ATMOsphere AUSTRALIA

EFFICIENCY GAINS OF A TRANSCRITICAL SYSTEM WITH PARALLEL COMPRESSION

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ay, 2017

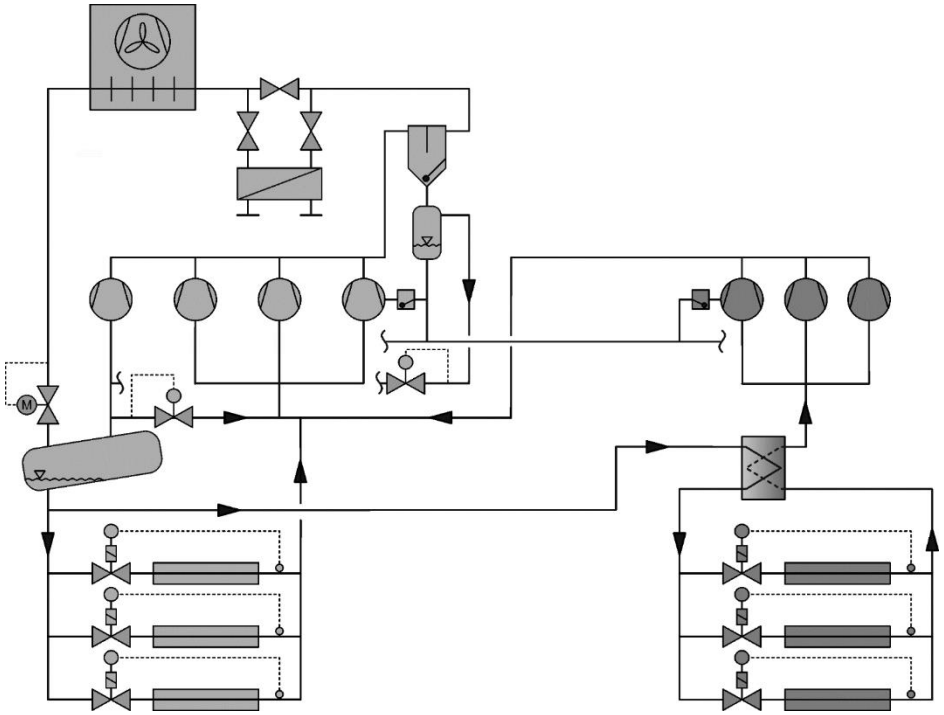
SYSTEM EFFICIENCY GAINS

- Many different efficiency gains being designed and promoted;
  - ⇨ Ejectors;
  - ⇨ “FTE”;
  - ⇨ Different configuration of heat exchangers;
- Most efficiency gains result in additional components;
- Additional components result in increased complexity;

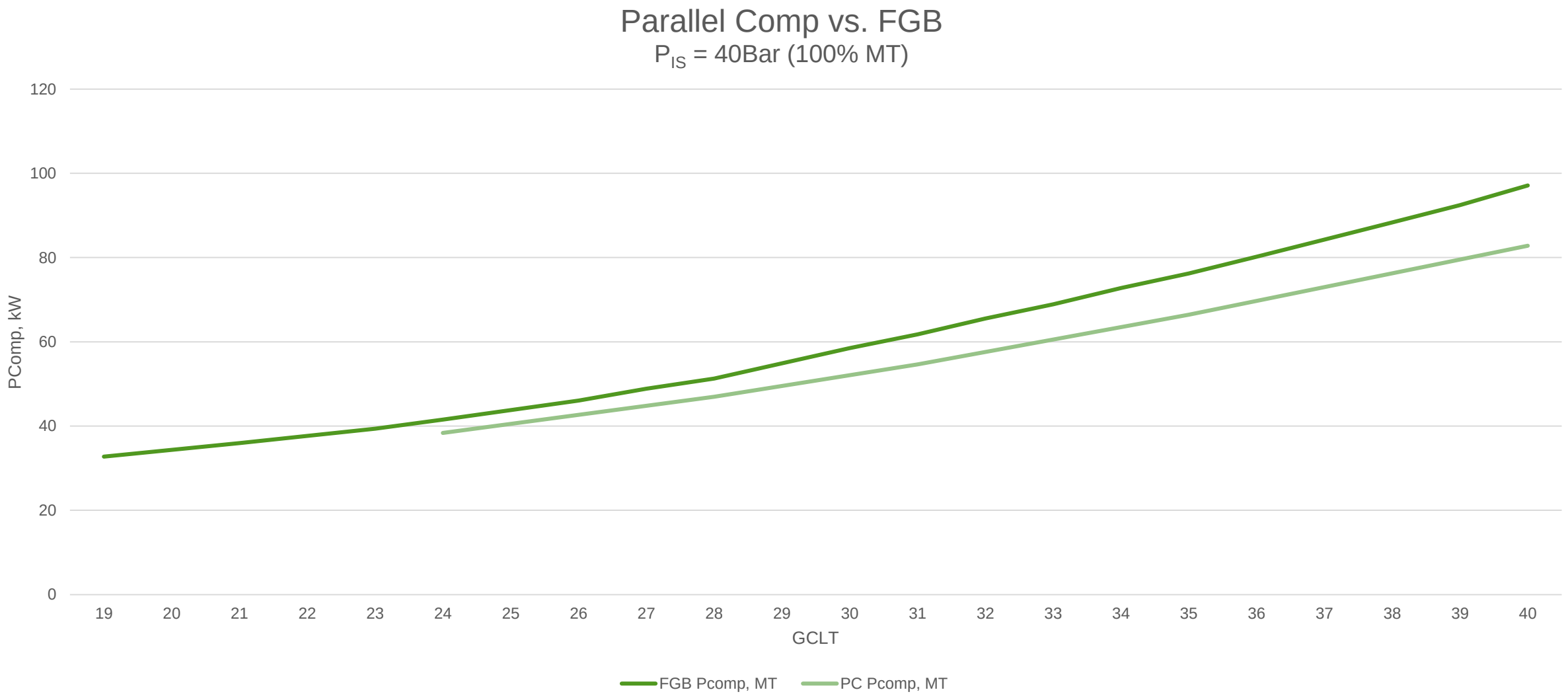
How do we raise system efficiency without adding more components?

