



Optimisation of O&M Efficiency at Qatar Power using the PI System

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Sr Engineer- Commercial & Performance

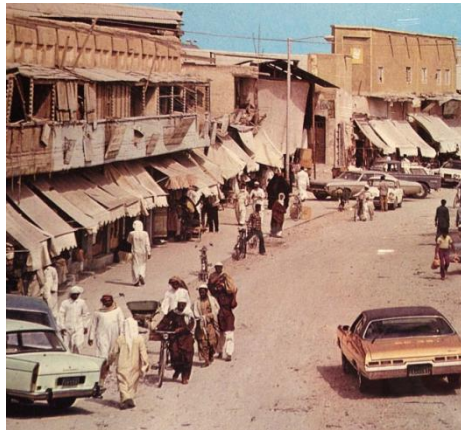


Enlighten the life in Middle East



- Imagine Life without Power and Water

Enrich the life in Qatar



Transformation

THEN

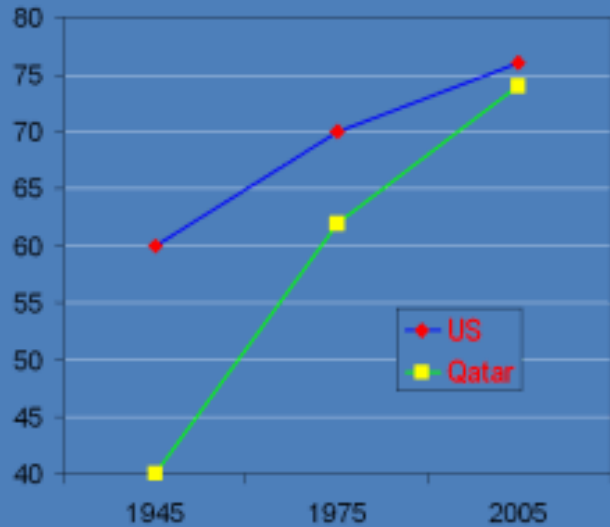
NOW



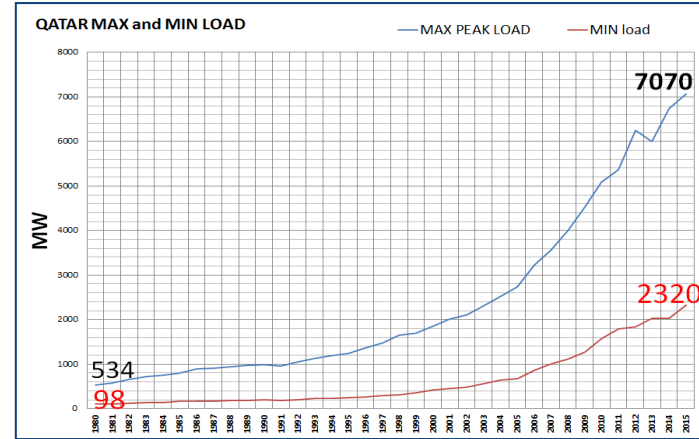
Energy, Power & Water plays the vital role in Qatar's Development and Transformation

Changing Life Expectancies in Qatar

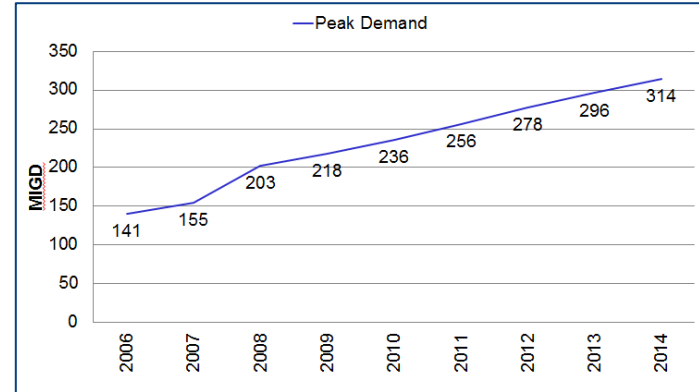
Changing Life Expectancies



Power and Water plays a vital role



Power Demand

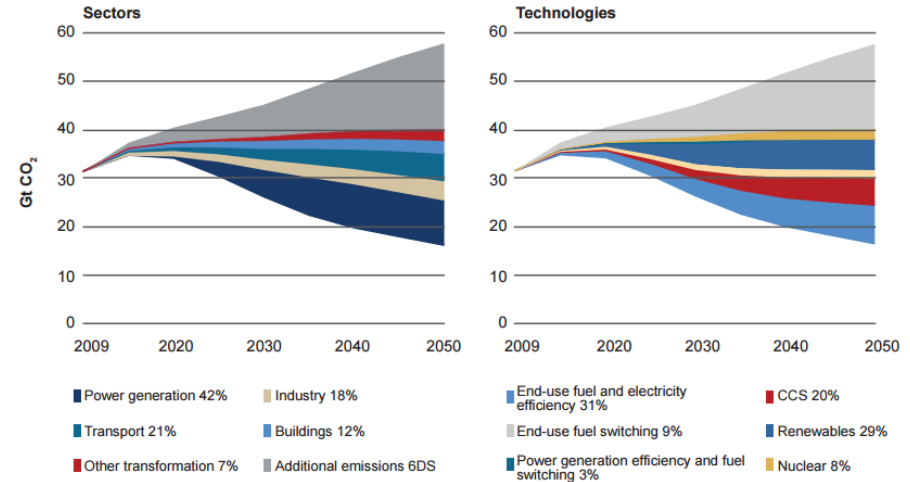


Water Demand

Changing Scenarios in Qatar

- Exponential growth and demand in power and water sector
- Rising demand for energy resource conservation due to climate change and green gas reduction
- Government initiated various energy and efficiency measures

Energy efficiency investments provide a large contribution to emissions savings—approximately 40 percent—due to their low cost and high returns.



Energy Technology Perspectives 2012: Global contributions to emissions reductions in the 2°C scenario, by sector and technology © OECD/IEA, 2012, fig. 1.9, p. 39.

- Optimisation of O&M Efficiency at Qatar Power
- PI System plays important role in improving O&M performance

Agenda

- About Qatar Power Company
- Business Environment and Challenge
- Case Study to improve O&M efficiency
- PI System Capabilities to solve Qatar Power's Business Challenges
- Results Obtained and Business Impact
- Future Plan and next step
- Summary and Conclusion

Qatar Power Company



Ras Laffan-B Independent Water and Power Plant (IWPP)
Plant Capacity: Power 1025 MW and Water 60 MIGD
Company: Q Power Q.S.C, P O Box 22664, Doha, State of Qatar

Qatar Power Company

- Long term PWPA with Kahramaa (regulator of Qatar)
- IWPP project company, responsible for facility O&M for 25 years under BOOT agreement
- It is consortium of Engie (GDF Suez), Chubu Electric and Qatar Electricity and Water Company
- Commissioned full facility of 1025MW Power and 60MIGD Desalination Water in year 2008.
- State of art technology in power and water production
- Implemented PI System in year 2012

Ras Laffan B - Independent Water & Power Plant (IWPP)

Combined Cycle Power and Desalination Plant

General Description

The contractor consortium of Siemens Power Generation, Germany and Doosan Heavy Industries & Construction, Republic of Korea performs the turnkey construction of the Ras Laffan B (RWPP), in Qatar.

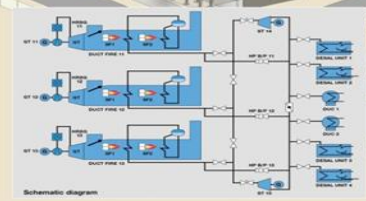
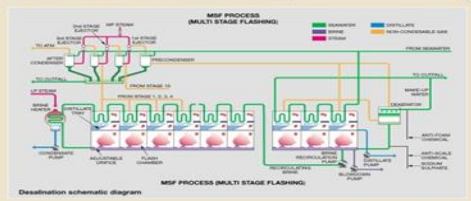
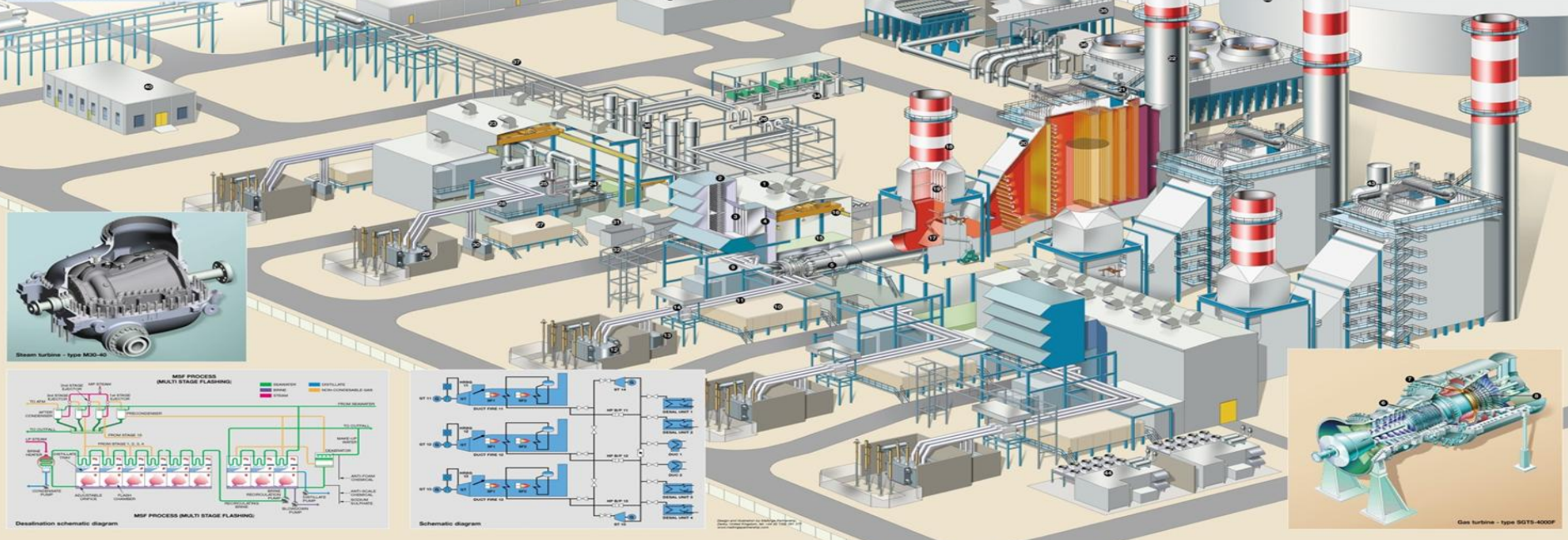
The plant is designed for a net rated electrical output of 1300 MW and a steam production for sea water desalination of 80 million imperial gallons per day (240,000 m³ per day). The plant is designed to be a combined cycle power plant with gas turbines (CCGT) and steam turbines (ST) for power generation and a desalination plant (DP) for water production.

The plant consists of three Gas Turbine (GT), three single pressure Heat Recovery Steam Generators (HRSG) of horizontal natural circulation design and two Steam Turbines (ST). Each GT can be separated from the HRSG by an exhaust gas bypass system with diverter damper. To cover the requirements of steam for the desalination units in various operation conditions, it is possible to maintain the steam production by means of supplementary firing (SF).

The power station includes the advanced SGT5-4000P GT with similar construction chamber and a turbine inlet temperature of 1230°C. Both, the high-temperature GTs and the supplementary firing are fired with natural gas.

The STs are designed as black prime motive machines from double-end design. The ST exhaust steam is condensed in brine heaters of the multiple stage flash (MSF) desalination plant. The condenser cooling water is supplied by the desalination plant. It is not able to extract the expanded steam from the STs and/or from the bypass system. Steam is also provided for steam jet air ejectors for strong vacuum in the evaporators of the MSF water plant.

The plant is constructed in three phases. The first phase covers the construction and commissioning of three GT units with their associated bypass stacks and auxiliary systems, one HRSG as well as one MSF. Two GTs are operated in single cycle mode until completion of the bottoming part comprising the HRSGs, STs and associated auxiliary systems. The second phase incorporates two additional HRSGs and both steam turbines as well as one new HRSG is completed. Following that and finally, the three remaining MSFs are constructed.



Main technical parameters

Plant

Operating mode
Duty

Plant Configuration
Heat output at site conditions (MW)
Combined cycle
80
80
80

Gas Turbines

Siemens Power Generation
SGT5-4000P (V94.3A)
Model
3000
3000
3000

Steam Turbines

Siemens Power Generation
M30-40
Model
3000
3000
3000

Generators

Siemens Power Generation
Type
Synchronous
Model
3000
3000
3000

Heat Recovery Steam Generators

Siemens Power Generation
Type
HRSG
Model
3000
3000
3000

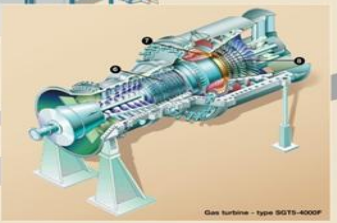
Desalination Plant

Doosan Heavy Industries & Construction Co. Ltd.
Type
MSF
Model
3000
3000
3000

Product water storage

Siemens Power Generation
Type
Storage tank
Model
3000
3000
3000

- Key**
- 1 Gas turbine building
 - 2 HRSG building
 - 3 Air filter
 - 4 Air filter
 - 5 Air filter
 - 6 Air filter
 - 7 Air filter
 - 8 Air filter
 - 9 Air filter
 - 10 Air filter
 - 11 Air filter
 - 12 Air filter
 - 13 Air filter
 - 14 Air filter
 - 15 Air filter
 - 16 Air filter
 - 17 Air filter
 - 18 Air filter
 - 19 Air filter
 - 20 Air filter
 - 21 Air filter
 - 22 Air filter
 - 23 Steam turbine building
 - 24 Steam turbine
 - 25 Steam turbine generator
 - 26 Steam turbine generator
 - 27 Steam turbine generator
 - 28 Steam turbine generator
 - 29 Steam turbine generator
 - 30 Steam turbine generator
 - 31 Ventilation unit
 - 32 Cooling water tank
 - 33 Cooling water tank
 - 34 Cooling water tank
 - 35 Cooling water tank
 - 36 Cooling water tank
 - 37 Cooling water tank
 - 38 Cooling water tank
 - 39 Cooling water tank
 - 40 Cooling water tank
 - 41 Cooling water tank
 - 42 Cooling water tank
 - 43 Cooling water tank
 - 44 Cooling water tank



