EASTMAN

ENERGY STAR AWARD 2014
PARTNER OF THE YEAR
Sustained Excellence

Electric Utility Connection Options

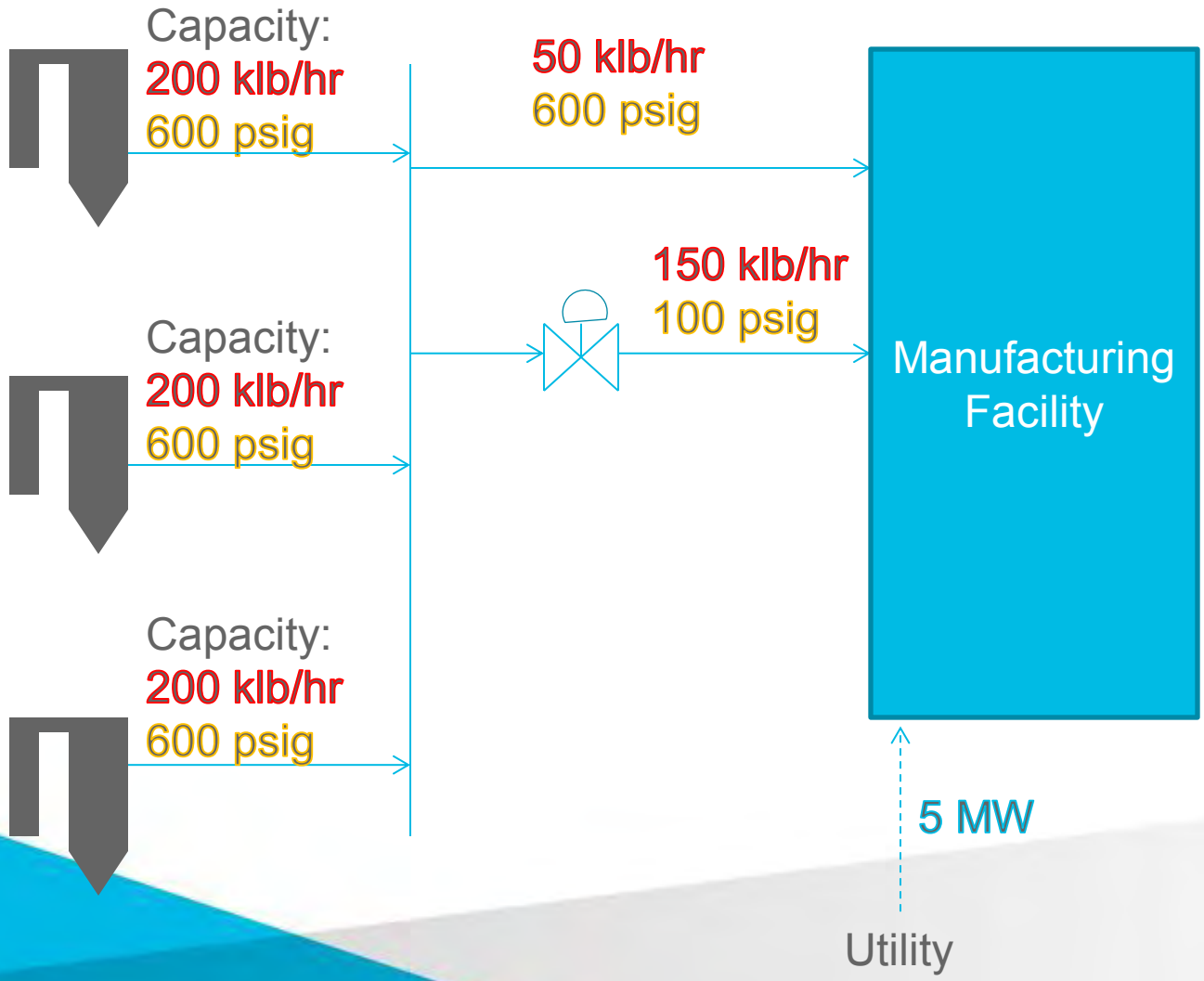
Jason Philpott
CIBO Technical Focus Group
September 16, 2014

