

1 Q. **Reference: Page 2.46.**

2 Re: Holyrood efficiency per page 2.46. Provide data in graphical and tabular form
3 showing actual operating efficiencies of each unit at Holyrood for the last 5 years,
4 as well as all activities undertaken in the last 5 years to improve the efficiency of
5 generation at Holyrood.

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8 A. The Holyrood operating efficiencies and conversion factors of each unit and
9 conversion factor of the overall plant, for the last five years are as follows:

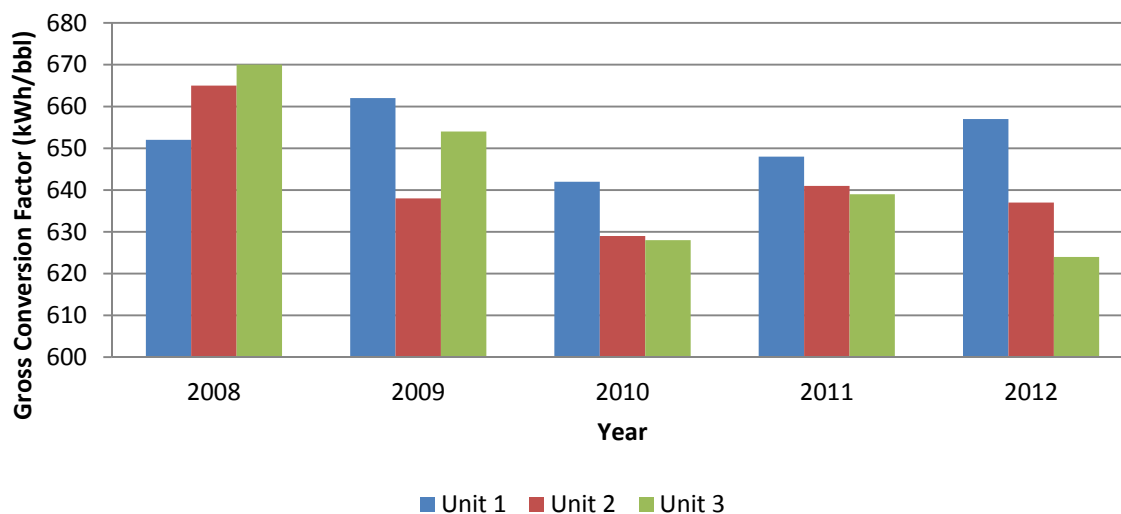
Efficiency (%) and Conversion Factor (kWh/bbl)							
Year	Unit 1		Unit 2		Unit 3		Plant
	Gross Efficiency	Gross Conversion Factor	Gross Efficiency	Gross Conversion Factor	Gross Efficiency	Gross Conversion Factor	Net Conversion Factor
2008	34.4%	652	35.0%	665	35.3%	670	625
2009	34.8%	662	33.5%	638	34.3%	654	612
2010	34.3%	642	33.6%	629	33.6%	628	589
2011	34.1%	648	33.8%	641	33.6%	639	603
2012	34.4%	657	33.4%	637	32.7%	624	599

10 Note that individual unit quantities shown above are gross (excluding the impact of
11 station service), as station service is measured and tracked on a plant basis. The
12 overall plant conversion factor is indicated on a net basis. The efficiency and
13 conversion factor of a unit and the overall plant are largely influenced by the level
14 of loading experienced by the units.

