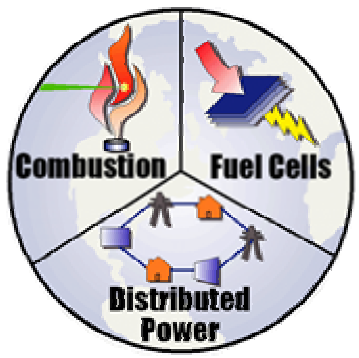
WHITE MOUNTAIN ENERGY PROJECT
Dynamic Simulation Results

JIM MEACHAM

ADVANCED POWER AND ENERGY PROGRAM



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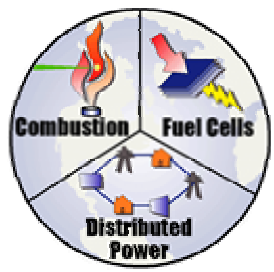
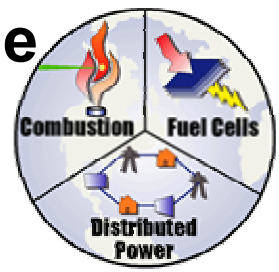
OVERVIEW

- **Simulation Data**
- **Scenario Results**
- **Conclusions**

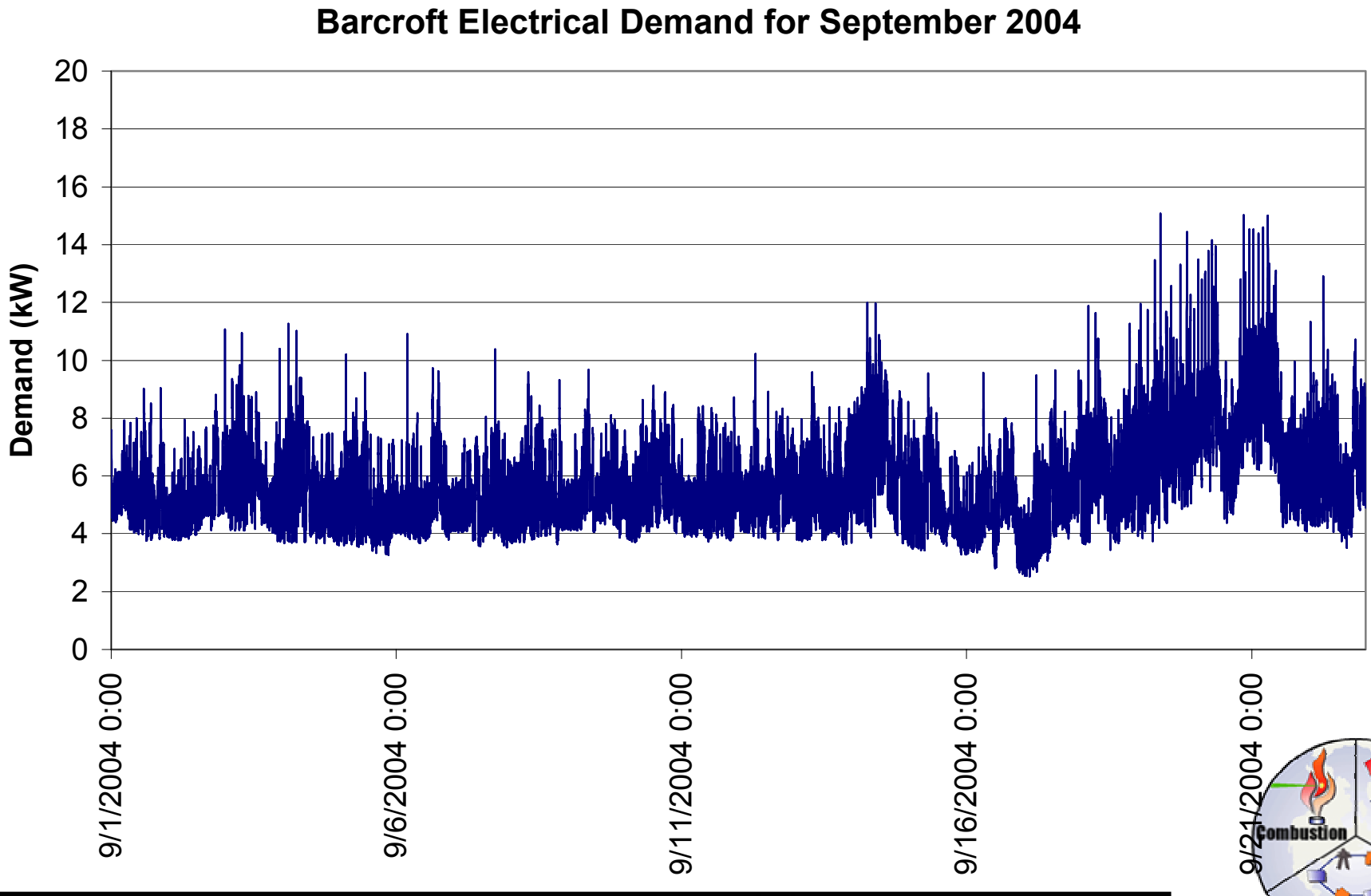


SIMULATION DATA

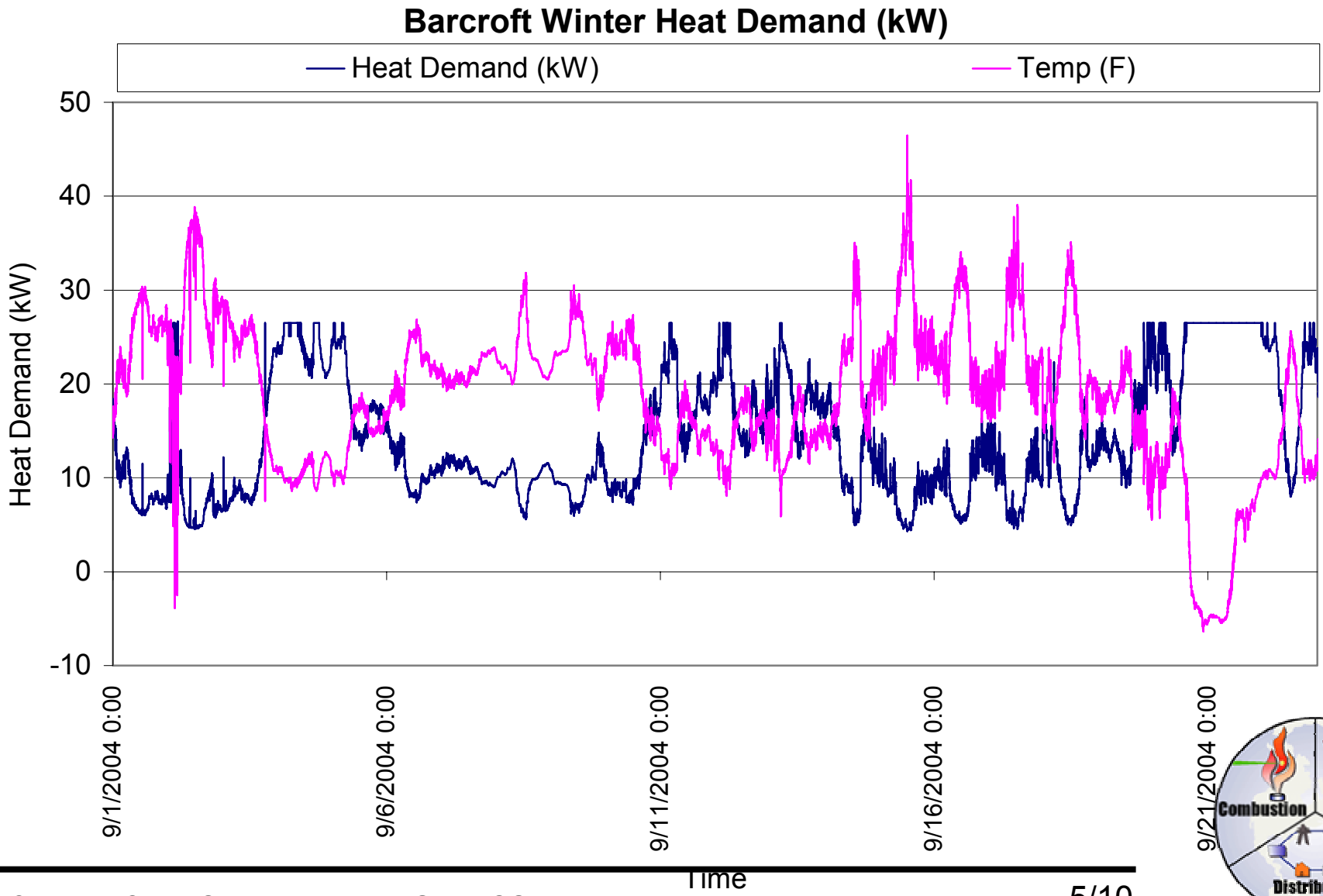
- Electrical load data scaled from actual gathered to remove any heating and reflect the actual energy use data from 2004.
  - Gives us a “worst-case” analysis (electrical load should only be higher – better economics for DG system)
- Heating load generated as a function of ambient temperature
- Solar Irradiance from PV test system for Sept 2004
- Grid energy cost – GS-2 Demand Rate Schedule
- Propane cost - $1.75/gallon delivered



