (which is used in brick manufacture, landfill, agriculture, road construction and road embankment) includes advertising and publicity to in-

crease awareness amongst brick manufacturers on the subject of increasing the use of pond ash in brick manufacturing and other products.

"We are also looking at the possibilities with WCL to fill the abandoned coal mines near Nagpur and Chandrapur, and to identify stone quarries that can be filled with ash," said Dr. Nitin Wagh. "Efforts are also being taken for green belt or tree plantation on abandoned ash bund of TPSs."

MAHAGENCO has signed a memorandum of understanding (MoU) with Circular Economy Alliance Australia (CEAA) in April 2022 to counter the challenges faced by Maharashtra on climate change by developing net zero strategies, implementing dedicated programmes and by adopting transformative robust and advanced technologies.

The company is examining the possibility of developing a Green Belt at Waregaon ash bund. Towards this end, MAHAGENCO had done plantation of bamboo on the periphery of the abandoned Waregaon Ash Bund at Khaperkheda.

MAHAGENCO is also looking at the possibility of creating a fly ash based industrial cluster. In 2018, the company had published EOIs for setting up of such industries in the vicinity of the company's thermal power stations. Nine agencies were shortlisted, but the matter has been kept on hold until further instructions of the Competent Authority.

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