kWintessence

Identifying price-responsive electric loads

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Introduction

Demand Response

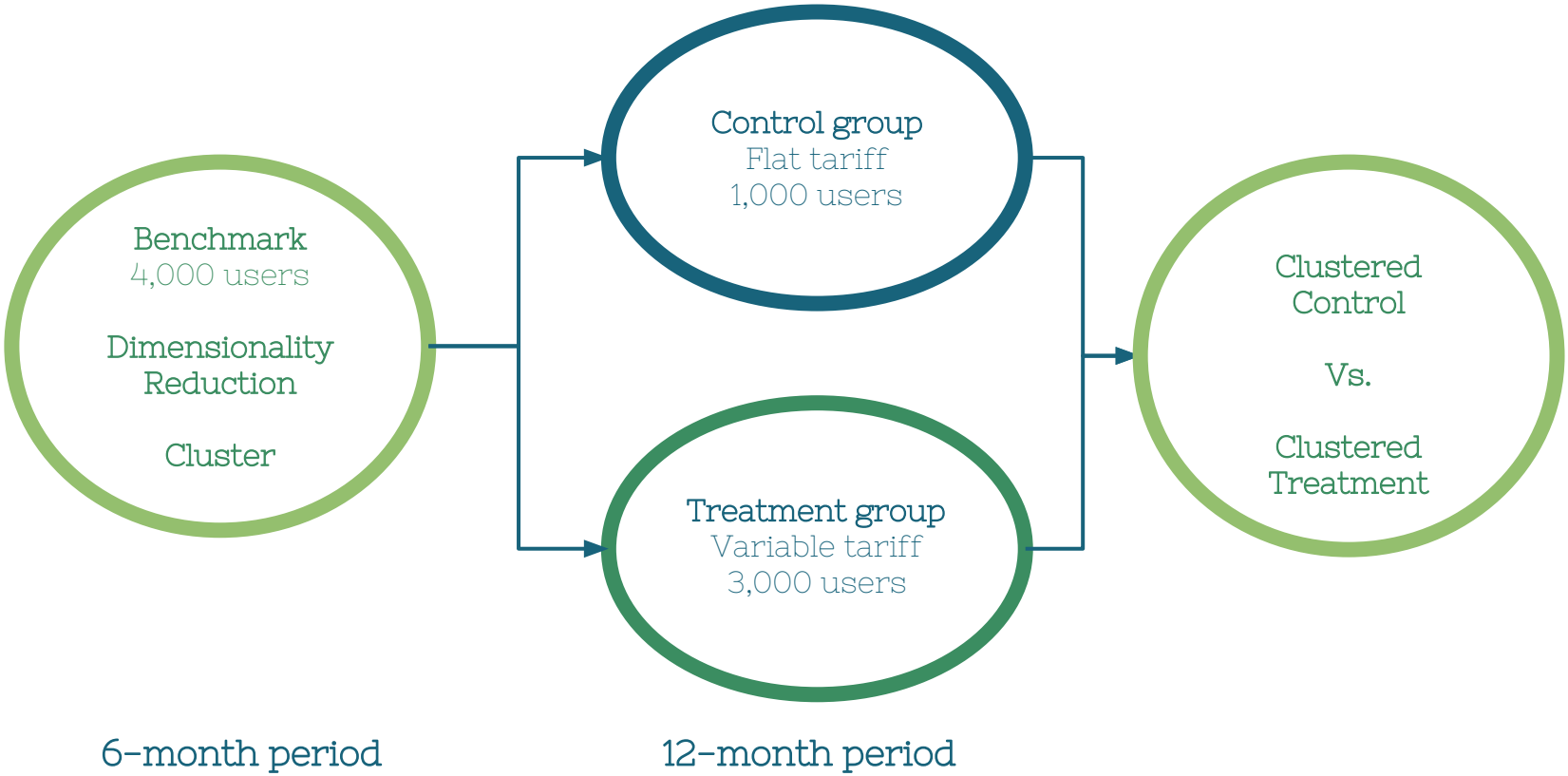
Shift demand to available time periods by exploiting consumption elasticity.

