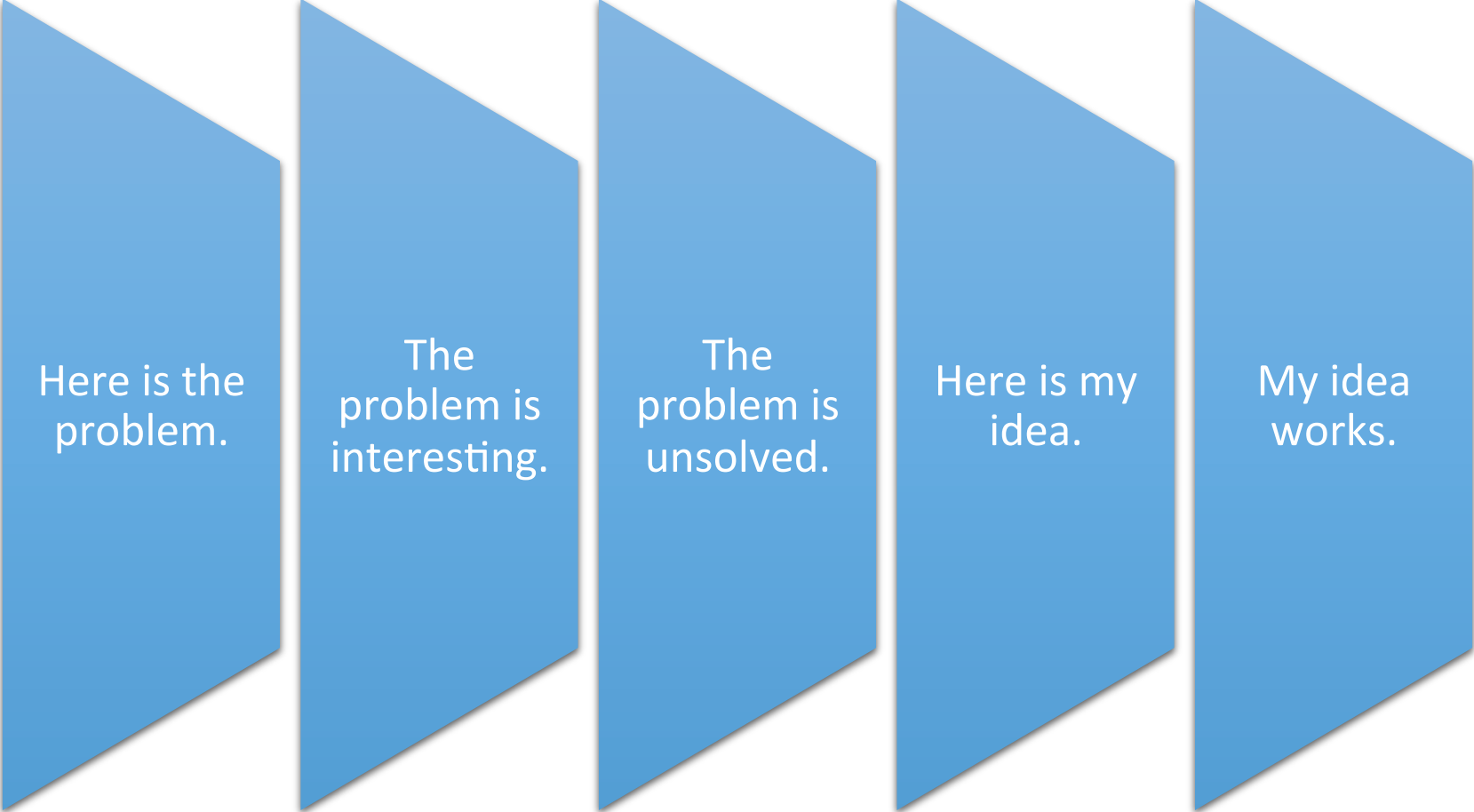


# A Brief Discussion about My Ongoing Work

Demand Response Mechanism in Colocation Data  
Center

# Outline



Here is the  
problem.

