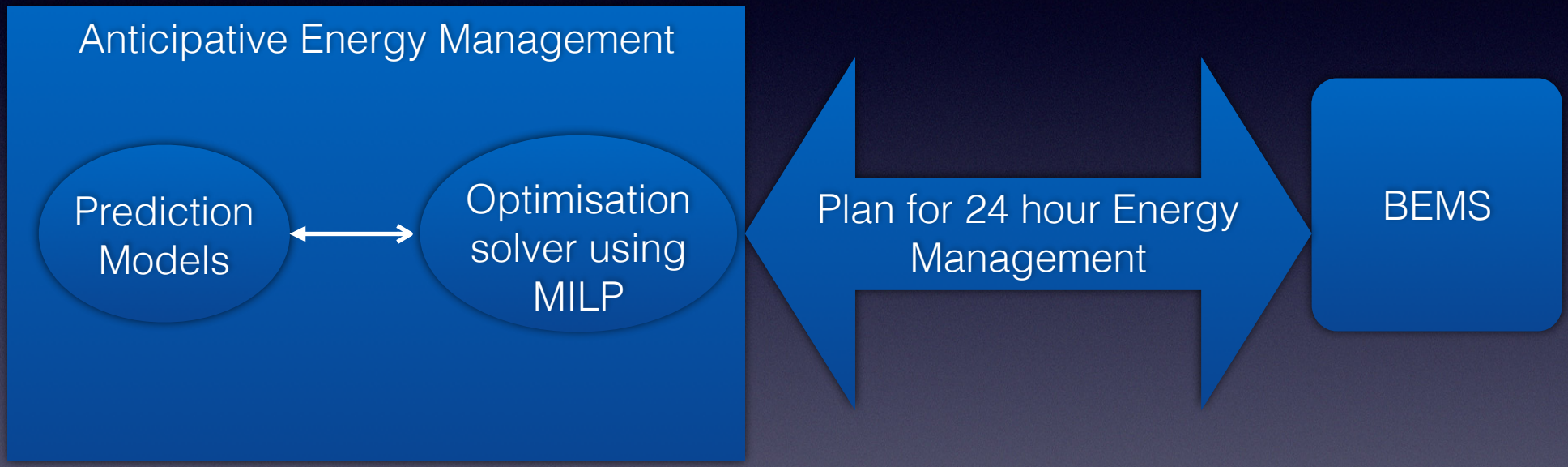
A study of Interaction between Reactive and Anticipative building energy management.

Mahendra Singh[1,2], Manar Amayri[2], Stéphane Ploix[2], Frédéric Wurtz[1]

