CONTACT HYDRO

CLYDE

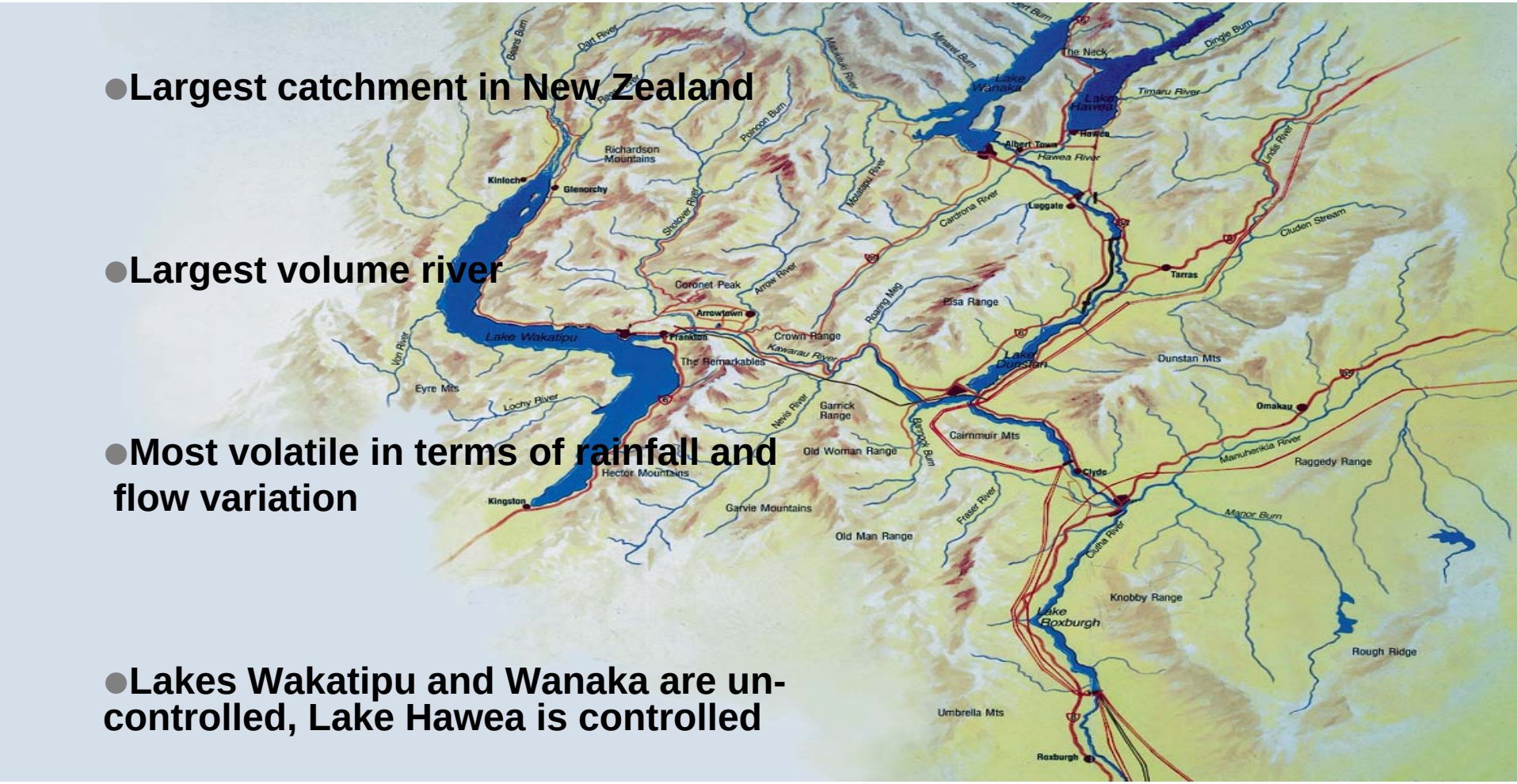
ROXBURGH

HAWEA

contact

CLUTHA CATCHMENT OVERVIEW

- Largest catchment in New Zealand
- Largest volume river
- Most volatile in terms of rainfall and flow variation
- Lakes Wakatipu and Wanaka are un-controlled, Lake Hawea is controlled



