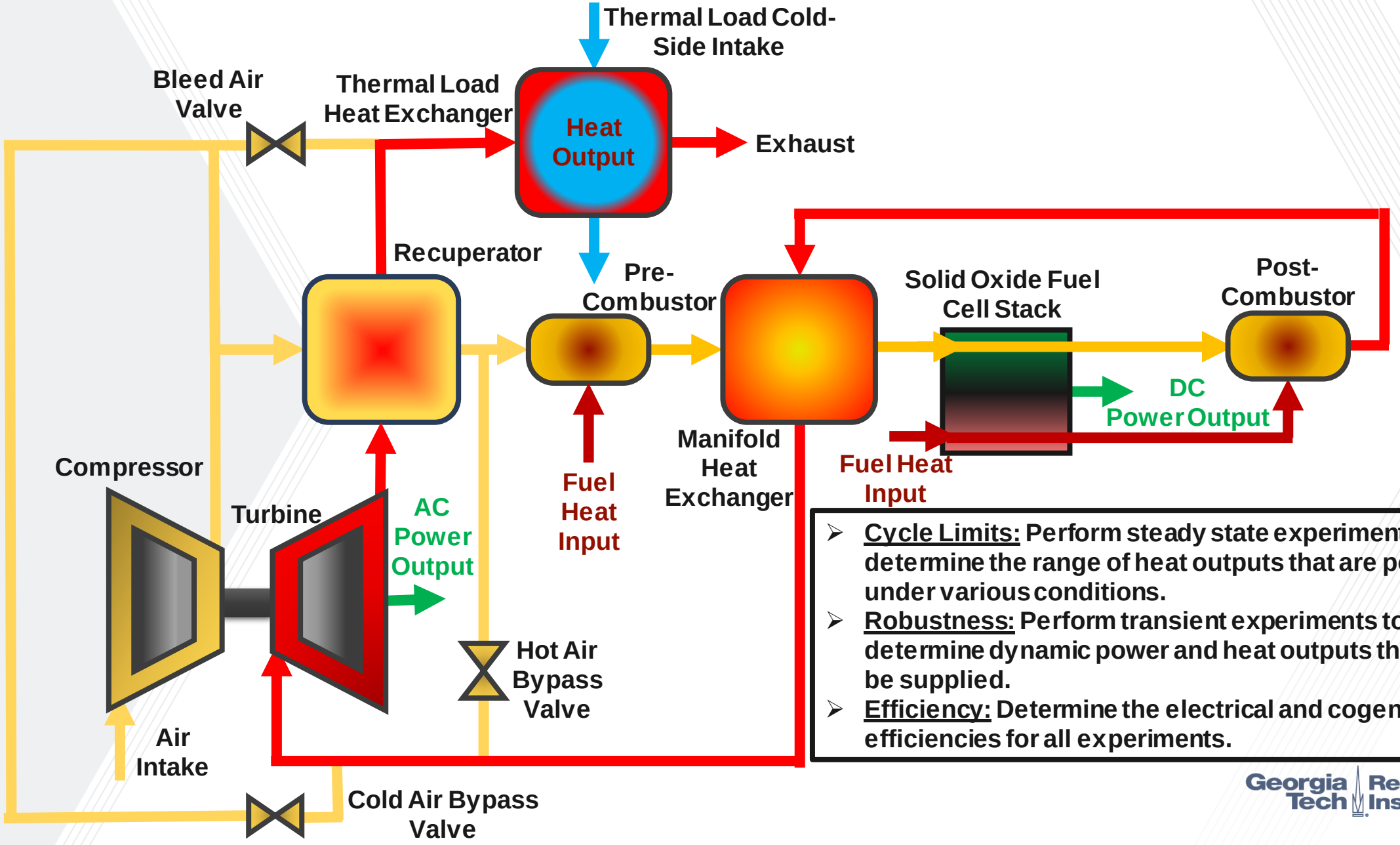
Solid Oxide Fuel Cell/Gas Turbine Cycles for Robust and Efficient Cogeneration

Comas Haynes

Cycle + Thermal Load

US Department of Energy EERE/AMO (CHP)
Award Number: DE-EE0009137



- **Cycle Limits:** Perform steady state experiments to determine the range of heat outputs that are possible under various conditions.
- **Robustness:** Perform transient experiments to determine dynamic power and heat outputs that can be supplied.
- **Efficiency:** Determine the electrical and cogeneration efficiencies for all experiments.