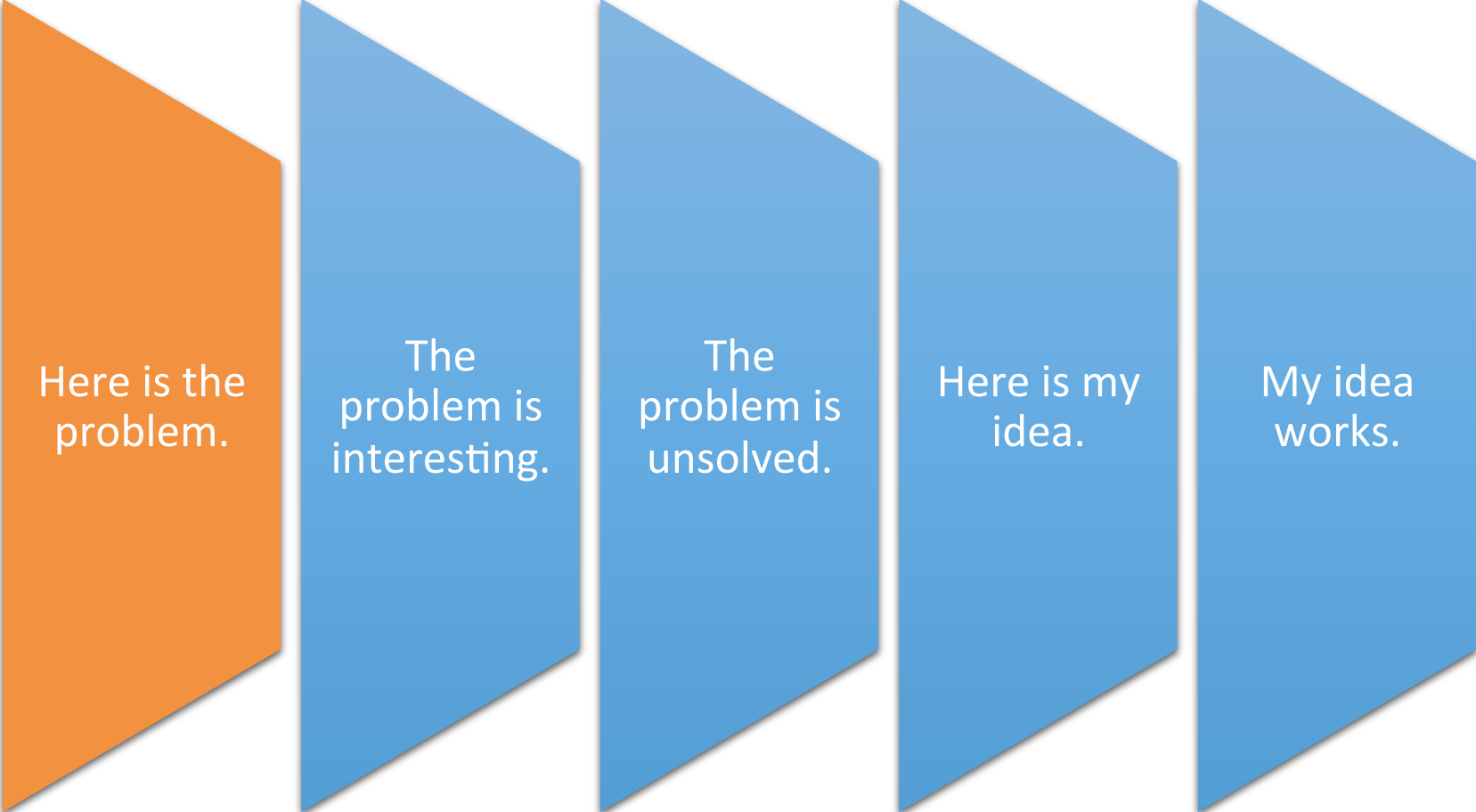
The  
problem is  
interesting.

The  
problem is  
unsolved.

Here is my  
idea.

My idea  
works.

# Section One



Here is the  
problem.