Plant Configuration

Commercial Operation Start : Jun 2008

Plant Design

- 3 GT 237.35 MW
- 2 ST 221 MW
- 4 MSF 15.13 MIGD

Plant Technology

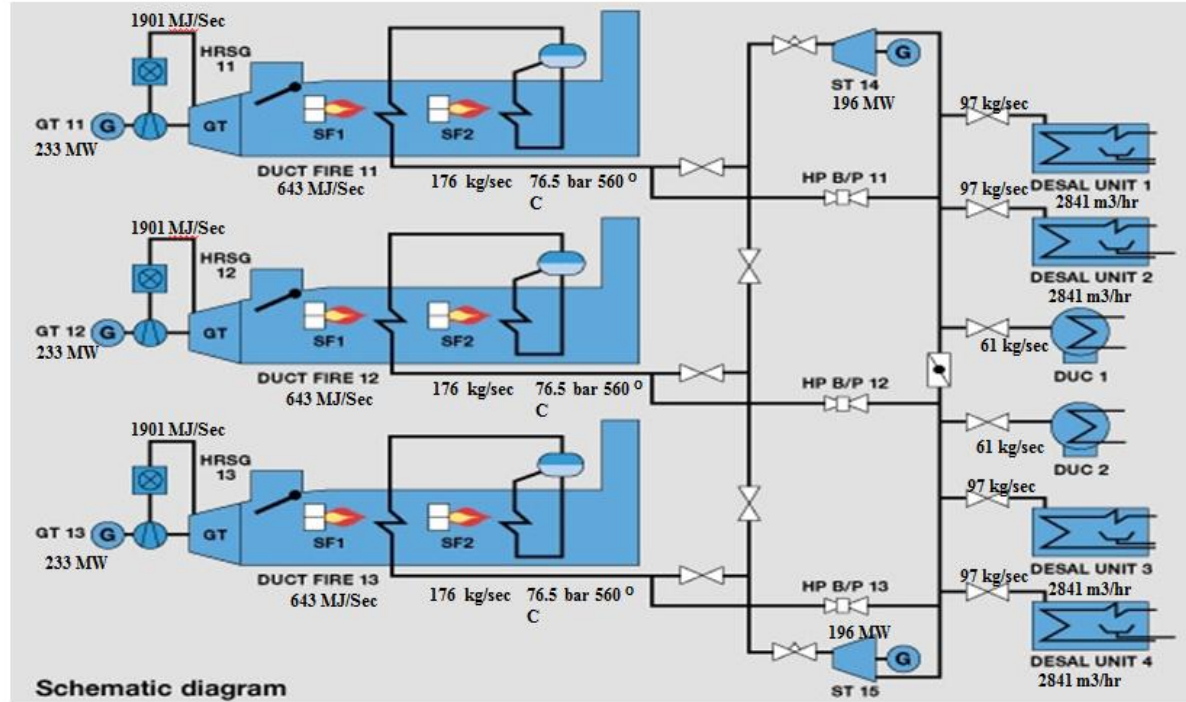
- GT : 94.3A-Siemens
- ST : M30-40-M2A-Siemens
- MSF : Doosan

Plant Net Efficiency

- At Ref Conditions
- Facility : 40.29 %
 - GT : 37.45 %
 - MSF PR : 8.26

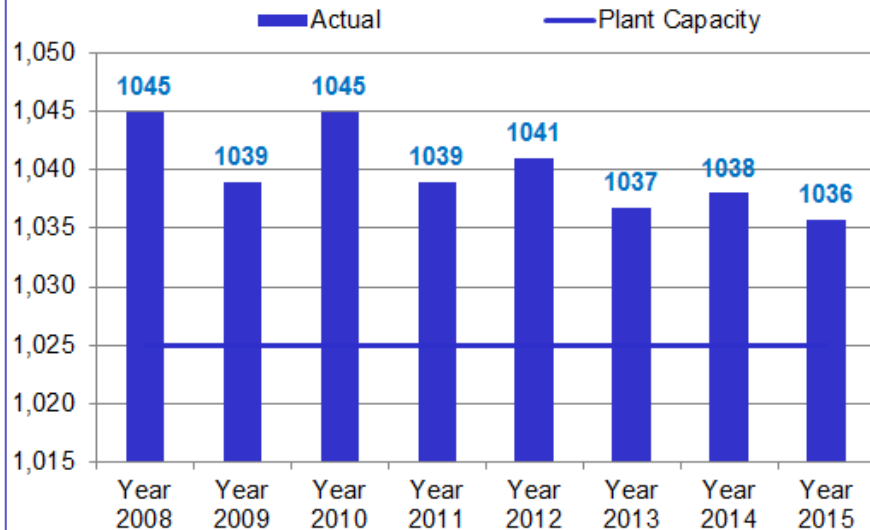
Capacity

- 1025 MW Net
- 60 MIGD (272700 m³/day)

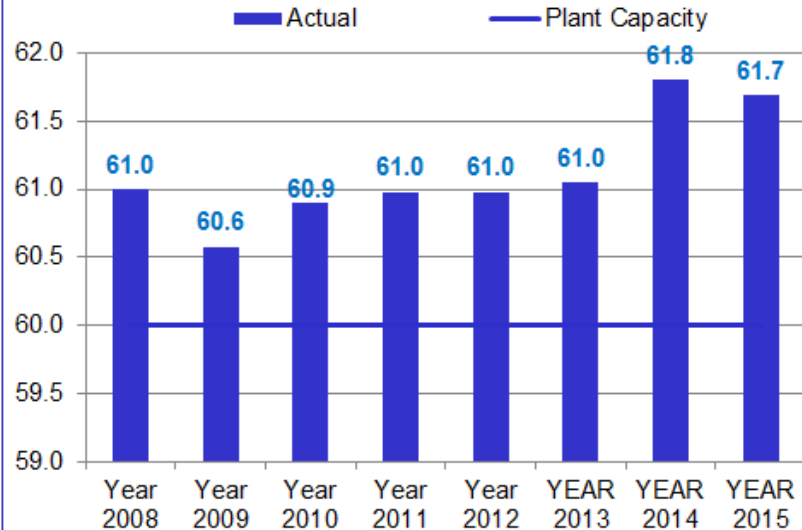


KPI - Plant Dependable Capacity Tests

Power Plant Net Capacities in MW



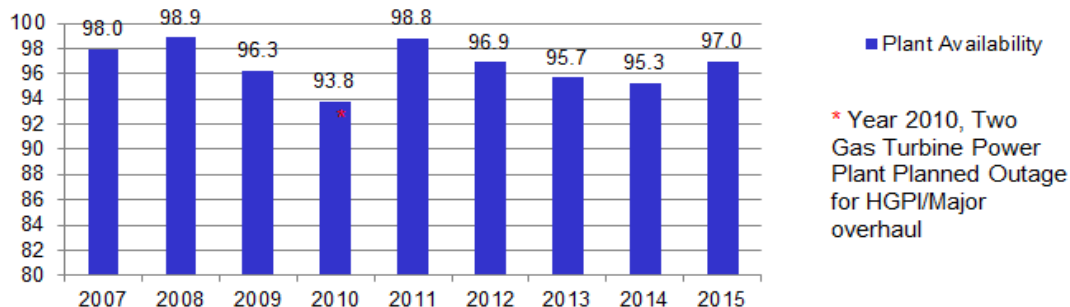
Water Plant Net Capacities in MIGD



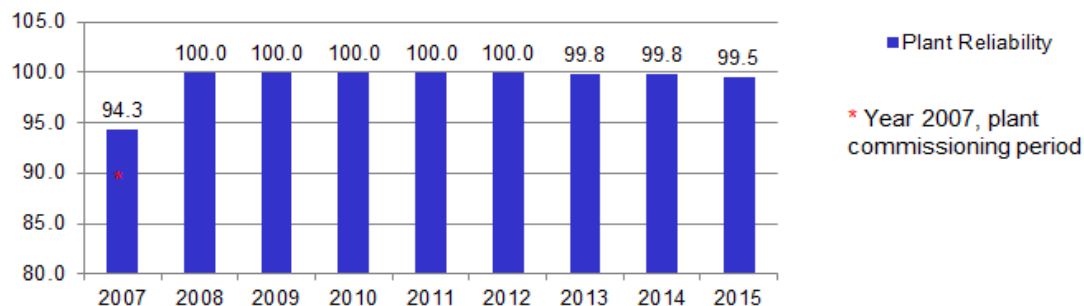
KPI - Power Plant Availability and Reliability

Power Plant Annual Availability-%

2015 figs are till YTD- July-15



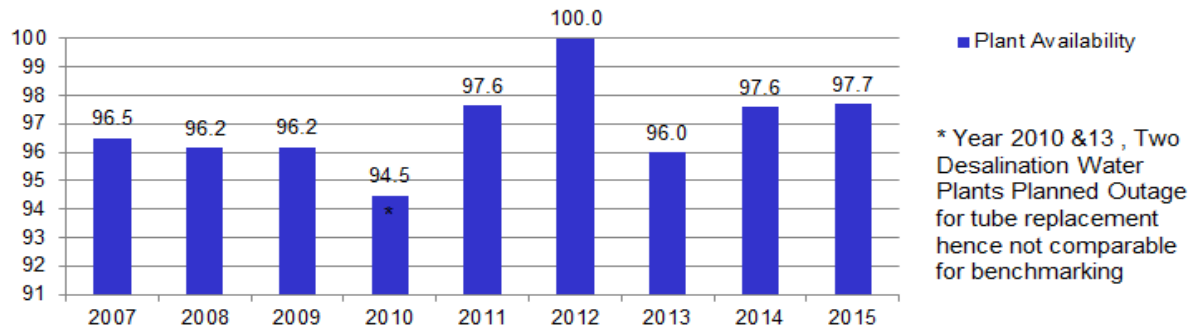
Power Plant Annual Reliability-%



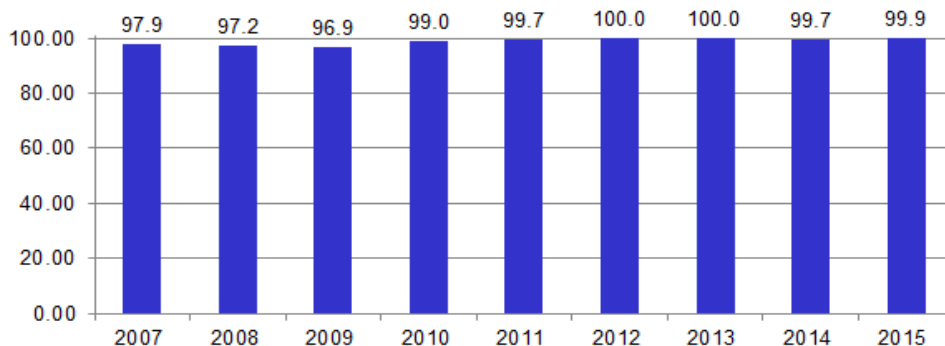
KPI - Water Plant Availability and Reliability

Water Plant Annual Availability-%

2015 figs are till YTD- July-15



Water Plant Reliability in %

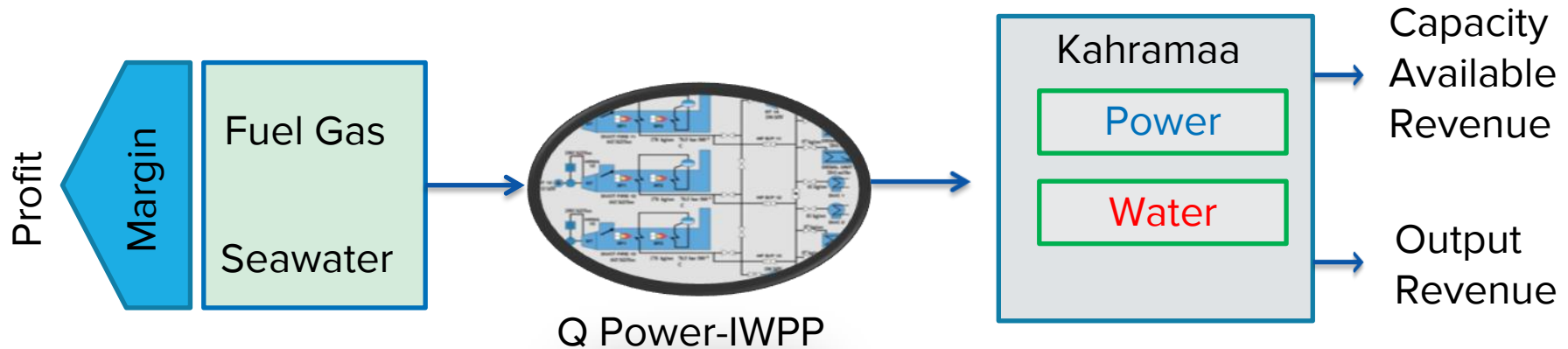


Awards and Recognition

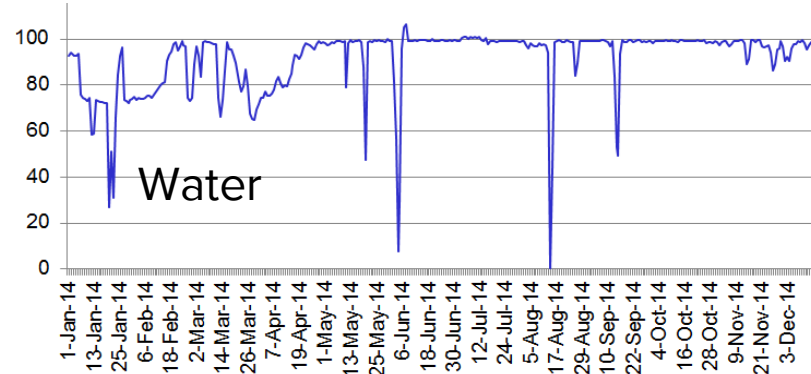
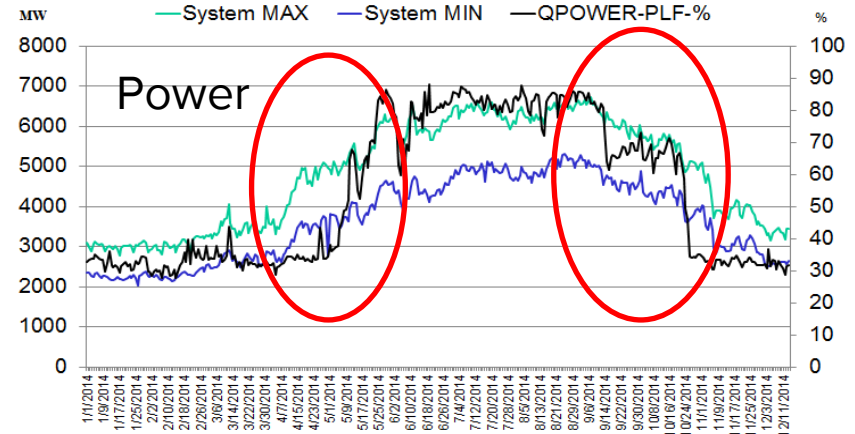
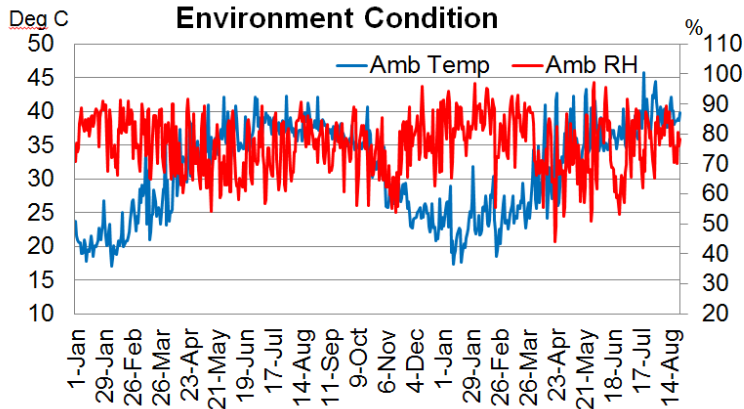


Business Environment

- Company income through PWPA
- Fuel gas and seawater used for power and water generation is not directly pass-through under PWPA
- Efficient O&M is vital for higher profit and to avoid penalties.



