



Conceptual Design, Performance and Economic Evaluation of Bottoming Cycles for Power Generation Applications

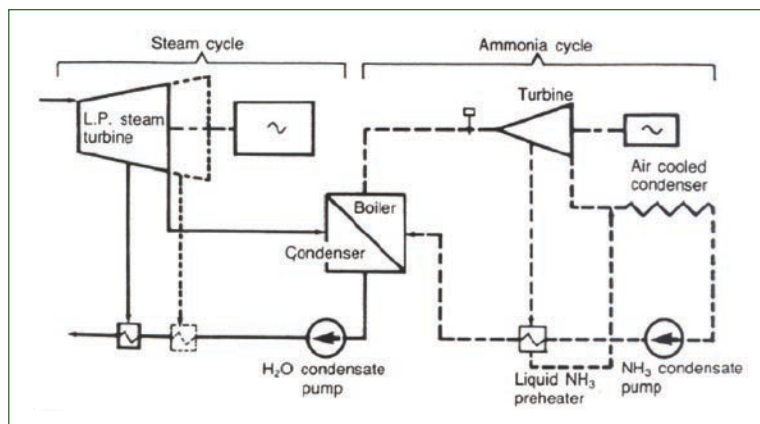
This is a proposal for the Advanced Cooling Technologies supplemental project. Final project tasks will be selected through prioritization by the project funders.

Issue

Indirect cooling and dry cooling using air-cooled condensers typically reduce power plant efficiency and increase capital costs compared to wet cooling. Advanced bottoming cycles can recapture some of this lost efficiency, but additional testing and economic evaluation is needed.

Description

Advanced bottoming cycles using ammonia, supercritical carbon dioxide, and other cooling fluids have the potential to increase power output and thermal efficiency while simultaneously reducing the heat rejection to the dry cooling system. EPRI has extensively studied and pilot-tested an ammonia cooling cycle with an air-cooled condenser.



The proposed project would conduct an engineering and economic evaluation of cooling systems using ammonia or other working fluid (supercritical CO₂ also has been proposed) in a bottoming cycle. Such a cycle would replace the conventional water- or air-cooled condenser in

the steam cycle with a heat exchanger, which would condense the steam by evaporating and superheating the cooling fluid. Some of the energy in the vaporized cooling fluid would be extracted as electricity by a turbine-generator set, and the remainder would be rejected in a dry or wet cooling tower.

Value

- Reduced impact of dry cooling on power plant performance
- Improved plant efficiency
- Reduced CO₂ emissions

Approach

EPRI has currently proposed the Phase I work under a DOE RFP. This Phase I would complete the conceptual study required to specify the design of a pilot test unit. Phase II (unfunded) would include construction and testing of the pilot to verify performance and costs.

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Project Deliverables

| Deliverable Title | Planned Completion Date | Deliverable Type |
|--|-------------------------|------------------|
| Conceptual Design, Performance and Economic Evaluation of Bottoming Cycles for Power Generation Applications | 9/30/2010 | Technical Report |

How to Apply the Results

This project is the next step in a potential new cooling option for the next generation of power plants. Successful development of this technology would provide efficiency benefits similar to those of combined-cycle plants.

Cost Estimate

Phase I of this project is estimated to require 24 months and \$660,000 to complete. Successful award of the DOE proposal would provide 80% of the required funding.

For More Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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