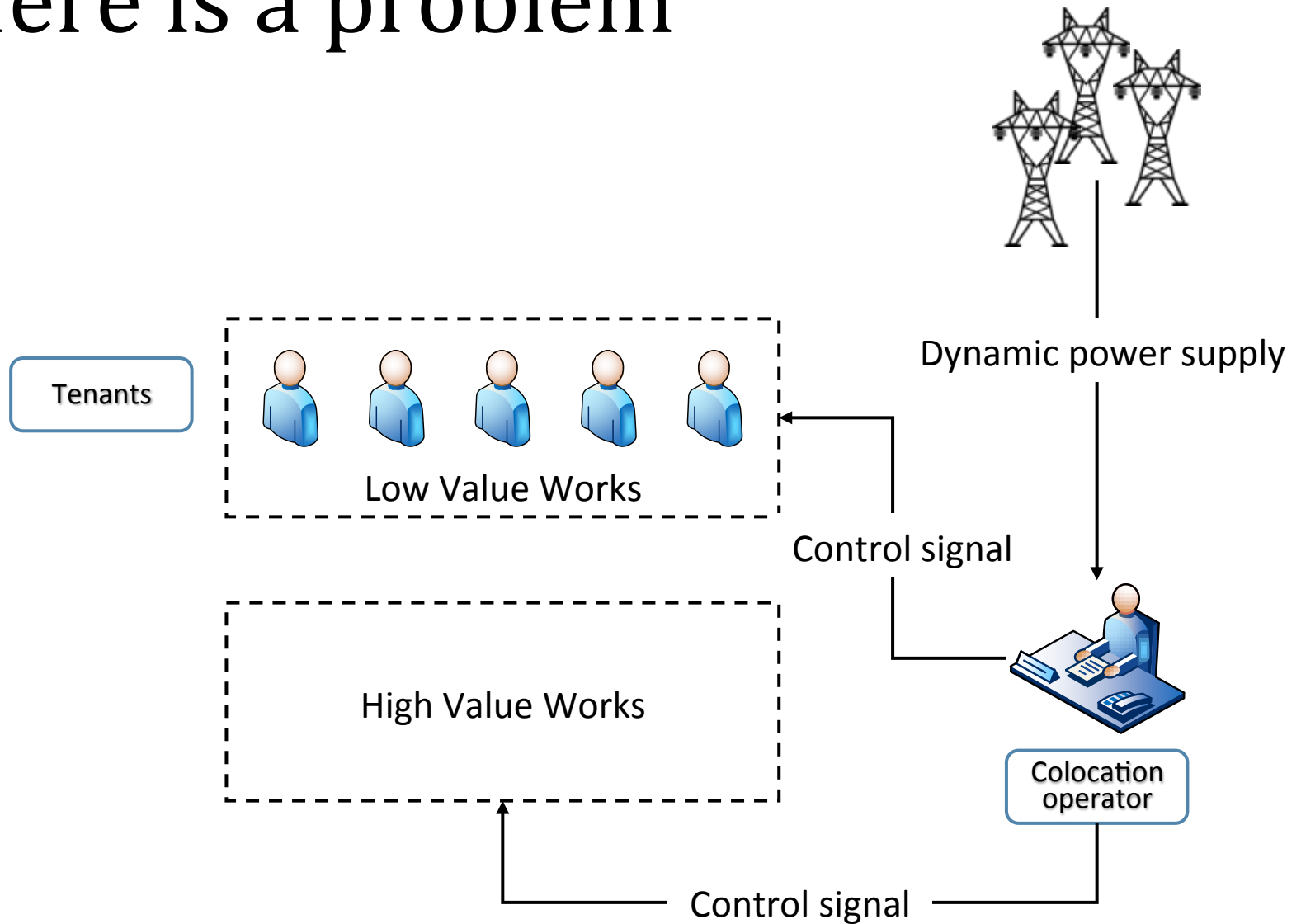
The  
problem is  
interesting.

The  
problem is  
unsolved.

Here is my  
idea.

My idea  
works.

# Here is a problem



# Colocation Data Center: Addressing Uncertain Power Supply

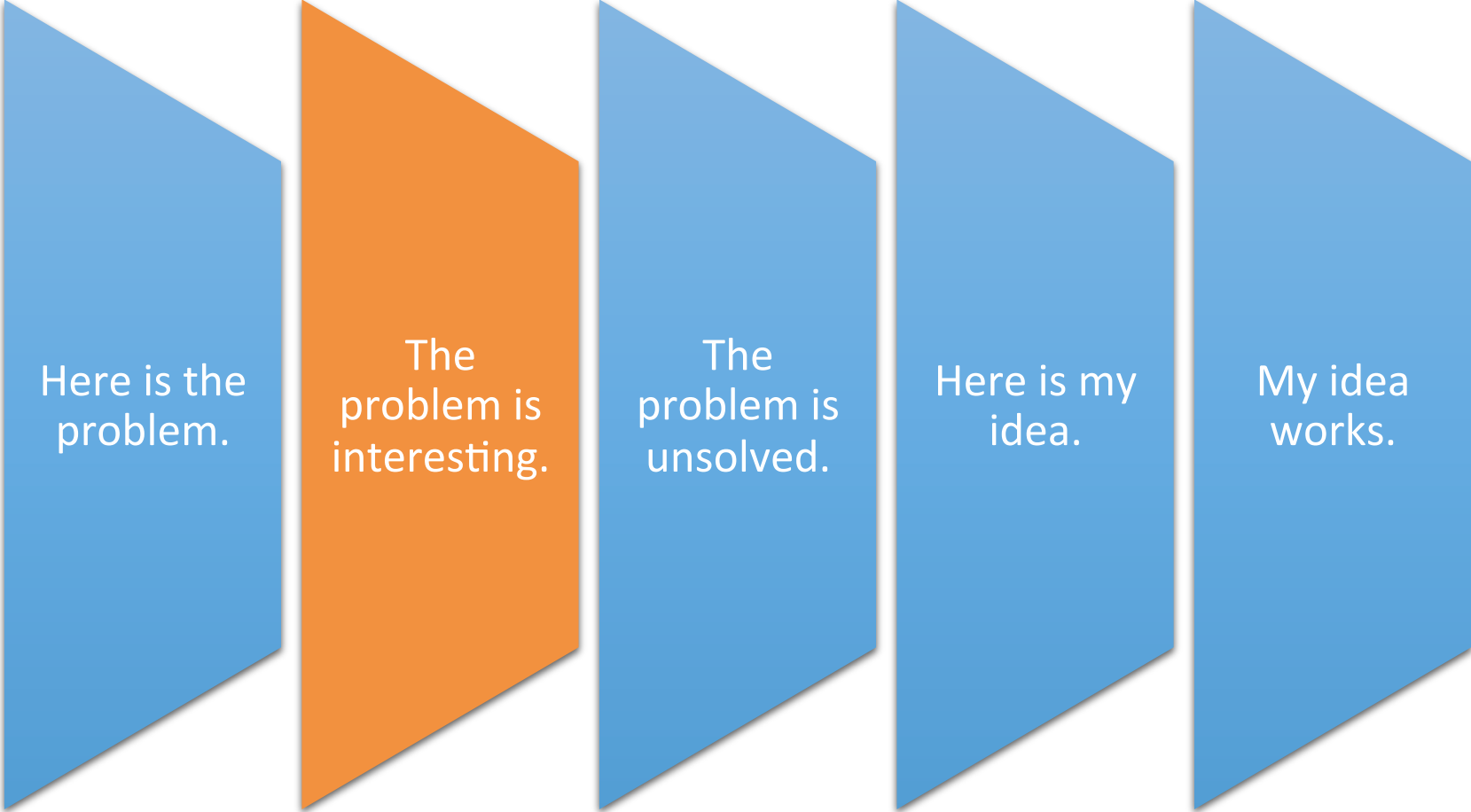
High value works and low value works are both running in a colocation data center

