RCEC

Output limit 612800 kW

Configuration	Gross Plant Efficiency, LHV	Gross Plant Efficiency, HHV	Net Plant Efficiency, LHV	Net Plant Efficiency, HHV
RCEC - 501 FD2	55.3%	50.7%	53.3%	48.9%
RCEC - 501 FD3	56.4%	51.7%	54.4%	49.9%
RCEC - 501 G	49.8%	45.7%	48.3%	44.3%
RCEC - Flex 10	49.3%	47.8%	45.2%	43.9%

Note the use of the 501G results in steam turbine that limited to 143 MW which results in an inefficient bottoming cycle.

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Russell City – Comparison of FD2 and FD3 Configurations

Iso Conditions – 59°F, 60% Relative Humidity
– Unfired Heat Recovery Steam Generator

FD2 = Net Output 556,668 KW
Auxiliary Power 20,392 KW
Heat Input = 3,881 MMBTU (HHV) HR
= 3,561 MMBTU (LHV) HR

Determine Net Plant Efficiency (HHV Basis)

$$= \frac{\text{Net Plant Out (KW)} \times 3413\ \text{KJ/BTU/HR}\ (\text{Conversion Factor})}{\text{Heat Input MMBTU (HR)} \times 10^6}$$

$$= \frac{556,668\ (3413)}{3881 \times (10^6)} = 0.48954 \times 100 = \boxed{48.9\%}$$

LHV Basis $\frac{556,668 \times 3413}{3561 \times (10^6)} = 0.53353 = \boxed{53.3\%}$

Gross Plant Efficiency

Gross Plant Out = Net Plant + Aux Power

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(HHV) Gross plant Eff = $\frac{(556{,}668 + 20{,}392) \times 3413}{3881 \times (10^6)}$

$= 0.5074 =$ **50.7 %**

LHV Gross Plant Eff = $\frac{(556{,}668 + 20{,}392) \times 3413}{3561 \times 10^6}$

$= 0.55307 =$ **55.3 %**

FD3 Configuration

Net Output = 574,456 KW
Aux Power = 21,143 KW
Heat Input = 3,928 MMBTU HHV
= 3,604 MMBTU LHV

Net Plant Eff_{HHV} = $\frac{574{,}456 \times 3413}{3928 \times 10^6}$

$= 0.49913 =$ **49.9 %** HHV

Net Plant Eff_{LHV} = $\frac{574{,}456 \times 3413}{3604 (10^6)}$

$= 0.54401 =$ **54.4 %** LHV

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FD3 Gross Plant Eff. = $\frac{\text{Net Power + Aux Power}}{\text{Heat Input}} \times 100\%$

LHV Basis = $\frac{(574,456 + 21,143)(3413)}{3,928 \times 10^6}$ (HHV)

$= 0.5175 =$ **51.7% HHV**

LHV Basis = $\frac{(574,456 + 21,143)(3413)}{3,604 \times 10^6}$

$= 0.56403 =$ **56.4%**

Summary of Results

Configuration	Gross Plant LHV	Gross Plant HHV	Net Plant LHV	Net Plant HHV
FD2	55.3%	50.7%	53.3%	48.9%
FD3	56.4%	51.7%	54.4%	49.9%
Δ	1.09%	1.00%	1.01	1%