GENERAL INFORMATION

- **Mean Clutha River Flow at Clyde is 490 cumecs**
- **Hawea, Clyde and Roxburgh are all Controlled from the Clutha Control Centre at Clyde**
- **Annual Output from the two Clutha Power Stations is around 3,700 GWHrs**

LAKE HAWEA

- **Hydro Storage Dam only**
- **Natural Lake which has been artificially raised for Water Storage**
- **142 Square Kilometres in Area**
- **8m Operating range**
- **Storage Capability is about 300 GWHrs**

HAWEA DAM

- **Earth Dam**
- **Commissioned in 1958**
- **No Generating Capability at Present**
- **Four Radial Arm Deep Water Sluices**
- **Outflow Range 10 to 200 cumecs**

LAKE DUNSTAN

- **Impounded by the Clyde Dam**
- **1 metre operating range**
- **26.4 square kilometres in area**
- **Landslide Management Plan for Cromwell Gorge Landslides**

CLYDE DAM

- Concrete Gravity Dam
- Commissioned in 1992
- 60m Head
- 490m Crest Width
- 4 Spillways with Radial Arm Gates
- 1 Radial Arm Low Level Sluice Gate
- Earthquake Slip Joint

CLYDE POWER PLANT

- **Station Capability is 432 MW**
- **Four 108 MW Machines**
- **Francis Turbines made by Hitachi**
- **Salient Pole Generators made by Hitachi**
- **Rotational Speed is 125 RPM**
- **All HV Equipment is Gas Insulated Switchgear**
- **Station Export Voltage is 220kV**

LAKE ROXBURGH

- **Impounded by the Roxburgh Dam**
- **6 Square Kilometres in Area**
- **1.8m Operating Range**
- **Extends Back to the Outlet of Clyde Dam**

ROXBURGH DAM

- **Concrete Gravity Dam**
- **Commissioned in 1956**
- **48m Head**
- **Crest Width is 358m**
- **Three Spillway Gates have recently been upgraded.**
- **Two Low Level Sluice Gates**