1 : Univ. Grenoble Alpes, G2Elab

2 : G-SCOP France

Anticipative Energy Management



Reactive Energy Management

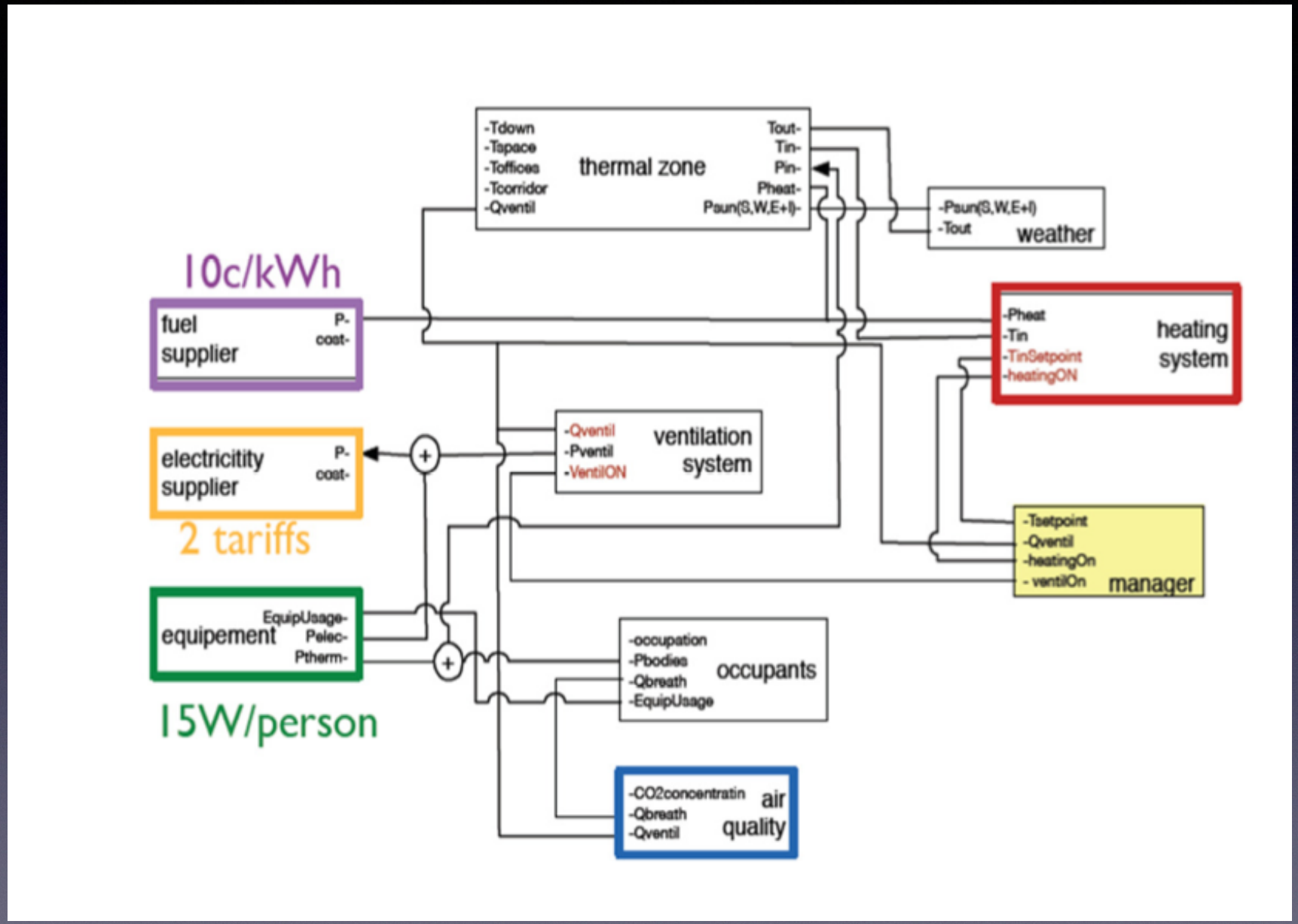
- *It works on the "if-else" or "condition-action" rule.*
- *Able to anticipate energy consumption in high volatile condition such as weather change, occupancy profile, turning on or off the home appliances.*
- *Reactive management will provide an efficient management of resources and also a reliable plan for anticipative energy management.*

How It Works?

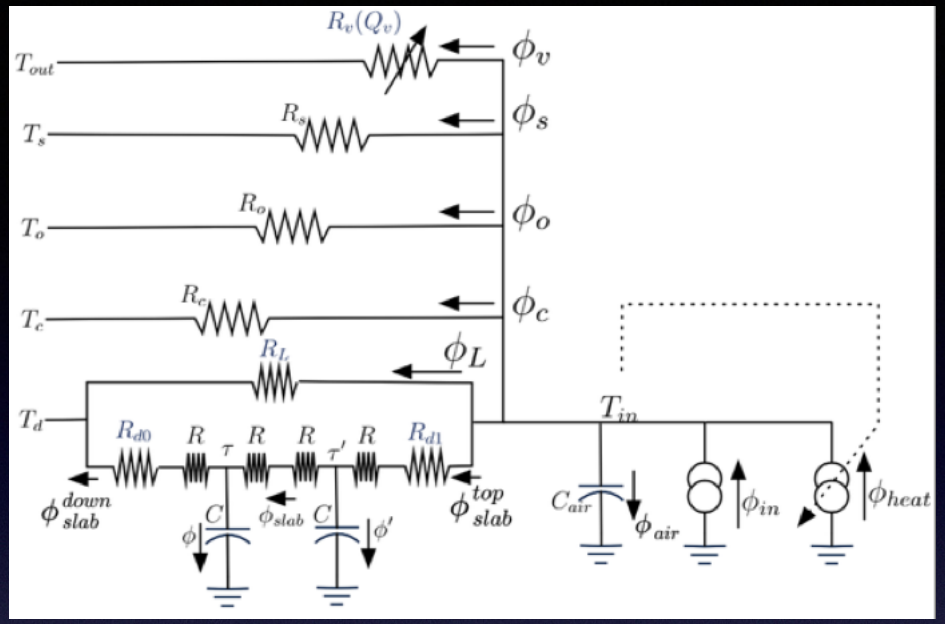
- *Get the plan(set points)*
- *Compare with the real scenario*
- *Identify the discrepancies,its cause and Characteristics*
- *if*
- *there is no discrepancy in plan*
- *then*
- *follow the plan*
- *else*
- *apply the possible corrections*