SIMULATION DATA

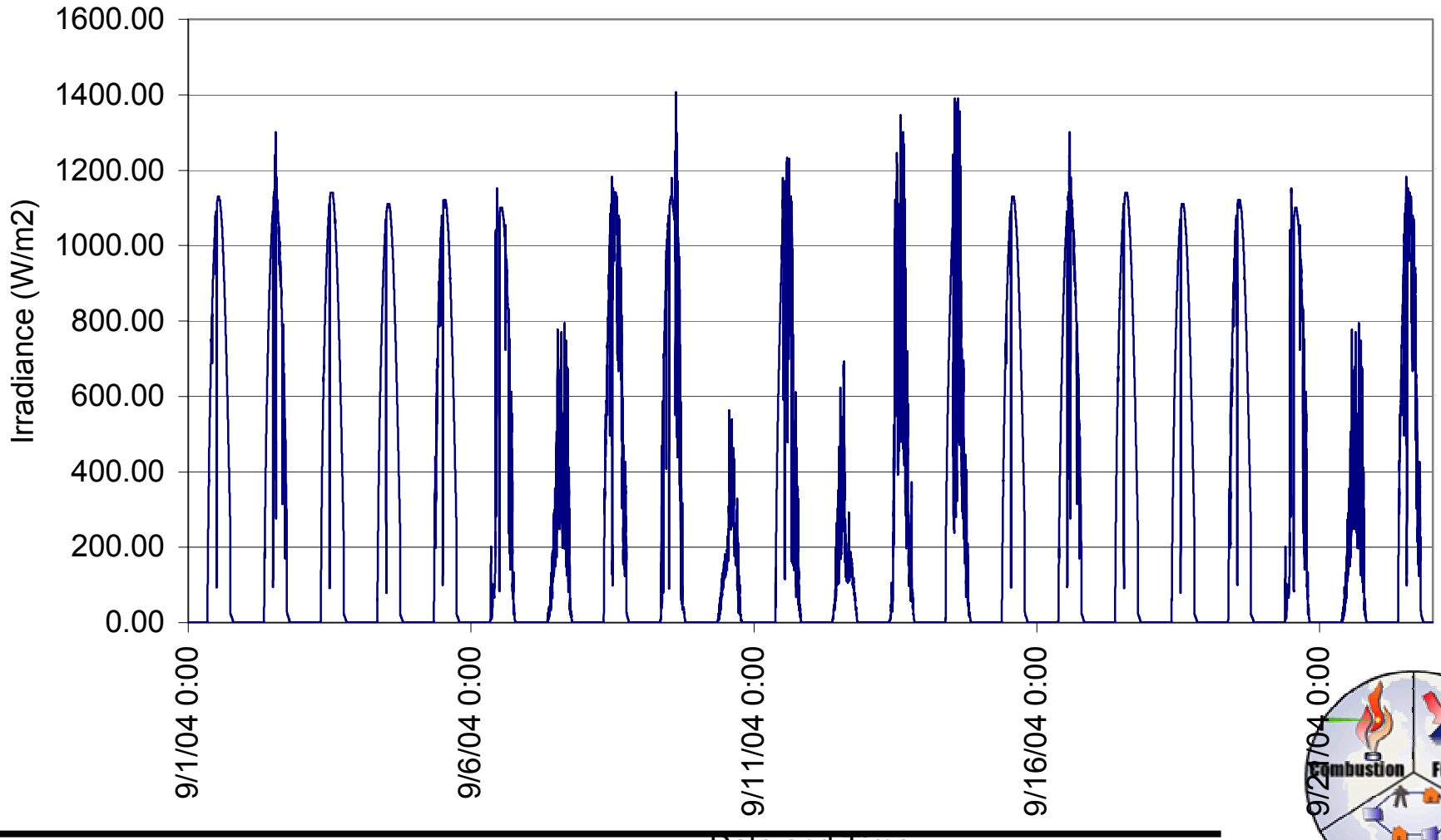


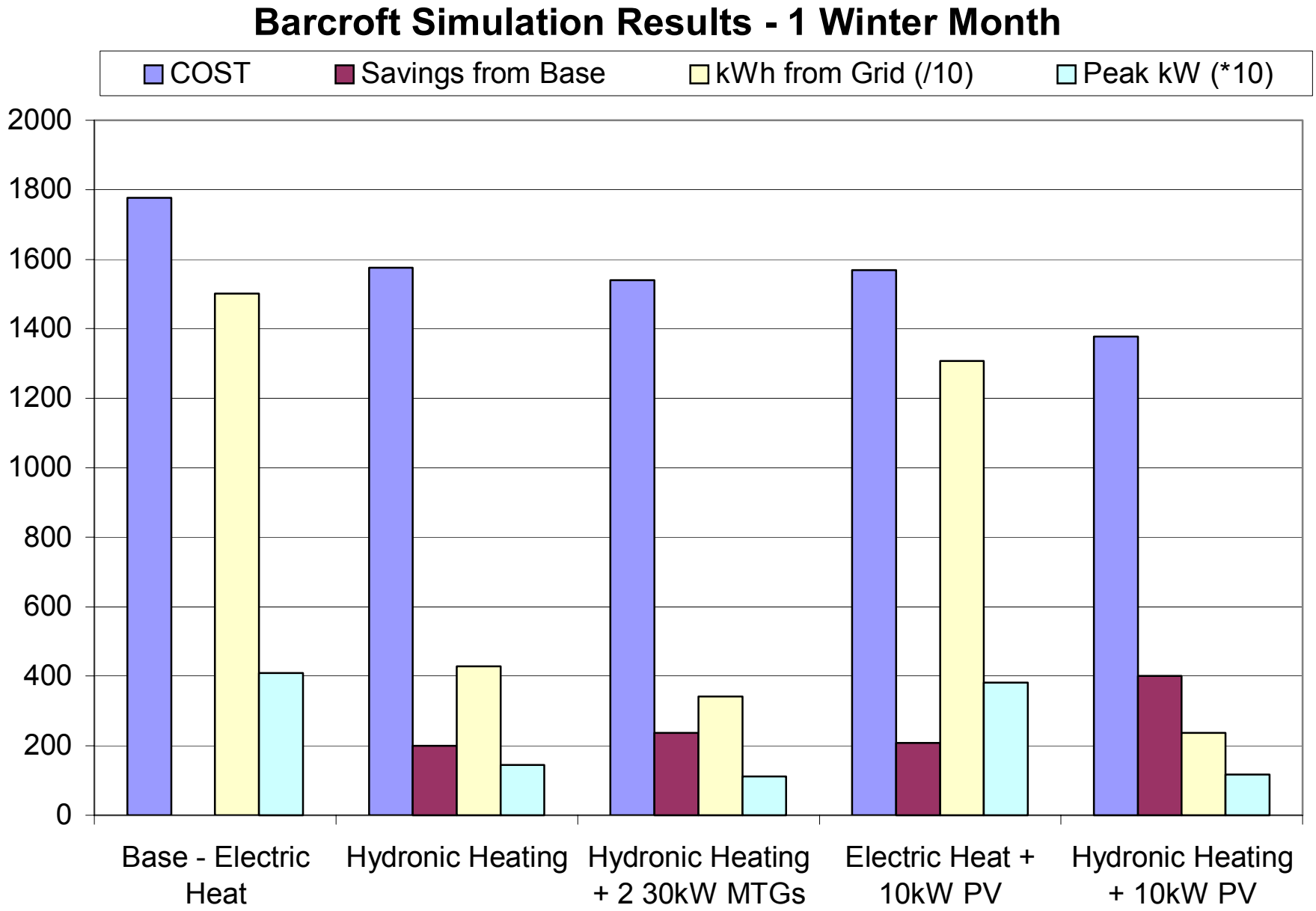
SIMULATION DATA

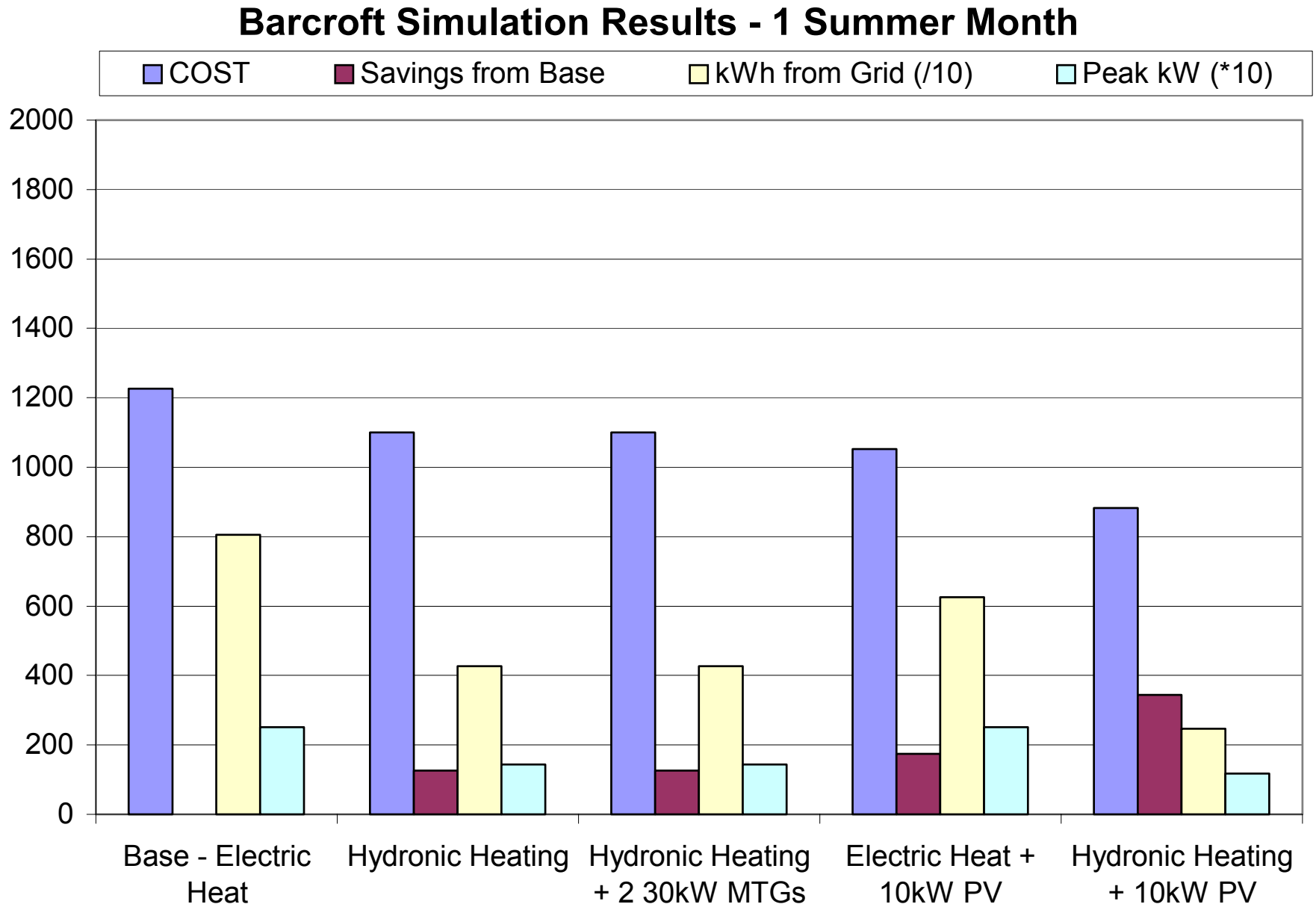


SIMULATION DATA

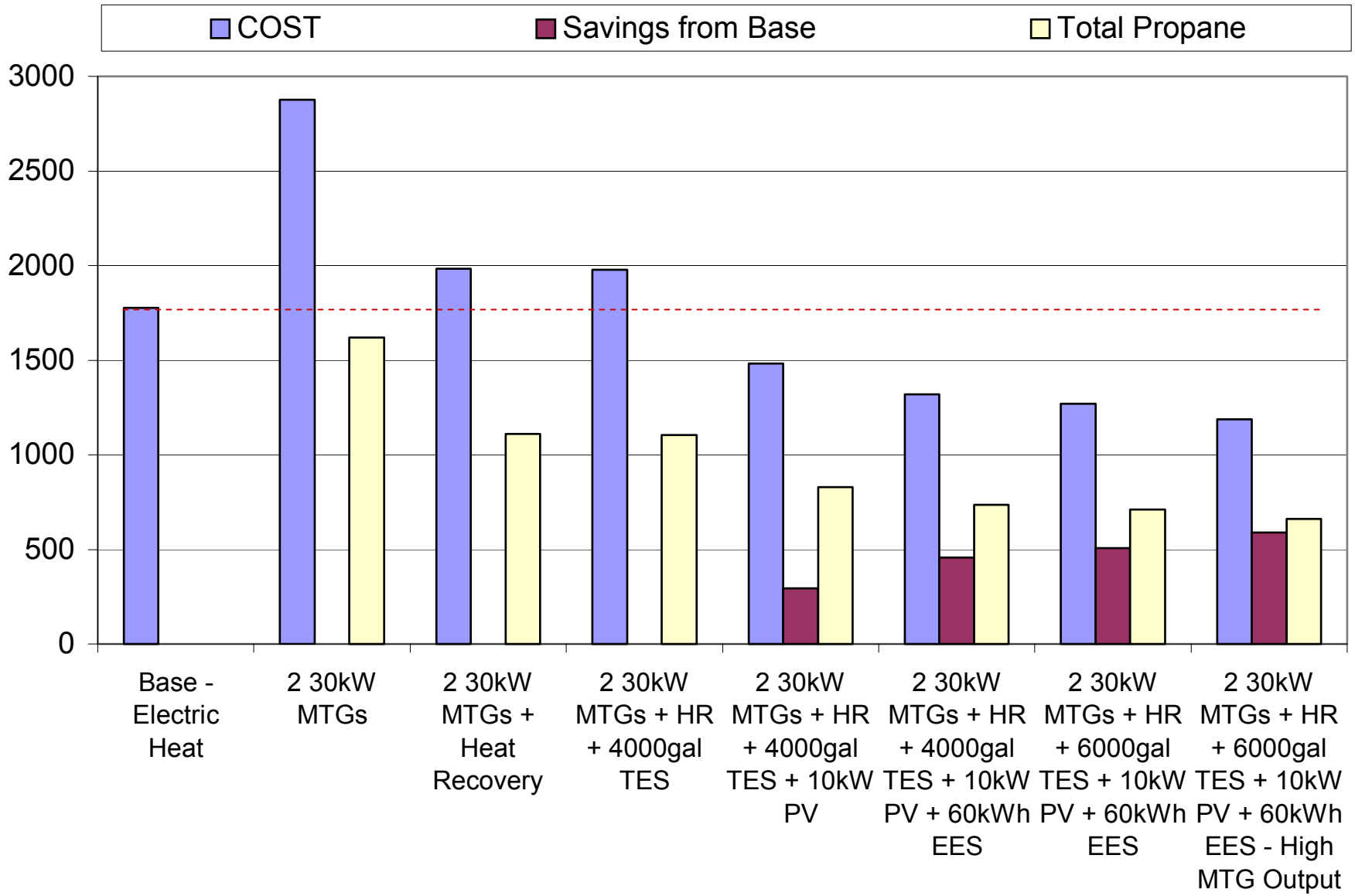
Barcroft Irradiance for September 2004




Barcroft Simulation Results - 1 Winter Month
COST
Savings from Base
kWh from Grid (/10)
Peak kW (*10)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Base - Electric Heat
Hydronic Heating
Hydronic Heating + 2 30kW MTGs
Electric Heat + 10kW PV
Hydronic Heating + 10kW PV


Barcroft Simulation Results - 1 Summer Month
COST
Savings from Base
kWh from Grid (/10)
Peak kW (*10)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Base - Electric Heat
Hydronic Heating
Hydronic Heating + 2 30kW MTGs
Electric Heat + 10kW PV
Hydronic Heating + 10kW PV

Barcroft Simulation Results - 1 Winter Month with NO Grid



CONCLUSIONS

1. Hydronic heating reduces winter utility bills by $200 per month and summer bills by $120 per month
2. Installation of MTGs with heat recovery does not significantly reduce utility bills beyond hydronic heating
3. 10kW of PV further reduces the utility bill over hydronic only scenarion by $200 per month in winter and summer
4. In a no grid scenario, a complete MTG – PV system with TES is necessary to keep utility costs below current
5. EES creates significant savings with no grid, and allows further reduction with innovative control strategies
6. EES also gives further redundancy with PV in the event of MTG failure