Goal:

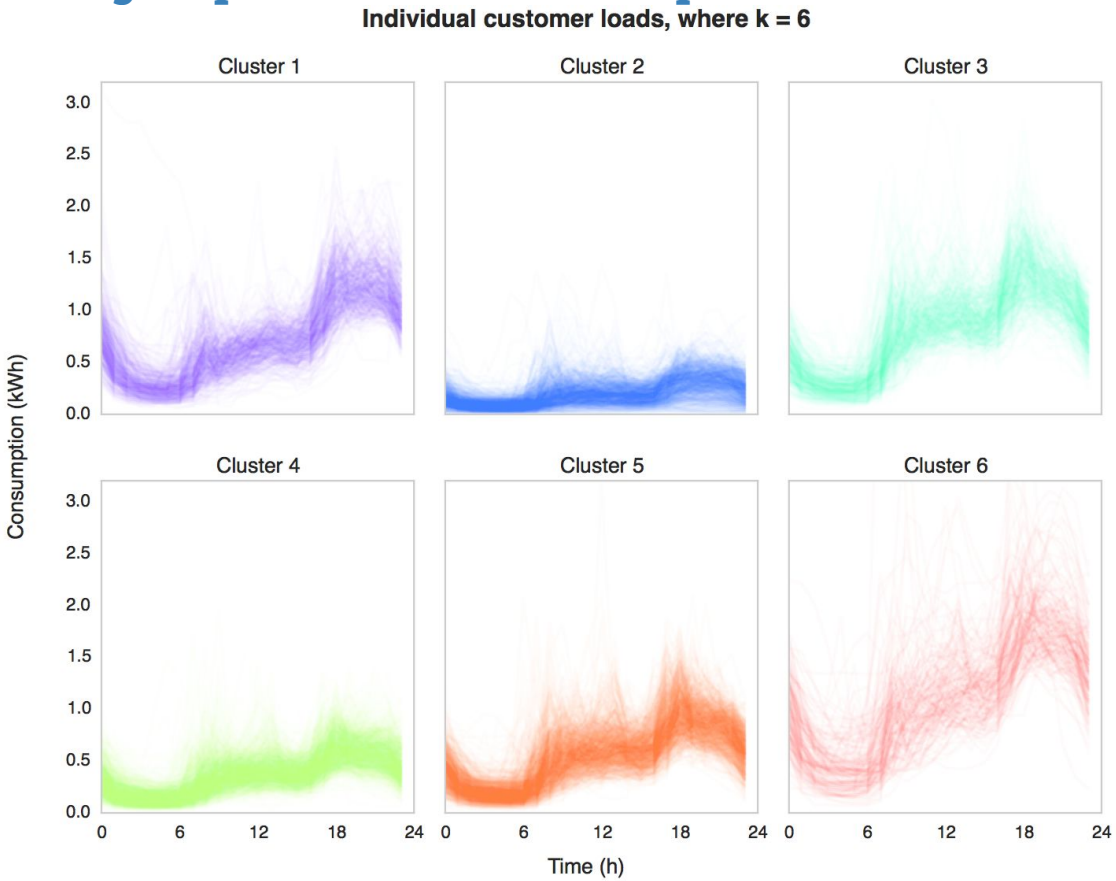
Identify price-responsive users.