Business Environment



- Adverse & Harsh Climate Conditions- RH – 90% Temp-45 °C
- Annual system demand variation (summer-winter) - 230%
- Daily system peak and low power demand- 45%
- QPower Water Demand-100%
- QPower Power demand in Winter-30%
- QPower Power demand in Summer-98%

Business Challenges

- Meet Health and Safety Target
- Meet Power and Water Demand
- Maintain higher Plant Capacity available all the time
- Efficient O&M at all operating scenarios
- Deterioration in Plant Efficiency factor over the period
- Deterioration in fuel and seawater margins
- Availability of real time plant information
- Availability of historical plant data and archival
- Real time analysis and Management information system

Business Challenge & PI System

- Implemented PI System and tools to find solutions to Business Challenges
- Application implemented in real-time

HSE: Monitoring Heat Stress Index

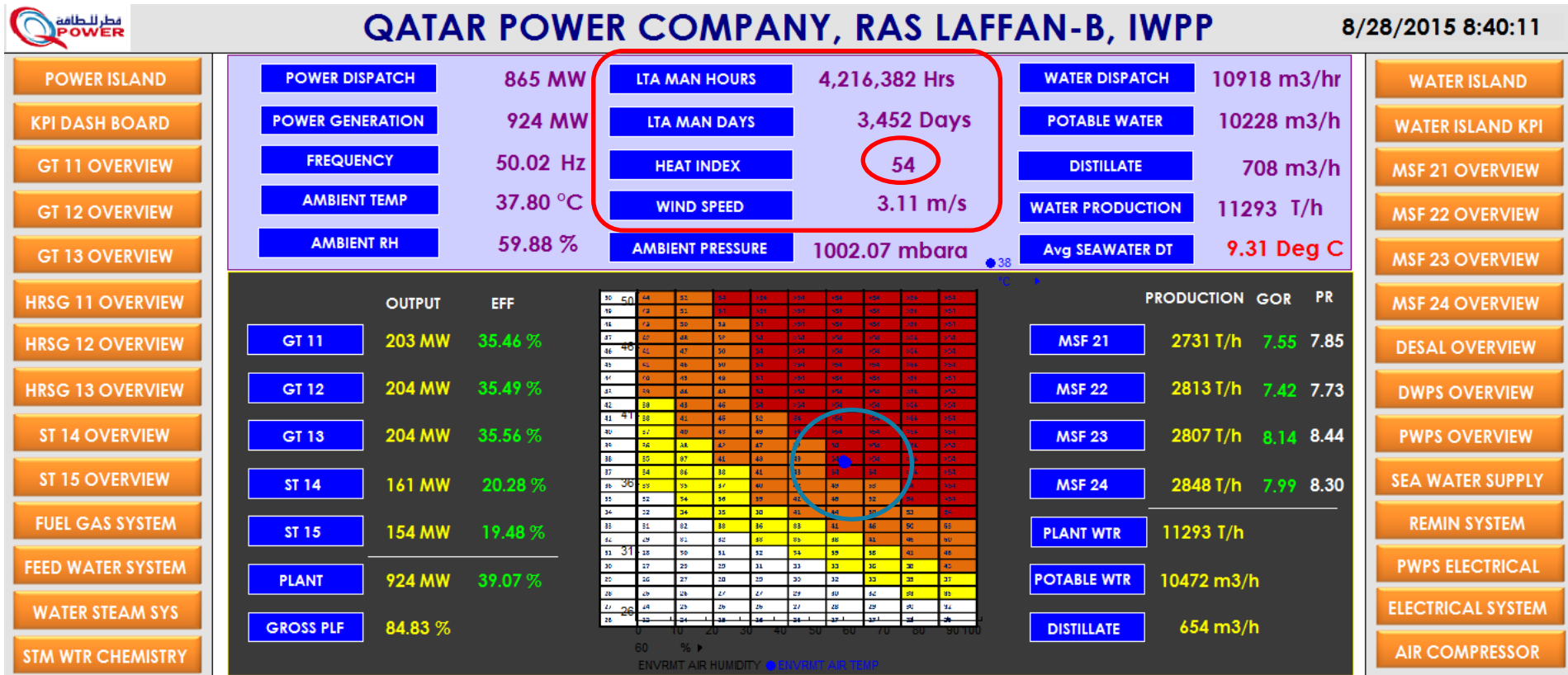
Past

- Difficult to monitor Heat Index.
- Conventional manual monitoring.
- Difficult decision making
- Missing Controls
- No people awareness

Present

- Online Monitoring of Heat Index through PI System
- Real time messaging and notifications
- Easy decision making
- System controlled measures
- People awareness
- Dash Board and displays

HSE: Monitoring Heat Index - PI ProcessBook



HSE: Monitoring Heat Index - Notifications

Category

This message was sent with High importance.

From: PI_AFServer@QATARPOWER.NET
To: Parasram Borkar
Cc:
Subject: Danger level- Normal Category-Heat Index > 39 to 49 (Level-III)

Heat Stress Index Value : 42

Ambient Temp: 39 Deg C Relative Humidity: 30 %

Severity Category : **Danger (Normal Category-Level -III)**

Heat Syndrome : Sunstroke, Heat Cramps or Heat Exhaustion likely, Heat

Work Rest Period Minutes : 30:10

Water Requirements (1 cup = 1/4 liter) : 1 Cup every 15 minutes

Controls: **Work Under Shade**

Notification Name : Heat_Stress_Level_3a

Triggering Condition : Heat Index >= 39

System Name :QATQPRAFW01

Notification Start Time : 7/17/2014 8:30:00 AM Arab Standard Time (GMT+03:00:00)

Target Path : Heat Index

Regards,

From: PI_AFServer@QATARPOWER.NET
To: Parasram Borkar
Cc:
Subject: Danger level- High Priority Category- Heat Index > 50 to 53 (Level-III)

Heat Stress Index Value : 52

Ambient Temp: 35 Deg C Relative Humidity: 70 %

Severity Category : **Danger (High Priority Category-Level -III)**

Heat Syndrome : Sunstroke, Heat Cramps or Heat Exhaustion likely, Heat Stroke possible with prolonged exposure a

Work Rest Period Minutes : 20:10

Water Requirements (1 cup = 1/4 liter) : 1 Cup every 10 minutes

Controls: **Elevated Work and Confined Space Works under direct sunlight to be Stopped.**

Notification Name : Heat_Stress_Level_3b

Triggering Condition : Heat Index >= 50 AND Heat Index < 53

Notification Start Time : 8/27/2015 10:05:00 PM Arab Standard Time (GMT+03:00:00)

Target Path : Heat Index

Regards,

Parasram Borkar
PI System Admin
+974 55840366

This message was sent with High importance.

From: PI_AFServer@QATARPOWER.NET
To: Parasram Borkar
Cc:
Subject: Extreme Danger (Severity Level-IV) Heat Stress Index : > = 54.

Heat Stress Index Value : **54 .**

Ambient Temp: 37 Deg C Relative Humidity: 60 %

Severity Category : **Extreme Danger (Level -IV)**

Heat Syndrome : **Heat Stroke or Sunstroke imminent**

Controls: **All Work under direct sunlight to be stopped**

Notification Name : Heat_Stress_Level_4

Triggering Condition : Heat Index >= 54

Notification Start Time : 8/28/2015 7:15:00 AM Arab Standard Time (GMT+03:00:00)

Target Path : Heat Index

Regards,

Parasram Borkar
PI System Admin
+974 55840366

HSE: Monitoring Heat Index – Asset Framework

\\QATQPRAW01\QPower_DB - PI System Explorer (Administrator)

File Edit View Go Tools Help

Database Query Date Back Check In Refresh New Element New Attribute

Elements

- Elements
 - Power Island
 - QATQPRPIS01 ModuleDB
 - QPOWER
 - GT11
 - GT12
 - GT13
 - Heat Exchanger
 - Heat Index
 - ST 14
 - ST 15
 - TARIFFMETER
 - Water Island
 - DWPS Overview
 - Electrical System
 - MSF 21
 - MSF 22
 - MSF 23
 - MSF 24
 - MSF Common Systems
 - PWPS Overview
 - Remineralization System
 - Element Searches

Heat Index

General Child Elements Attributes Ports Analyses Version

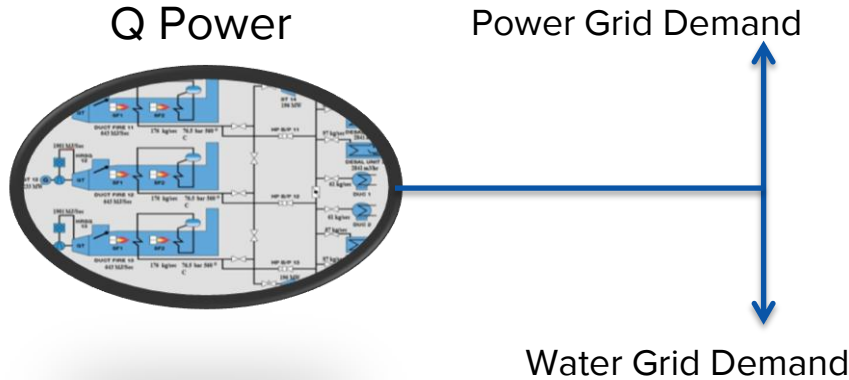
Filter

Name	Value	Time Stamp	Description	Data Reference
AMB_RH	50 %	8/28/2015 9:03:26.324 AM	Ambient Relative Hu...	Formula
AMB_TEMP	38 °C	8/28/2015 9:03:26.324 AM	Ambient Temp rounded	Formula
GT11_RH	53.8199844360...	8/28/2015 9:03:26.324 AM	Relative Humidity	PI Point
GT12_RH	55.8399810791...	8/28/2015 9:03:26.324 AM	Relative Humidity	PI Point
GT13_RH	52.7099838256...	8/28/2015 9:03:26.324 AM	Relative Humidity	PI Point
Heat Index	49	8/28/2015 9:03:26.324 AM	Heat Index Calculated	Formula
Heat Index 10	35 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
Heat Index 20	37 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
Heat Index 30	41 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
Heat Index 40	43 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
Heat Index 50	49 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
Heat Index 60	54 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
Heat Index 70	54 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
Heat Index 80	54 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
Heat Index 90	54 %	8/28/2015 9:03:26.324 AM	Heat Index	Table Lookup
RH	59.1499862670...	8/28/2015 9:03:26.324 AM	Relative Humidity	PI Point
Temp	37.7899627685...	8/28/2015 9:03:26.324 AM	Ambienttemp	PI Point

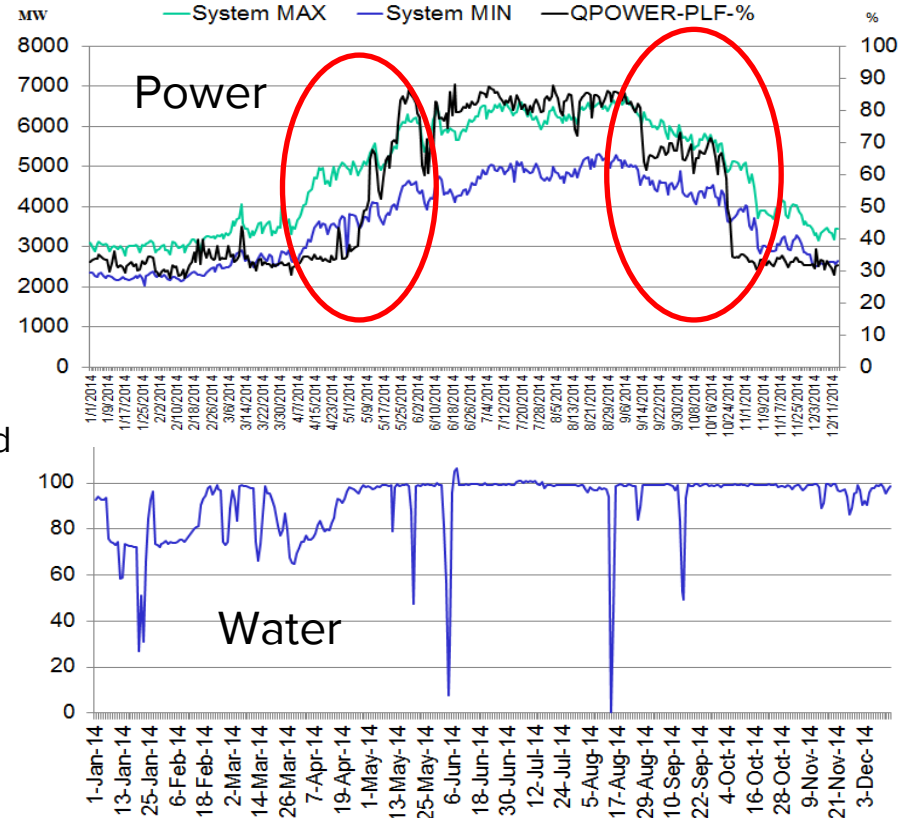
HSE Performance Achievements

- No heat stress related incidents.
- Achieved 4.2 million man-hours in 3,452 days without LTA