PARALLEL COMPRESSION vs. FGB

- PC: More efficient than FGB in all conditions;
- FGB: challenging to maintain operation at low FG conditions;
- Mission: Improving the efficiency of PC- systems, without adding components and costs



PARALLEL COMPRESSION vs. FGB



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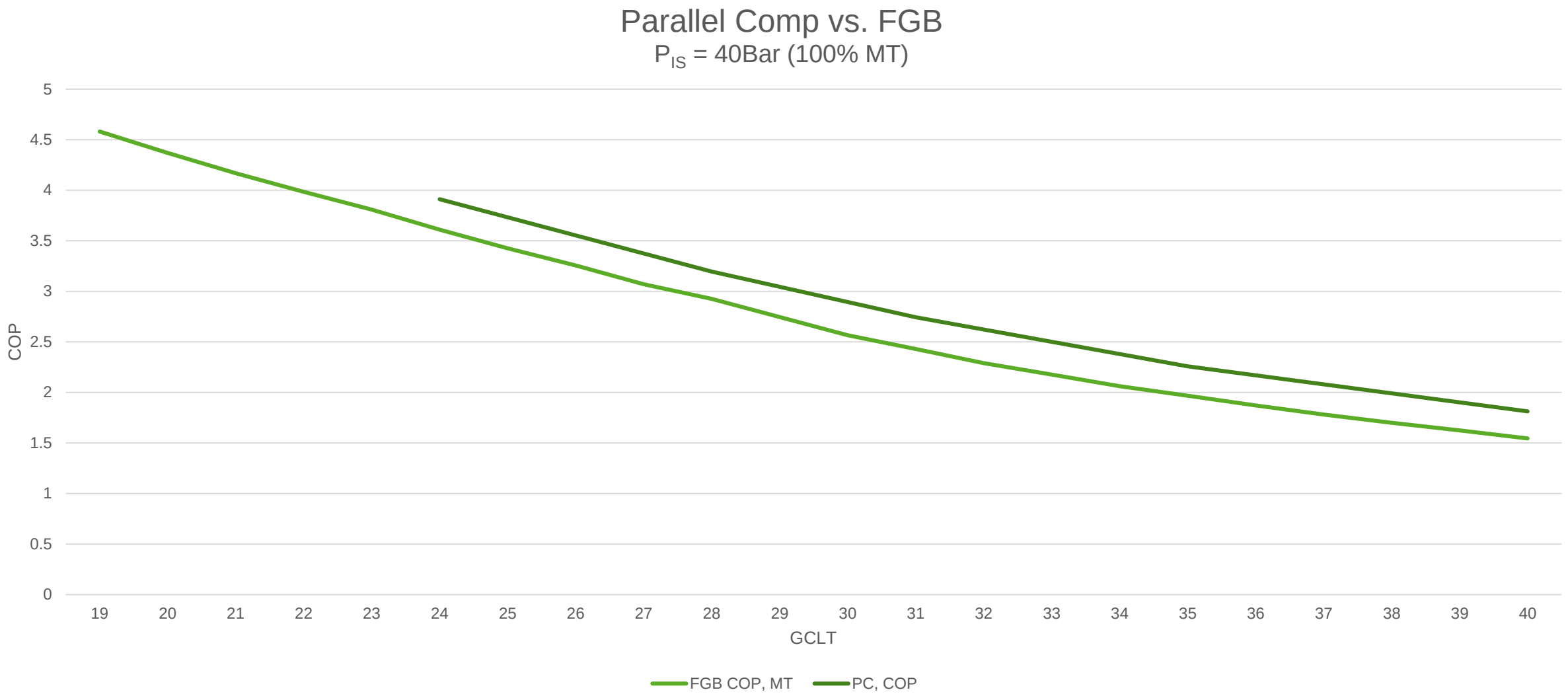