Agenda

- Electric Grid Options
  - Buy all
  - Make/Buy
  - Make all
  - Sell all
  - Sell/Buy
  - Demand Response

EASTMAN

Your Facility As-Is



General Observations

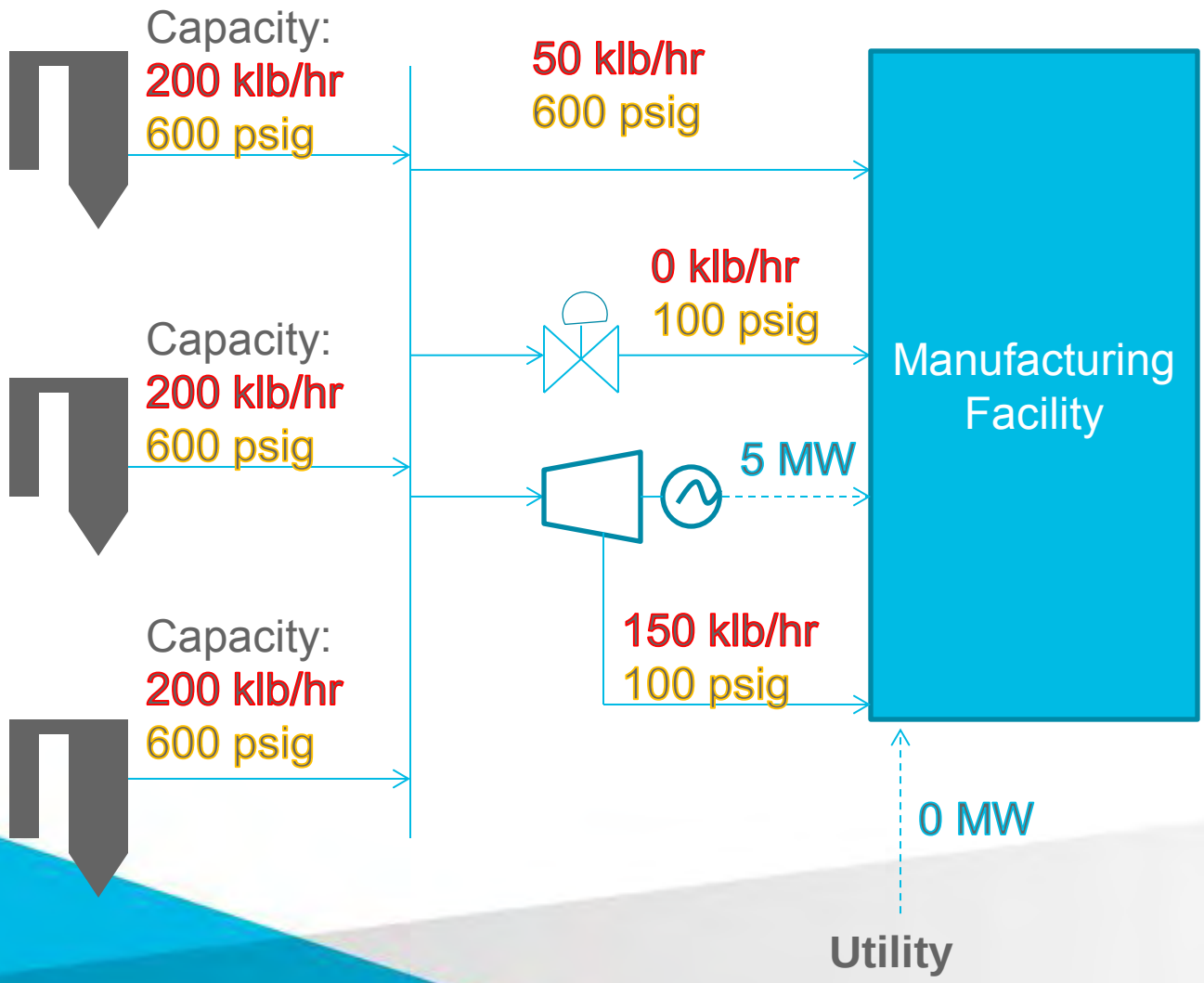
Excess Capacity
600 klb capacity
200 klb usage