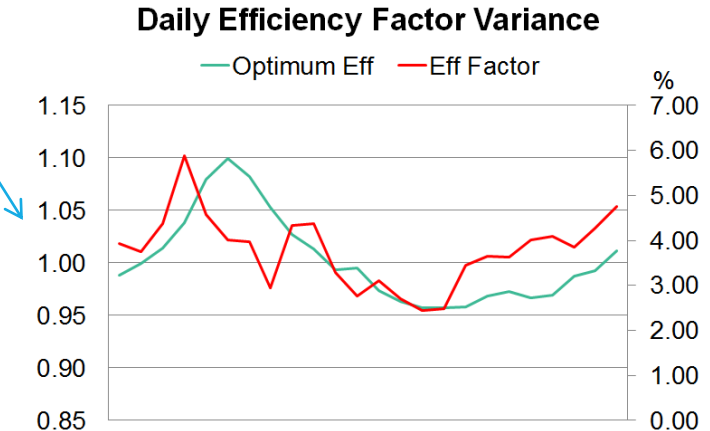
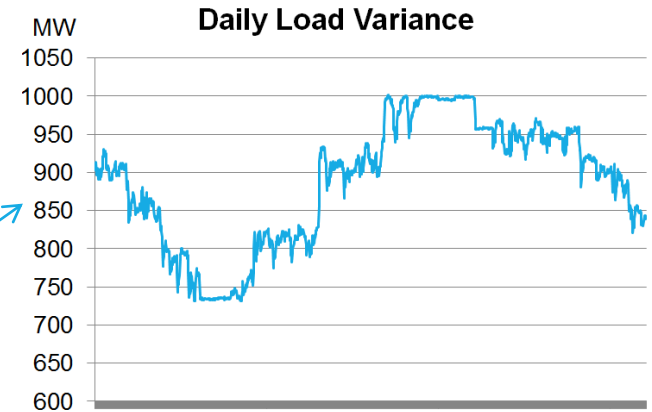
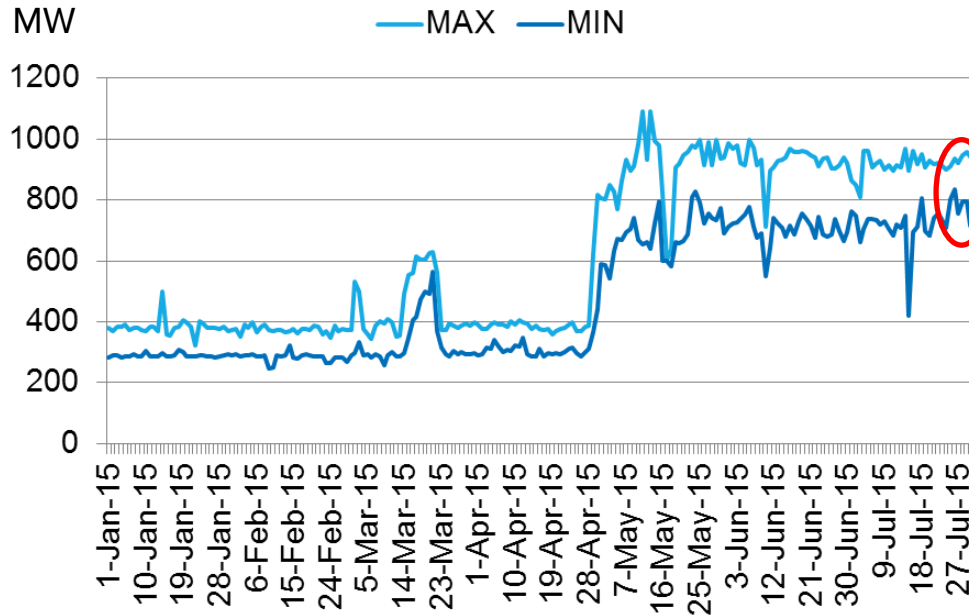
Plant O&M Optimisation



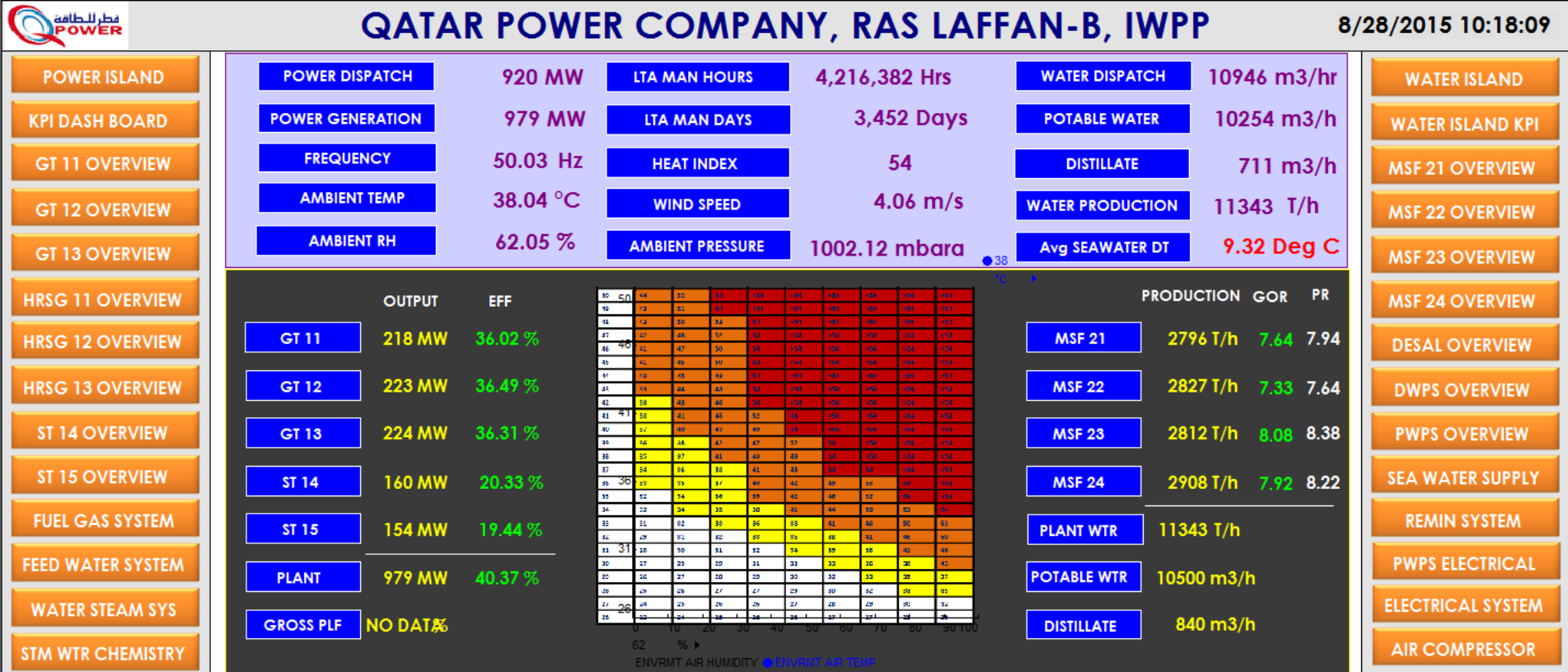
- Difficult to optimise Plant Configuration
- Inherent Energy Losses
- Plant efficiency deterioration
- Plant life and maintenance issues
- Lower fuel and seawater margins
- Real time data archival and analysis



Plant O&M Optimisation



Plant O&M Optimisation - Dash Boards



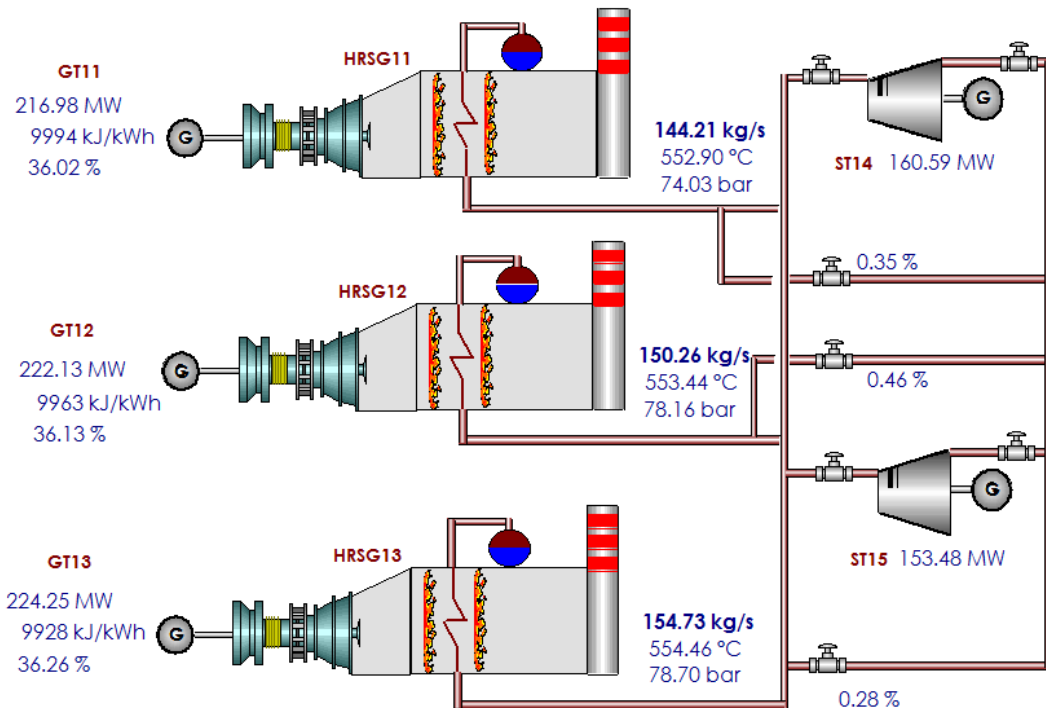
Plant O&M Optimisation - PI ProcessBook



Power Island Overview

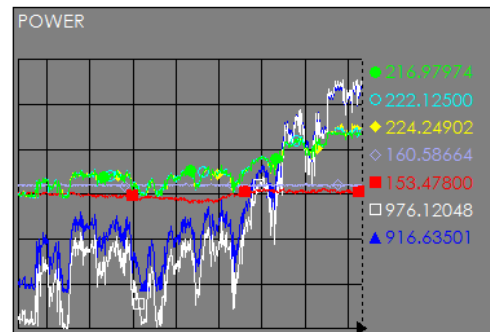
8/28/2015 10:19:29

- POWER ISLAND
- POWER ISLAND KPI
- GT 11 OVERVIEW
- GT 12 OVERVIEW
- GT 13 OVERVIEW
- HRSG 11 OVERVIEW
- HRSG 12 OVERVIEW
- HRSG 13 OVERVIEW
- ST 14 OVERVIEW
- ST 15 OVERVIEW
- FUEL GAS SYSTEM
- FEED WATER SYS
- WATER STEAM SYS
- DUMP CONDENSER
- COOLING TOWER
- AIR COMPRESSOR
- STM WTR CHEMISTRY
- ELECTRICAL AUX
- HEAT FLOW DIAGRAM



POWER DISPATCH 917 MW
POWER GENERATED 976 MW
PLANT NET EFFICIENCY 40.54 %
PLANT AUX POWER 59 MW

To Desal Plant 11751.9 M3/Hr



Plant O&M Optimisation - Equipment monitoring



Gas Turbine 11 Overview

8/28/2015 10:21:04

POWER ISLAND

GT11 OVERVIEW

AIR INTAKE SYSTEM

BRG VIBS & TEMPS

EXHAUST TEMPS

GENERATOR

LUBE OIL SYSTEM

HYDRAULIC SYSTEM

FUEL SYSTEM

ELECTR SYSTEM

REPORT

GT12 OVERVIEW

GT13 OVERVIEW

ENVIRONMENT

TEMPERATURE 37.94 °C
REL HUMIDITY 60.92 %
PRESSURE 1002.12 mbara

INLET AIR

REL HUMIDITY 55.38 %
PRESSURE 1000.4 mbar
TEMPERATURE 39.37 °C
DEW POINT TEMP 28.80 °C

EOH 70104.2
OP HOURS 68320.5
NO OF STARTS 109

AIR FILTER

DP FILTER 8.93 mbar
DP COALESCER 0.26 mbar
DP PULSEFILTER 6.56 mbar
DP FINEFILTER 1.66 mbar

NG PRES U/STR ESV 27.29 bar
NG TEMP U/STR ESV 49.56 °C
FG FLOW GT11 62112.00 Nm³/h
GAS HHV 38.81 MJ/Nm³

FUEL

FUEL GAS TEMP 56.12 °C
NG FLOW 13.78 kg/s
VB FLOW 12.81 kg/s
PILOT GAS FLOW 0.97 kg/s

POWER 217.07 MW
FREQ 50.00 s-1
POWER FACTOR 0.97
HEAT RATE 10003 kJ/kWh
CYCLE EFFICIENCY 35.99 %
COMP EFFICIENCY 95.46 %

IGV ACT POSITION 100.0 %
AIR FLOW 613.97 kg/sec

COMPRESSOR INLET

978.8 mbara
32.0 °C
32.0 °C
32.0 °C
32.0 °C

SHAFT POSITION

2.05 mm
2.17 mm
2.21 mm
2.22 mm
2.22 mm

COMPRESSOR OUTLET

431.42 °C 15.74 bara
435.16 °C 15.76 bara
433.29 °C 15.74 bara
15.74 bara

GT EXHAUST

CALC TURB OUT TEMP CORR 559.72 °C
591.35 °C
GT EXHAUST TEMPERATURE 585.71 °C
586.3 °C
593.9 °C
593.9 °C

GT EXHAUST FLOW 645.2 kg/s

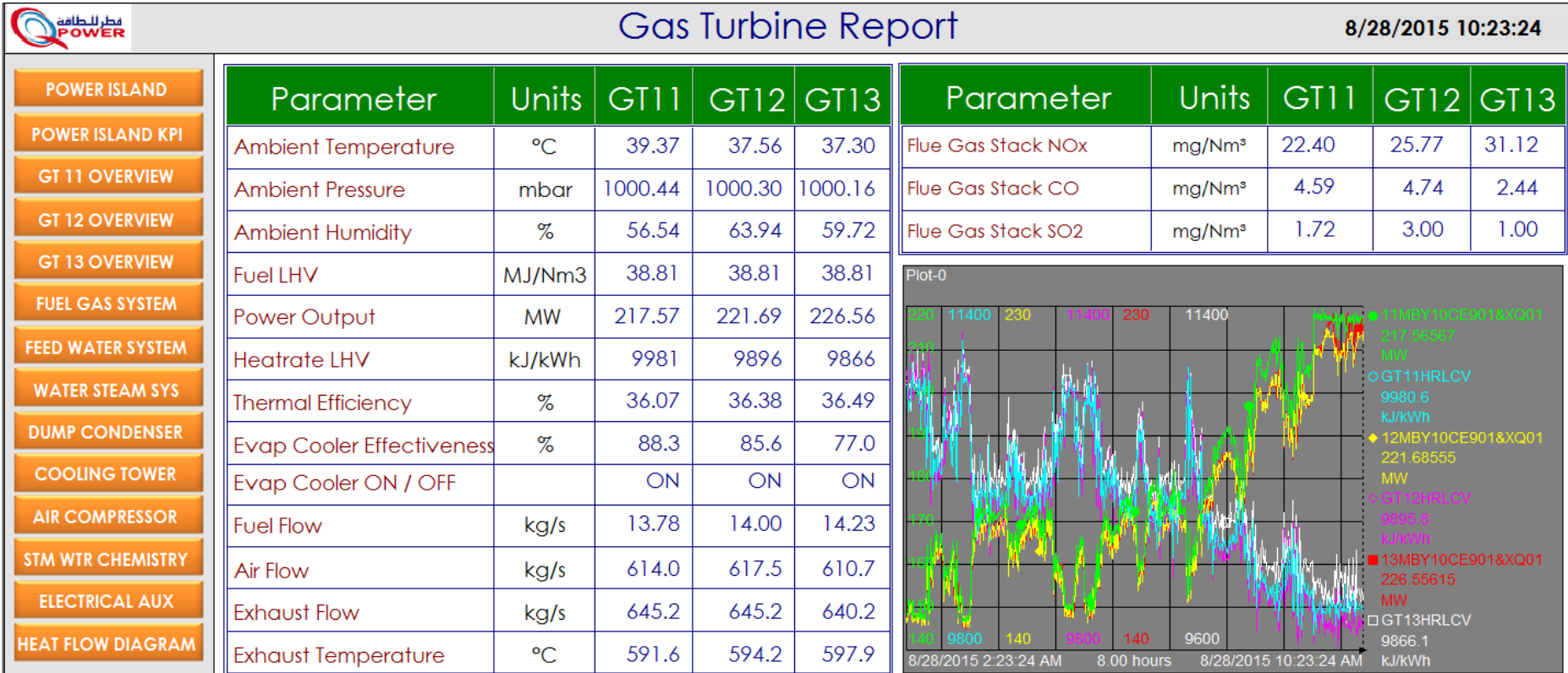
SWGR VOLTAGE 11.4 kV
EXCITER CURRENT 1114.2 A