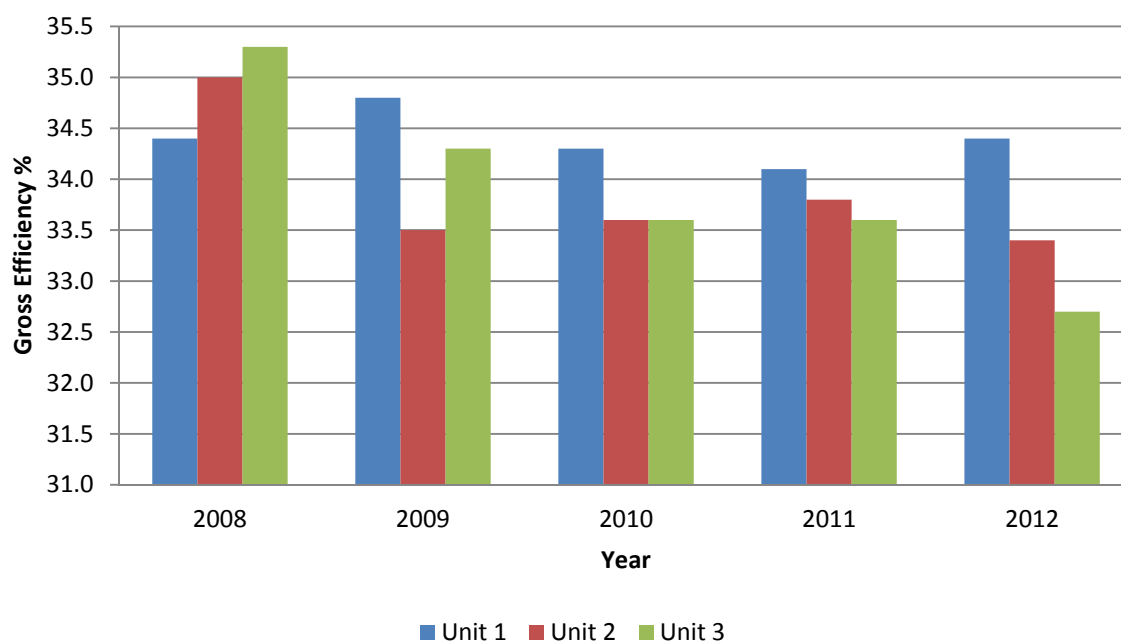
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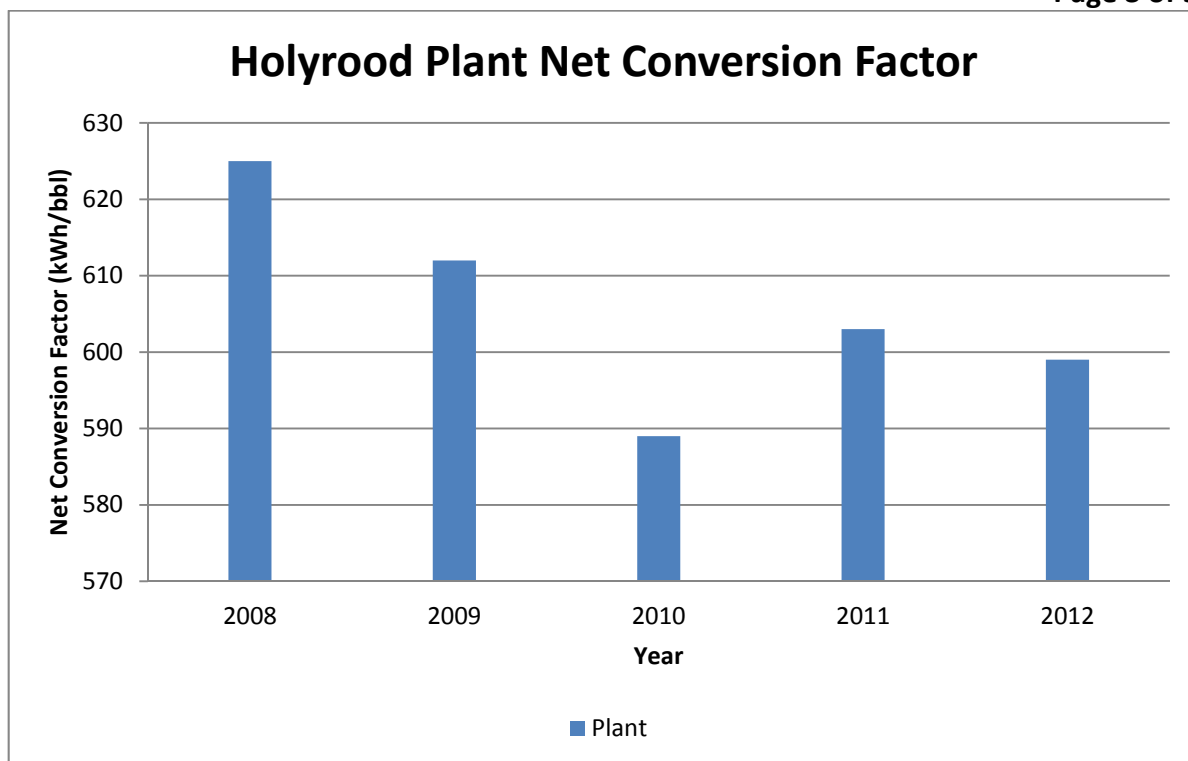
16 The following charts summarize the operating efficiency and conversion factor data
17 provided above.

Holyrood Unit Gross Conversion Factor



Holyrood Unit Gross Efficiencies





The following activities are performed on a routine or annual basis, and are designed to maintain efficiencies.

- Environmental management programs – efficiency driven initiatives for emissions reduction.
- Heat exchanger maintenance and cleaning.
- Equipment overhaul programs (e.g. annual boiler overhauls).
- Maintaining major equipment efficiencies (e.g. boiler feed pumps).
- Routine furnace and air heater cleaning.
- EtaPRO performance monitoring and efficient use of plant systems.
- Non-destructive examination program enhancements.

The activities and initiatives undertaken in the last five years to improve unit and overall plant efficiency are:

2008

- Installation of a variable speed drive air compressor to reduce auxiliary power consumption.

2009

- A study of the feasibility of installing an intelligent soot-blowing system to only use steam to clean boiler components when fouling reaches inefficient levels.

2010

- A study of the feasibility of installing variable speed drives on boiler feed pumps and forced draft fans.
- Submission of a capital budget proposal to upgrade forced draft fan ductwork to reduce air flow restriction, hence reducing electrical load on the fans.

2011

- A review of turbine condenser operation and maintenance activities with a view to increasing unit efficiency for all three units.
- The installation of a new forced draft fan ductwork.

2012

- Performance of a gap analysis on condenser operation and maintenance.
- Submission of a capital budget proposal to install variable speed drives on the six 1500 hp forced draft fan motors.
- Implementation of an improved and more timely method for conversion of Unit 3 to and from synchronous condenser operation thus reducing the time that Units 1 and 2 have to be generating at low inefficient load levels for voltage support.
- Installation of new energy efficient heat tracing on fuel oil lines.

- 1 • Performance of a lighting study to establish the cost of upgrading to energy
- 2 efficient lighting throughout the facility, including the use of photo cells and
- 3 motion sensors.

4 **2013**

- 5 • Currently performing design work to install variable speed drives on the six
- 6 forced draft fans.
- 7 • Implementing recommendations of the 2012 condenser gap analysis.
- 8 • Completed installation of new energy efficient heat tracing on fuel oil lines.