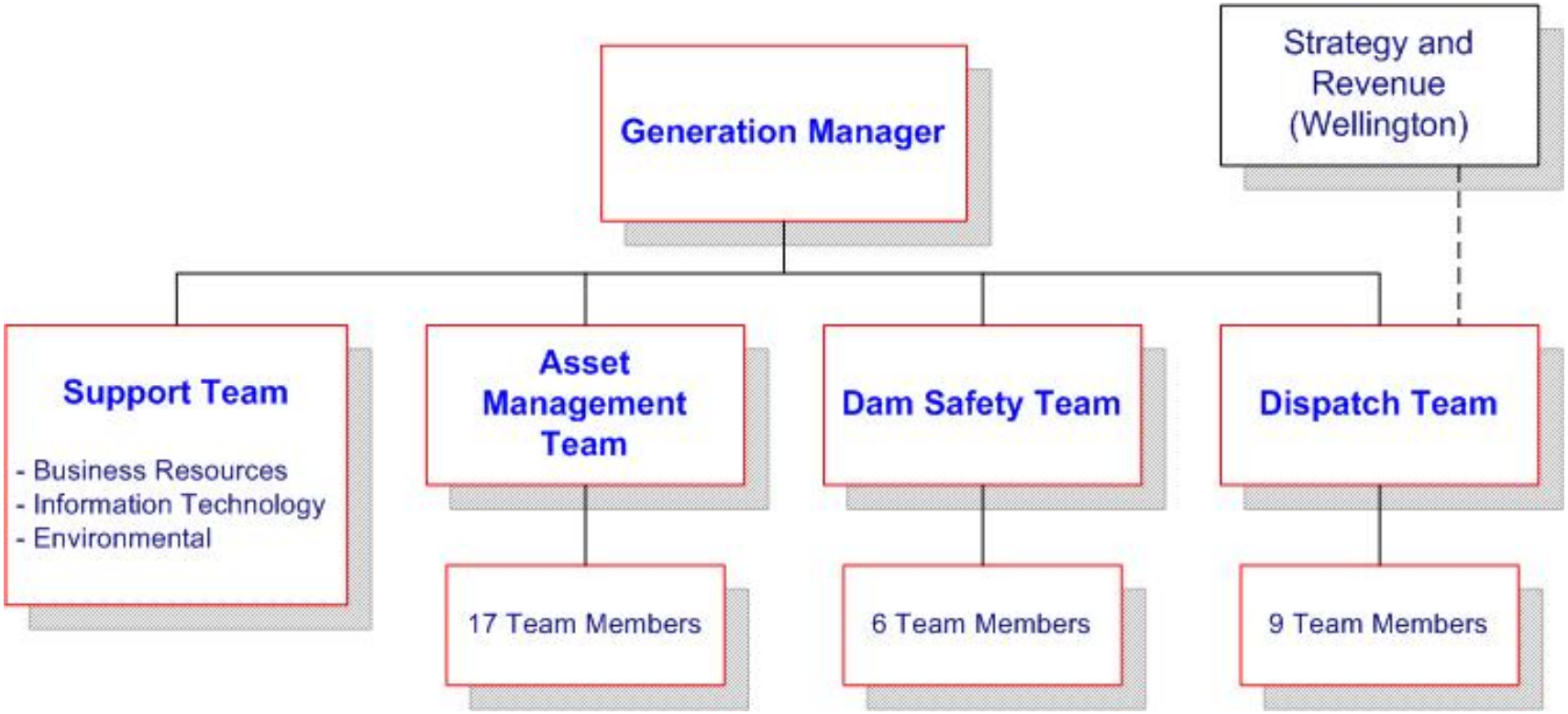
ROXBURGH POWER PLANT

- **Station Capability is 320 MW**
- **Eight 40 MW Machines**
- **Francis Turbines made by Canadian Dominion Engineering**
- **Salient Pole Generators are British Thompson Houston (BTH)**
- **Rotational Speed is 136.4 RPM**
- **Station Export Voltage is 110kV or 220kV**

RESOURCE CONSENTS

- **In March 2001 Contact submitted RMA applications to renew consents to operate its Clutha hydro generation plants.**
- **Key operational requirements were finalised in 2007 including a 35 year term.**
- **These consents provide operational certainty in terms of access to water and ramp rates.**
- **Contact also has consents to install two new generators at Hawea**

SITE MANAGEMENT STRUCTURE



DAM SAFETY TEAM

- **Dam Safety Monitoring**
- **Landslide Monitoring**
- **Environmental**
- **Civil Engineering**