To HRSG 11

FLUEGAS STACK

NOx 22.77 mg/Nm³
CO 4.92 mg/Nm³
SO2 1.48 mg/Nm³

Plant O&M Optimisation - PI ProcessBook Report



Plant O&M Optimisation - PI ProcessBook



Water Island Overview

8/28/2015 10:27:59

WATER ISLAND

WATER ISLAND KPI

MSF 21 OVERVIEW

MSF 22 OVERVIEW

MSF 23 OVERVIEW

MSF 24 OVERVIEW

DESAL OVERVIEW

DWPS OVERVIEW

PWPS OVERVIEW

SEA WATER SUPPLY

REMIN SYSTEM

PWPS ELECTRICAL

ELECTRICAL SYSTEM

AIR COMPRESSOR

WATER CHEMISTRY

MSF 21

TBT	110.24 °C
BBT	44.68 °C
PROD	2809.45 t/h
STEAM	361.00 t/h
GOR	7.50
DIST/SW	0.12
SEA WATER	22200.00 m3/h
BLOW DOWN	5198 m3/h

FROM POWER PLANT

MSF 22

TBT	109.96 °C
BBT	45.04 °C
PROD	2812.95 t/h
STEAM	381.95 t/h
GOR	7.46
DIST/SW	0.12
SEA WATER	22839.00 m3/h
BLOW DOWN	5250 m3/h

361.00 t/h

381.95 t/h

0.00 kg/s

0.00 kg/s

350.45 t/h

352.95 t/h

DUMP CONDENSER 1

DUMP CONDENSER 2

MSF 21
2765.00 T/h
37.92 uS/cm
7.95PR

MSF 22
2798.25 T/h
2.07 uS/cm
7.92PR

MSF 23
2839.20 T/h
4.4 uS/cm
8.47 PR

MSF 24
2919.00 T/h
201.9 uS/cm
8.51PR

MSF 23

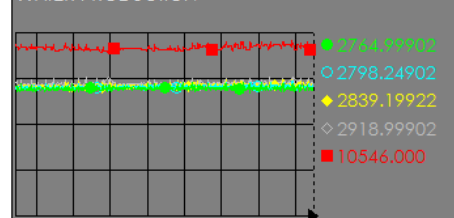
TBT	110.14 °C
BBT	44.71 °C
PROD	2781.80 t/h
STEAM	350.45 t/h
GOR	8.16
DIST/SW	0.14
SEA WATER	20616.00 m3/h
BLOW DOWN	5357 m3/h

Avg SW DT **9.31 Deg C**
WATER PRODUCTION 11133
WATER DISPATCH 10960 m3/hr

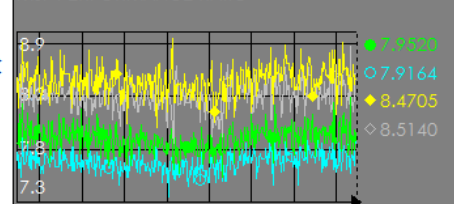
MSF 24

TBT	110.28 °C
BBT	44.17 °C
PROD	2921.10 t/h
STEAM	352.95 t/h
GOR	8.20
DIST/SW	0.12
SEA WATER	23580.00 m3/h
BLOW DOWN	5358 m3/h

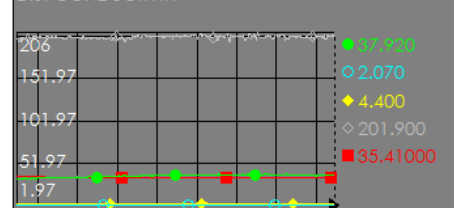
WATER PRODUCTION



MSF PERFORMANCE RATIO



DIST CONDUCTIVITY

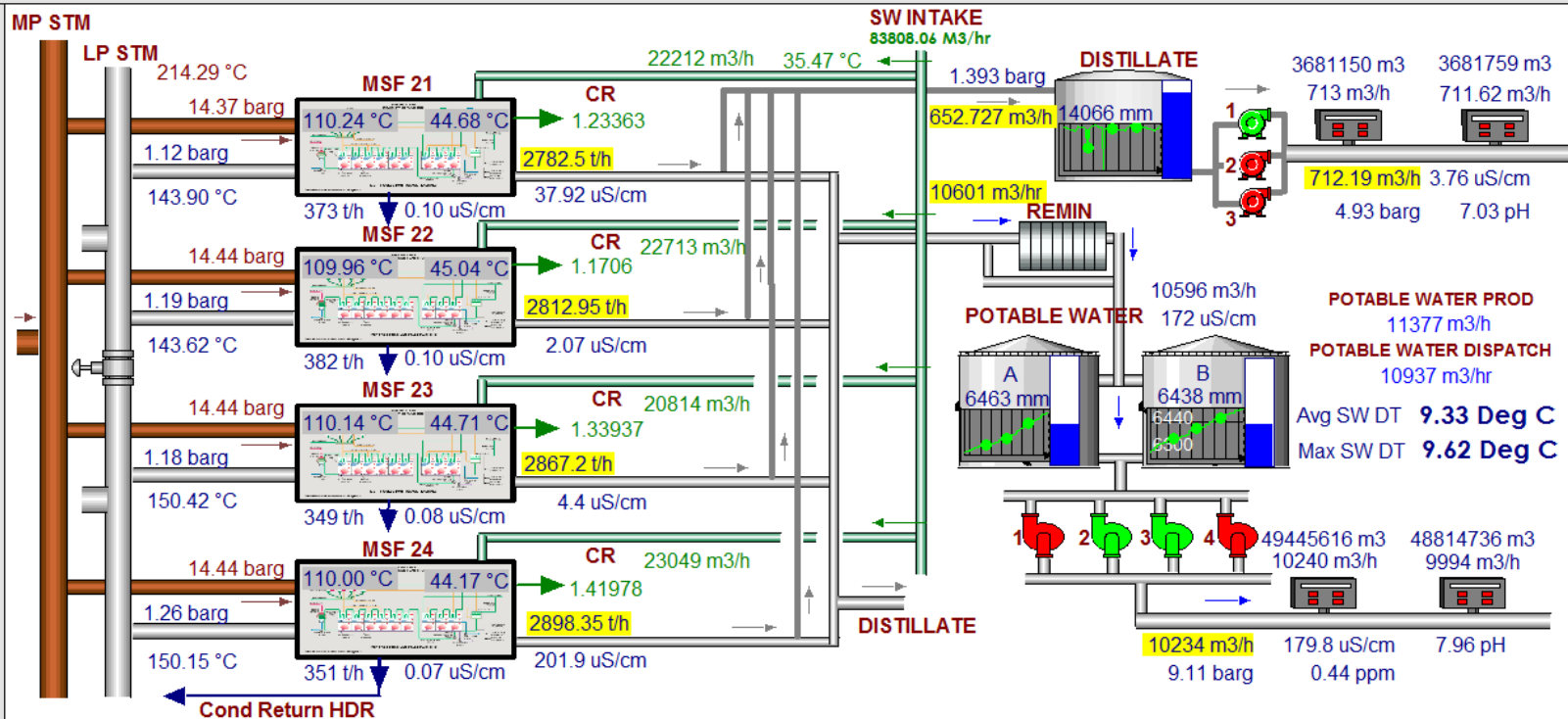


Plant O&M Optimisation - Water Plant Monitoring

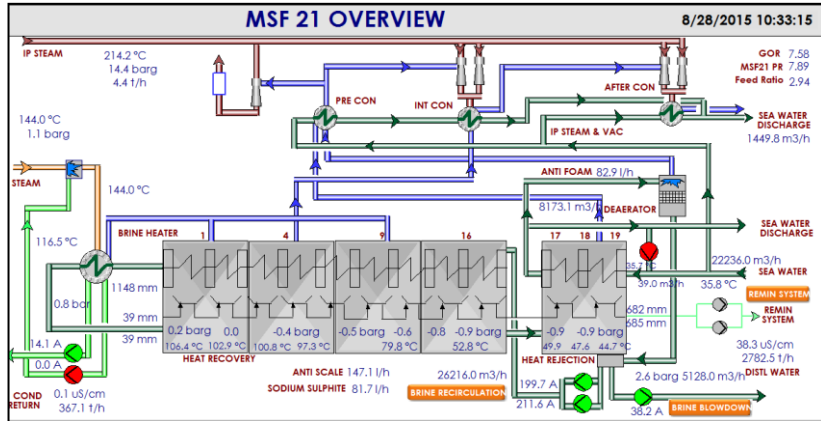


DESALINATION PLANT OVERVIEW

8/28/2015 10:30:09



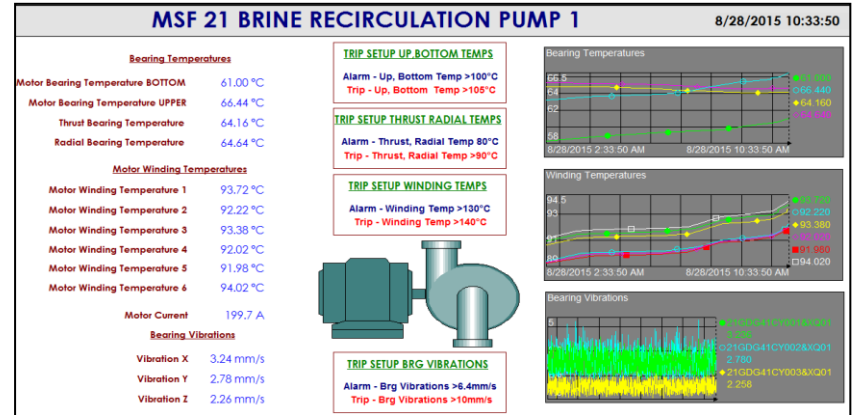
Plant O&M Optimisation – Real-time Reports



MSF WATER CHEMISTRY

8/28/2015 10:35:50

COMMON SYSTEMS		MSF #21	MSF #22	MSF #23	MSF #24
HYD CARB SW DISCHARGE COMMON HEADER	9.96 ppm				
HYD CARB SW SUPPLY COMMON HEADER	0.09 ppm				
CL SEA WATER HEADER	0.00 ppm				
PRODUCT WATER ALKALINITY	60.93 ppm				
CL2 PRODUCT WATER	Bad				
CLO2 LOW PRESSURE LINE	0.13 PPM				
POTABLE WATER CLO2	0.44 ppm				
RESIDUAL CHLORINE LOW PRESSURE LINE	0.39 PPM				
RESIDUAL CHLORINE HIGH PRESSURE LINE	0.12 PPM				
DISTILLATE WATER PH	7.16 pH				
PRODUCT WATER PH	7.88 pH				
POTABLE WATER PH	7.96 pH				
NEUTRAL WATER PH	7.40 pH				
SW COMMON HEADER DISCHARGE CONDUCTIVITY	83.15 µS/cm				
SW HEADER ANALYSIS CONDUCTIVITY	55.44 µS/cm				
DISTILLATE WATER CONDUCTIVITY	3.76 µS/cm				
PRODUCT WATER CONDUCTIVITY	173.78 µS/cm				
POTABLE WATER CONDUCTIVITY	180.20 µS/cm				
DISSOLVED OXYGEN	133.40 ppb	327.40 ppb	5.20 ppb	16.20 ppb	
CWRP SUCTION PH	8.07 pH	8.40 pH	7.60 pH	6.83 pH	
CWRP DISCHARGE PH	7.54 pH	8.28 pH	6.61 pH	8.09 pH	
BRINE RECIRC CONDUCTIVITY	68.64 µS/cm	65.36 µS/cm	74.60 µS/cm	78.74 µS/cm	
DISTILLATE CONDUCTIVITY	38.28 µS/cm	4.40 µS/cm	201.45 µS/cm	201.45 µS/cm	
CONDENSATE CONDUCTIVITY	0.10 µS/cm	0.10 µS/cm	0.08 µS/cm	0.07 µS/cm	
DISTILLATE PRODUCTION	2769.20 T/h	2802.45 T/h	2858.45 T/h	2860.90 T/h	
PERFORMANCE RATIO	7.98 PR	7.78 PR	8.43 PR	8.32 PR	
GROSS OUTPUT RATIO	7.68	7.47	8.13	8.01	
FEED RATIO	2.91	2.91	2.95	2.84	
ANTISCALE CONSUMPTION FLOW	35.40 Kg/MG	34.11 Kg/MG	35.35 Kg/MG	33.04 Kg/MG	
CWRP FLOW	39.0 m³/h	24.0 m³/h	4.5 m³/h	16.5 m³/h	
SEAWATER INTAKE	22890.0 m³/h	23025.0 m³/h	20505.0 m³/h	23472.0 m³/h	
DISTILLATE/ SEAWATER RATIO	0.12	0.12	0.14	0.12	

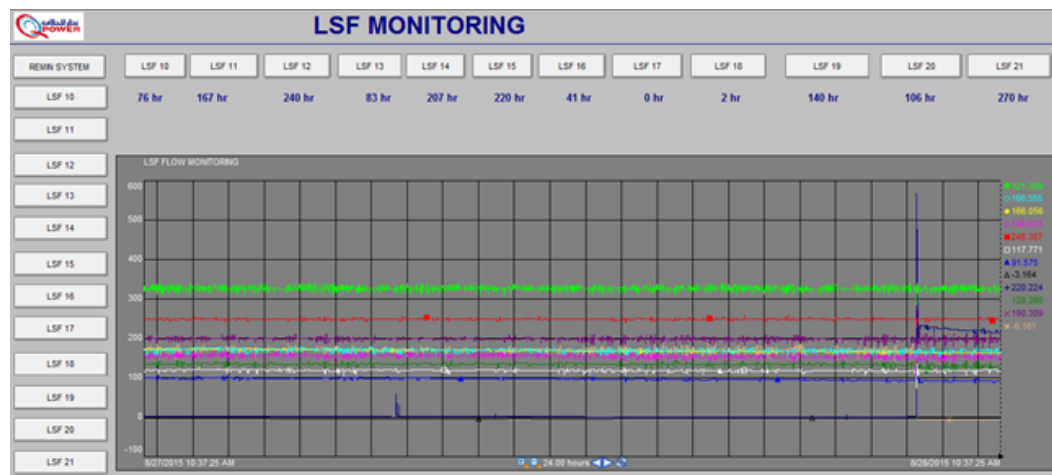
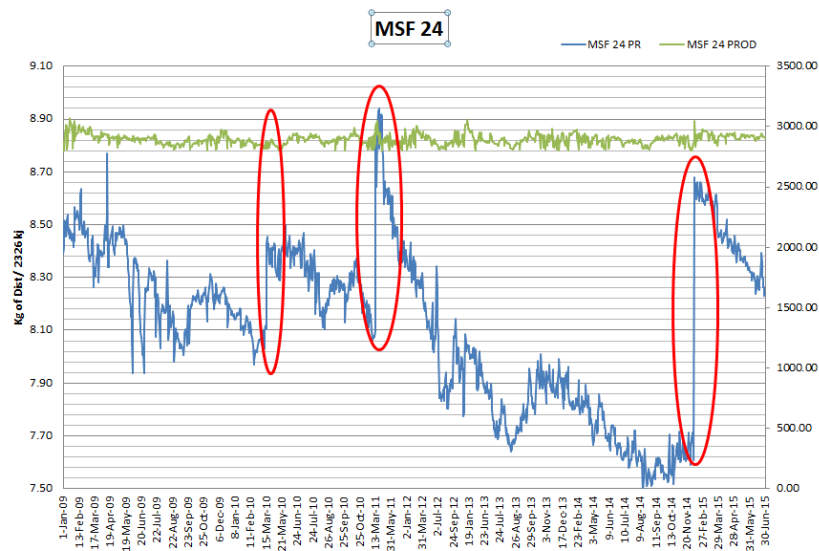