Power supply is uncertain

- The unknown time
- The unknown amount

Some of works have to be shut down and lose valuations

# Section Two



Here is the  
problem.

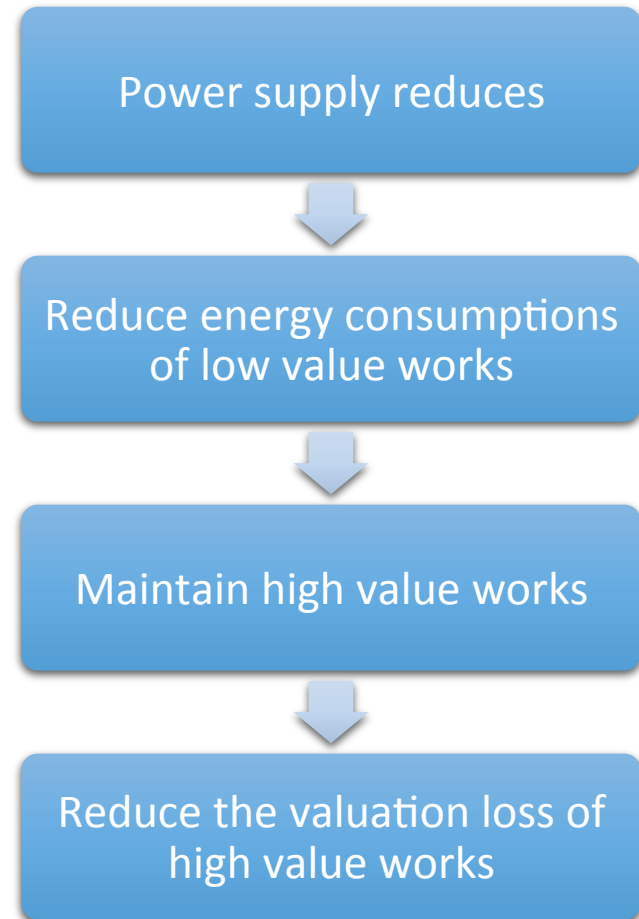
The  
problem is  
interesting.

The  
problem is  
unsolved.

Here is my  
idea.

My idea  
works.