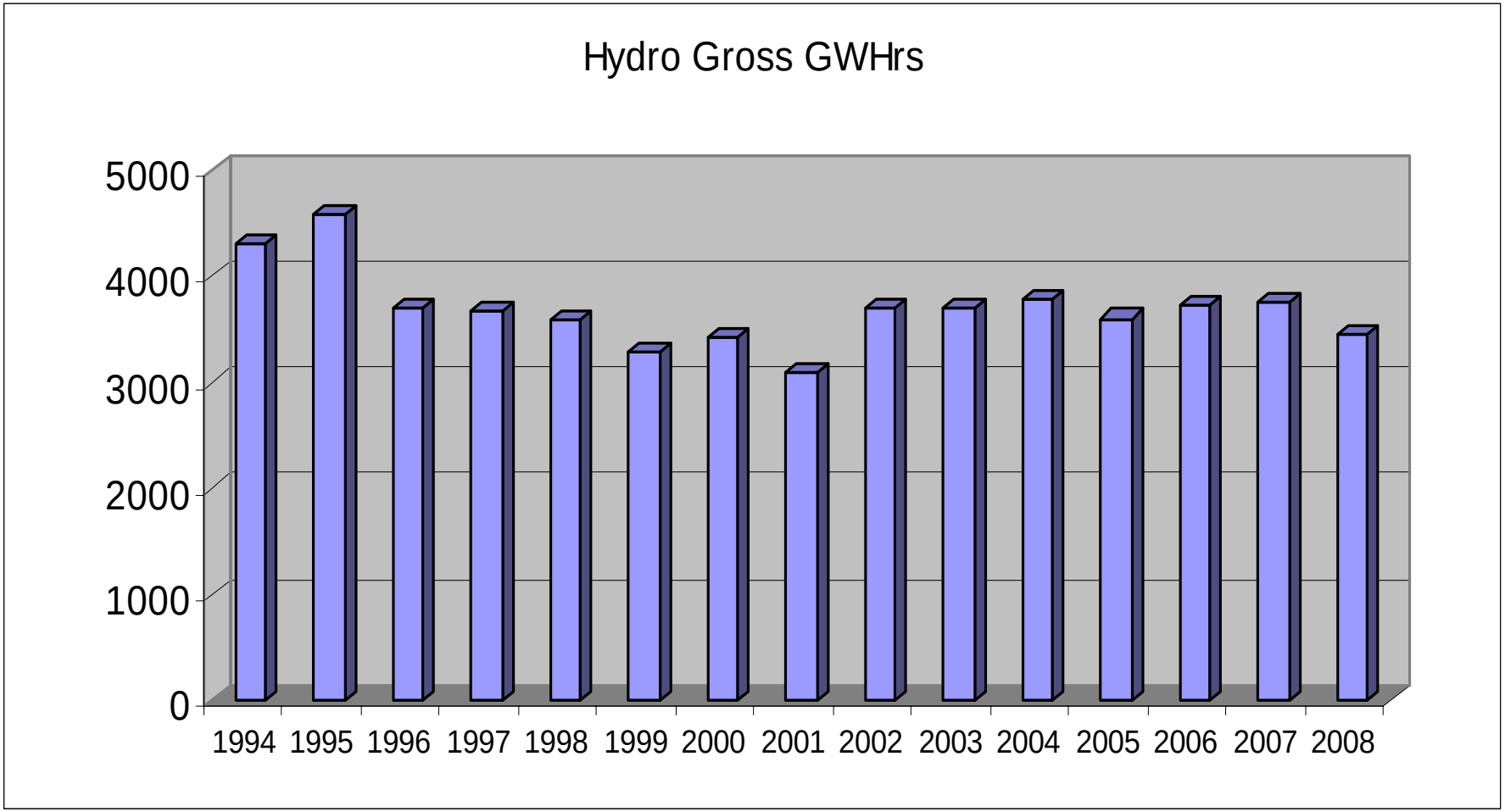
ASSET TEAM

- **Day-to-Day Plant Operation**
- **Safety Permit Management**
- **Asset Management and Plant Maintenance**
- **Electrical, C&I and Mechanical Engineering**
- **Contract Supervision**
- **Facilities Maintenance**