HRSG Report

8/28/2015 11:02:58

Parameter	Units	HRSG 11	HRSG 12	HRSG 13	Parameter	Units	HRSG 11	HRSG 12	HRSG 13
Feedwater Flow	kg/s	143.35	140.21	144.74	Drum Water CA	asS/cm	1.77	1.67	1.72
HP Steam Flow	kg/s	143.81	149.67	153.01	Drum Water pH	pH	9.17	9.24	9.20
HP Steam Temperature	°C	552.00	552.96	553.62	Saturated Steam CA	asS/cm	0.06	0.06	0.06
HP Steam Pressure	bar	74.60	74.60	74.60	Main Steam CA	asS/cm	0.06	0.06	0.06
Duct Burner1 Fuel Flow	Nm³/h	7635.60	7673.47	7585.61	Stack Temperature	°C	166.83	165.69	162.42
Duct Burner2 Fuel Flow	Nm³/h	6671.68	6612.95	6950.66	Flue Gas Stack NOx	mg/Nm³	22.52	25.60	31.60
Duct Burner1 Inlet Temp	°C	NO DATA	NO DATA	NO DATA	Flue Gas Stack CO	mg/Nm³	4.99	4.78	2.79
Duct Burner1 Outlet Temp	°C	NO DATA	NO DATA	NO DATA	Flue Gas Stack SO2	mg/Nm³	1.32	1.32	1.12
Duct Burner2 Inlet Temp	°C	NO DATA	NO DATA	NO DATA					
Duct Burner2 Outlet Temp	°C	NO DATA	NO DATA	NO DATA					
Drum Pressure	bar	81.86	81.20	80.80					
GT Exhaust Flow	kg/s	645.25	644.87	627.68					
HRSG Efficiency	%								

Plant O&M Optimisation - Performance/Condition based Maintenance



Online Monitoring of equipment performance used for performance & condition based maintenance of distillers, lime stone filters and major pumps, GT suction filters etc.

Seawater Margin Improvement



SEA WATER SUPPLY AND COOLING WATER DISCHARGE

8/28/2015 11:14:14

WATER ISLAND

WATER ISLAND KPI

MSF 21 OVERVIEW

MSF 22 OVERVIEW

MSF 23 OVERVIEW

MSF 24 OVERVIEW

DESAL OVERVIEW

DWPS OVERVIEW

PWPS OVERVIEW

SEA WATER SUPPLY

REMIN SYSTEM

PWPS ELECTRICAL

ELECTRICAL SYSTEM

AIR COMPRESSOR

WATER CHEMISTRY

SW SUPPLY 84903.86 M3/hr
PRODUCTION 10600.00 m3/h
PW PRODUCTION 10648.00 m3/h
DIST PRODUCTION 467.80 m3/h
SW TO PW 12.77 %
SW SUPPLY TREND

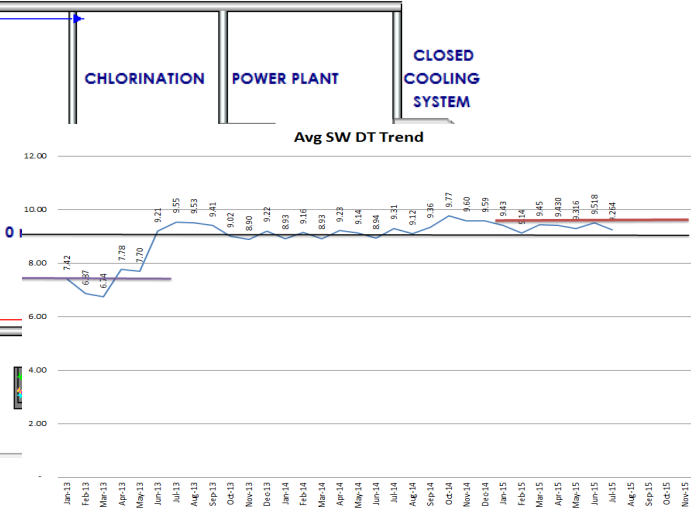
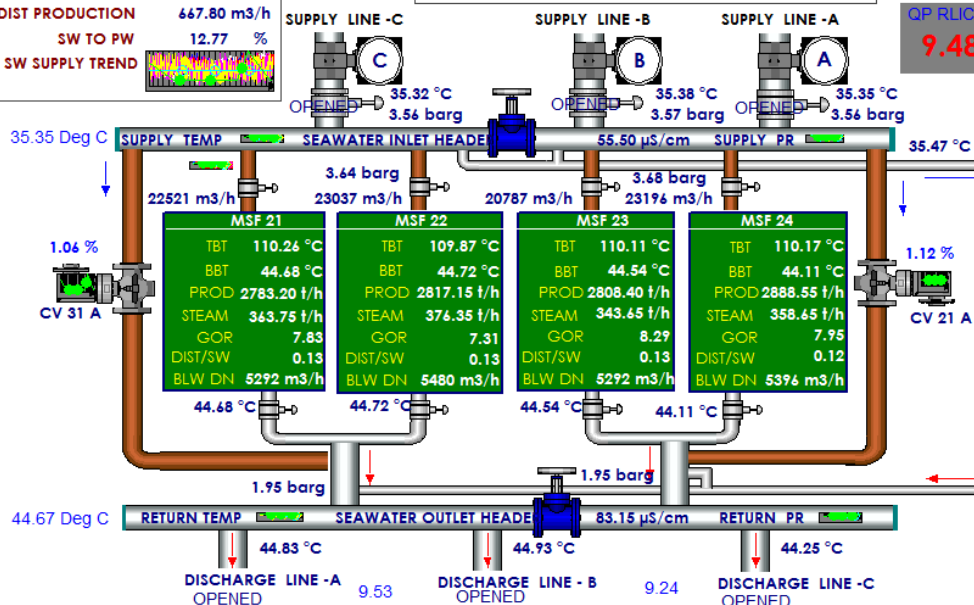
Q POWER-AVG
9.32

WATER PRODUCTION 11315.79 m3/hr
MAX SW DT 9.58 Deg C
Avg SW DT 9.30 Deg C

Q POWER
9.58

QP RLIC
9.48

MAX SW DT 9.58 Deg C
Avg SW DT 9.30 Deg C
SW BYPASS -4610 M3/Hr
-7.32 %
SW INLET TEMP 35.35 Deg C
SW RETURN TEMP 44.67 Deg C
MAX SW RETURN TEMP 44.93 Deg C
SW CONDUCTIVITY RISE 49.81 %
SW PR DROP 1.71 barg



Plant O&M Optimisation - Monthly KPI Reporting



QATAR POWER COMPANY, RAS LAFFAN-B, IWPP

8/28/2015 10:38:40

POWER ISLAND

POWER ISLAND KPI

GT 11 OVERVIEW

GT 12 OVERVIEW

GT 13 OVERVIEW

HRSG 11 OVERVIEW

HRSG 12 OVERVIEW

HRSG 13 OVERVIEW

ST 14 OVERVIEW

ST 15 OVERVIEW

FUEL GAS SYSTEM

FEED WATER SYSTEM

WATER STEAM SYS

STM WTR CHEMISTRY

POWER DISPATCH

916 MW

AMBIENT TEMP

38.13 °C

WATER DISPATCH

57.76 MIGD

POWER GENERATION

976 MW

AMBIENT RH

60.40 %

POTABLE WATER

54.03 MIGD

FREQUENCY

50.02 Hz

AMBIENT PRESSURE

1002.07 mbara

DISTILLATE

3.76 MIGD

POWER FACTOR

0.98

WIND SPEED

5.35 m/s

WATER PRODUCTION

60.03 MIGD

LTA MAN HOURS

4,216,382 Hrs

LTA MAN DAYS

3,452 Days

HEAT INDEX

54.00

WATER ISLAND

WATER ISLAND KPI

MSF 21 OVERVIEW

MSF 22 OVERVIEW

MSF 23 OVERVIEW

POWER COMMERCIAL AVAILABILITY

LAST MONTH

YEARLY

ACTUAL

BUDGET

ACTUAL

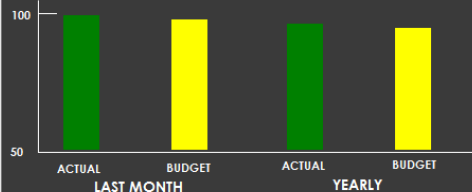
BUDGET

99.89 %

98.38 %

97.02 %

95.13 %



MONTHLY PERFORMANCE REPORTS

KPI DASH BOARD

JANUARY

FEBRUARY

MARCH

APRIL

MAY

JUNE

JULY

AUGUST

SEPTEMBER

OCTOBER

NOVEMBER

DECEMBER

JANUARY

FEBRUARY

MARCH

APRIL

MAY

JUNE

JULY

AUGUST

SEPTEMBER

OCTOBER

NOVEMBER

DECEMBER

META - R Power Analytical Performance Review ~JUN-2015

- Input KPIs sheet -

YTD to be filled in by the entry
For "N/A" if it is not applicable

DEFINITION:

Net Maximum Electrical Capacity (MW)
Net Maximum Water Capacity (MG)
Net Dependable Power Capacity (MW)
Net Dependable Water Capacity (MG)
Contract Power capacity (MW)
Contract Water capacity (MG)

Availability

Commercial availability (%) Contract Year 1

Commercial Power Availability (%)

Commercial Water Availability (%)

Technical Power availability (%)

- Planned outage

- Unplanned outage

- External unavailability

Technical Water availability (%)

- Planned outage

- Unplanned outage

MONTH: JUN-2015

Current Month V1

YTD V1

YTD

Current Month V2

YTD V2

FY Forecast

Actual	Budget V1	Actual	Budget V1	Year 2014	Actual	Budget V2	Actual	Budget V2	Budget V1	Budget V2	Forecast	Year 2014
1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0	1,025.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0%	98.1%	96.5%	94.6%	90.7%	100.0%	98.1%	96.5%	96.2%	96.4%	97.3%	97.4%	95.4%
100.0%	97.8%	97.3%	94.4%	95.7%	100.0%	97.8%	97.3%	96.1%	96.0%	96.9%	97.5%	97.5%
100.0%	96.3%	96.8%	94.7%	90.7%	100.0%	96.3%	96.8%	96.3%	96.5%	97.3%	97.3%	95.4%
0.0%	0.0%	2.8%	3.5%	0.0%	0.0%	0.0%	2.8%	2.8%	1.7%	1.4%	1.4%	4.6%
0.0%	1.7%	0.0%	1.8%	0.2%	0.0%	1.7%	0.0%	0.9%	1.0%	1.3%	1.1%	0.1%
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
100.0%	98.2%	97.3%	94.8%	95.7%	100.0%	98.2%	97.3%	96.4%	96.5%	97.3%	97.3%	97.5%
0.0%	0.0%	2.8%	3.5%	0.0%	0.0%	0.0%	2.8%	2.8%	1.6%	1.3%	1.3%	4.6%
0.0%	1.9%	0.1%	1.9%	0.1%	0.0%	1.9%	0.1%	0.9%	1.9%	1.4%	1.0%	0.1%



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Plant O&M Optimisation – Real-time KPI Monitoring

Power Plant KPI

Key Performance Indicator	Unit	Design	Current Value	Average	Minimum	Maximum	Std Dev
GROSS POWER GENERATION	MW	1090	974.13	892.13	722.42	987.70	80.26
POWER EXPORT	MW	1025	914.62	832.53	663.07	927.93	80.08
PLANT EFFICIENCY	%	40.29	40.57	38.56	34.22	41.43	1.87
PLANT EFFICIENCY FACTOR		1	1.09	1.09	1.09	1.18	0.05
PLANT LOAD FACTOR	%	100	89.23	89.23	89.18	90.26	0.29
GT 11 LOAD	MW	233	216.89	192.37	135.02	221.70	26.29
GT 11 EFFICIENCY	%	36.76	35.79	34.96	31.35	36.68	1.29
GT 12 LOAD	MW	233	220.29	193.34	134.60	226.61	27.19
GT 12 EFFICIENCY	%	36.76	36.24	35.06	31.24	36.93	1.38
GT 13 LOAD	MW	233	223.00	193.79	134.99	229.50	27.66
GT 13 EFFICIENCY	%	36.76	36.36	35.08	31.25	37.02	1.40
ST 14 LOAD	MW	220	159.69	160.21	158.23	162.22	0.41
ST 15 LOAD	MW	220	152.27	152.43	137.56	157.40	1.82
HRSG 11 STEAM TEMP	Deg C	566.6	549.66	555.29	547.20	563.58	4.05
HRSG 11 STEAM FLOW	Kg/Sec	176.9	143.40	143.32	139.26	146.59	1.02
HRSG 11 STEAM PRESSURE	Bar	88.7	73.81	74.49	72.92	75.71	0.49
HRSG 11 FLUE GAS EXIT TEMP	Deg C	146.7	140.56	156.26	149.38	140.83	4.00

Water Plant KPI

Key Performance Indicator	Unit	Design	Current Value	Average	Minimum	Maximum	Std Dev
TOTAL WATER PRODUCTION	M3/Hr	11462.5	11207.56	11161.73	11146.38	11207.56	21.76
TOTAL WATER EXPORT	M3/Hr	11362.5	10940.63	11117.83	10823.01	11308.68	105.42
PW DISPATCH	M3/Hr		97.10	97.07	96.82	97.24	0.09
DISTILLATE DISPATCH	M3/Hr		717.83	786.67	611.45	938.86	118.27
WATER PLANT LOAD FACTOR	%	100	10940.63	10956.70	10940.63	10967.21	8.74
MSF21 DIST PROD	M3/Hr	2840.9	2787.05	2778.87	2661.05	2911.30	24.74
MSF21 STEAM CONSUMPTION	TPH	336.9	362.55	363.10	347.20	373.80	3.68
MSF21 SW INTAKE	Ton/Hr	22500	22797.00	22665.37	21360.00	24102.00	328.13
MSF21 DISTILLATE COND	uS	<25	38.31	35.09	28.65	40.29	2.77
MSF21 BRINE HEATER PR	Bar		0.78	0.78	0.77	0.78	0.00
MSF21 GOR	Kg Dist/ Kg Steam	8.43	7.61	7.63	7.53	7.69	0.06
MSF21 COVERSION FACTOR	%		0.13	0.12	0.12	0.13	0.00
MSF21 TBT	Deg C	110	110.26	110.26	109.95	110.44	0.09
MSF21 BBT	Deg C	43.8	44.68	45.01	44.43	45.83	0.29
MSF21 ANTIFOAM	L/Hr	0.027	82.98	81.71	77.44	121.54	1.36
MSF21 ANTISCALANT	L/Hr		146.91	141.18	133.95	171.54	2.03
MSF22 DIST PROD	M3/Hr	2840.9	2801.75	2801.86	2714.60	2911.65	21.77
MSF22 STEAM CONSUMPTION	TPH	336.9	376.75	377.46	362.00	386.10	2.93

Process displays, AF Asset Model and reports are build in-house within short time.