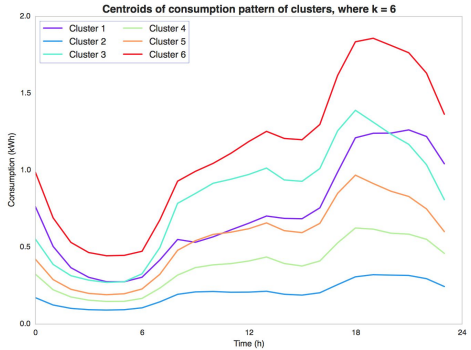
Pipeline

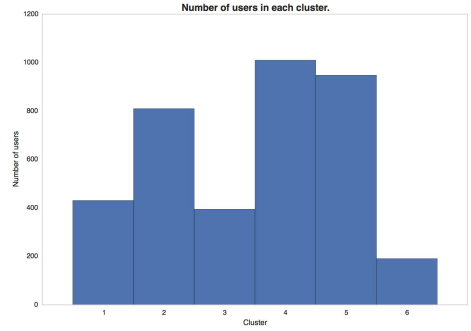
Data: id, 15-min resolution consumption



Subgroups with similar load profile

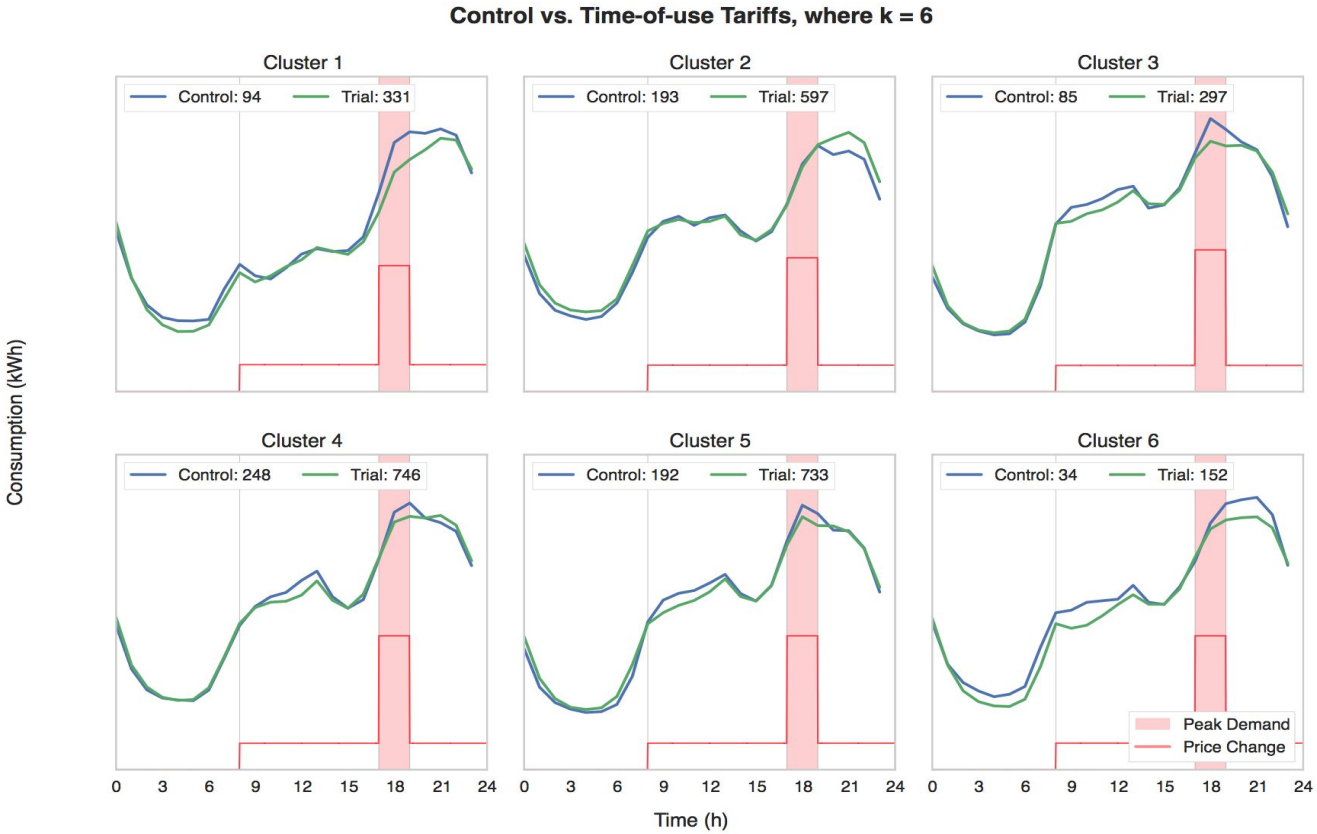






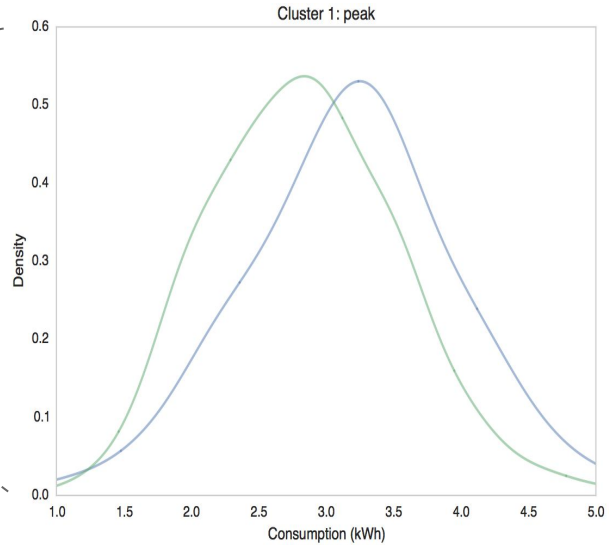
Identify Responsive Users

Price responsive?



