



Harnessing Waste Heat for Power Generation in Karnataka Policy Note

Issue

Karnataka is the fifth most industrialised state in India and among the top producers of cement (~15 Mt) and iron and steel (~10 Mt). The industrial sector is a dominant electricity consumer with over 28% share of the state's total electricity consumption currently. This sector will continue to be a dominant consumer of electricity till 2030, with its share being in excess of 20%. Within the organised industry sector, cement and iron and steel plants alone account for over 42% of the total industrial electricity demand¹.

As per the [Green Growth Strategy for Karnataka](#) report, Waste Heat Recovery (WHR) is an important Energy Efficiency (EE) measure that could be harnessed by the state, especially for the cement and iron and steel industries. Center for Study of Science, Technology and Policy (CSTEP) and Global Green Growth Institute (GGGI) estimates suggest a potential² of deploying more than 560 MW capacity of WHR by 2030 in these industries. It is possible to generate about 4 billion kWh/year of firm power using WHR (equivalent to 1,800 MW of wind generation capacity or 2,400 MW of solar power). Proven mature technology is available and reputable technology providers are present in India to enable industries in adopting WHR systems.

However, WHR is at an incipient stage in the state (~170 MW) today across both Iron and steel and cement sector. Especially, the current deployment in cement units in Karnataka (~10 MW) is very low as compared to industry standards (more than 300 MW in cement units across India). In spite of the obvious advantages, adoption of WHR has been sluggish in Karnataka for the following reasons:

- High upfront capital investment (more than INR 7.5 crore³/MW) as against using depreciated captive coal plants is a deterrent
- Mobilizing these investment is a challenge for cement companies in Karnataka, who are operating in an extremely competitive market and experience financial constraints for any capital investments.
- Uncertainty in the sale of surplus power deters banks from financing such initiatives. Today there is an absence of a provision for off take arrangements such as PPAs with local distribution utilities which could help companies receive bank financing for WHR.
- Lack of penetration of WHR in Karnataka limits the awareness about the technology and knowledge sharing among companies, even though some of these companies have WHR systems installed in units in other states.

¹Transitioning towards a Green Economy in Karnataka (2014) – GGGI and CSTEP

²This potential is based on current WHR technology and might increase as technology improves. Also, this potential assumes that all new plants build will be more efficient and not require WHR as an energy efficiency improvement option.

³Taking Interest during Construction (IDC) and other expenses, investment could be up to Rs. 9-10 cr. /MW in Karnataka.

Policy Implications:

WHR is one of the options that industries have to improve their energy efficiency under the Perform-Achieve-Trade (PAT) scheme under the purview of the Bureau of Energy Efficiency. However, PAT is applicable for measures which do not transgress the system boundary, i.e. in this case the specific industrial unit. This means that in case electricity generated from WHR systems is not for captive use and needs to be sold to the utility, the system will not receive Energy Savings Certificates (ESCerts) through the PAT scheme.

Also, Karnataka currently does not acknowledge WHR from industries like Cement and Iron and Steel as renewable energy. And hence, electricity generated from waste heat is not admissible to meet their Renewable Purchase Obligations (RPOs). Hence there is no added incentive for the industry to adopt WHR solutions.

There are capital subsidies in the form of Accelerated Depreciation (AD) available on WHR equipment, at par with depreciation benefits available for various energy efficiency technologies. However, in spite of AD benefits, cement industries do not have viable business case for implementing WHR in Karnataka.

Since the two industrial sectors, cement and iron & steel, account for a majority of the WHR potential in Karnataka (more than 90% of the 560 MW potential in 2030), the targeting is relatively easy for the government to explore new policy measures to encourage the adoption of WHR. There are 8 cement plants in Karnataka, with capacity of more than 1 MT per annum, which are most suitable for WHR solutions. Enabling the adoption of WHR systems in cement plants has no financial implications for the government and no outlay is expected.

Research and Stakeholder Consultation Findings

Detailed technical research and extensive stakeholder discussion was carried out by Global Green Growth Institute (GGGI) and Center for Study of Science, Technology & Policy (CSTEP), under the leadership of Karnataka Renewable Development Limited (KREDL), with an intent to identify appropriate policy interventions to alleviate some of these issues, so as to promote WHR in Karnataka. Some of the key policy recommendations that emerge from the technical research and stakeholder consultation can be summarized as under:

- The government could come up with a preferential tariff (around Rs. 5/kWh) for signing long-term PPAs (minimum 10 years) from electricity generated by WHR-enabled cement plants
- State government could provide local tax incentives for enhancing uptake of Waste Heat Recovery. The government could explore accessing low cost international climate finance, such as the Clean Technology Fund (CTF) by World Bank, for incentivizing such investments
- State government could allow captive WHR projects to qualify towards meeting RPOs for obligated entities
- Government could also try and build a robust ecosystem for WHR adoption through active collaboration between companies, vendors and technical institutions