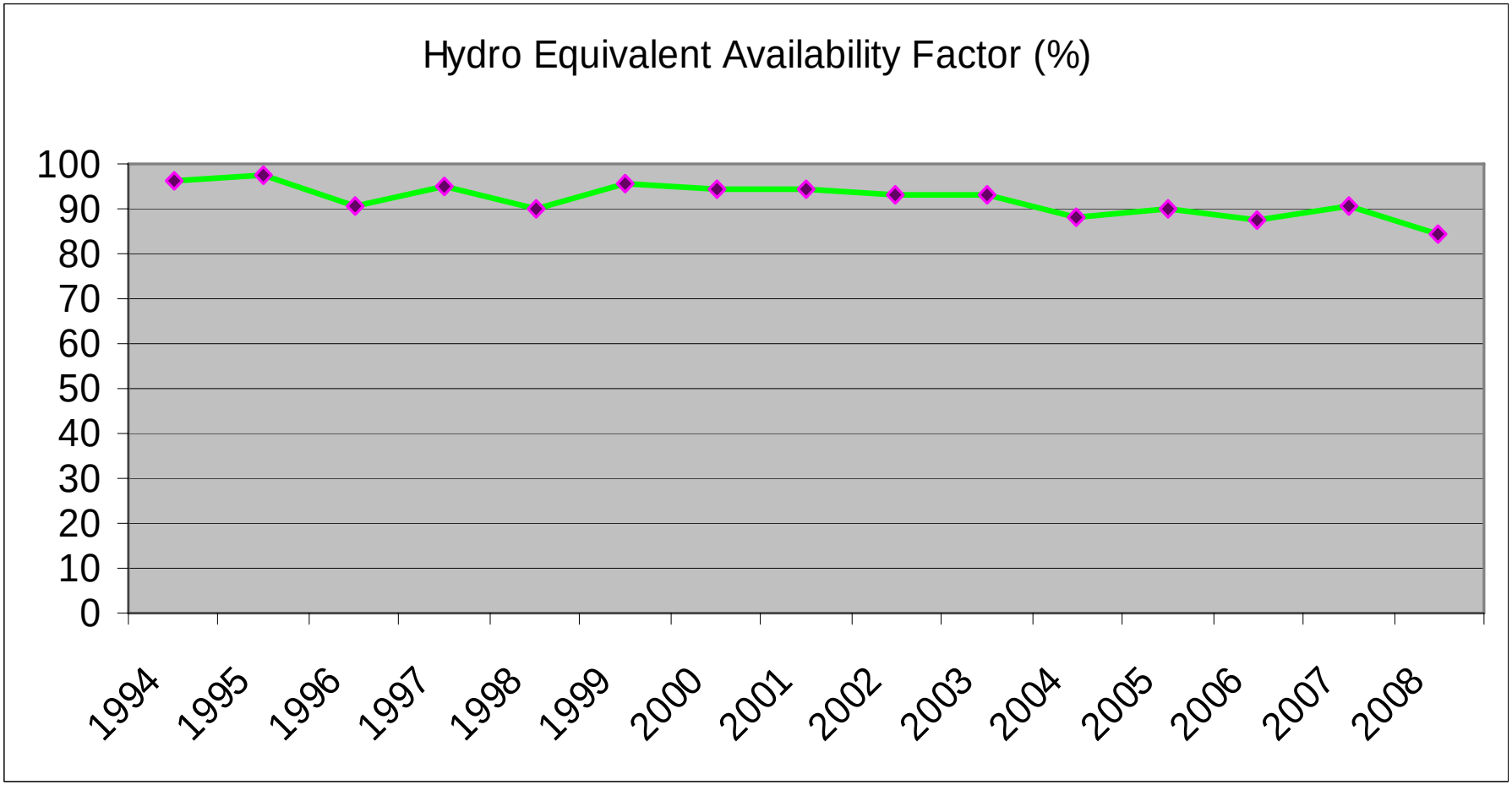
DISPATCH TEAM

- **The Efficient and Safe Operation of Hawea Gates as well as Clyde and Roxburgh Generators, Spillgates and Sluices**
- **Planning and Optimisation of the Clutha's Generation Offer to NZEM**
- **Analysis of the Catchment Hydrology and Meteorology Conditions.**
- **Catchment Management (Predominantly through the Control of Hawea Releases)**
- **24 Hour Responsibility for Contact's Market and Dispatch (Trading) Function**