Pipeline > Benchmark Clustering > **Identify Responsive Users** > Quantify Price Response

Test-Control Example



H0:

Price induces a significant change of consumption behavior.

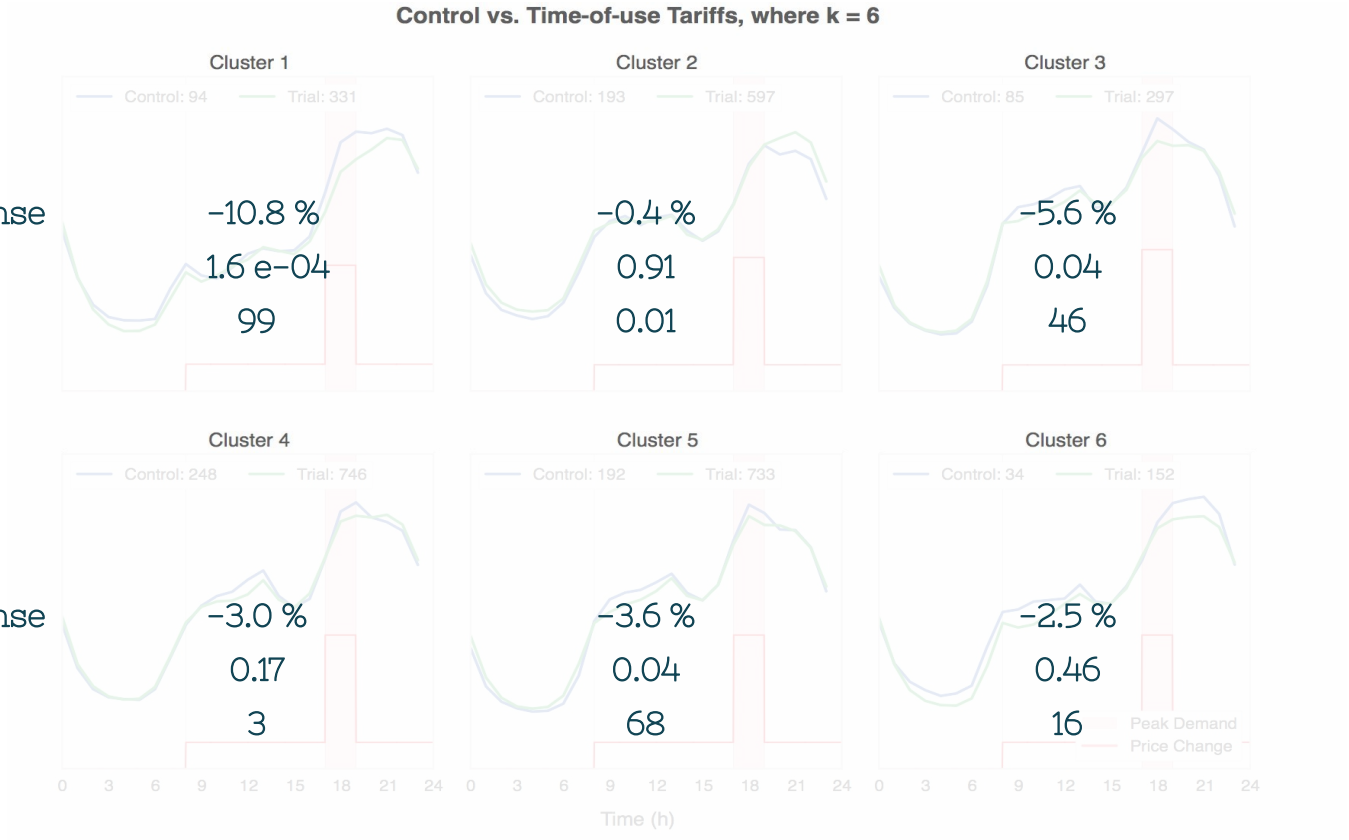
Response: -10.8 %

p-value : 1.6 e-04

Power : 99

Pipeline > Benchmark Clustering > Identify Responsive Users > **Quantify Price Response**