Plant O&M Optimisation - Performance Reports

STATION STATUS REPORT									
PRODUCTION		GENERATION		DISPATCH		POWER SYSTEM CONDITION		WEATHER CONDITION	
LOAD	MW	949.58	890.05	FREQUENCY	Hz	50.04	TEMPERATURE	Deg C	38.09
POTABLE WATER	M3/HR	10314	10232	POWER FACTOR		0.98	RELATIVE HUMIDITY	%	61.32
POTABLE WATER	MGD	54.45	54.02						
DISTILLATE WATER	M3/HR	756	715	220 KV BUS VOLTAGE	UV	226	WIND SPEED	m/sec	5.03
DISTILLATE WATER	MGD	4.0	3.8						
PRODUCT WATER	M3/HR	11070	10947	AUXILIARY POWER	MW	60	RAIN FALL	kg/m2	42.00
PRODUCT WATER	MGD	58.4	57.8						

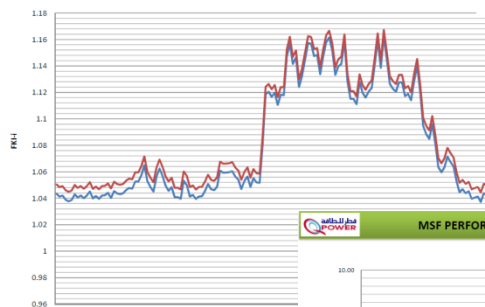
POWER PLANT STATUS REPORT									
PARAMETER	UNIT	GT 11	GT 12	GT 13	ST 14	ST 15	TOTAL		
ACTIVE LOAD	MW	212.64	212.91	212.91	160.78	156.0	955.21		
REACTIVE LOAD	MVAR	40.28	39.22	38.64	19.17	34.82	172.12	DC 14 kg/sec	0.00
FREQUENCY	Hz	50.02	50.03	50.03	50.04	50.03	50.04	DC 15 kg/sec	0.00
POWER FACTOR		0.97	0.97	0.98	0.97	0.95	0.98		
IGV POSITION	%	95.70	95.7	79.08					
OTC TEMP	Deg C	559.33	553.6	564.26					
HR	HR	70105.2	72493	62676	33584	34405			
NO OF STARTS	HR	109	135	107	88	70			
OPERATING HOURS	HR	68322	69973	60481	33584	34405			
FUEL GAS FLOW	NM3/HR	60968	60680	60584			227100		
EFFICIENCY	%	32.35	32.55	32.60			39.01		

WATER PLANT STATUS REPORT									
PARAMETER	UNIT	DESIGN	MSF 21	MSF 22	MSF 23	MSF 24	TOTAL		
DISTILLATE PROD.	M3/HR	2865.94	2762.90	2821.70	2812.25	2838.50	11235.35	SW U/L - A	35.42
DISTILLATE PROD.	MGD	15.13	14.59	14.90	14.85	14.99	58.31	SW U/L - B	35.51
DISTILLATE COND.	M3/HR	<25	38.37	2.01	4.40	203.34	62.03	SW U/L - C	35.38
STEAM CONS.	T/H	336.89	363.40	378.85	345.05	356.45	1443.75	SW O/L - A	44.83
TOP BRINE TEMP	Deg C	110.00	110.26	109.85	110.12	109.96	110.05	SW O/L - B	44.93
SW U/L TEMP	Deg C	35.00	35.84	35.48	35.32	34.66	35.32	SW O/L - C	44.28
SW SUPPLY	M3/HR	22500.00	22299.00	23559.00	20718.00	22963.00	84038.38	Avg SWDT Deg C	9.25
% DIST CONVERSION	%	12.737	12.390	11.977	13.974	12.350	13.87	OP SW DT	9.30
ISCR	RATIO	8.567	7.603	7.448	8.358	7.963	7.78	SW TEMP CV 21	1.12
PR	kg dist/2326 kj	8.261	7.984	7.61	8.22	8.03	7.95	SW TEMP CV 31	1.06
Corrected PR	kg dist/2326 kj	8.26	8.06	7.73	8.24	7.98	8.00		

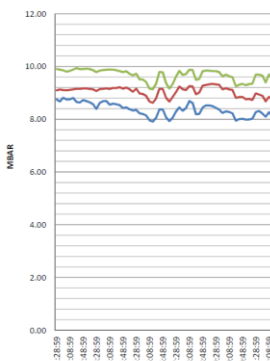
POWER PLANT CONDITION MONITORING									
PARAMETER	UNIT	GT 11	GT 12	GT 13					
SUCTION FILTER DP	mbar	8.84	9.73	8.22					
COALESCER FILTER DP	mbar	0.22	0.36	0.16					
PULSE FILTER DP	mbar	6.57	7.68	6.30					
FINE FILTER DP	mbar	1.68	1.28	1.39					
AMB TEMP	Deg C	40.19	37.93	37.66	POTABLE WATER-A	MM	6480.38		
AMB RH	%	54.65	63.33	58.77	POTABLE WATER-B	MM	6467.17		
Wet Bulb Temp-Calc	Deg C	31.28	30.99	29.87	DISTILLATE WATER	MM	14052.22		
EVAP COOLER EFF	%	89.27	79.97	72.92	DM WATER	MM	12.53		
AMB PRESSURE	mbar	999.56	999.62	999.30					
COMP U/L TEMP	Deg C	32.24	32.38	31.96					
COMP O/L TEMP	Deg C	433.73	432.68	350.68					
COMP O/L PH	bar	15.61	15.57	15.26					
EXHAUST CHAMBER DP	mbar	455.52	480.48	433.08					
GT AMBIENT TEMP	Deg C	586.19	583.59	591.74	NOX : mg/Nm3	23.05	24.87	33.17	
GT STACK TEMP	Deg C	586.14	583.54	591.74	SO2 : mg/Nm3	1.52	1.68	0.80	
					CO : mg/Nm3	4.46	4.47	7.41	



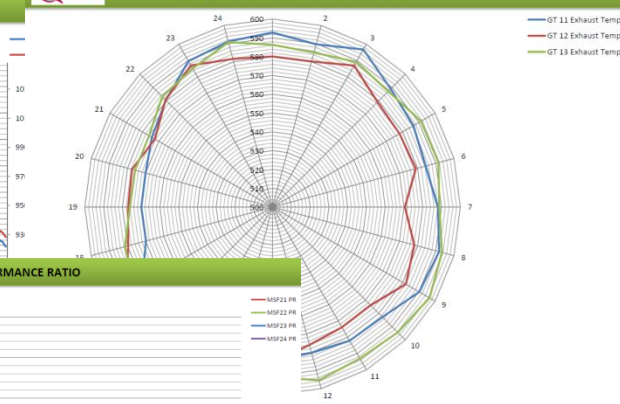
PLANT HEAT RATE AND FACILITY K-FACTORS



GAS TURBINE SUCTION



GT EXHAUST TEMPERATURE PROFILE



MSF PERFORMANCE RATIO

PERFORMANCE ISENTROPIC-EFFICIENCY-%

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Plant O&M Optimisation - Performance Reports

- Daily, Weekly and Monthly Performance reports
- Daily O&M meeting discussion on performance issues with real time data reporting
 - Plant Efficiency
 - Plant Loading
 - GT/MSF/HRSG Efficiency
 - GT Evaporative cooler efficiency
 - HRSG Main Steam Temp
 - HRSG Flue Gas Exit Temp
 - GT Comb Chamber Monitoring
 - Seawater Consumption
 - Chemical Consumption
 - MSF Distillate Conductivity
 - GT Suction Filter perf. Monitoring
 - Step Change and abnormality reporting

QATAR POWER COMPANY



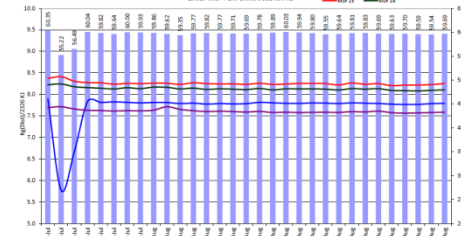
RAS LAFFAN "B" IWPP

DAILY GENERATION AND PERFORMANCE REPORT					DATE 23-Aug-15	
GENERATION PLAN(MW) :	DAILY: 22990	MONTHLY :	506140			
POTABLE WATER (MG) :	DAILY: 60	MONTHLY :	1380			
1 FACILITY PERFORMANCE						
	DAILY	AUG-15	YEAR 2015	REMARK		
POWER						
GAS(GENERATION (MW))	22518	504238	3802177			
NET GENERATION (MW)	21143	472840	3320889			
POWER IMPORT(MW)	0	0	29142			
COMMERCIAL AVAILABILITY(%)	100.00	100.00	97.93			
OPERATIONAL AVAILABILITY (%)	100.00	100.00	97.94			
FORCED OUTAGE RATE (%)	0.00	0.00	0.29			
PLANT LOAD FACTOR(%) Gross	91.53	89.12	62.79			
MAX NET HOURLY LOAD (MW)	967	971	1093			
MAX NET HOURLY LOAD (MW)	790	689				
AUX POWER (MW)	1373	31393	309303			
WATER						
MSF DISTILLATE WATER PRODUCTION (MG)	59.89	1373.72	13933.82			
NET POTABLE WATER PRODUCTION (MG)	55.57	1266.84	12611.36			
DISTILLATE WATER TO DIST TANK	3.49	91.23	824.58			
PERFORMANCE RATIO (GROSS/200 KJ)	7.93	7.84	8.08			
COMMERCIAL AVAILABILITY (%)	100.00	100.00	97.93			
OPERATIONAL AVAILABILITY (%)	100.00	100.00	97.94			
FORCED OUTAGE RATE (%)	0.00	0.00	0.29			
MAX HOURLY PRODUCTION (MG/HR)	11841	11892	11683			
MIN HOURLY PRODUCTION (MG/HR)	11018	10707				
GAS CONSUMPTION (MMBTU)						
GT GAS FIRING	155591	3512074	36029670			
SUPPLEMENTARY GAS FIRING	47328	1037747	12331238			
TOTAL GAS FIRING	202919	4549821	38356908			
SEA WATER CONSUMPTION (KMS)						
POTABLE WATER						
POTABLE WATER DISPATCH (MG)	54.78	1264.40	12379.79			
DISTILLATE WATER DISPATCH (MG)	3.47	91.43	823.87			
TOTAL PRODUCT WATER DISPATCH (MG)	58.20	1355.83	13203.66			
2 UNIT WISE PERFORMANCE						
POWER						
GAS(GENERATION (MW))	GT 11	GT 12	GT 13	GT 14	GT 15	
NET (GROSS) (MW)	4907	4932	4950	3816	3911	
NO (OF STARTS (MG))	69988	72185	62568	33477	34297	
AVAILABILITY (%)	109	119	107	78	79	
PLANT LOAD FACTOR (%)	100.00	100.00	100.00	100.00	100.00	
MAX HOURLY LOAD (MW)	87.75	88.20	88.51	71.95	73.75	
MAX HOURLY LOAD (MW)	220	224	229	181	180	
MIN HOURLY LOAD (MW)	178	178	178	150	156	
WATER						
GAS WATER PRODUCTION (MG)		14.48	14.83	14.95	15.24	
PERFORMANCE RATIO (GROSS/200 KJ)		7.79	7.59	8.25	8.11	
AVAILABILITY (%)		100.00	100.00	100.00	100.00	
3 AVERAGE AMBIENT CONDITIONS						
DEVIATION w.r.t. PLAN						
AMBIENT TEMPERATURE(Deg C)	33.992					
AMBIENT PRESSURE(Bar)	1.000					
AMBIENT SHIN	50.503			DAY	MONTH	
SEA WATER (L TEMPT(Deg C)	32.714			POWER	-47.5	506140.0
FREQUENCY(HZ)	50.000				-1.5	1380.0
POWER FACTOR	0.983					
FUEL OIL(MG)	46796					
4 POTABLE WATER STOCK						
	TANK A	TANK B	TOTAL STOCK			
SEA WATER (Distill Stock)	6.28 M	14.49 MG	6.31 M	16.74 MG	29.23 MG	
Distillate Water Stock	14.09 M	5.12 MG	P W + D (M) =		34.36 MG	



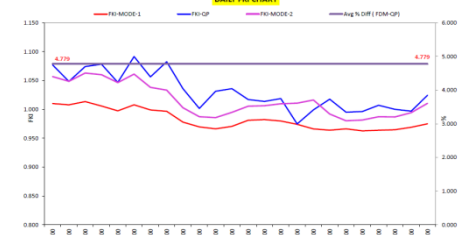
RAS LAFFAN B IWPP

DAILY MSF PERFORMANCE RATIO



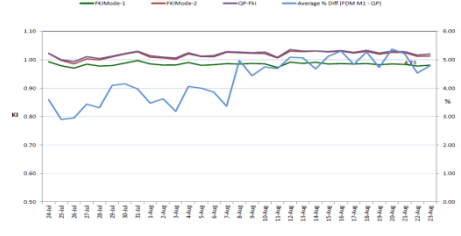
RAS LAFFAN B IWPP

DAILY FRI CHART



RAS LAFFAN B IWPP

DAILY FACILITY PERFORMANCE CHART



Application of PI System Tools and Capabilities

ProcessBook

- Real-time data analysis
- Dashboards
- Process Displays
- Equipment performance
- Trending
- Real-time deviation

PI DataLink

- Real-time data analysis
- Online performance monitoring
- Reports
- Equipment performance
- Trending
- Excel add ins

PI Coresight

- Real-time data analysis
- Dash Boards
- Equipment performance
- Trending
- Real-time decision making

PI Analytics AF Server

- Analytical
- Performance Calculation
- Heat stress Index
- Creating asset model analytics and notification

Notifications

- Real-time messaging
- Notification on heat stress
- Alerting high deviations
- Equipment tripping's
- Start/stop notification

Application of PI ProcessBooks and PI DataLink



- 24/7 access to plant data from Engineers desktop
- Applications can be build in house without in depth expertise in IT

