

Oman Electricity Transmission Company

TRANSMISSION SYSTEM
PERFORMANCE REPORT – 2005

Submitted to
The Authority for Electricity Regulation, Oman

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1 Introduction

This is the first Report submitted by the Oman Electricity Transmission Company SAOC (OETC) to the Authority for Electricity Regulation, Oman ('the Authority') in compliance with Condition 26 of its Transmission and Dispatch Licence ('the Licence').

The Report covers the calendar year 2005. It should be noted that the Oman Electricity Transmission Company commenced its licensed activities on 1 May 2005: data prior to this date refers to the system operation under Ministry of Housing, Electricity and Water.

2 Transmission System Availability

System performance is monitored by reporting monthly variations in system availability, summer peak and average annual system availability, together with planned and unplanned system availability.

System Availability is defined by the formula:

$$\frac{\text{The sum for all circuits of hours available} \times 100 \%}{(\text{No. of circuits}) \times (\text{No. of hours in period})}$$

A circuit is defined as an overhead line, cable, transformer, or any combination of these plant items, controlled by one or more circuit breakers. (*Transformer incomers are not treated as separate circuits in this report.*)

Availability is reduced whenever a circuit is taken out of operation, either for planned purposes e.g. for construction work, or as a result of a fault.

Planned work is required to provide new user connections as well as the maintenance necessary to retain a high level of system reliability to ensure that Licence Standards of security are met.

Average Annual System Availability of the Transmission System for 2005 was 97.70%

2.1 Planned & Unplanned Availability

The chart and table shows the month by month variation in system actual availability in respect of the Oman Transmission System, on a month by month basis for the year 2005.

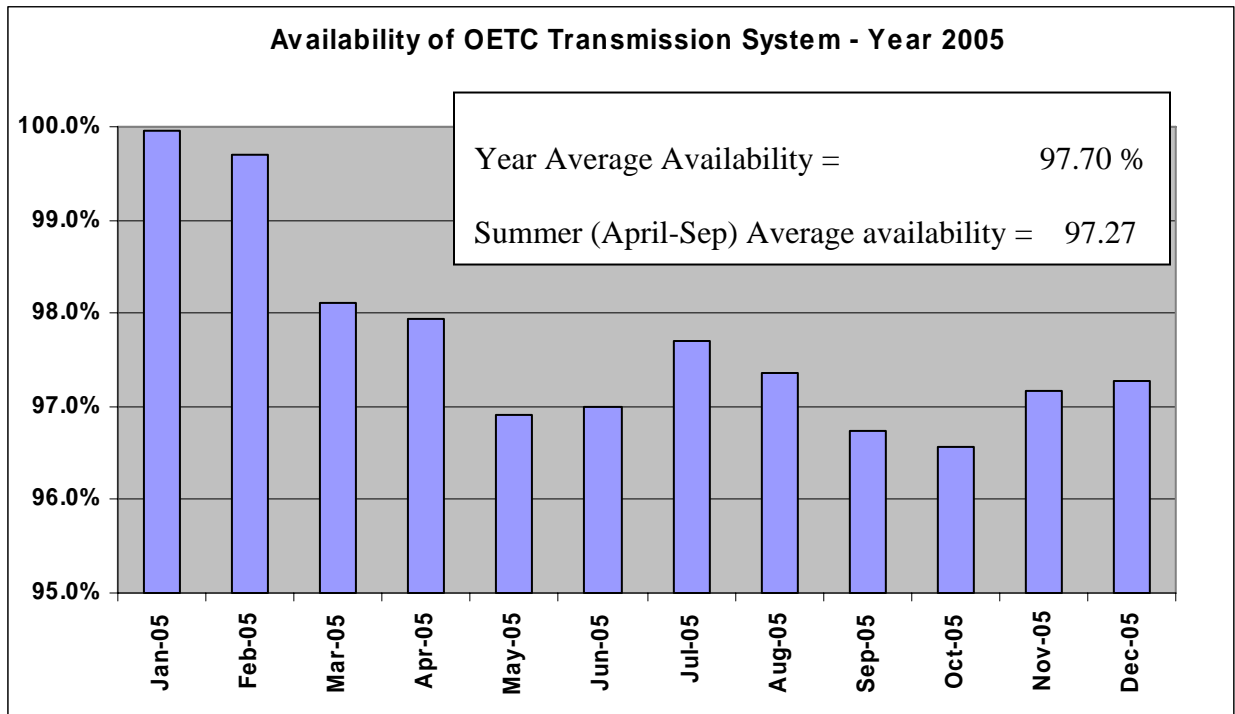
Source of Data:

Planned availability was derived from the switching schedules and Hand Cleaning of Lines records for the year.

Unplanned availability was derived from the records of outages and incidents during the year.

