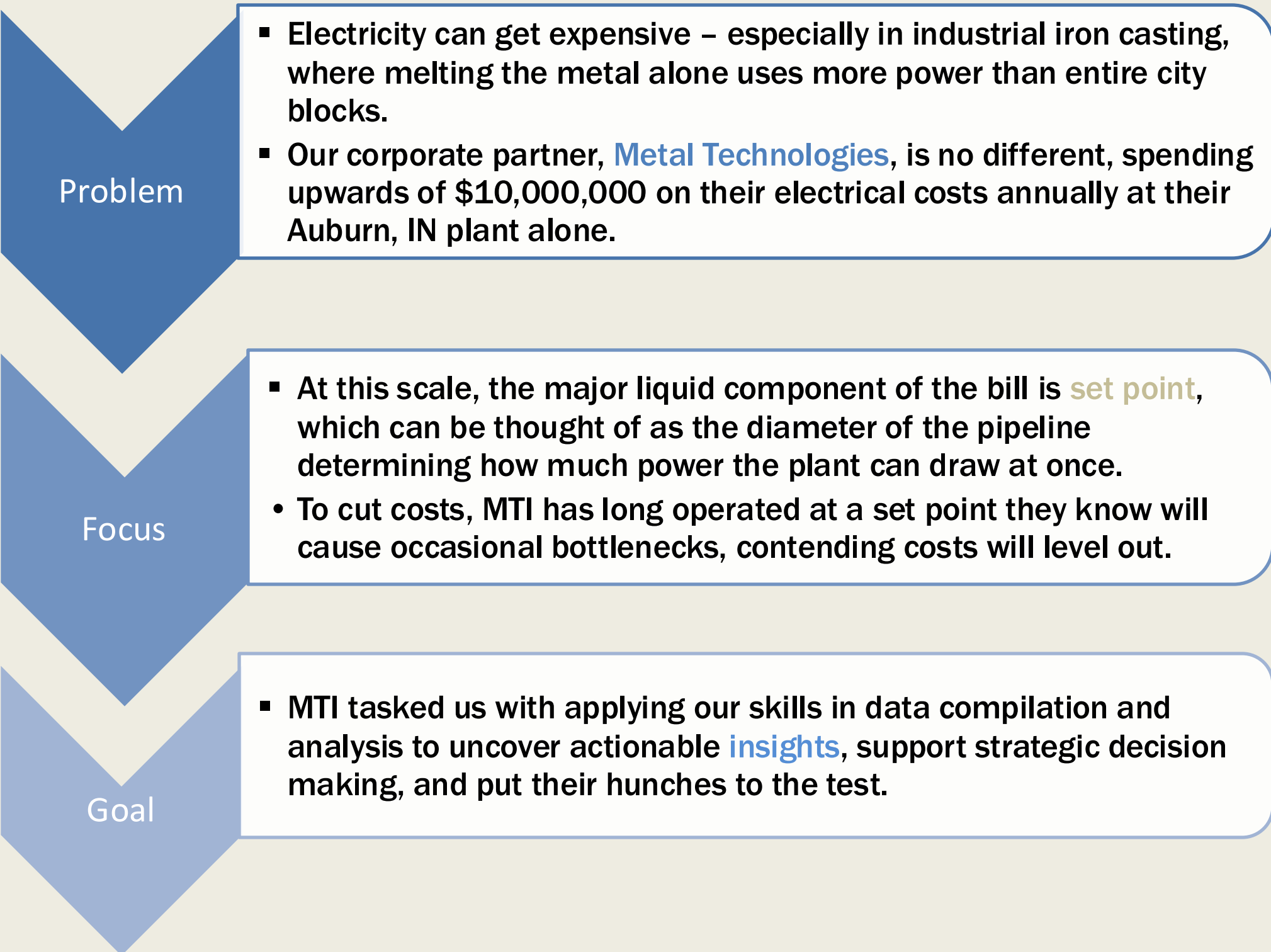


PROJECT INTRODUCTION

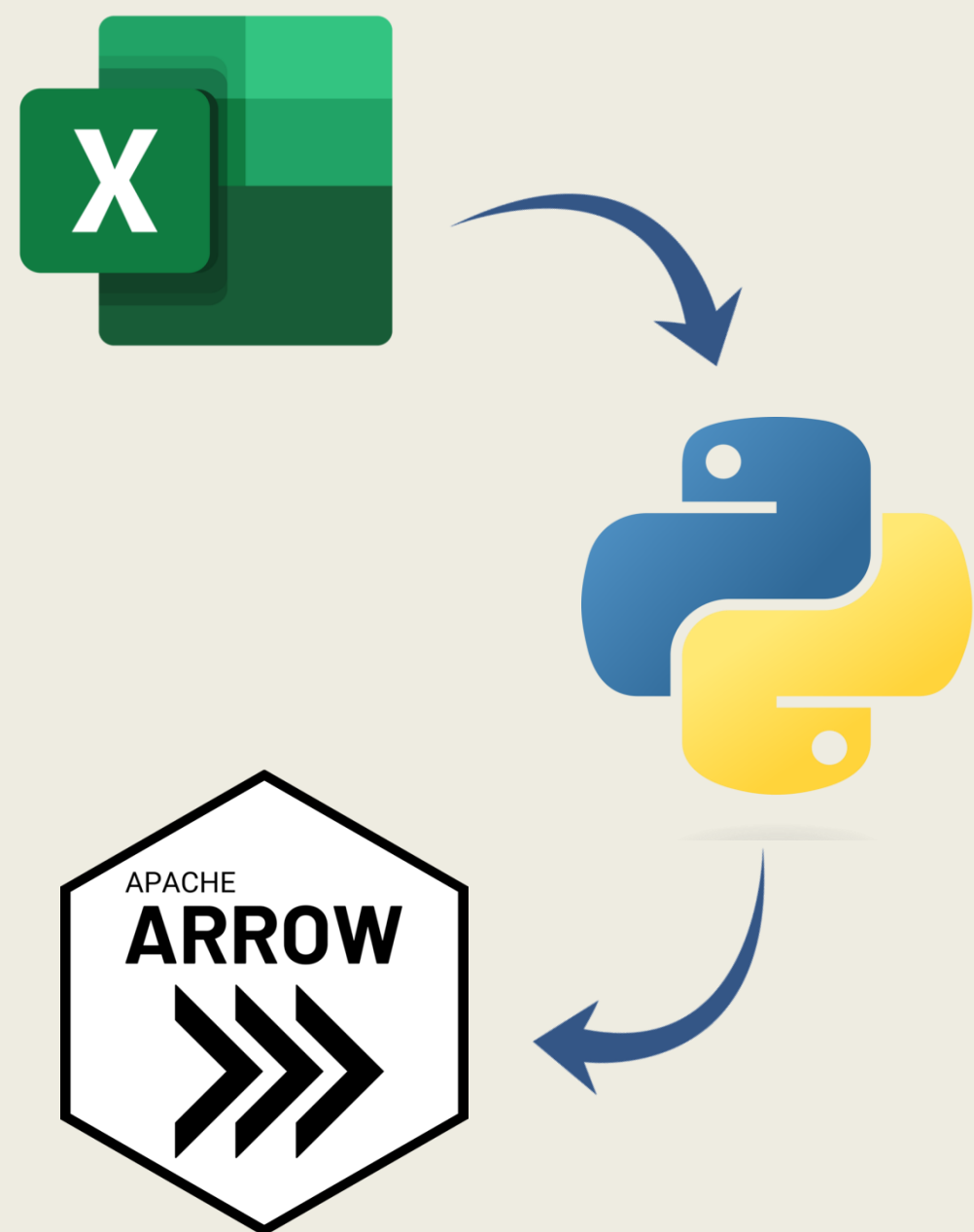


COLLECTING DATA

- Before this project, all data analysis at MTI was performed **manually** in Excel, mandating that the fifteen years of 5-second interval power demand data we were given access to be stored in unique files per day.
- This **format** is impractical for large-scale analysis, necessitating compilation.

