THE Burns GROUP ENGINEERING AND CONSTRUCTION

The Philadelphia Navy Yard
A Window to the Energy Infrastructure of the Future

THE Burns GROUP ENGINEERING AND CONSTRUCTION

Presentation to IDEA

Campus Energy Conference Microgrid Workshop

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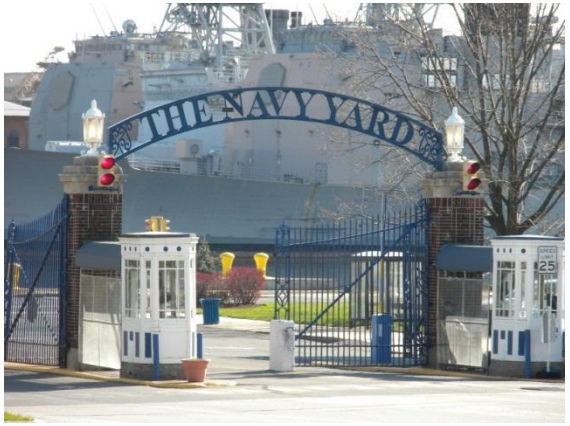


THE PHILADELPHIA NAVY YARD – A WINDOW TO THE ENERGY INFRASTRUCTURE OF THE FUTURE

INTRODUCTION

- Welcome
- Philadelphia Navy Yard Smart Microgrid
- The Role of “Micro” District Energy
- Conclusion

TOMORROW LAND FOR ENERGY GEEKS

THE NAVY YARD TODAY

- Over 120 companies and 3 Navy activities
- More than 10,000 employees
- In excess of 6.6 million SF occupied/ in development
- $700+ million of private investment
- Industrial, Office and R&D campus

PHILADELPHIA NAVY YARD GRID

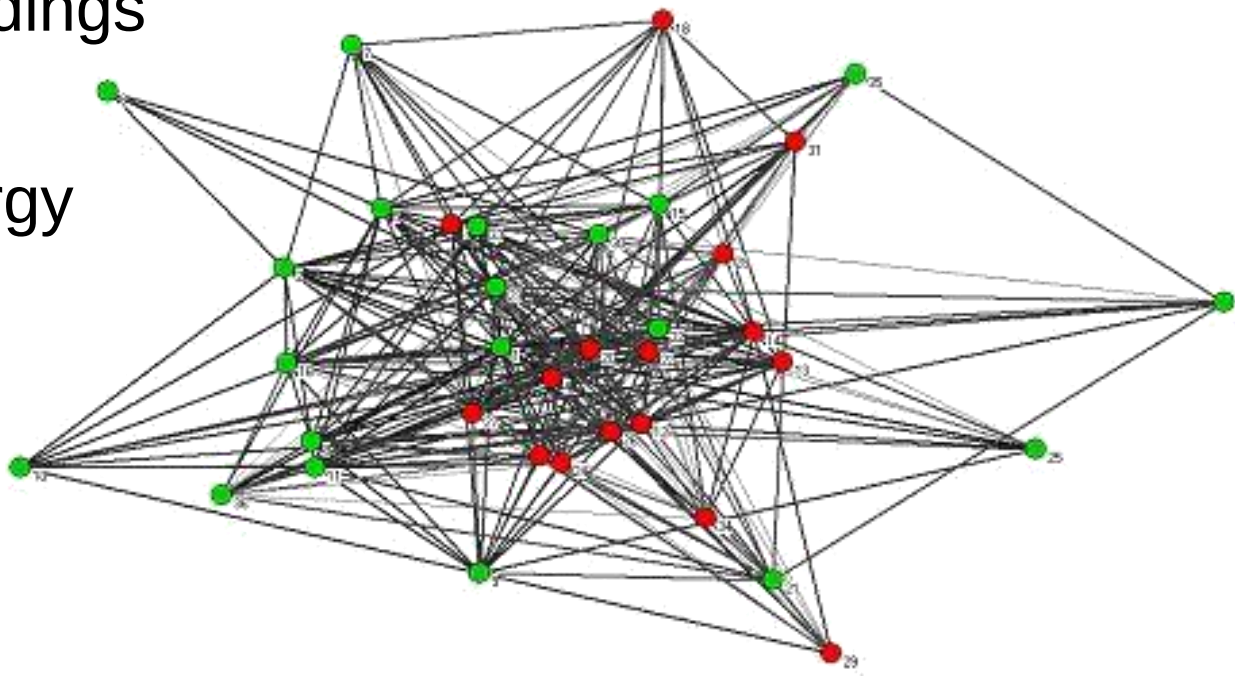
- Independent, Unregulated, Constrained, and Antiquated (100 y.o)
- Dynamic Growth: 30 MW to 70 MW and 6 msf to 12 msf by 2022
- Vision: “Smart Energy Campus”, Reduced Carbon, Low Energy Costs, Resilience
- The Owner - Philadelphia Industrial Development Corp (PIDC) - needed a plan