Model Requirement

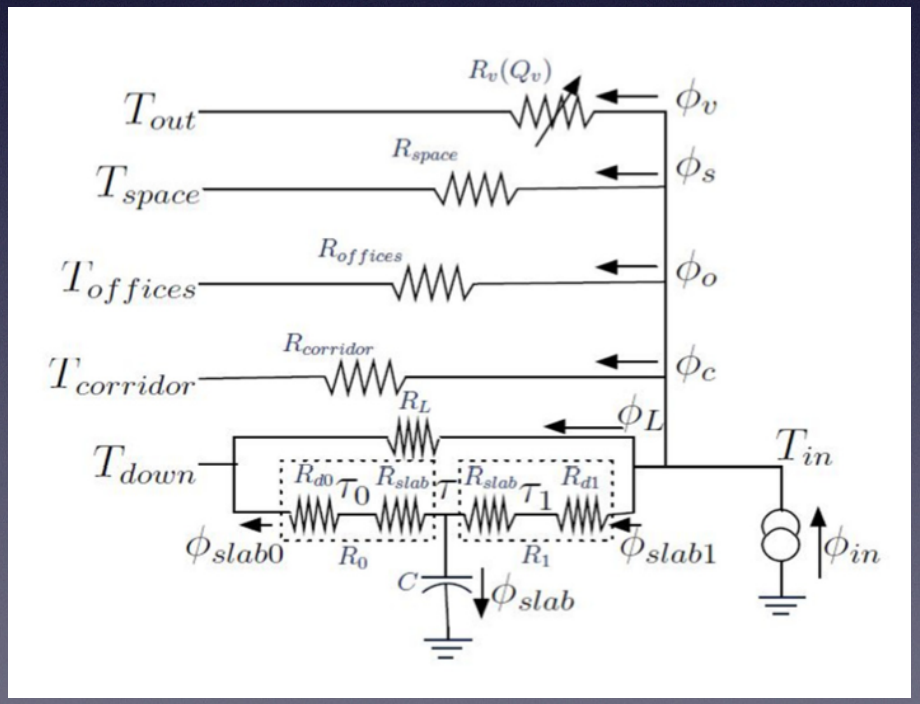
- *Reactive energy management requires a model with fast dynamics.*
- *Reactive period should be* $\Delta_r < \Delta_a$
- *Model should be able to incorporate the fast dynamics of occupants and environment.*