# It's an Interesting Problem

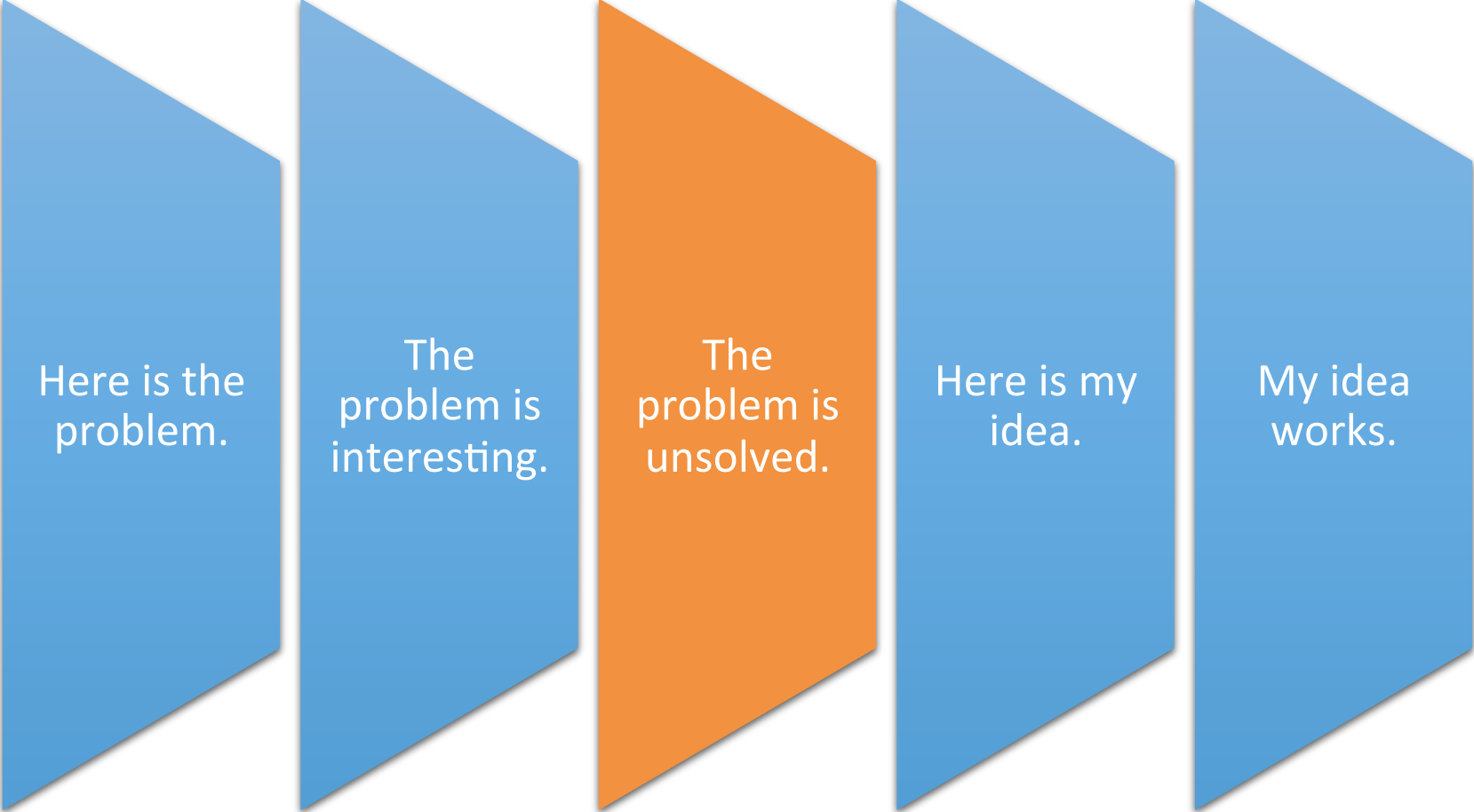


# Model

- We ask bidders to submit:
  - Bids
  - Maximal amounts of energy reductions
- We decide:
  - The winning bidders who reduce their energy consumptions
  - The prices of rewards for winning bidders
- We use reduced energy consumptions to maintain the high value works
- We give money to winning bidders for rewarding



# Section Three



Here is the  
problem.

The  
problem is  
interesting.

The  
problem is  
unsolved.

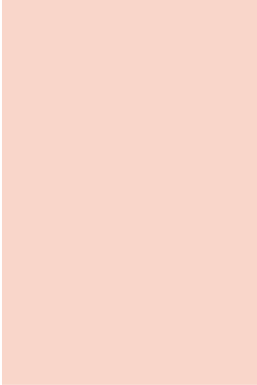
Here is my  
idea.

My idea  
works.

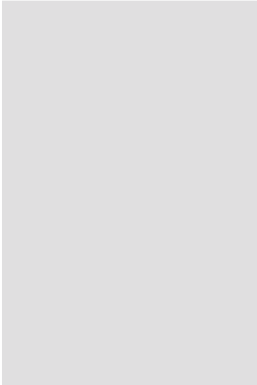
# Objectives and Challenges

- Dynamic power supply
  - Reductions of power supply dynamically happen
  - The amount of reduction is unknown
- Design objectives and challenges
  - Ensure truthfulness
  - Achieve reward fairness
  - Obtain performance bound