2.1.1 Average Annual System Availability

The Average Annual Availability for the Oman Transmission System during 2005 was 97.98 %



System Connection Outages are planned outages required to construct or modify assets which are not provided for the exclusive benefit of specific system users.

User Connection Outages are planned outages required to construct or modify assets which are provided to facilitate connection for the exclusive benefit of specific system users.

Unplanned Unavailability

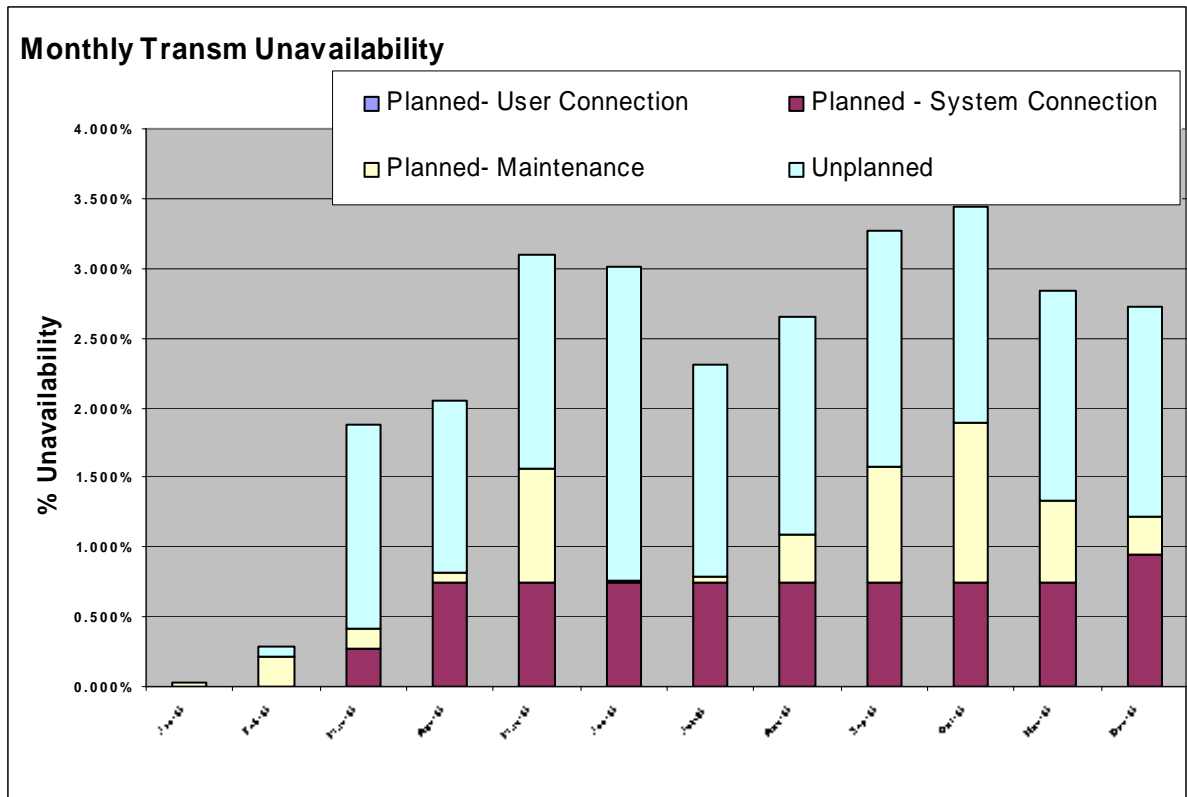
Unplanned unavailability is due to an outage which occurs as a result of plant breakdown, i.e. outages required & taken immediately upon request or planned at less than 7 days notice

Unavailability is defined = (100 - Availability) %

Planned & Unplanned Unavailability for the Oman Transmission System

	% Unavailability					% AVAILABILITY
	Planned- User Connection	Planned - System Connection	Planned- Maintenance	Unplanned	Total	
Jan-05	0.000%	0.000%	0.029%	0.005%	0.034%	99.966%
Feb-05	0.000%	0.000%	0.208%	0.085%	0.293%	99.707%
Mar-05	0.000%	0.265%	0.150%	1.466%	1.882%	98.118%
Apr-05	0.000%	0.746%	0.066%	1.237%	2.049%	97.951%
May-05	0.000%	0.746%	0.818%	1.527%	3.091%	96.909%
Jun-05	0.000%	0.746%	0.020%	2.248%	3.015%	96.985%
Jul-05	0.000%	0.746%	0.046%	1.512%	2.304%	97.696%
Aug-05	0.000%	0.746%	0.339%	1.560%	2.645%	97.355%
Sep-05	0.000%	0.746%	0.825%	1.691%	3.262%	96.738%
Oct-05	0.000%	0.746%	1.147%	1.541%	3.434%	96.566%
Nov-05	0.000%	0.746%	0.590%	1.497%	2.833%	97.167%
Dec-05	0.000%	0.947%	0.272%	1.499%	2.718%	97.282%
ANNUAL AVERAGE	0.000%	0.599%	0.376%	1.322%	2.297%	97.703%
SUMMER AVERAGE	0.000%	0.746%	0.352%	1.629%	2.728%	97.272%