Wasted Energy
150 klb reduced from 600# to 100#

Need to study TG options to reduce steam pressure and Utility Bill

EASTMAN

TG Option #1 (Make/Buy)



600#→ 100# gives ~1MW/30klb

Use PRV when steam load high & power load low

Use Utility when steam load low and power load high

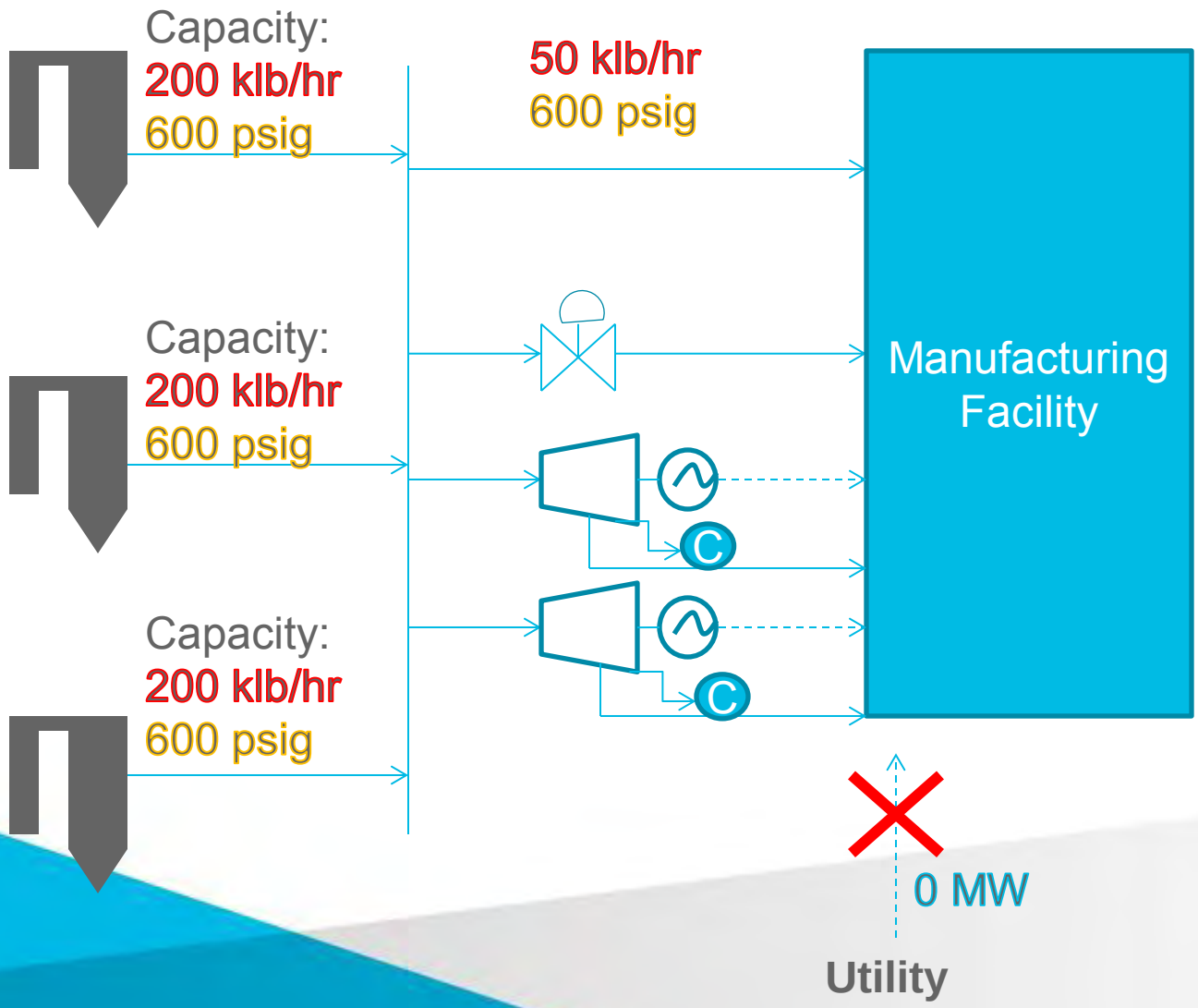
Use TG rack to control 100# header

EASTMAN

Change in Utility Bill

- Before generator
  - Energy Charge
    - $/kwh * monthly kwh = monthly energy charge
  - Capacity (Demand) Charge
    - Peak kW usage * demand charge = monthly capacity charge
      - Peak kW usage looks back at 12 previous months