Fine Simulation Model With Simulation Time =1 min



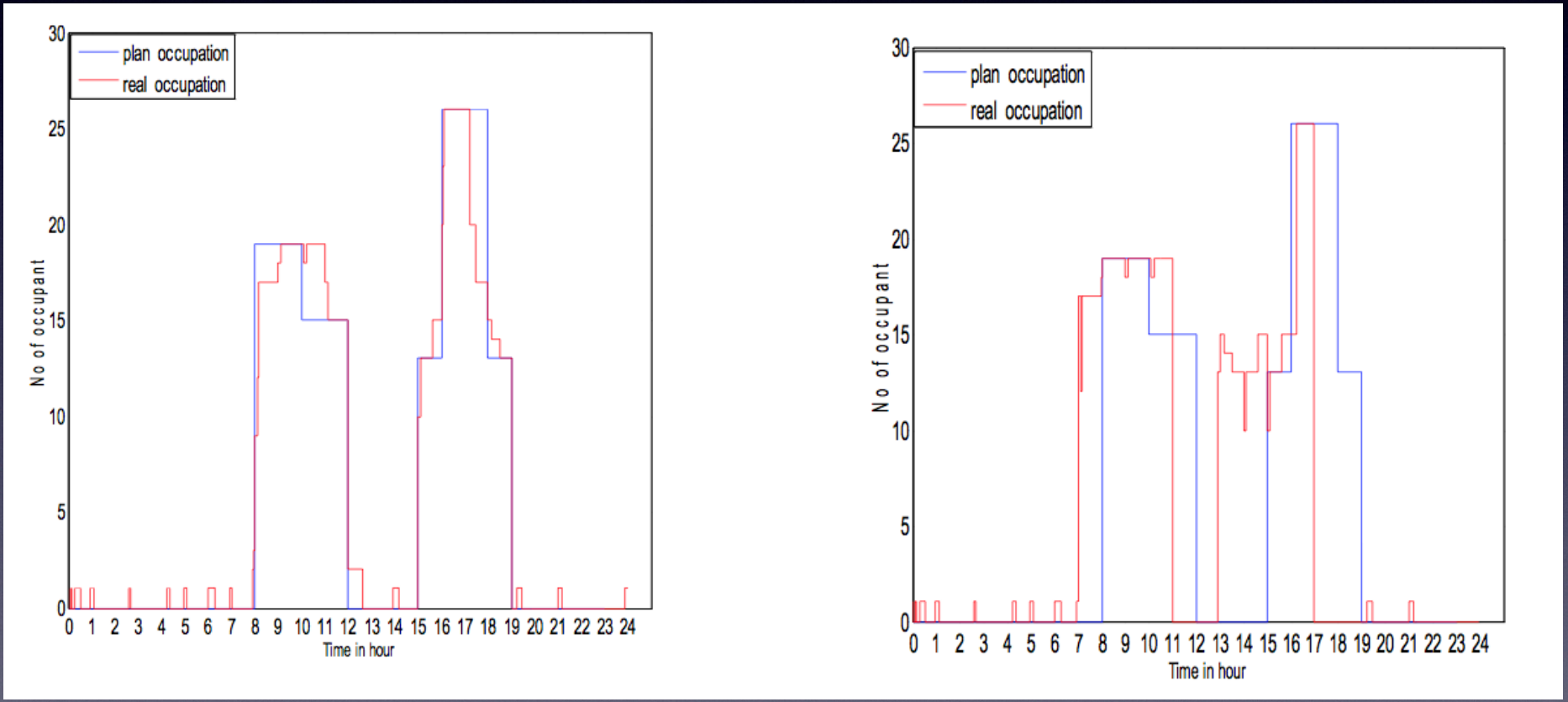
3rd Order Fine Simulation Model



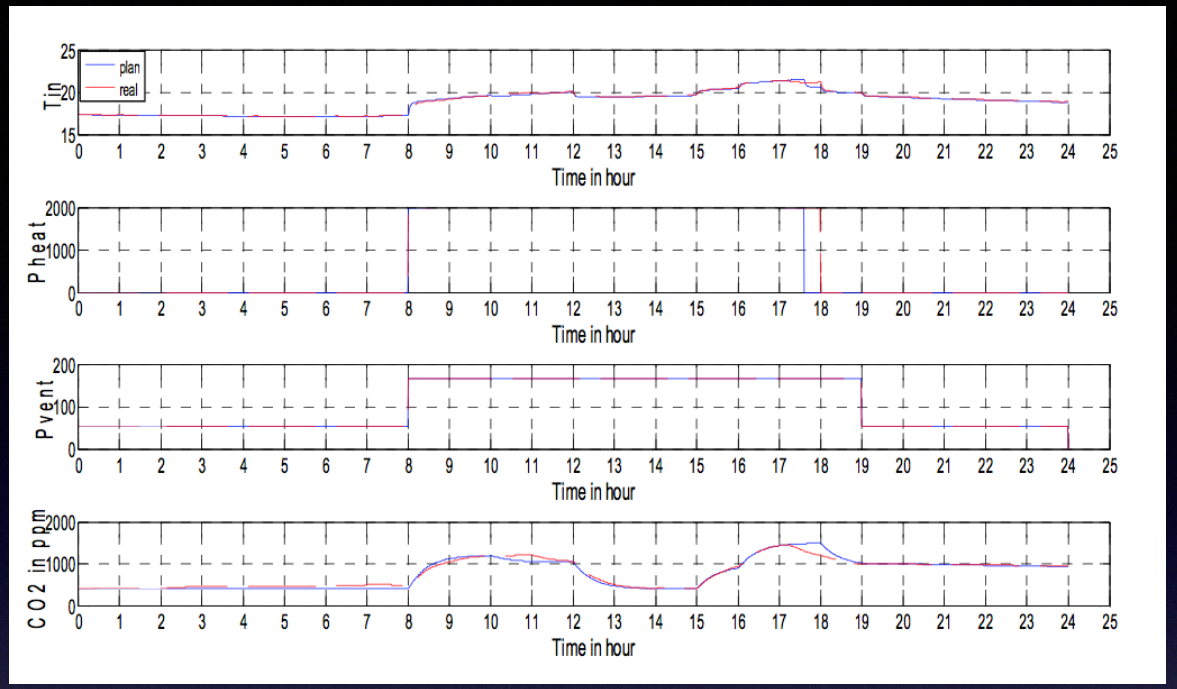