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Note-1:

96 % of the Unplanned outages consist of the following

- 132 kV Wadi Adai-Wadi Kabir circuit 2 out due to cable fault from 3/3/2005 to 1/4/2005
- 132 kV Wadi Adai-Wadi Kabir circuit 1 out due to cable fault from 1/4/2005 to 31/12/2005

For each case, the corresponding transformer also considered as unplanned outage, because it was not possible to utilize the transformer when the circuit was off.

- JBB Ali transformer-1 was out due to earthing transformer problem from 19/6/2005 to 20/7/2005

These three outages account for 15033 hours of unplanned outage, out of the total 15597 hrs total unplanned outages (96 %)

Note-2:

60 % of the planned unavailability is due to planned outage of Al Hayl Transformer-1. This transformer was kept off from 20/3/2005 to 31/12/2005, for modification works. The load was transferred to Transformer-2 which was newly commissioned.

This outage accounts for 6840 hours out of total 11493 hours planned outage of all circuits.

The summary of Unplanned outages is given in Annexure-2

The summary of Planned outages is given in Annexure-3

3 Transmission System Security

All Transmission System related events resulting in a loss of supplies are reported individually giving information concerning the nature and cause of the event, its location, duration, and an estimate of energy unsupplied.

In this year's report the number of loss of supply events and the associated values of unsupplied energy are displayed in charts.

Performance is monitored by total estimated energy unsupplied from the Oman Transmission System for each incident and the average incident duration. An incident is defined as any system event which results in a single or multiple loss of supply.

During 2005 there were 146 incidents.

These 146 incidents include 51 Significant Incidents. The total incidents are summarized below

Type	OETC	Others	Total
Significant Incidents	47	4 (Barka PS -3, Rusail PS-1)	51
Incidents (including Significant Incidents)	142	4	146

Incidents which caused loss of supply due to outage of OETC equipment = 43

3.1.1 Total Energy not delivered

Total energy not delivered in the above 43 incidents = 2,244 MWh

The summary of Incidents and Significant Incidents is given in Annexure-4

The summary of Incidents which caused loss of supply is given in Annexure-5

4 Quality of Service

Quality of service is measured with reference to system voltage and frequency.

4.1 Voltage:

The Grid Code permits variations of voltage not exceeding 10% above and below the nominal at voltages of 132kV and 220kV and not exceeding 6% at the lower voltage side of Transformers connecting users to the Transmission System.

Normal operational limits are agreed and monitored individually at connection points with consumers to ensure that voltage limits are not exceeded.

4.2 Frequency:

The Grid Code permits variations in frequency in a range of 49.95 to 50.05Hz.

Frequency may, however, move outside these limits under fault conditions, or when abnormal changes to operating conditions occur. Losses of generation above 250 MW are considered abnormal although operational measures, including automatic and manual load shedding should return the frequency to within limits within a short time.

Detailed records of frequency and voltage deviations were not maintained in this period. However, limited data collected from various incidents is given in the following table

Date	Incident	Frequency	Voltage
20/6/2005	Barka PS trip 452 MW generation lost	Dropped to 49.16 Hz	
24/7/2005	Trip of feeders in Bureimi area, during rainy weather Bureimi & Al HAYl stations disconnected	Max recorded 50.47 Hz	Muladha & AL Wait Momentary voltages recorded 116 kV during fault conditions
25/7/2005	Trip of feeders in Al Wasit & Bureimi during rainy weather.	Maximum recorded 50.43 Hz	Muladha incomers momentary voltage recorded 35.7 kV Muladha 132 kV Bus recorded 112 kV minimum momentarily Al Wasit momentary voltage recorded 109.7 kV and 80.84 kV at two fault instances
11/8/2005	Al Kamil+Sur + JBB Ali separated from system due to 132 kV lines trip	The separated part recorded Maximum frequency 51.6 Hz Minimum frequency 49.05 Hz	Al Kamil voltage recorded 116 kV (99.0 kV minimum and 145 kV maximum recorded momentarily during fluctuations)
21/8/2005	Khaborah ss trip during high humidity conditions	Maximum frequency 50.38 Hz	Minimum voltage recorded 111.4 kV momentarily
5/9/2005	Barka PS separated due to trip of 220 kV feeders in high humidity condition	Minimum frequency 49.5 Hz	

5. Interconnector Availability

International interconnection with UAE was not commissioned in year 2005.

Internal interconnection with PDO was off in the year 2005.