- After generator
  - Energy Charge ~$0
    - Depends if you needed to buy any power that month
  - Capacity charge replaced by backup power contract (less $/kw than capacity) for times of TG maintenance.
    - Pay monthly fee (privilege of use) but only pay for capacity and energy during the month you use it instead of the next 12 months.

TG Option #2 (Island)



Need 2nd TG for reliability.

Use TG rack to control frequency

Automatic exciter controls for VARS (power factor)

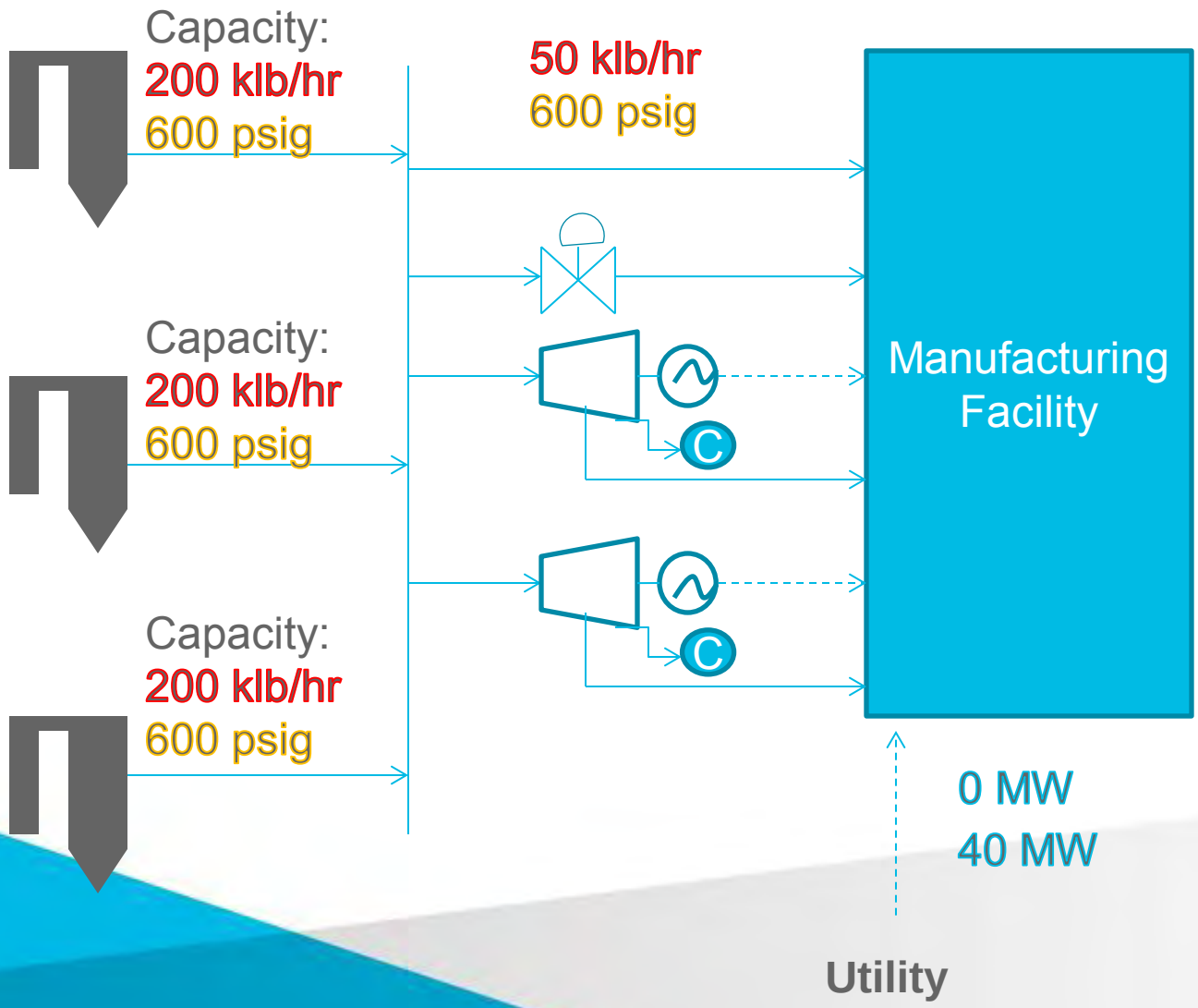
Need condensing section on TG's to control 100# header (or vent when pressure high and use PRV when low).