Data Conversion:

- Files that we were given from MTI are DBF files had issues from **inconsistent** data sheets to log times being doubled.
- Collected all files into one folder and wrote a python script to iterate through and output files **compiled** with nearby identically-columned files
- Apache Arrow **Feather** File Format
 - Loads 78 million lines, just under 1 billion data points, in 20 seconds
 - Lossless compression of 9 GB into 2 GB



ANALYSIS

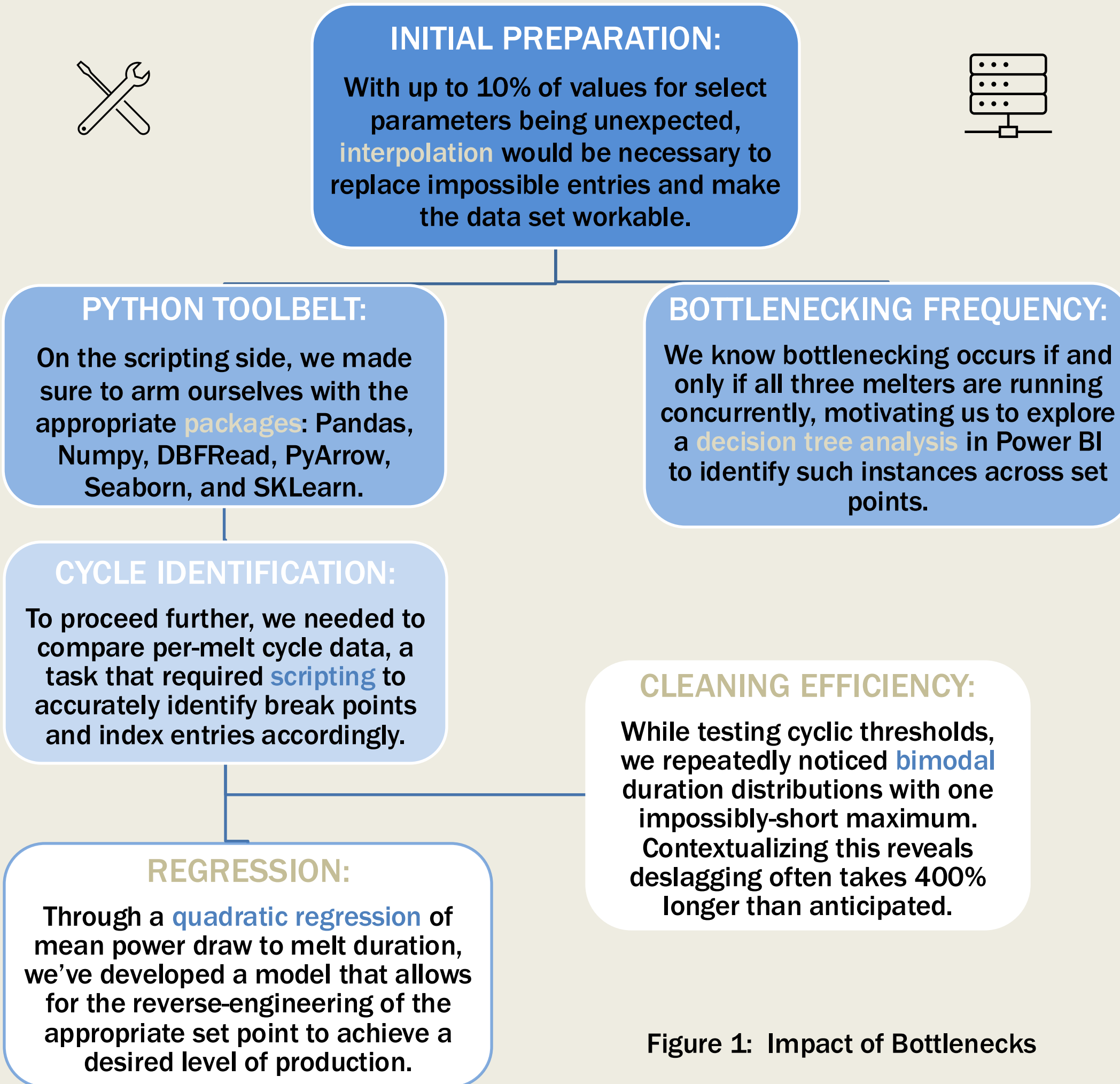
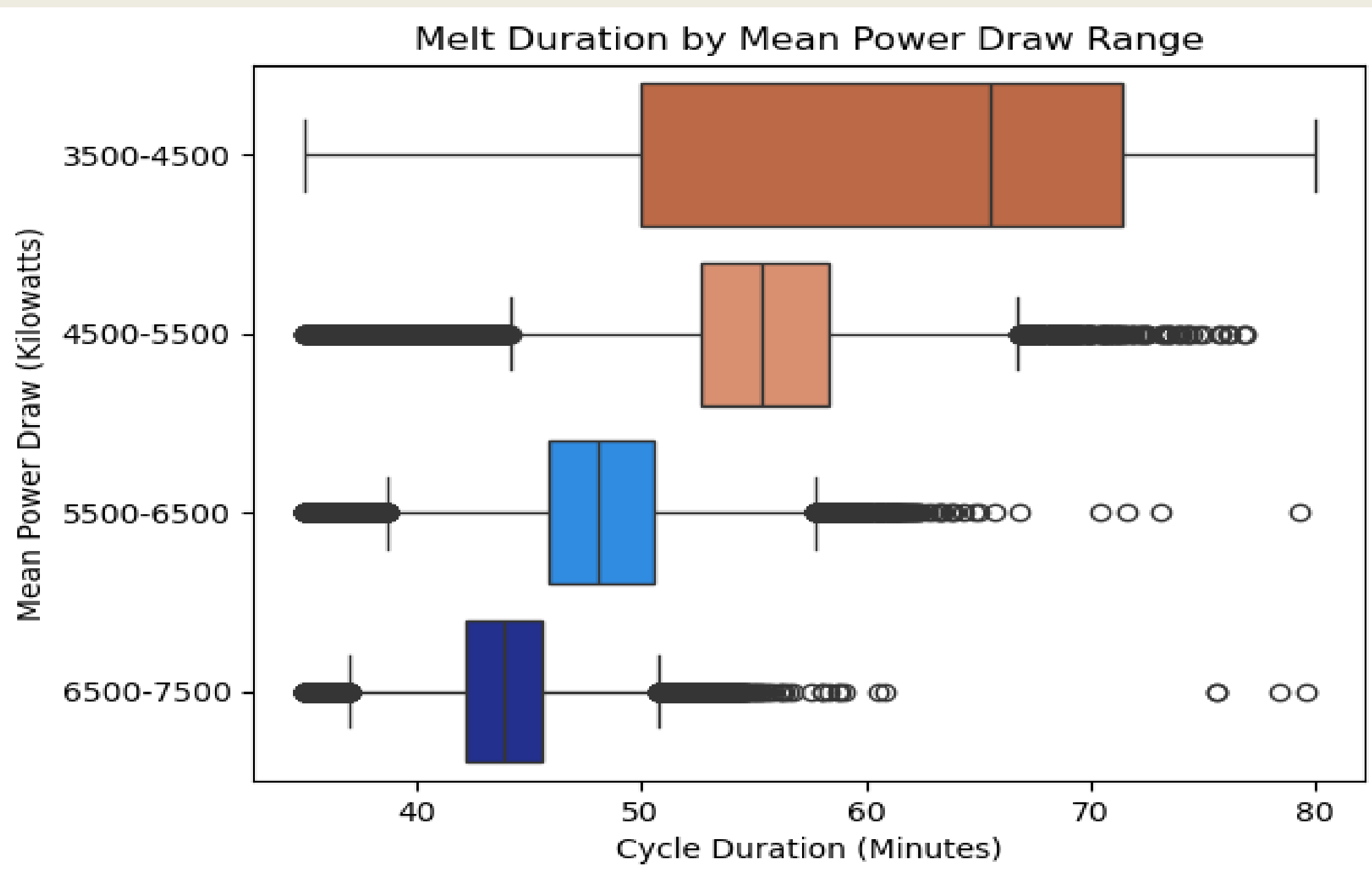