Quantify Response

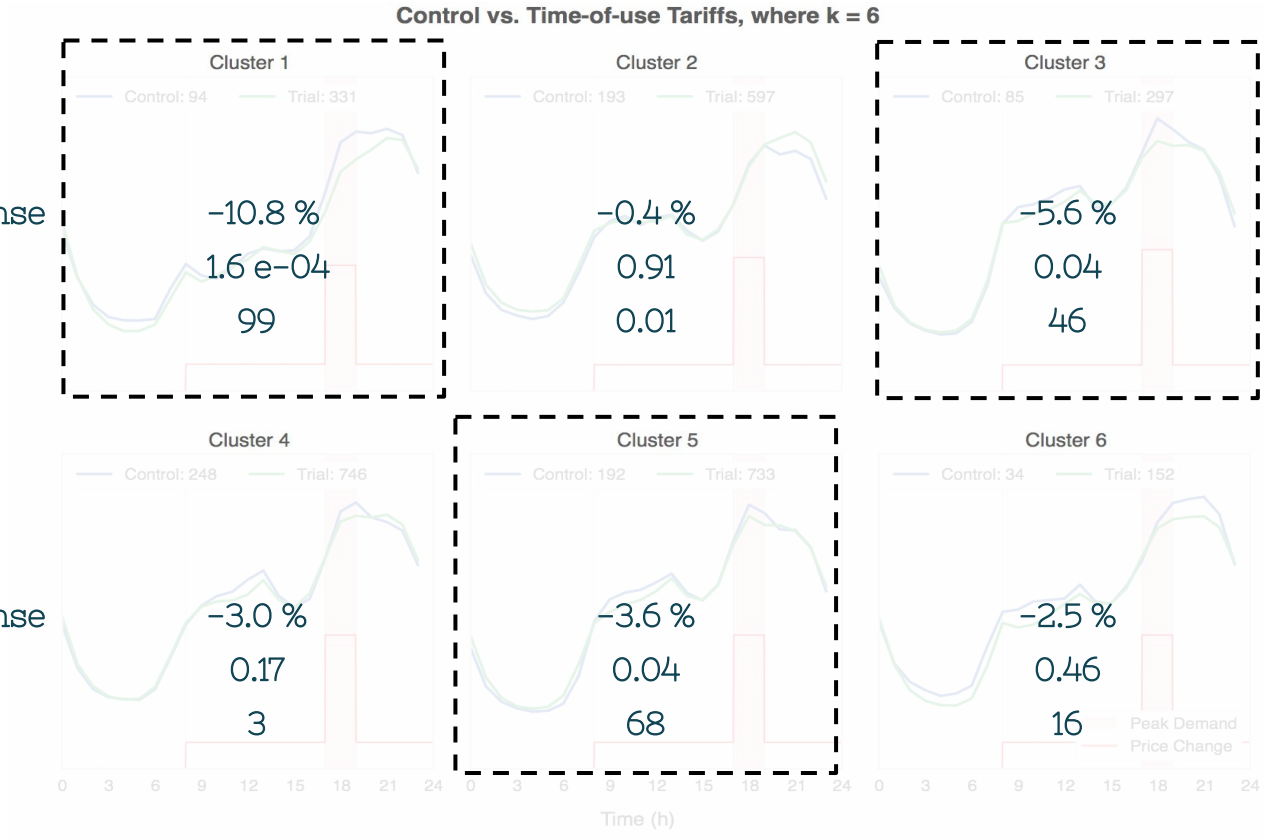


	Cluster 1	Cluster 2	Cluster 3
Avg. Response	-10.8 %	-0.4 %	-5.6 %
p-value	1.6 e-04	0.91	0.04
Power	99	0.01	46

	Cluster 4	Cluster 5	Cluster 6
Avg. Response	-3.0 %	-3.6 %	-2.5 %
p-value	0.17	0.04	0.46
Power	3	68	16

Pipeline > Benchmark Clustering > Identify Responsive Users > **Quantify Price Response**

Quantify Response



Pipeline > Benchmark Clustering > Identify Responsive Users > **Quantify Price Response**

Conclusions

Takeaways

> Systematic way of identifying responsive users.

> Quantifiable response.

Application

> Target subgroups with specific strategies to maximize capacity utilization.

Future Work

> Characterize responses.

> Regression-model baseline using demographic and weather data.

> Cluster based on frequency-based features instead of temporal.

> Evaluate reliability and accuracy of clusters.

THANKS!

Any questions?

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