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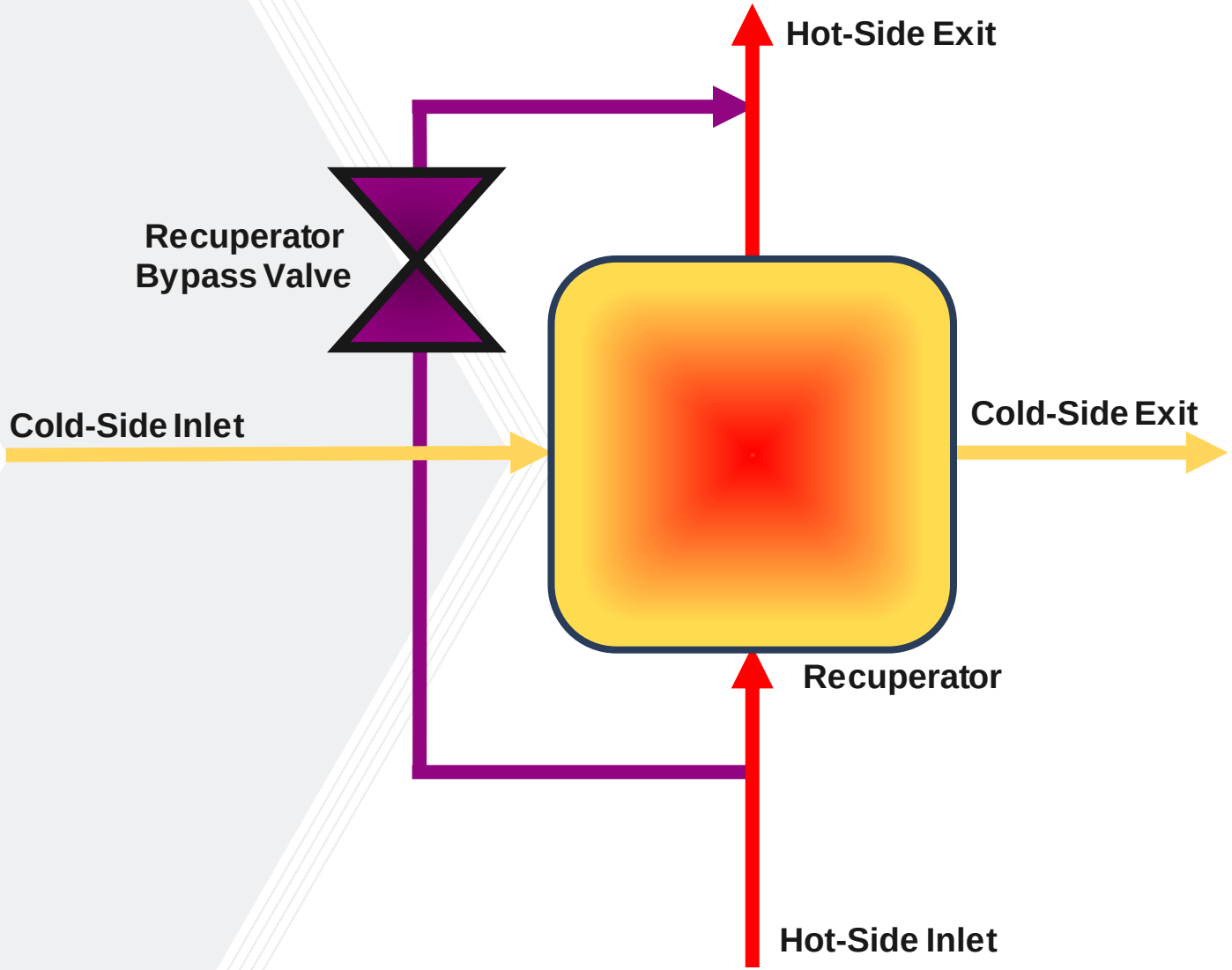
Develop a Hot-Side Recuperator Bypass Valve



1. Develop a high-temperature valve to bypass the hot-side of the recuperator.
2. Develop a model for the valve that maps its "percent open" to the mass flow rate that it allows to bypass the recuperator under the ranges of operating conditions it can experience in the cycle.
3. Insert the bypass valve into the cycle.