# It's an Unsolved Problem

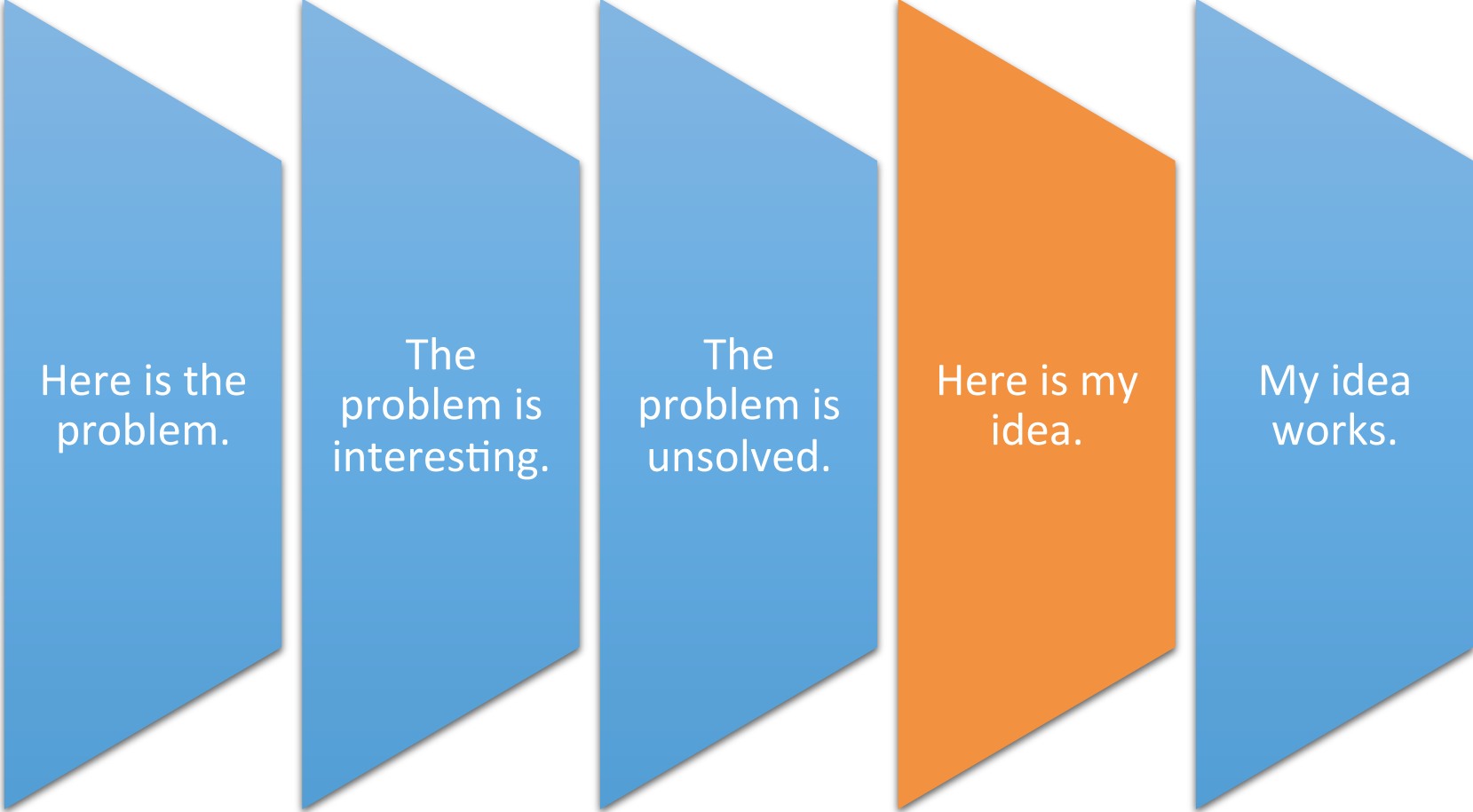


We achieve truthfulness  
when power supply is  
uncertain



No matter how many the  
actual power supply is, we  
achieve a welfare guarantee  
in expectation

# Section Four



Here is the  
problem.

The  
problem is  
interesting.

The  
problem is  
unsolved.

Here is my  
idea.

My idea  
works.

# Here is my idea

Guess the amount of total energy reduction



Select candidates from all bidders



Generate a random permutation of candidates



Assign energy reductions following the random permutation

# How about the Prices of Rewards?



The diagram consists of three horizontal bars of different colors (orange, reddish-brown, and grey) stacked vertically. To the left of each bar is a white circle with a thin grey outline. A thin grey line connects the top of each circle to the top-left corner of the bar it represents. The text is written in white on each bar.