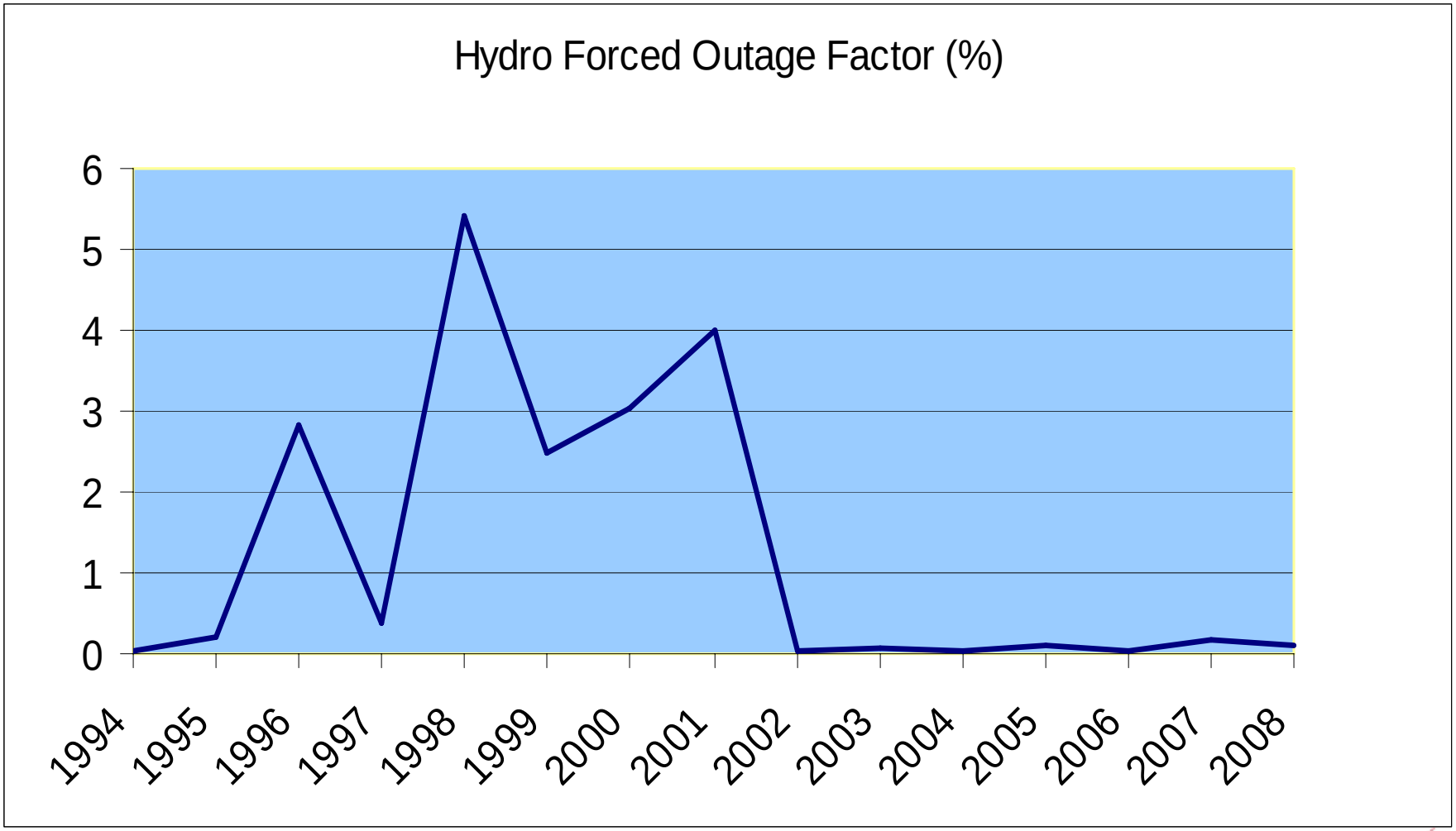
HISTORICAL PRODUCTION



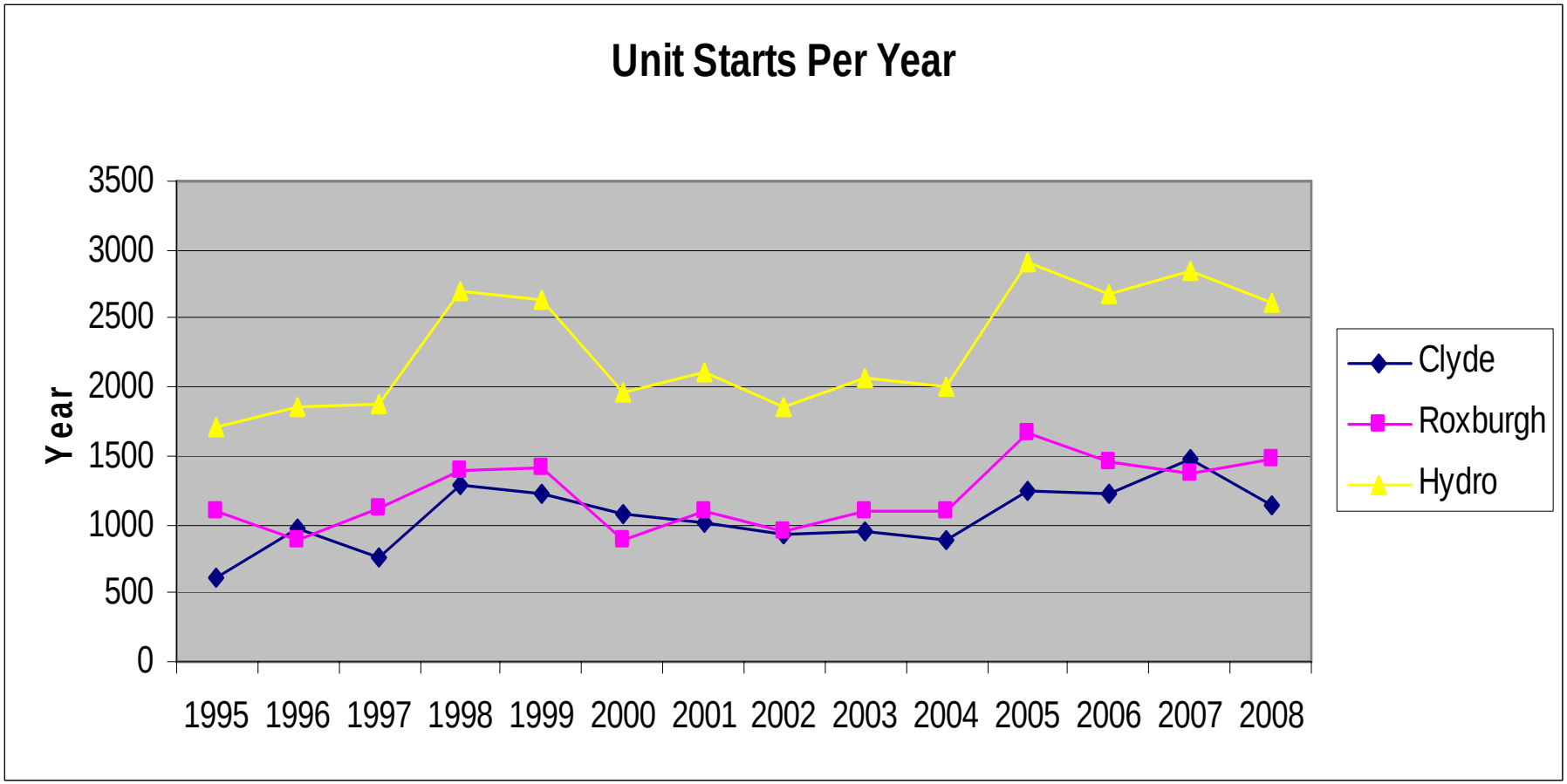
