

## Power plant optimisation tools

*Software to assist in optimising operation of coal-fired power stations*

### Challenges

Operators of coal-fired power stations face extremely competitive and challenging environments. The challenges they face in optimising the performance of their plant include:

- determining, accurately, current plant efficiency and comparing that efficiency with build specifications or expectations
- identifying areas of inadequate performance
- developing options for improving below-par plant performance
- predicting and quantifying the precise impact each option to improve performance will have on plant operation
- determining how cost-effective each option will be
- evaluating long-term abatement actions for plant operation in a lower-emissions-intensity economy.

### Solutions

HRL has developed a plant-optimisation-tool for coal-fired power stations. The software-package provides extensive data in easily-observed formats to assist plant operation personnel.

HRL has extensive experience in implementing plant-optimisation-tool software, and in undertaking extensive plant-performance testing on coal-fired plant. Built on reliable, proven and readily available Microsoft Excel software, the optimisation tool does not require purchase of expensive proprietary software.

The tool:

- offers simple integration with plant data
- provides flexibility for a range of operations and a client's changing needs
- contains safeguards against accidental or erroneous data input
- requires minimal computer resources and has a simple-to-understand graphical user interface.



HRL power plant optimisation tools assist engineers to operate their coal-fired power stations efficiently

HRL's plant optimisation tool is designed to:

- assist power station personnel to operate plant efficiently and effectively
- guide plant operators in setting operational parameters to best meet design parameters
- assist plant performance engineers to monitor plant operation over time via back-office screens
- provide flexibility to add-on additional optimisation tool modules as they are needed/developed.

The plant-optimisation-tool is one in a suite of complementary services HRL Technology Group offers to assist operators of coal-fired power generators.

**HRL Technology Group Pty Ltd**  
ABN 89 609 887 327  
info@hrl.com.au  
hrlt.com.au

**Melbourne**  
Level One Unit 4  
677 Springvale Road  
Mulgrave VIC 3170  
Phone +613 9565 9888  
Fax +613 9565 9879

**Victorian Regional Office**  
Gippsland Enterprise Centre  
50 Northways Road  
Churchill Vic 3842  
Phone +61 3 5132 1500 Fax  
+61 3 5132 1580

**Queensland**  
Unit 2  
33-37 Rosedale Street  
Coopers Plains QLD 4108  
Phone +61 7 3423 4300  
Fax +61 7 3345 5937

## Benefits

Among the benefits clients who employ HRL's plant-optimisation tool enjoy are:

- a graphic user interface that can:
  - compare current plant operation with reference conditions
  - indicate plant operating under non-ideal conditions
  - calculate current plant net unit heat rate, additional fuel costs, additional carbon permit liabilities, and lost sent-out power opportunities
  - provide real-time information on plant operation
  - provide historical reflections on plant operation
- the ability for station engineers to identify, quickly, areas of plant not performing adequately
- being able to use the optimisation tool to:
  - compare different operating strategies for the plant
  - guide stations operators as to how operation decisions impact on unit efficiency
- the ability to compare differences in operating conditions and efficiencies easily across several generating units
- core module that calculates the gross-turbine-heat rate, boiler efficiency and gross-unit-heat rate as well as showing deviations from the reference condition for several main operating conditions
- an ability to add modules/enhancements to the core module to meet a client's particular requirements.

## Case Study

### Identifying the cause of poor performance

Using the HRL optimisation tool, engineers at a coal-fired power station observed a decrease in generator output caused by high condenser vacuum. Cleaning the condenser and sealing air ingress failed to rectify the problem. The engineers suspected a problem in the cooling tower was leading to power loss in the condenser.

HRL created an additional cooling-tower and condenser-performance monitor. The new module showed the condenser was operating as it should, based on the temperature of the supplied cooling water. The module also showed that the cooling tower was operating nowhere near its design points, providing the plant with warmer-than-expected cooling water.

The HRL optimisation tool cooling-tower module provided the power-station engineers with evidence to add cooling tower repairs to the next scheduled outage.

#### Contact

Chris Patterson

Telephone +61 3 9565 9816

Mobile +61 417 913 558

Email [cpatterson@hrl.com.au](mailto:cpatterson@hrl.com.au)

#### Need more information? Go to [hrl.com.au](http://hrl.com.au)

The company's NATA Accredited Laboratories number is 561.

HRL Technology Group's ISO 9001 Quality Management is certified by BSI under certificate FS605116

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