PHILADELPHIA NAVY YARD GRID


trends

MICRO ENERGY TRENDS

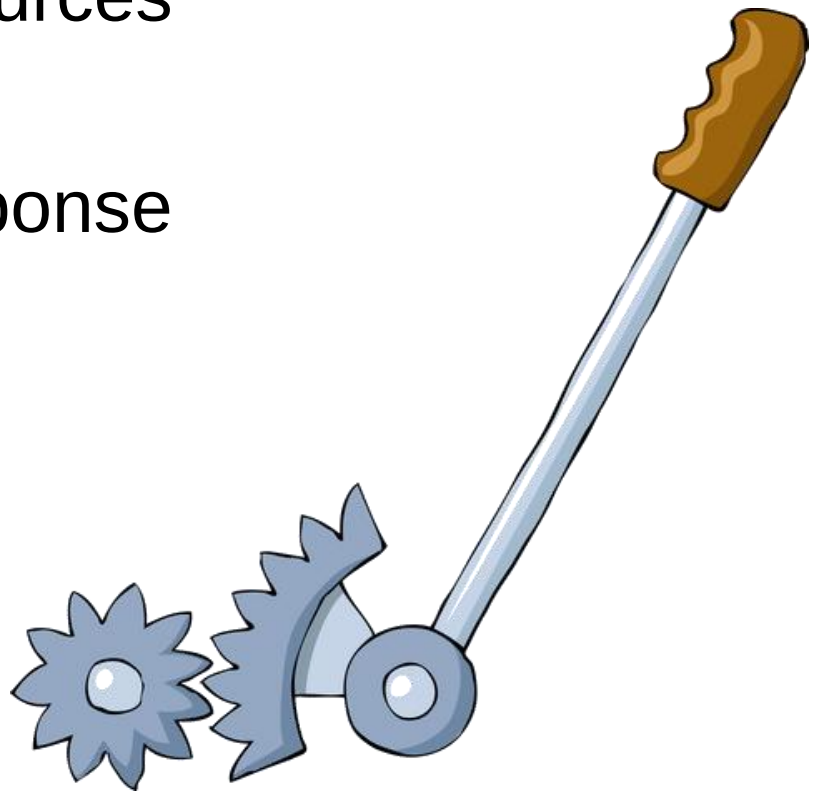
- Smart Systems
- Smart Buildings
- The Prosumer
- Net Positive Buildings
- Microgrids
- Transactive Energy