Prices are decided before assigning

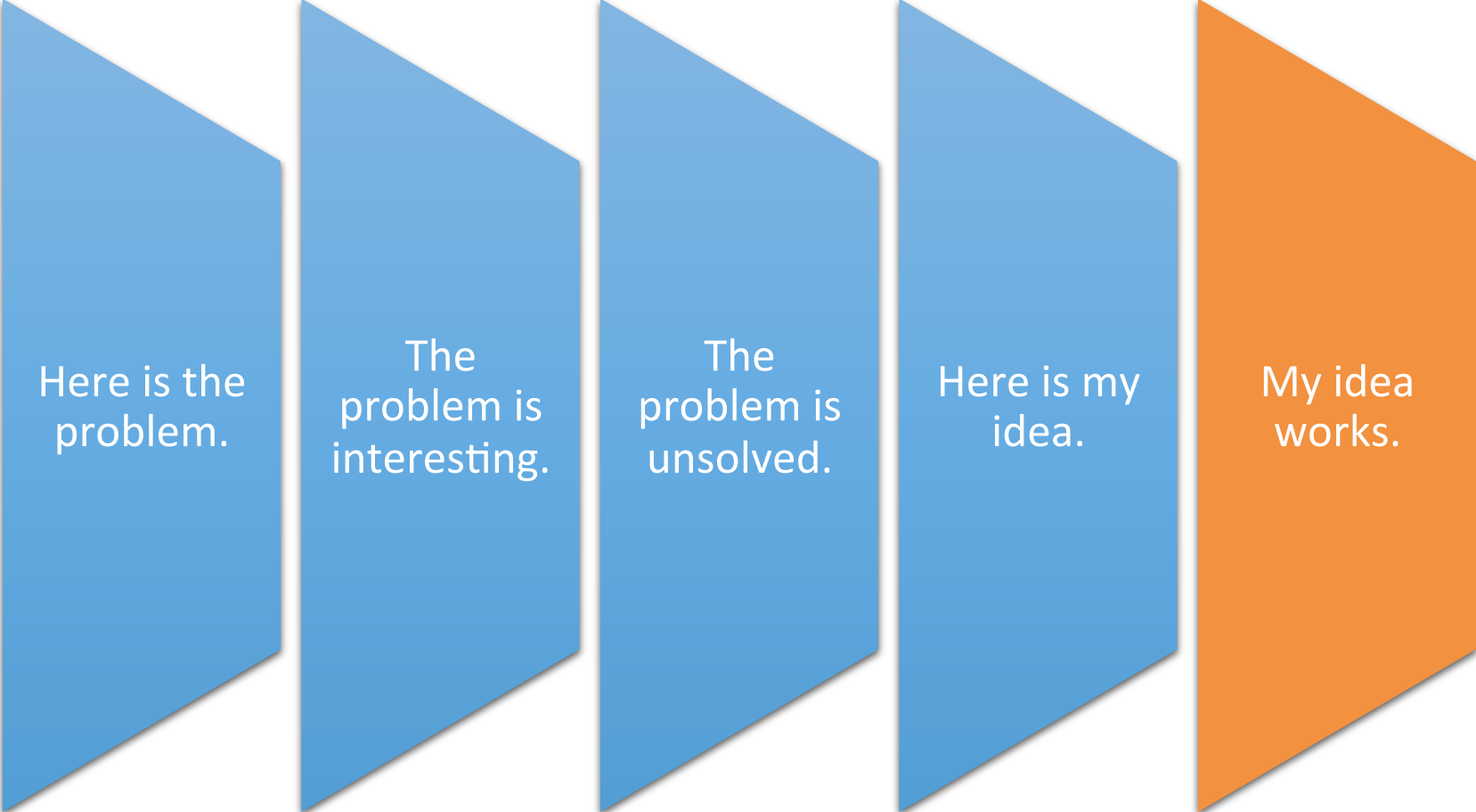
Prices are almost the same between winning bidders

Only reward bidders after reducing energy consumption

# How to Guess the Amount?

- Let  $m$  denote the maximal total amount of energy consumption which all bidders could reduce.

# Section Five



Here is the  
problem.

The  
problem is  
interesting.