Figure 1: Impact of Bottlenecks



CONCLUSIONS

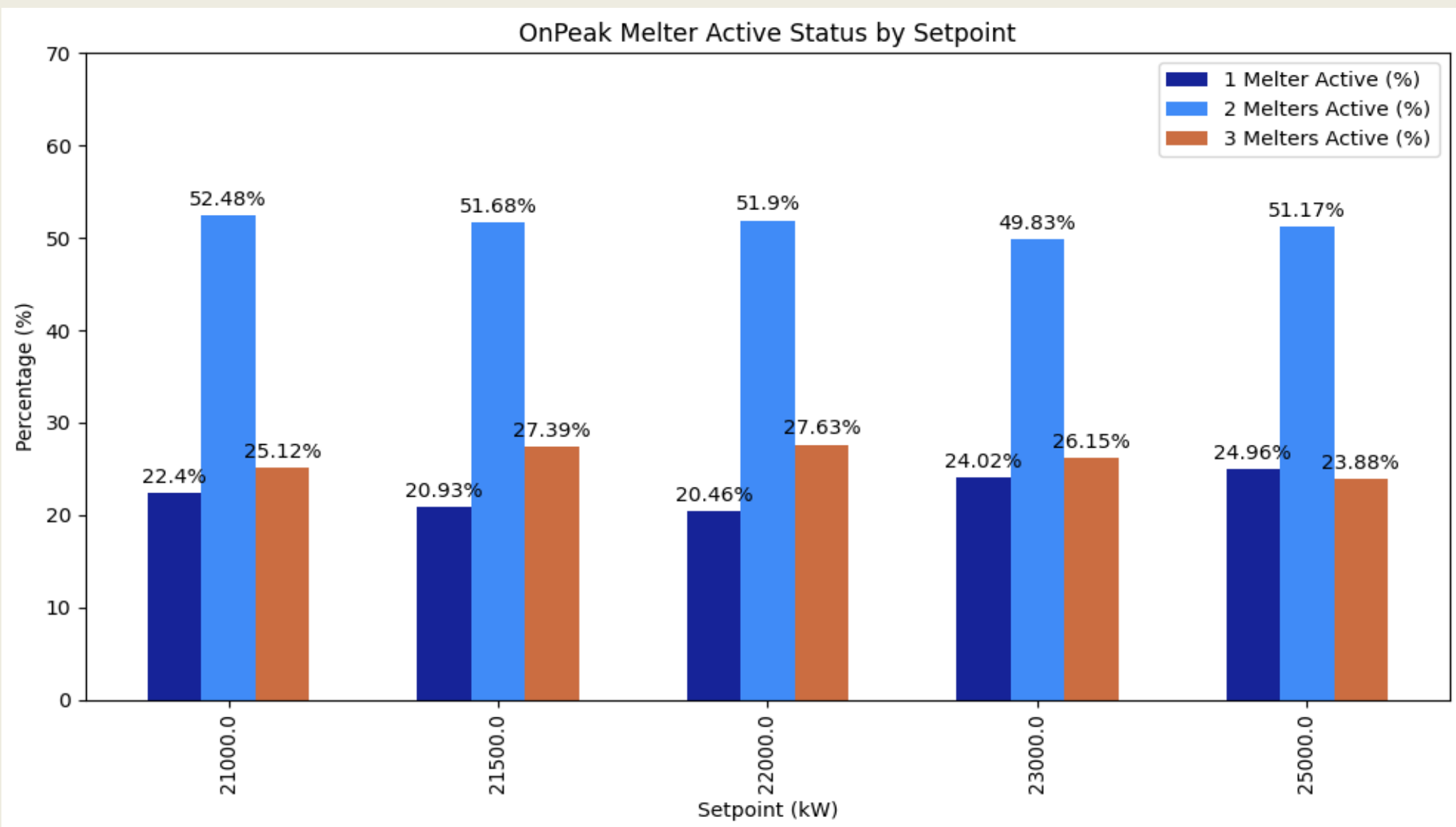


Figure 2: Active Melter Count While Melting by the Top Five Recent Set Points

Concurrent Melter Usage is Common

- Over 20% of daytime operations involve all three melters running at once (bottleneck), despite MTI's **expectation** that this was lower.

Bottlenecking Reduces Melting Efficiency

- Unrestricted melt cycles complete between 5 and 20 minutes faster than **bottlenecked** cycles, depending on the extent of the problem.

In Melting, Minutes Matter

- Even if bottlenecking was only increasing the duration of 20% of cycles by 5 minutes, at 10,000 cycles per year, an entire melt's worth of iron is being **lost** every other day.

IMPACT

- Data-Driven Strategic Guidance:** Our analysis and predicative modeling gives MTI the tools to align electricity costs with operational goals, supporting more informed investment decisions and promoting sustainable growth, both within and outside of their Auburn plant.

FUTURE GOALS

- Developing software that can be used internally at MTI for **large-scale** data compilation, cleaning, and analysis in a user-friendly interface
- Implementing **machine learning** algorithms to improve accuracy of cycle identification and all derived data across time, set points, and iron mixes
- Integrate** data from other parts of the plant into our analysis to better understand findings

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