SYSTEMS APPROACH

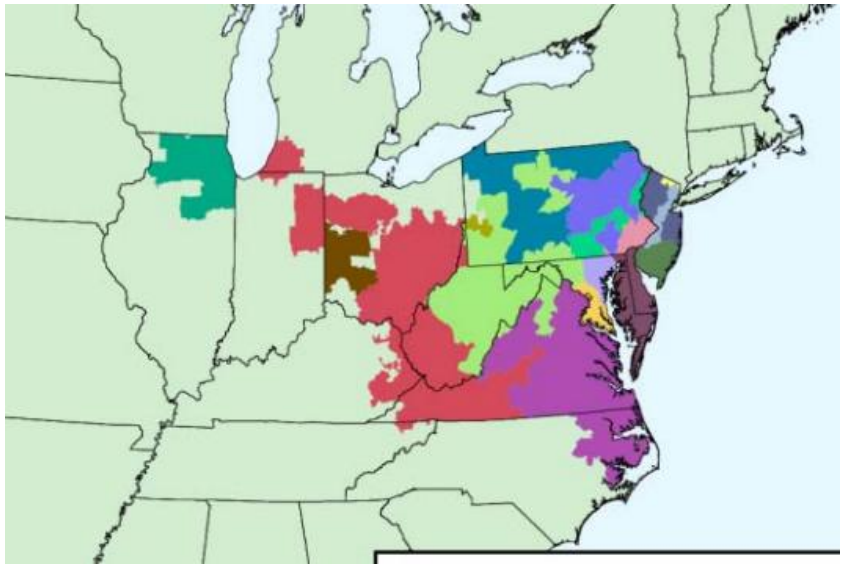
TOOLS TO LEVERAGE

- What's In Your Tooklit?
  - Distributed Energy Resources
  - Micro District Energy
  - Automatic Demand Response
  - Innovative Tariffs
  - New Business Models
  - Third Party Capital
  - Energy Markets (PJM)