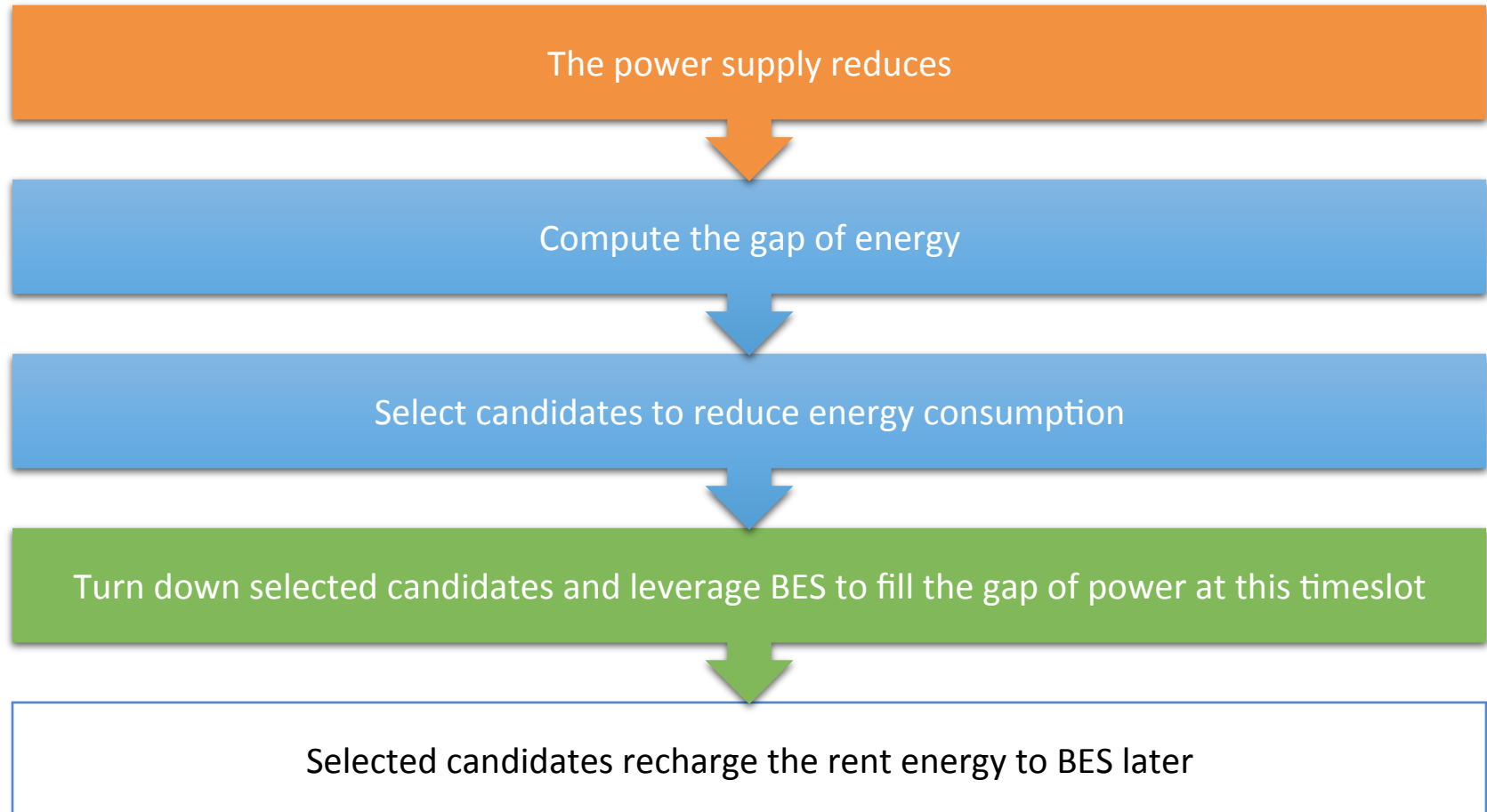
The  
problem is  
unsolved.

Here is my  
idea.

My idea  
works.



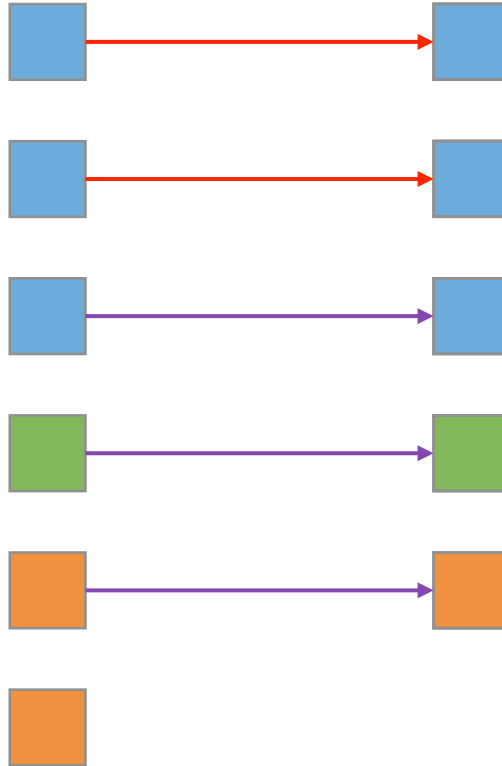
# What Happen When the Power Supply Dynamically Reduce?



Candidates are  
sorted by bids



Random  
permutation



Two units of energy  
reduction arrive

Three units of energy  
reduction arrive

No energy reduction,  
Waiting...

# How to Prove Performance Guarantee?