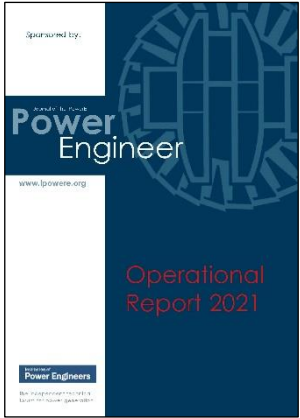


The IPowerE Operational Report



The IPowerE Operational Report has an international reputation as a definitive document providing an independent comparison and analysis of power plant performance. It is valued by industry consultants, developers and operators alike in the pursuit of excellence in terms of plant performance and optimisation.

Originally known as the Working Costs Report it was first presented to members in 1923 and since its first appearance the Report has, over the years, made available a vast amount of data contributed by engine users all over the world. This has proved of high practical value to Contributors and the Power Industry worldwide.

THE REPORT



HYDRO



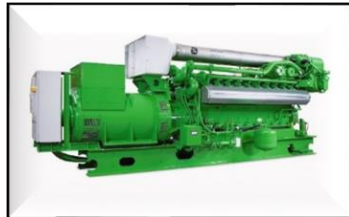
SOLAR

Traditionally the report covered reciprocating engines, gas turbines and combined cycle power plants. The changing world of power generation has resulted Solar, Wind,

Biomass as well as Hydropower, now being reviewed in addition to the traditional. In line with the Institution's new focus the Operational Report now includes renewable power sources Solar and Hydro power generation in addition to the traditional areas of technology.



GT CCGT



RECIP ENGINES



SLOW SPEED

Contributors provide data for the report covering engines and all forms of generating plant including reciprocating engines, gas turbines, combined cycle plants, conventional steam plant, hydro plants and renewables including solar, wind, and hydro plants.

All the Operational Report Contributors who submit a qualifying report are invited to nominate one member to take a one-year free membership for each power plant they reported. Each nominee will be asked to submit a membership application and qualify for member status.

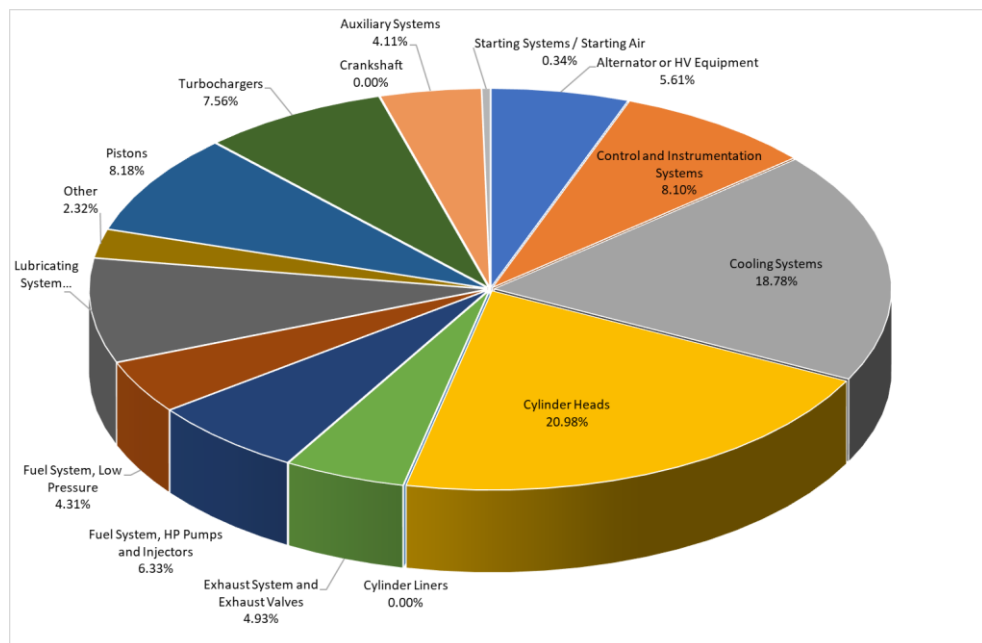
The report provides detailed analysis and tables of all the data submitted by Contributors.

Table 1 2-Stroke Diesel Engines			Table 6 Open Cycle Gas Turbines		
Overall Operating Statistics: 2-Stroke Diesel Engines			Overall Operating Statistics: Open Cycle Gas Turbines		
Total Number of Engines	33 engines		Total Number of Units	68 units	
Total Installed Capacity	685 MW		Total Installed Capacity	2773 MW	
Total Running Hours	223,168 running hours		Total Running Hours	174,315 running hours	
Typical Duty	Baseload		Typical Duty	Standby, peak lopping	
Plant Utilisation Factor	41.2% average		Plant Utilisation Factor	12.6% average	
Running Plant Load Factor	71.3% average		Running Plant Load Factor	47.95% average	
	Average	Best Reported		Average	Best Reported
Availability	88.00%	98.40%	Availability	95.80%	100%
Reliability	96.90%	100.00%	Reliability	98.70%	100%
Net Thermal Efficiency **	39.60%	49.00%	Net Thermal Efficiency **	23.10%	35.00%

Table 2 All 4-Stroke Diesel Engines			Table 7 Combined Cycle Gas Turbines		
Overall Parameters: All 4-Stroke Diesel Engines			Overall Operating Statistics: Combined Cycle Gas Turbines		
Total Number of Engines	119 engines		Total Installed Capacity GT	639 MW	
Total Installed Capacity	701 MW		Total Installed Capacity ST	380 MW	
Total Running Hours	619,979 running hours		Total Running Hours Gas Turbines	51,468 running hours	
Typical Duty	Baseload, peak lopping, and standby		Total Running Hours Steam Turbines	36,001 running hours	
			GT Utilisation Factor	56.7% average	
			ST Utilisation Factor	48.9% average	
	Average	Best Reported		Average	Best Reported
Availability	98.10%	100%	Availability GT	83.20%	99.70%
Reliability	99.30%	100%	Availability ST	74.10%	100%
Net Thermal Efficiency **	34.60%	38.70%	Reliability GT	93.60%	100%
			Reliability ST	91.10%	100%
			Net Thermal Efficiency ** GT Only	26.30%	33.90%
			Net Thermal Efficiency CCGT	44.10%	49.40%

THE ANALYSIS

As well as running data and plant power generated there is the provision for Contributors to submit a Forced Outage Report. This Forced Outage data is then analysed and a comparison made to identify the cause of plant unplanned outages. The diagram below shows one of these forced outage charts.



FORCED OUTAGE ANALYSIS

The Annual Operational Report is a unique compilation of data of value to organisations worldwide, including Owners, Operators, Financial Bodies, manufacturers and consulting engineers. The Report is one of a number of technical papers presented and published by IPowerE annually. Over recent years we have had 40 countries and territories represented in our operational reports representing over 600 sites and 3000 prime movers. Please help us to achieve our target by sending in your return and recommending this to others.

For further information please contact the IPowerE office in Bedford, United Kingdom. To download the Invitation Letter, Guidance to Contributors and the Return Template please follow the link on the IPowerE Web Site
https://www.ipower.org/operational_report.html

Introduction to the IPowerE 2021 Operational Report

The Institution of Power Engineers

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