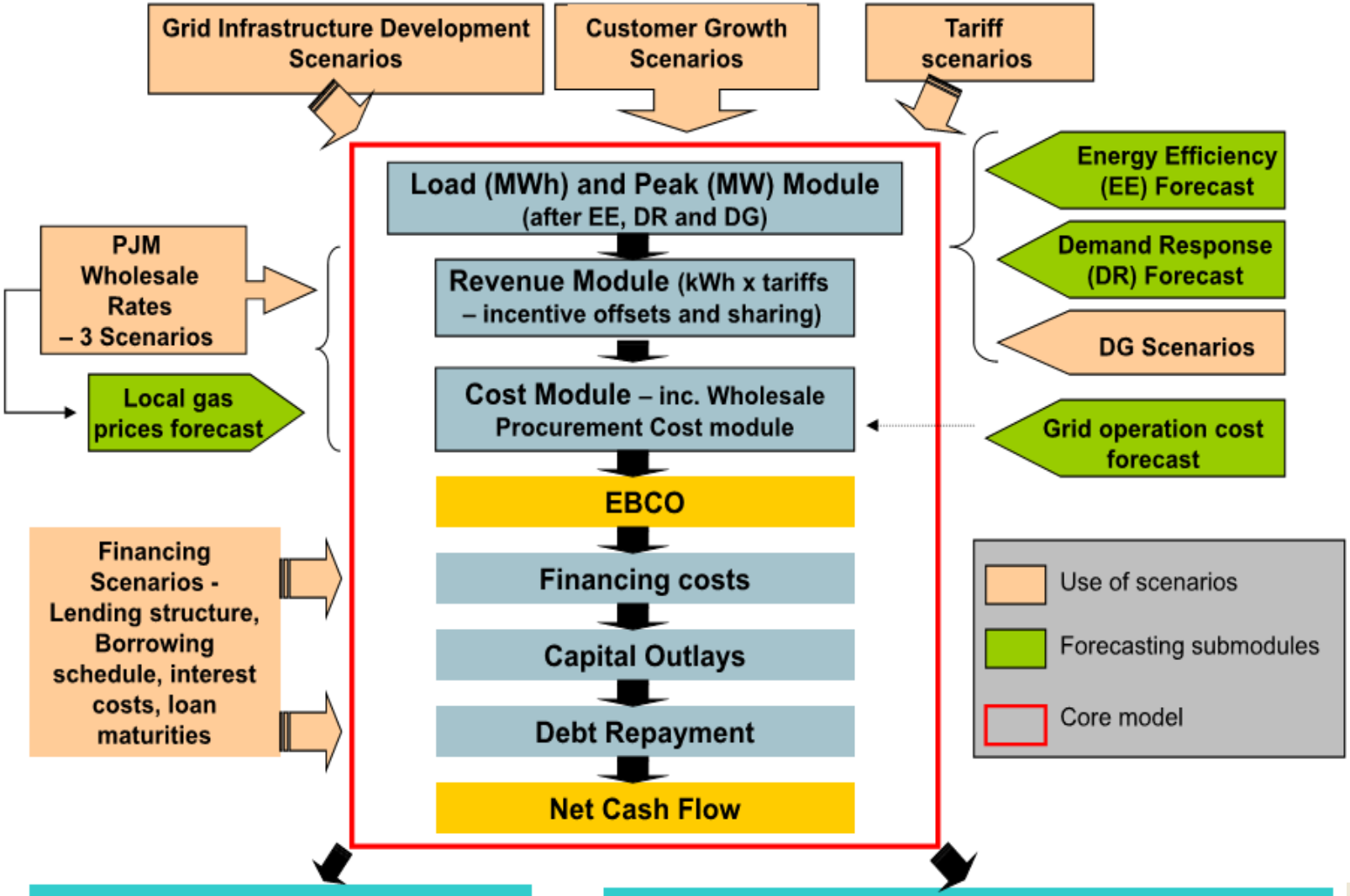


LEVERAGING ENERGY MARKETS

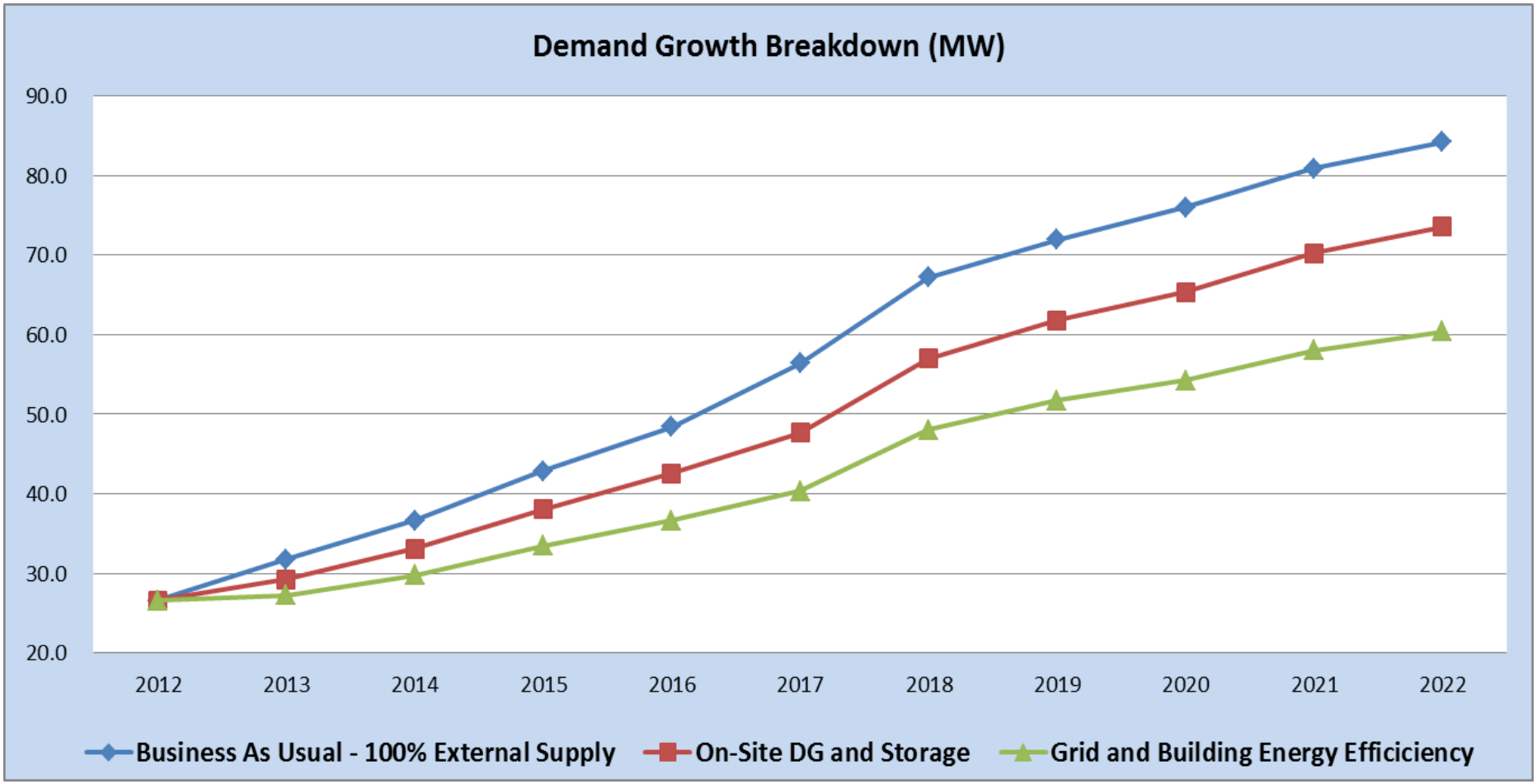
- Energy Markets
  - Day-Ahead
  - Real-Time
- Ancillary Services
  - Synchronized Reserves
  - Regulation
  - Black Start Service
- Demand Response
  - Emergency
  - Economic