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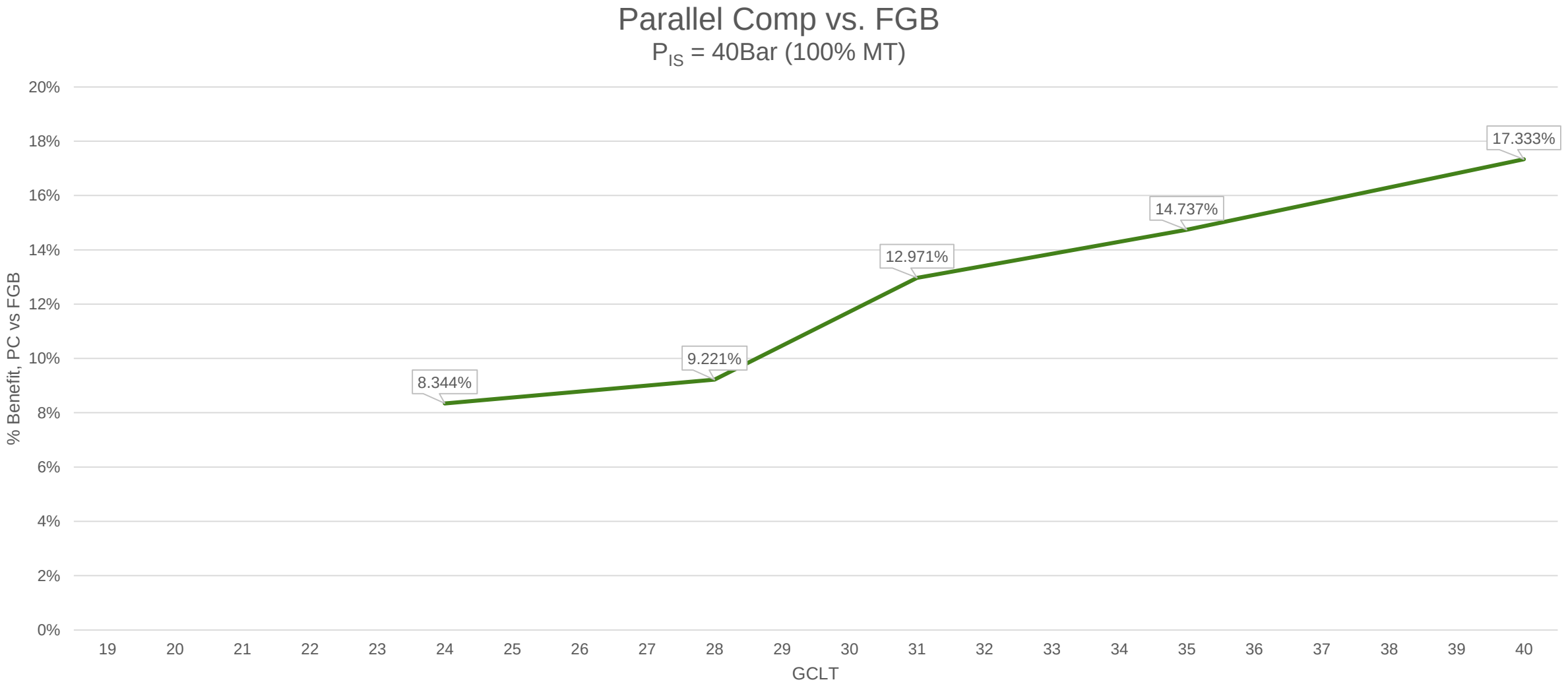


DEVIATING INTERSTAGE PRESSURE

Benefits of raising IP:

/ Increased IP results in increased liquid fraction;

/ Increased liquid fraction equals lower flash gas mass flow;

/ Reduced flash gas mass flow with lower compression ratio for PC results in significant power input reductions;

Drawbacks of raised IP:

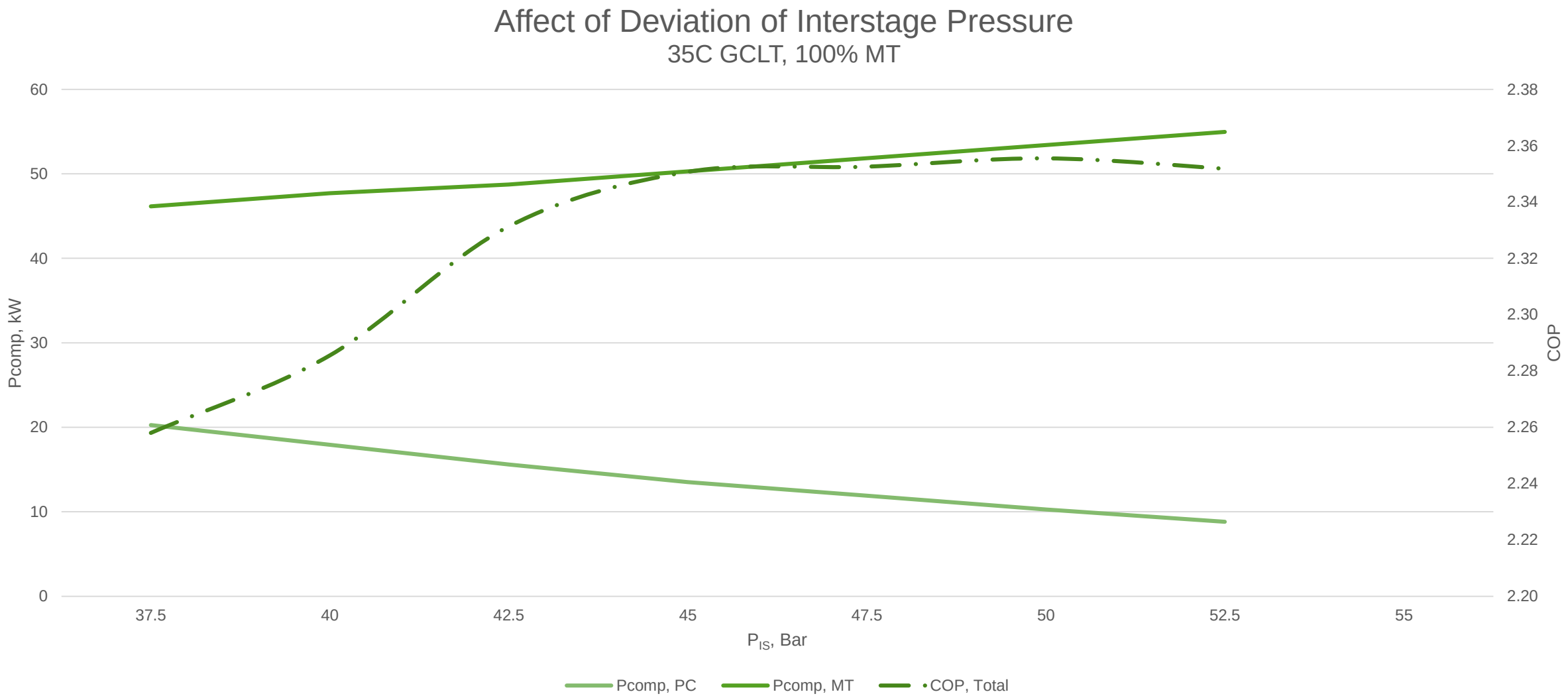
/ Reduced enthalpy difference of liquid phase in evaporators;

/ Larger mass flow rate of the MT (& LT) stage to maintain constant load;

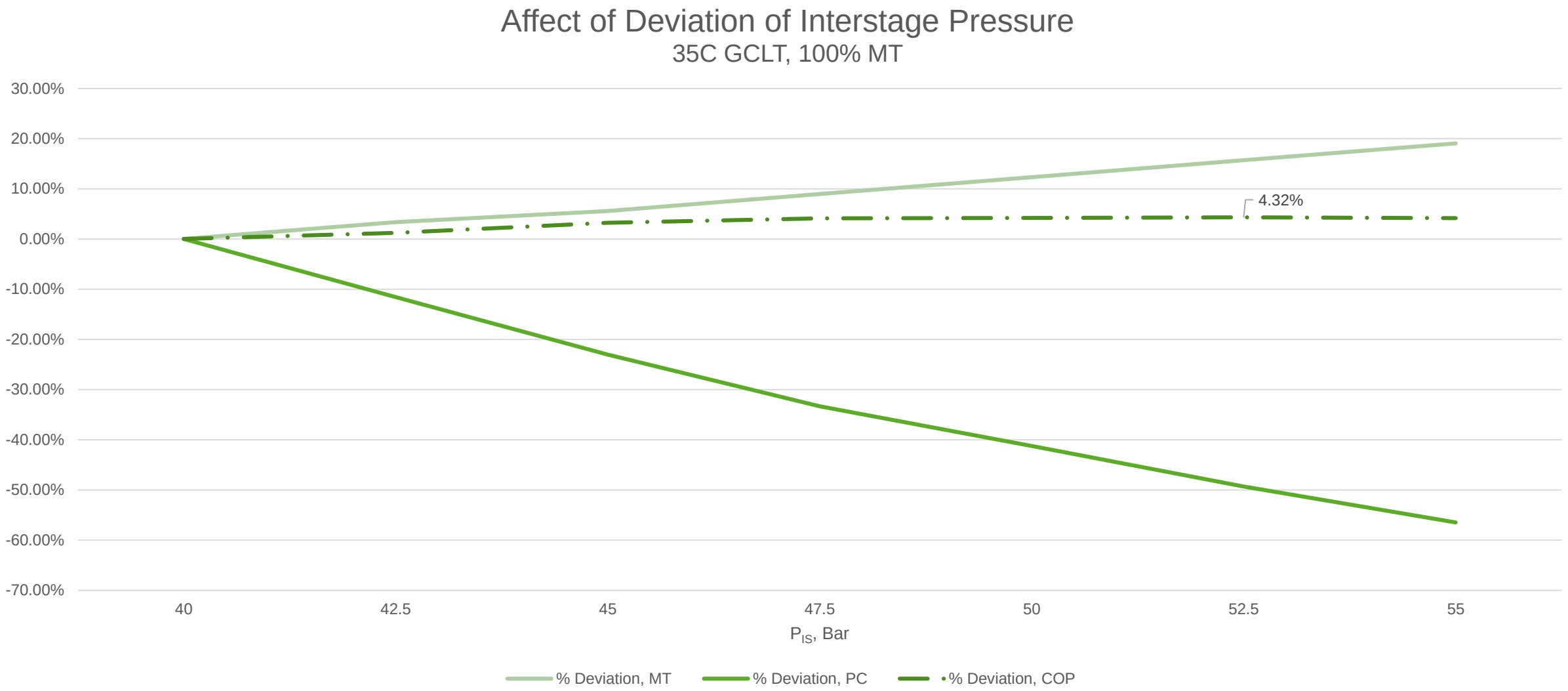
/ Slight increase in MT (& LT) compressor power input;