1st Oder Model for Plan Anticipation

Experiments And Results

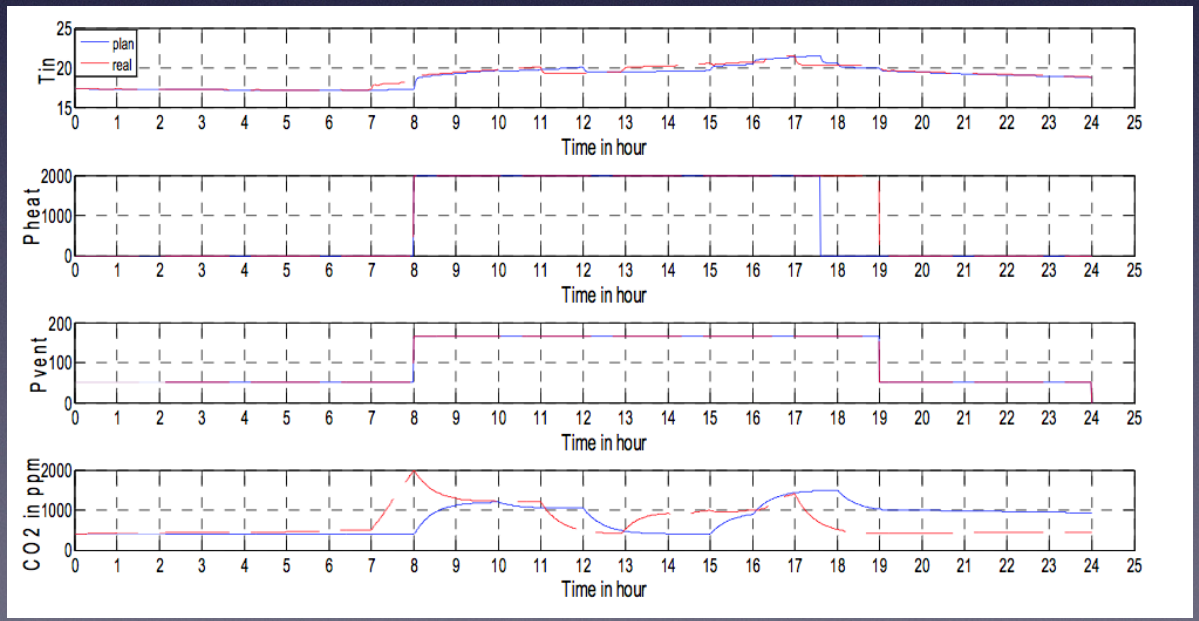
Discrepancy In Occupation-



Occupation profile for winter (a) small variation (b) large variation.