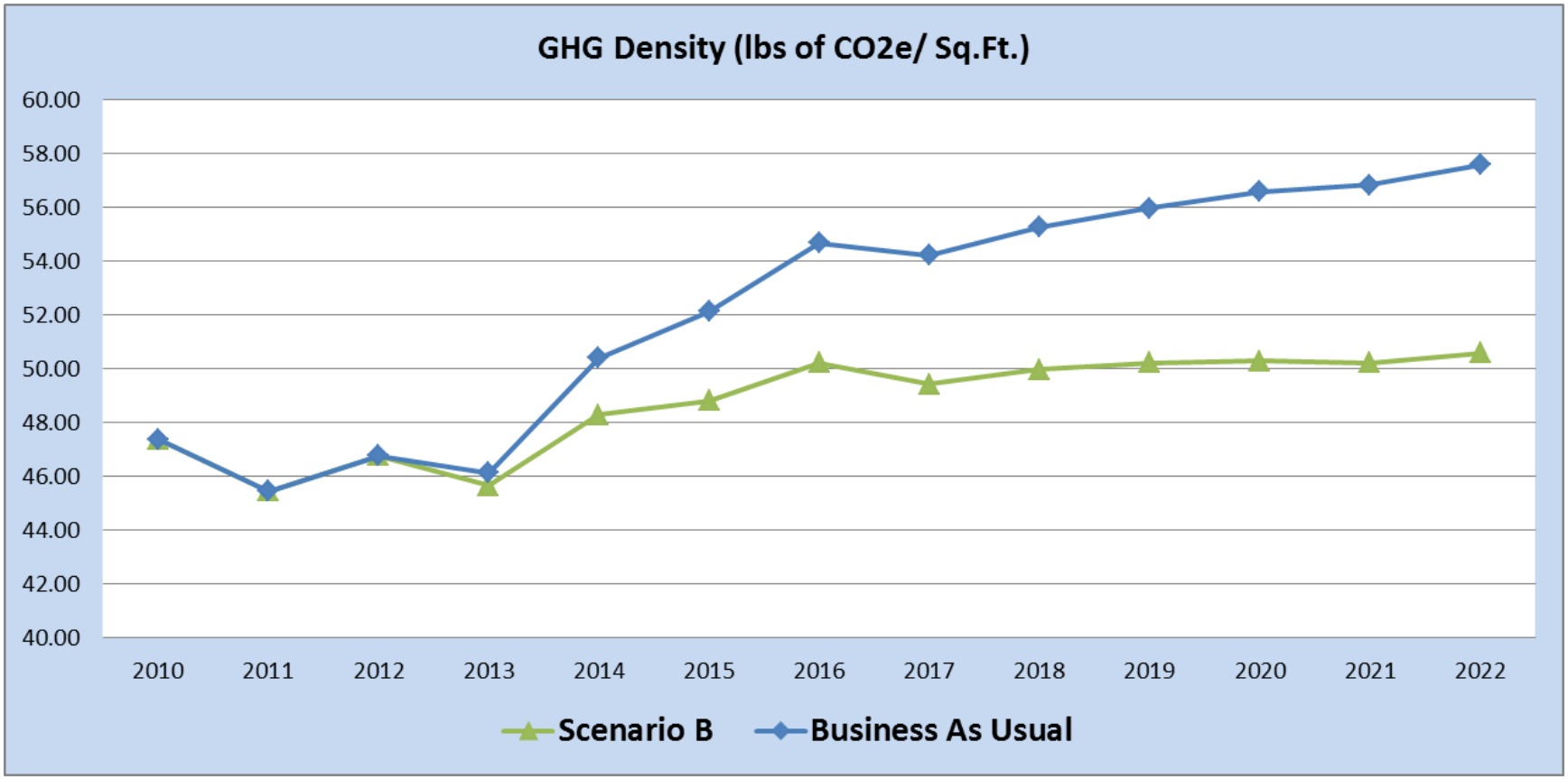
NAVY YARD FINANCIAL MODEL



NOT BUSINESS AS USUAL



SUSTAINABLE GROWTH PLAN



PHILADELPHIA NAVY YARD GRID

- Plan Implementation Underway - Phase 1
  - Meters, Communications, NOC
  - Distributed Energy Resources
    - 6 MW Peaker (Recips)
    - Renewables (PV)
    - Micro District Energy
  - Evaluating/Testing Battery Storage (GridStar)

KEEPING BUILDINGS IN LINE

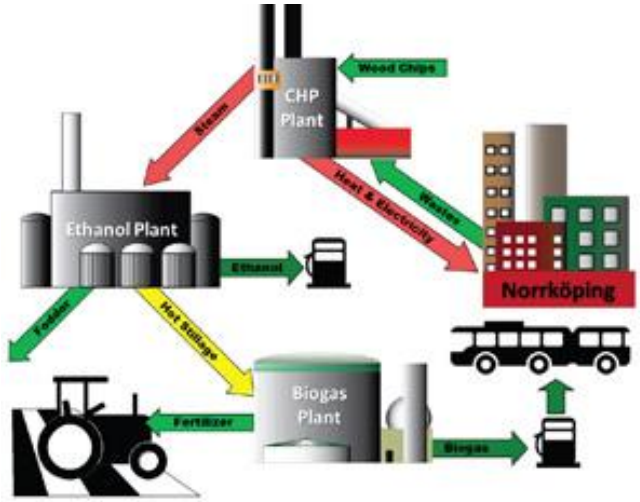
- Monitoring-Based Commissioning (MBCx)
  - Aka Fault Detections & Diagnostics (FDD) or Continuous Commissioning
  - More mature, new entrants
- Automated Demand Response
  - “Jace” based, multi-year single-site track record
  - Software technology embedded in off the shelf BMS controllers; uses Artificial Intelligence, local weather data
- Building Operating Systems: The “next level”

GENERATION AND STORAGE

- Peak Power
- CHP
- Renewables
  - Community Solar
- Fuel Cells
- Energy Storage
  - Batteries
  - Thermal

MICRO DISTRICT ENERGY

- CHP serving a small group of buildings
- Opens up possibilities and applications for CHP
- Urban Outfitter Campus within the Navy Yard
- System could provide thermal energy and backup power to URBN and others while also alleviating electrically constrained substation in the Navy Yard



- Economic justification aided by avoided CAP-EX for substation expansion as well as market plays
- Could play significant role as build out occurs

CONCLUSION

A Window to the Energy Infrastructure of the Future

- Technology innovation
- Machine to machine and the “internet of things”
- Microgrids, multi-directional energy flows and “prices to devices”
- New markets, business models and paradigms

The lesson? Embrace change…it’s coming to a neighborhood near you!