PLANT AVAILABILITY



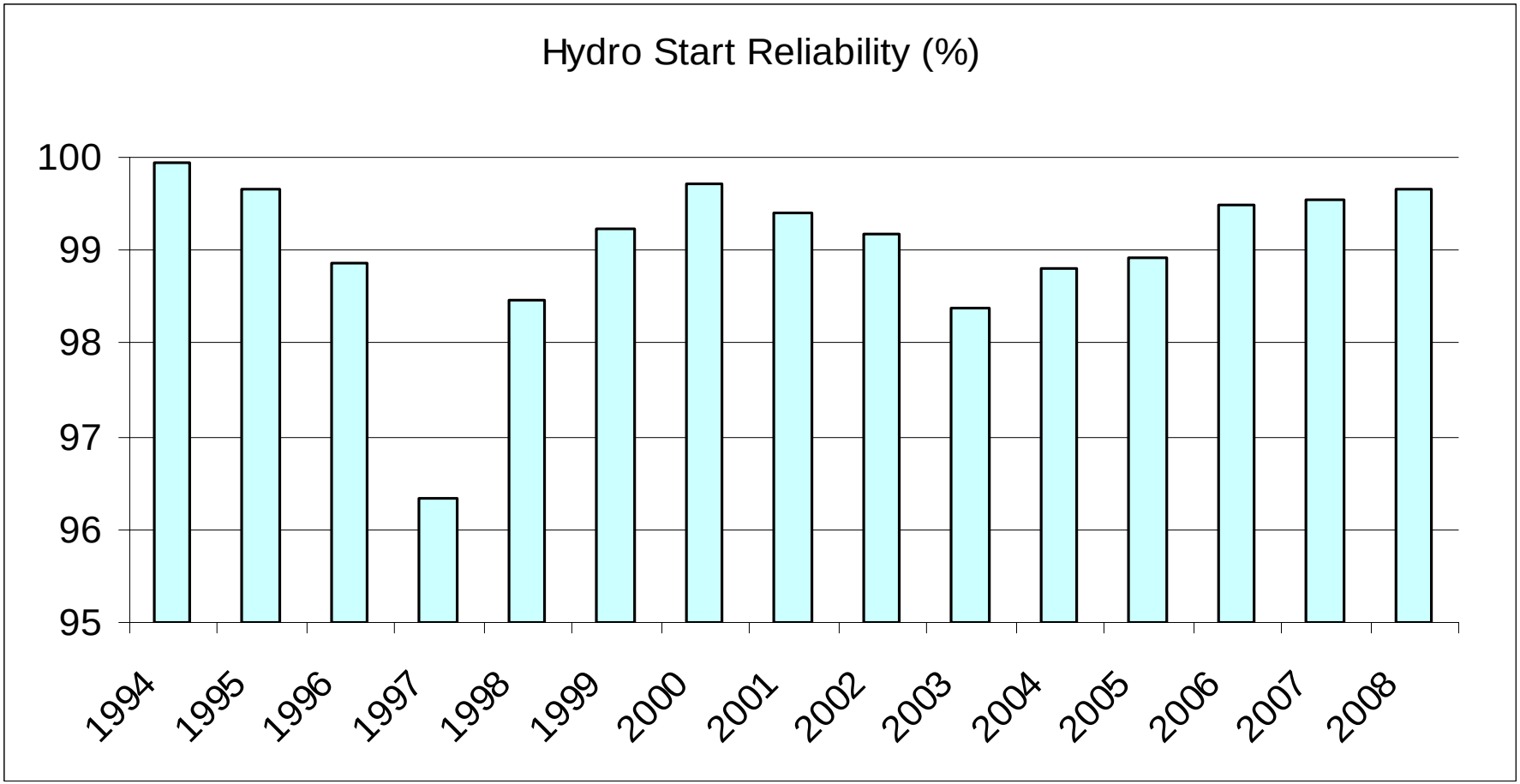
FORCED OUTAGE FACTOR



NUMBER OF START-UPS



START RELIABILITY

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