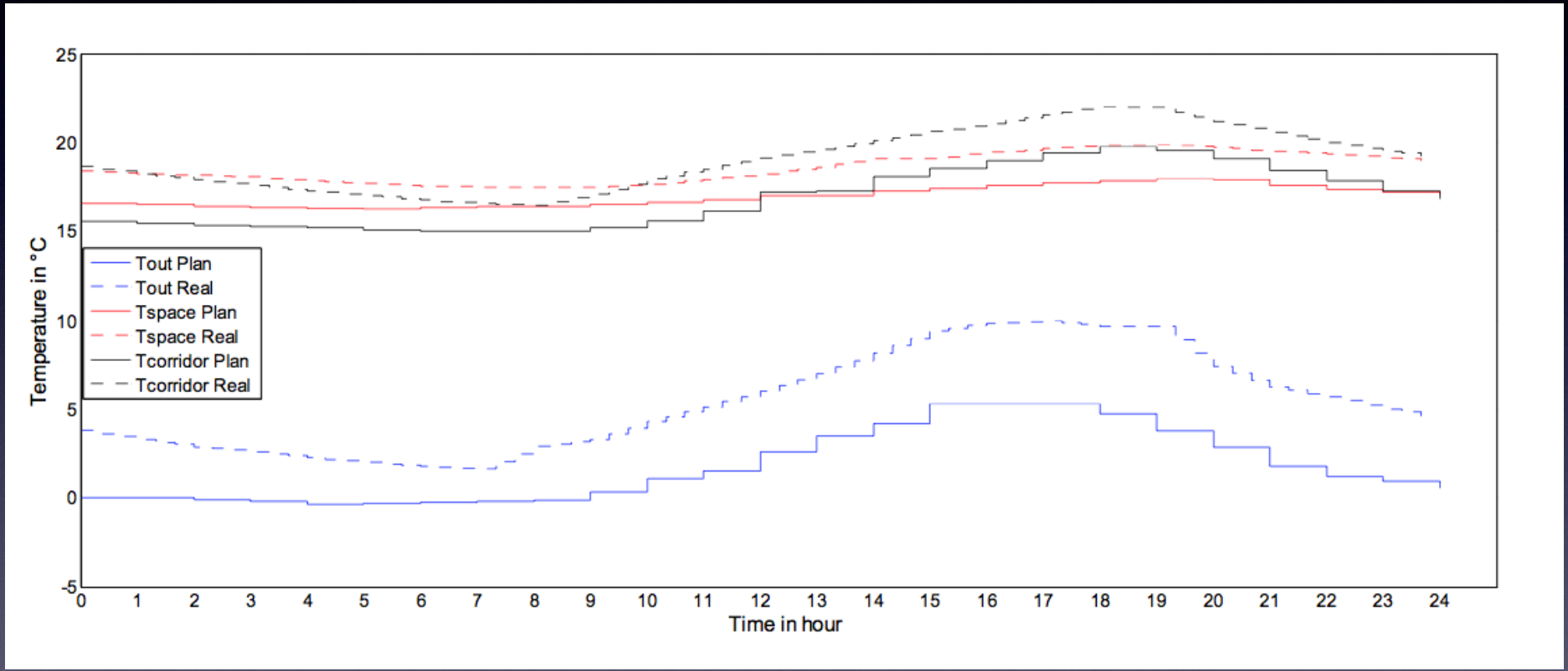


Planned and simulated result for small variation in occupation

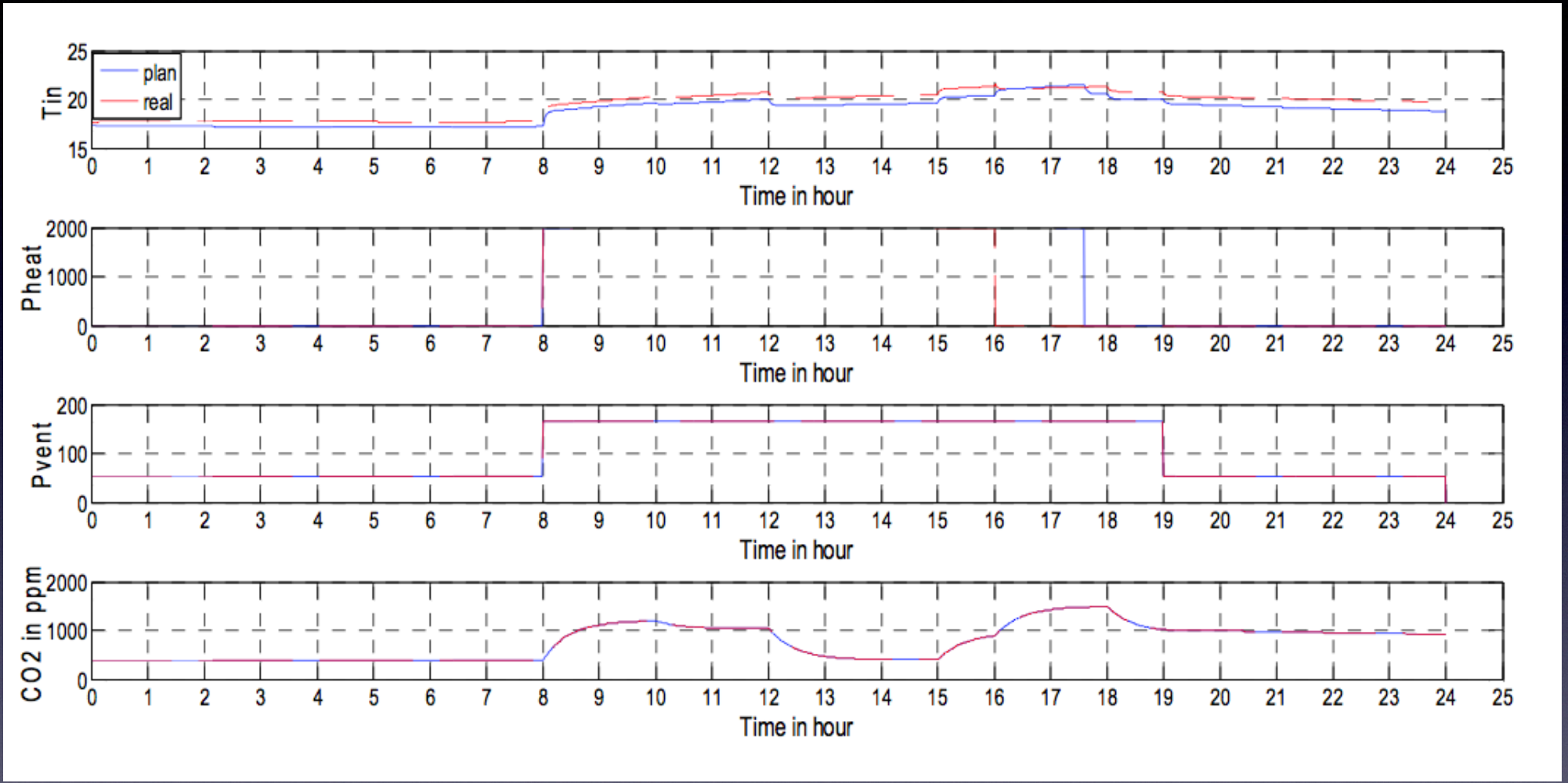


Planned and simulated result for large variation in occupation

Discrepancy in weather



Average variation in weather for a winter day



Planned and simulated result for variation in weather

Possible Solutions

Possible cause for discrepancy	Possible Variations			Possible solution
	CO2 Concentration	Energy cost	Inside temperature	
1-Positive variation in occupation profile	Positive	Positive	Positive	CO2 control Temperature control
2-Change in outside weather	No change	Positive/Negative	Positive/Negative	Temperature control
3-Use of unplanned appliances	No change	Positive/Negative	Positive/Negative	Compute the anticipative plan
4- Opening the doors or windows	Negative	Positive	Positive/Negative	CO2 control Temperature control

Explanation of discrepancies with possible solutions

THANKS

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