Overall, a rising Interstage Pressure results in a higher COP

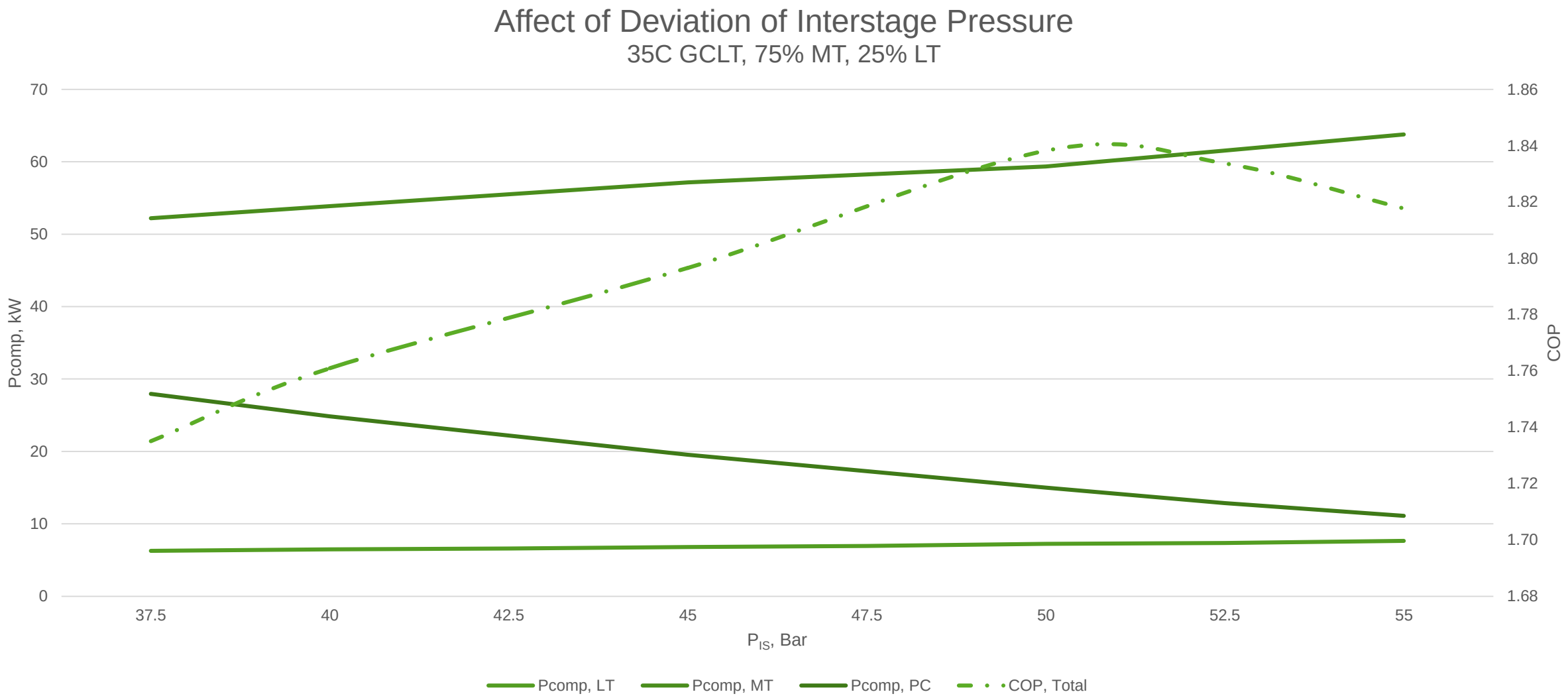
DEVIATING INTERSTAGE PRESSURE



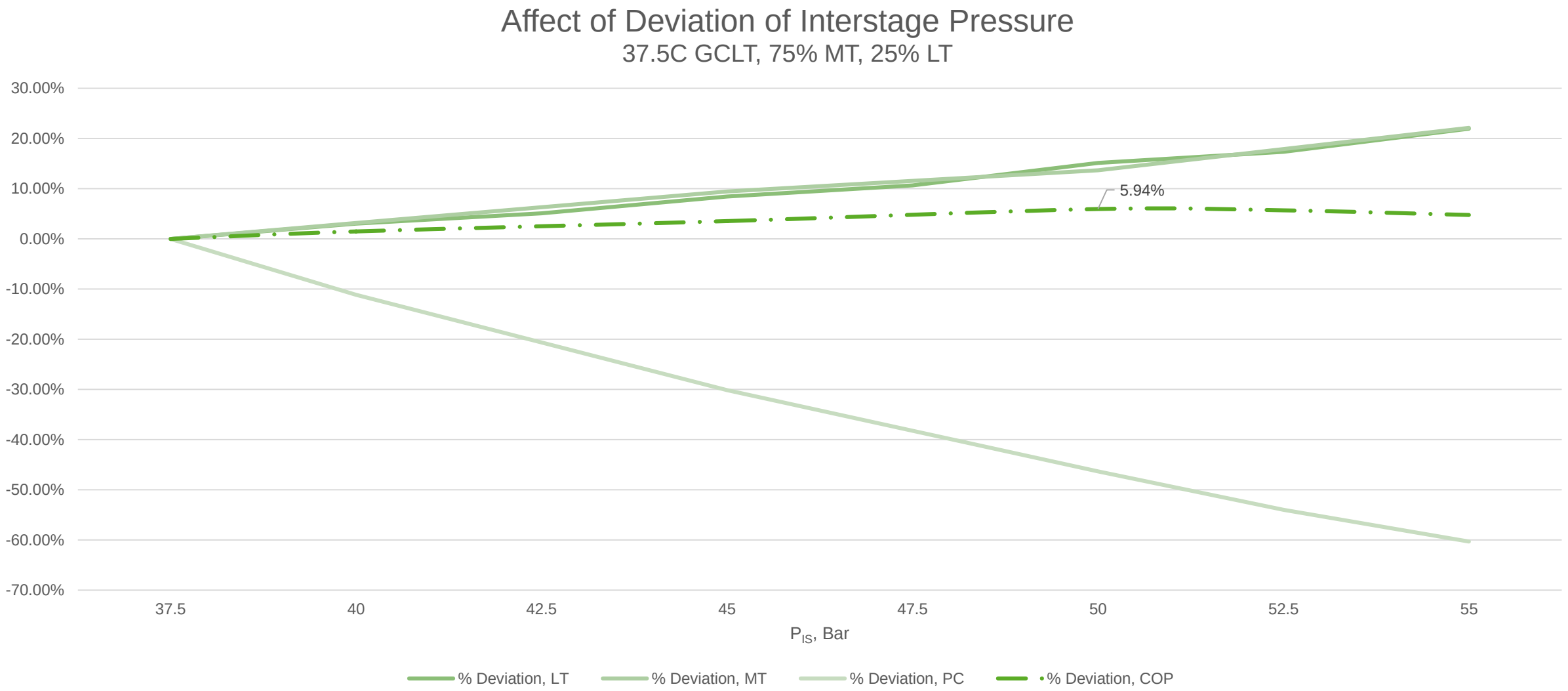
DEVIATING INTERSTAGE PRESSURE



DEVIATING INTERSTAGE PRESSURE