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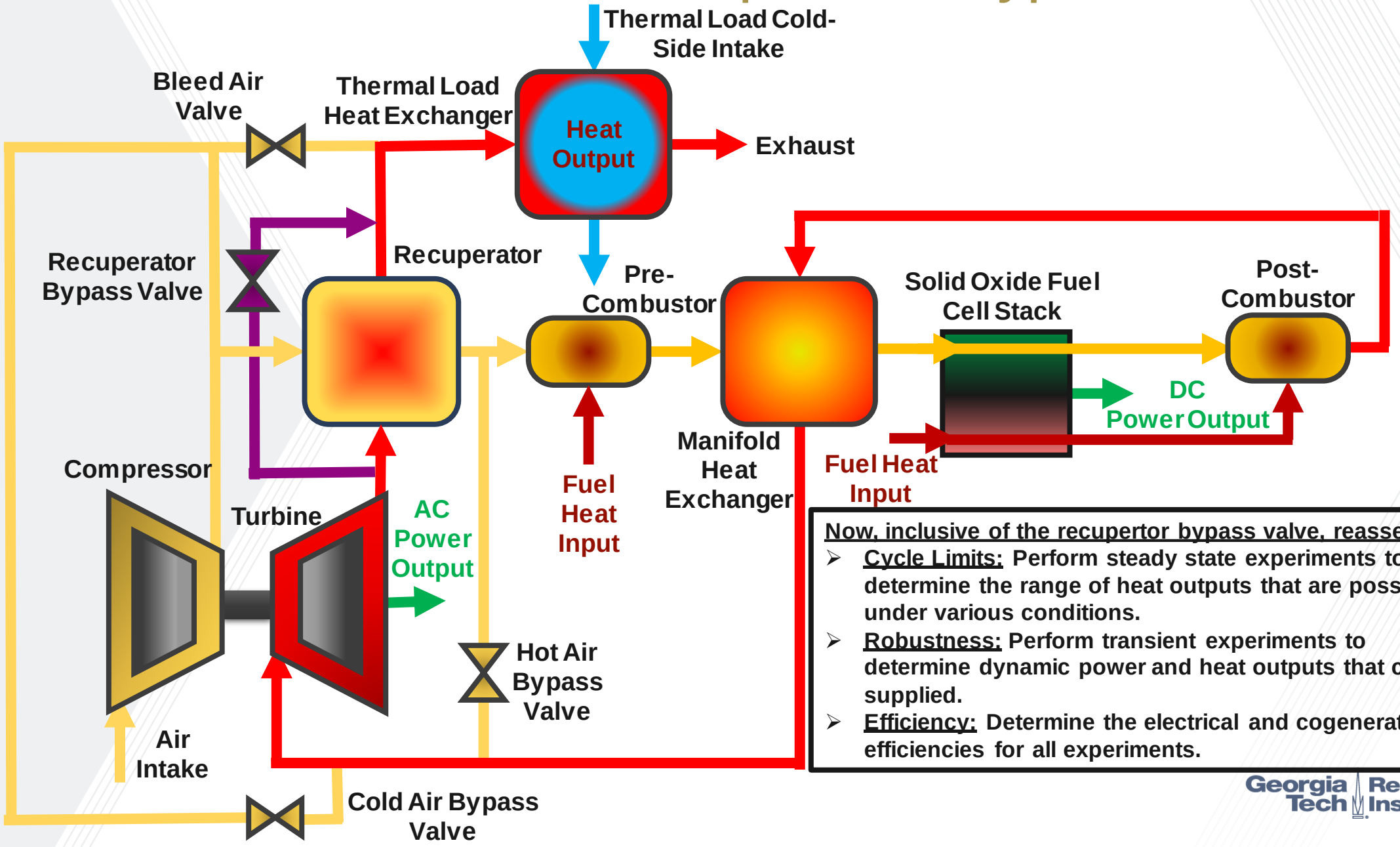
Cycle + Thermal Load + Recuperator Bypass Valve



Now, inclusive of the recupertor bypass valve, reassess:

- Cycle Limits: Perform steady state experiments to determine the range of heat outputs that are possible under various conditions.
- Robustness: Perform transient experiments to determine dynamic power and heat outputs that can be supplied.
- Efficiency: Determine the electrical and cogeneration efficiencies for all experiments.

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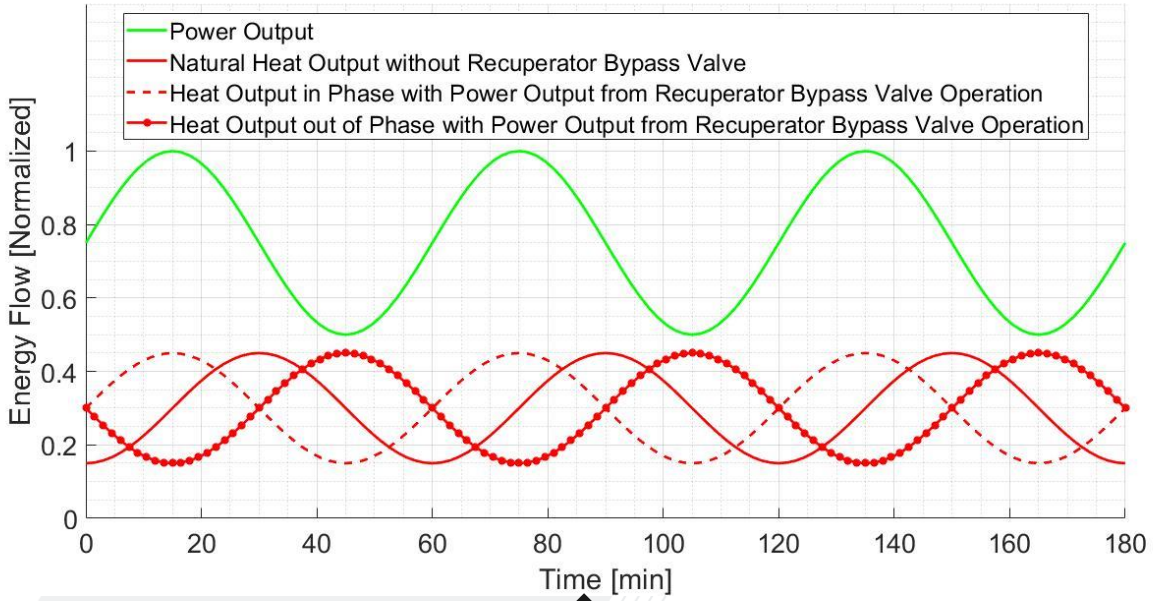
Concept Plots of Potential Final Results



Dynamic Power and Heat Outputs that the Cycle can Supply

Cycle Efficiencies under Various Conditions