Application of PI Coresight



Mainly designed for Senior Management

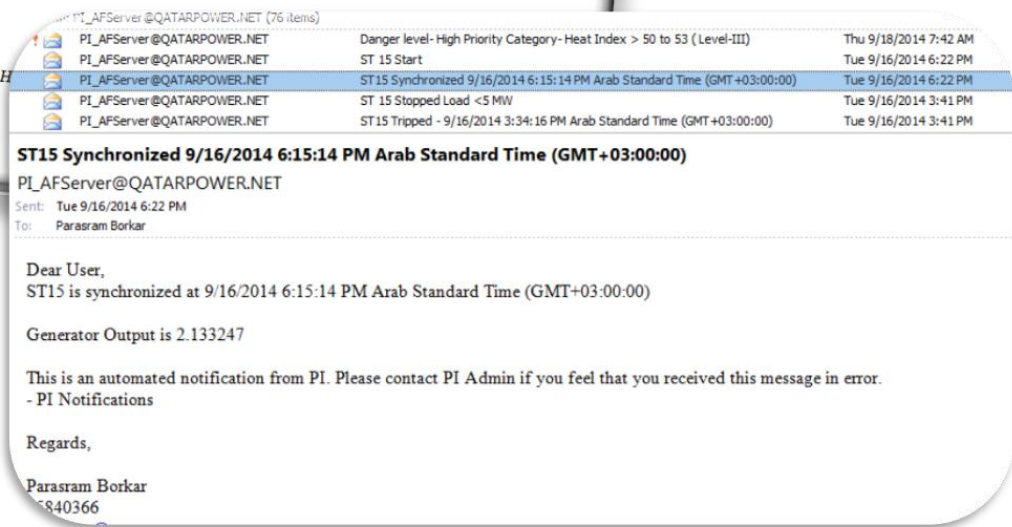
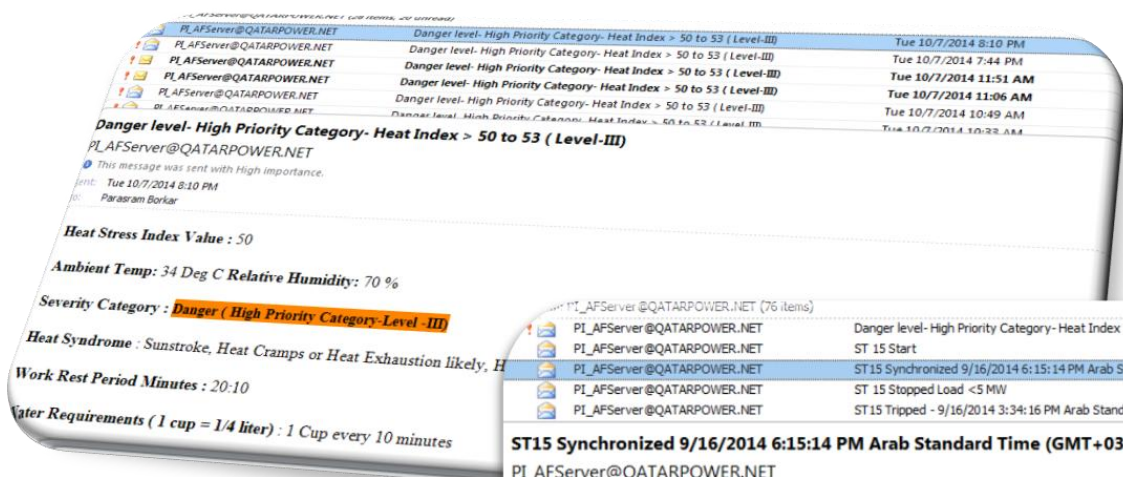
Application of PI Server and Analytics

- Asset Model developed based on function and equipment
- Created templates for equipment performance analysis
- Used for HSE heat stress index calculation and notifications

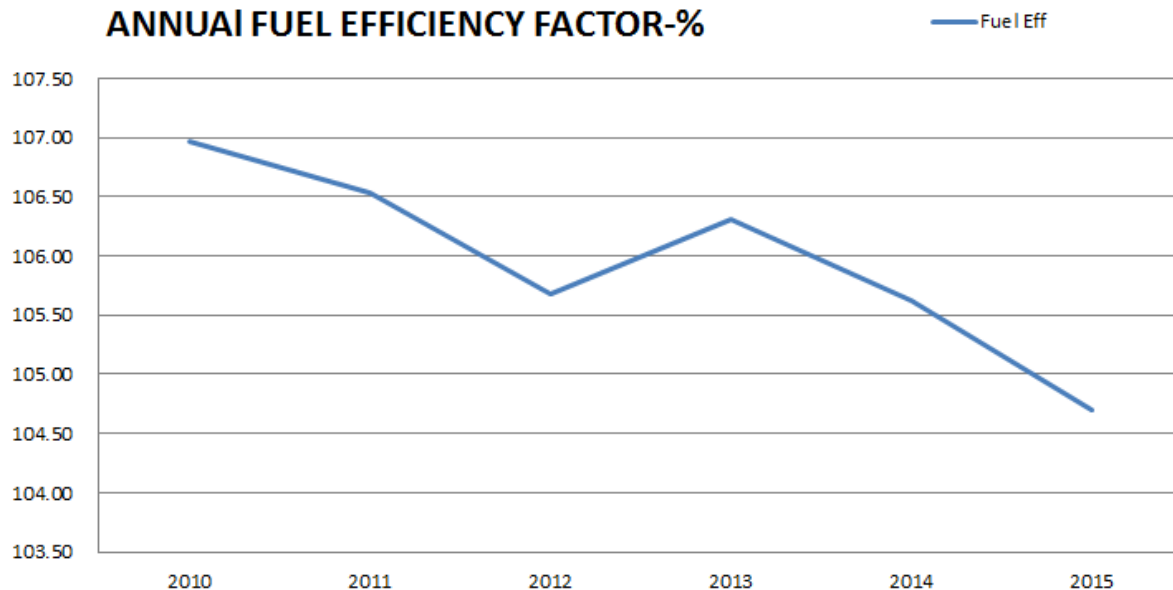
The screenshot displays the PI System Explorer interface. On the left, a tree view shows the hierarchy of assets, including 'Power Island', 'QATQPRIS01 ModuleDB', 'QPOWER', 'TARIFFMETER', 'Water Island', 'DWPIS Overview', 'Distillate Flows', 'Distillate Pump1', 'Distillate Pump2', 'Distillate Pump3', 'Distillate Tank', 'Electrical System', 'MSF 21', 'MSF 21 Brine Blowdown System', 'MSF 21 Brine Recirculation', 'MSF 21 Distillate System', 'MSF 21 Element Display', 'MSF 21 IP Steam and Vacuum System', 'MSF 21 LP Steam', 'MSF 21 Pumps', 'MSF 21 Sea Water Cooling and Make Up', 'MSF 21 Vent Gas System', 'MSF 22', 'MSF 23', 'MSF 24', 'MSF Common Systems', 'PwPS Overview', 'Potable Water Pump1', 'Potable Water Pump2', 'Potable Water Pump3', 'Potable Water Pump4', 'Potable Water Tank', and 'Remineralization System'. The main pane shows the 'MSF 21' asset model with a table of parameters.

Name	Value	Description	Data Reference
Chemical Dosing		Chemical Dosing	<None>
Anti Foam Dosing	80.45999 l/h	Anti Foam Dosing	PI Point
Anti Scale Dosing	141.8999 l/h	Anti Scale Dosing	PI Point
Sodium Sulphate Dosing	81.71999 l/h	Sodium Sulphate Dosing	PI Point
Cooling Water		Cooling Water	<None>
Cooling Water Down Stream...	2.022 barg	Cooling Water Down Stream...	PI Point
Cooling Water Down Stream...	40.95999 °C	Cooling Water Down Stream...	PI Point
Cooling Water Recirculating...	9.805599 pH	Cooling Water Recirculating...	PI Point
Cooling Water Recirculating...	0.417 barg	Cooling Water Recirculating...	PI Point
Cooling Water Recirculating...	9.507399 pH	Cooling Water Recirculating...	PI Point
Cooling Water Through Co...	1293.75 T/h	Cooling Water Through Cond...	PI Point
DeSalination Gross Production	1290.25 T/h	DeSalination Gross Production	PI Point
DeSalination Water Producti...	2627.999 T/h	DeSalination Water Production	PI Point
IP Steam Parameters			<None>
IP Steam Flow	3.147 T/h	IP Steam Flow	PI Point
IP Steam Pressure	14.56499 barg	IP Steam Pressure	PI Point
IP Steam Temperature	212.7299 °C	IP Steam Temperature	PI Point
LP Steam DeSuperheater		LP Steam DeSuperheater	<None>
DeSuperheater Down Stre...	119.13 °C	DeSuperheater Down Stream...	PI Point
DeSuperheater Down Stre...	117.255 °C	DeSuperheater Down Stream...	PI Point
DeSuperheater Up Stream...	1.131999 barg	DeSuperheater Up Stream Pr...	PI Point
LP Steam After DeSuperh...	119.305 °C	LP Steam After DeSuperheat...	PI Point
LP Steam to DeSuperheat...	144.75 °C	LP Steam to DeSuperheat...	PI Point
LP Steam Parameters			<None>
LP Steam Flow	3.171 T/h	LP Steam Flow	PI Point

Application of Notifications

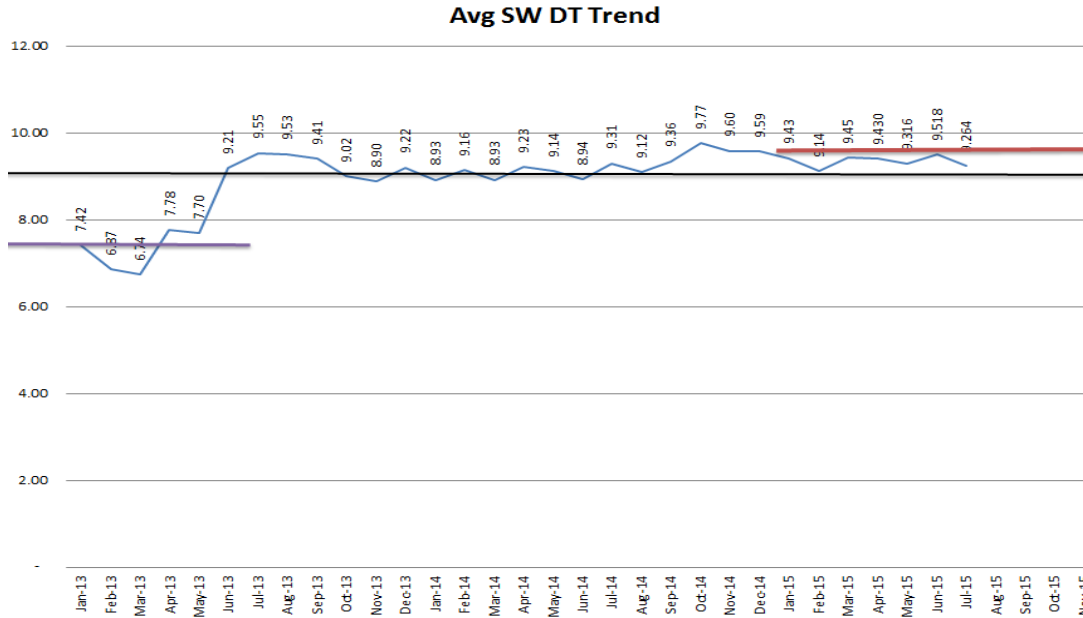


Result Obtained - Fuel Gas Margin Improvement



- Continuous monitoring of O&M efficiency, the savings through fuel margin have improved.

Result Obtained - Seawater Margin Improvement



- Continuous monitoring of seawater usage leads to savings of more than 1 million USD in first year

Results Obtained and Business Impact

- HSE Performance Improved
- Availability and Reliability Improved
- Fuel efficiency Factor Improved- Fuel margin improved
- Seawater usage reduced- Seawater margin improved
- ROI of PI System implementation is achieved

At QPower, the PI System has been utilised in an effective way to improve the plant efficiency, troubleshooting, reducing seawater consumption and condition monitoring. This improved O&M capability and continue to maintain the plant in a healthy condition for higher reliability.

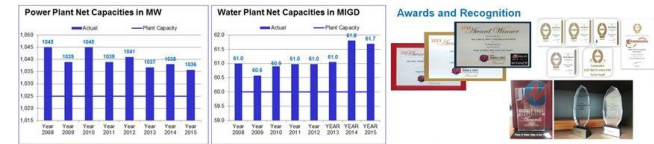
QPower utilised PI System for HSE performance improvement which is unique step towards protection of human resource occupational health hazards.

Future Plan

- Event Frames
- PI Coresight with future data
- Building displays with PI ProcessBook and PI Coresight
- Continue to improve availability, reliability and plant efficiency through utilization of PI System tools
- Create value to the stake holders

Summary

QPower: Emerged as a most trusted reliable and efficient source of power and water for the State of Qatar.
Contributed to Qatar's national growth to fulfill Vision 2030.
The PI System creates value to QPower's business through real-time KPI monitoring for financial benefits.



BUSINESS CHALLENGES

- A. Availability of operational data across the company
- B. Improve the fuel and seawater margin
- C. Improve O&M efficiency
- D. Improve reliability, availability
- E. Improve HSE performance

SOLUTION

- A. Implemented PI system infrastructure and historian with the powerful analytical tools
- B. Devised real time performance management system
- C. Integration of Offline FDM with PI DataLink

RESULTS AND BENEFITS

- Real-time data availability. Implementation of dash-boards includes operational efficiency and KPIs for quick decision making
- Fuel Efficiency Factor improved by 0.98% resulting into fuel margin of 1.4 million USD/year (0.2%)
- Seawater margin improved by 1.3 million USD for year 2013 & 14.
- Positive NPV with ROI – 8 months

Contact Information

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Performance

Qatar Power Company



Questions

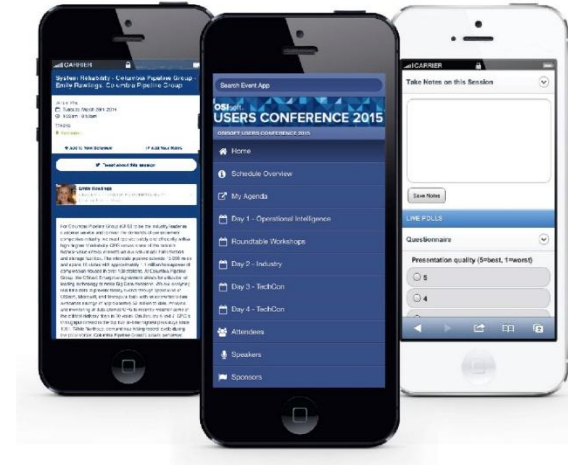
Please wait for the **microphone** before asking your questions



State your
name & company

Please don't forget to...

Complete the Online Survey
for this session



<http://eventmobi.com/emeauc15>



감사합니다

谢谢

Danke

Merci

Gracias

Thank You

ありがとう

Спасибо

Obrigado