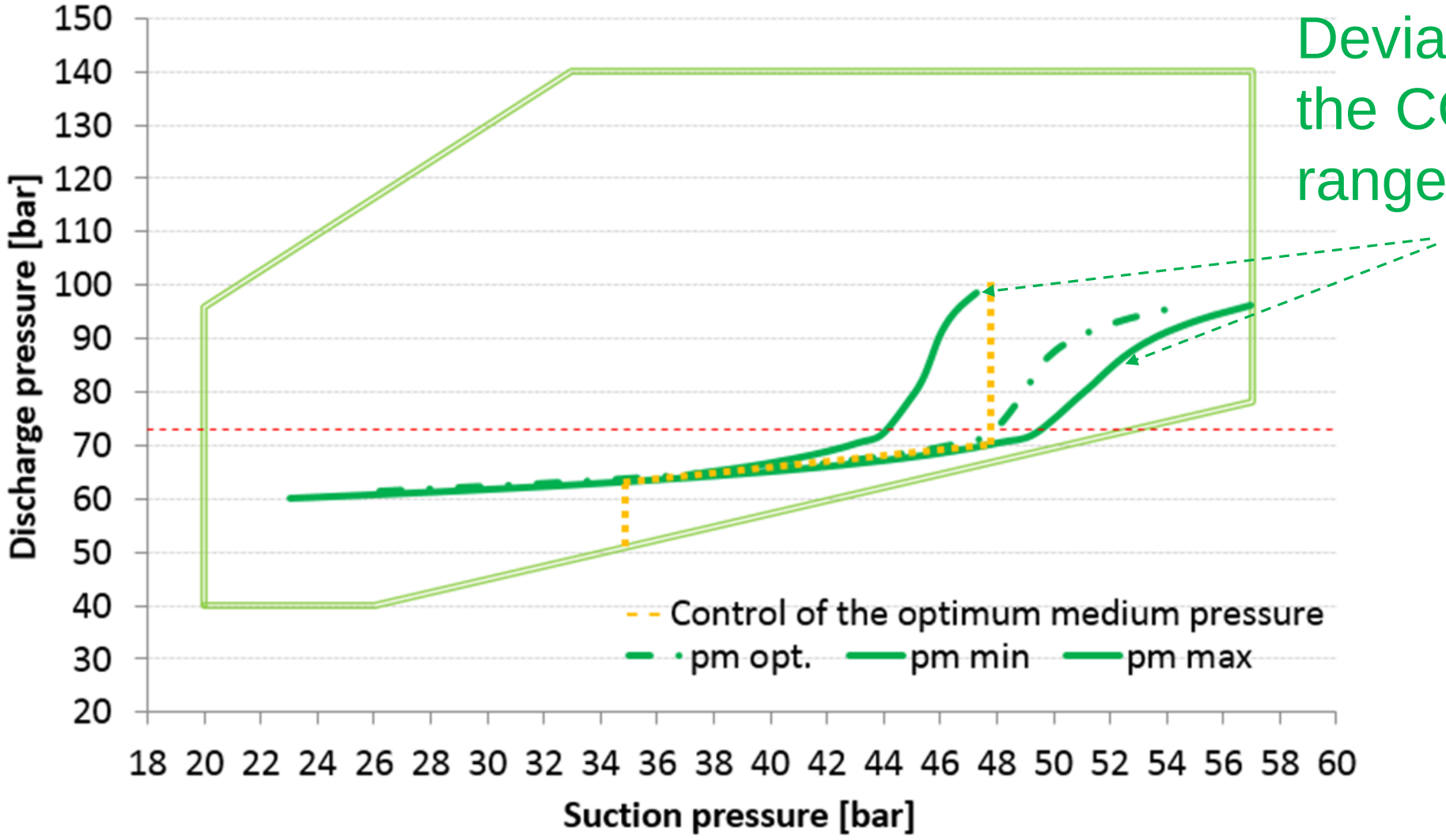


DEVIATING INTERSTAGE PRESSURE



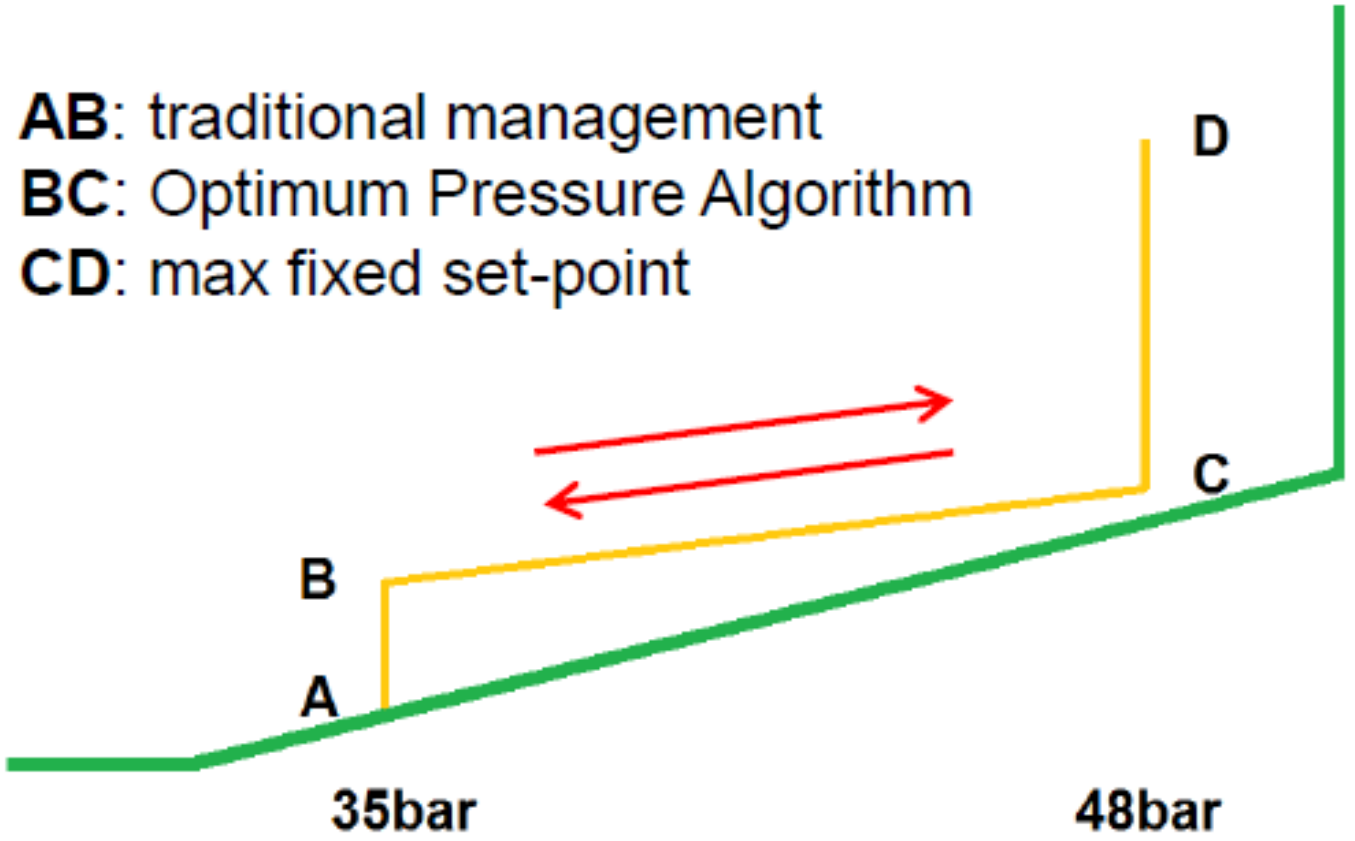
JOINING FORCES TO INCREASE EFFICIENCY

OPTIMISING THE PC STAGE

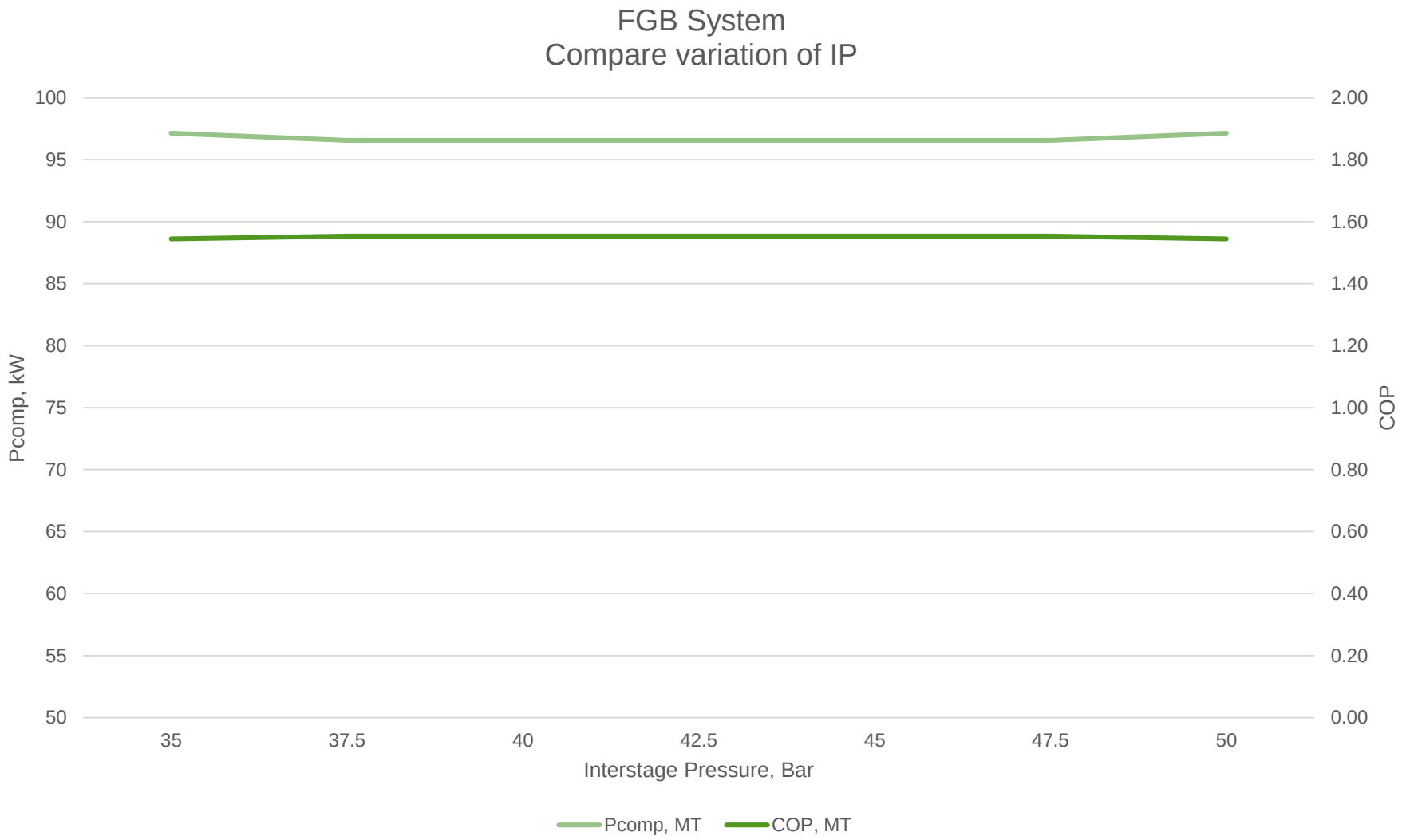


Deviation of the COP in the range of -1 %

OPTIMUM PRESSURE ALGORITHM



FGB SYSTEM CANNOT BE OPTIMISED



SUMMARY

- Careful commissioning can result in benefits that are not insignificant;
- BITZER and CAREL are working to simplify the complexity associated with controls and system commissioning;
- Increase in system efficiency possible without having to add more components or system complexity;
- Floating P_{ls} can be of great benefit in Australian & NZ Climate!

THE HEART OF FRESHNESS

AUSTRALIA

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