Black start capabilities?

Utility Bill = $0

EASTMAN

TG Option #3 (Sell)



100#→ condensate gives ~1MW/15klb

Can generate 45MW at full boiler capacity and 150klb/hr going to 100#

Grid provides frequency control

Extra water usage

Power contract depends on reg/de-reg & contracts/bid market

EASTMAN

Selling Power Contract

- "Selling all the time"
  - Bid into market (PJM, MISO) or use contracts to sell your capacity and energy
  - Still need 5MW backup power contract for emergency to avoid paying capacity fee for 12 months
    - Or you may decide it is worth not paying for this. You can take your chances that the power will be available when both TGs go offline (unplanned) and pay capacity fee for 12 months.
- "Buy all/Sell all"
  - Buy all 5MW for facility from grid
  - Sell all 45MW to grid
  - Done by some paper companies who can sell as "green" power
- Economic Dispatch
  - Can you price follow?
    - Can you cut back power production at night when power price are low?
  - If no flexibility, can you make enough money on peak to overcome to losses during off peak?

EASTMAN

Demand Response

- Can be used without owning a generator if you can curtail production. Or you can increase generation to reduce off take from grid.
- Emergency DR
  - Receive capacity payment for entire time you are available to be called
    - If never called, you receive payment without doing anything except being ready
  - Receive energy payment for actual time you are responding at full LMP (local marginal price)
- Economic DR
  - Bid into market.
  - Receive energy payment for amount you reduced
    - Utilities claim this is double dipping but you have to consider that they are losing production
  - Air Separation Plants like to do this since electricity is their main raw material

EASTMAN

Summary

- Make/Buy
  - Reduce/eliminate energy fee
  - Replace capacity fee with backup power contract
- Island
  - Eliminate Utility power bill
  - Added capital cost
- Sell
  - Economic dispatch
    - Can you make power cheaper than utility?
    - Can you follow pricing? Steam/power balance
  - Still pay backup power contract fee
- Demand Response
  - Emergency DR pays capacity payment all the time and energy payment when called upon
  - Economic DR pays energy payment when called upon

EASTMAN

Questions?

EASTMAN