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Pragmatic Approach to Implementing CHP and Solar at a Small University

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Agenda

1. Introduction
2. Microgrid Opportunity at Gallaudet
3. Due diligence challenges
4. Phased due diligence approach
5. Lessons learned
6. Questions

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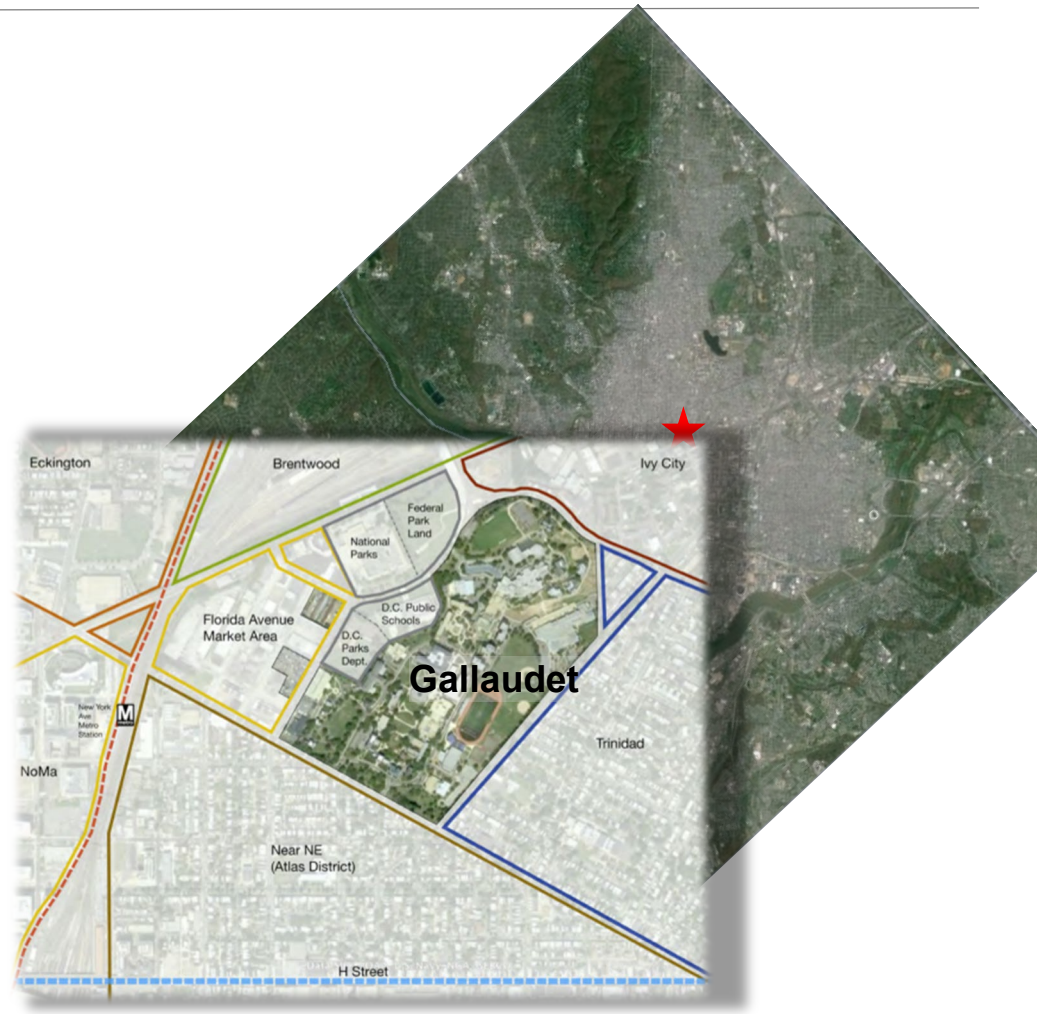
Gallaudet University

Gallaudet is the only university in the world which tailors all programs for deaf and hard of hearing students

- Charter signed by Abraham Lincoln in 1864
- ~2,000 students (graduate, undergrad, HS, and elementary)
- Ninety-nine acres in Near-Northeast DC
  - ½ mile East of NoMa-Gallaudet Metro station and 1 mile north of Union Station
- 40 Buildings, ~2 million sf



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Existing Central Plant

Central plant provides steam and chilled water to most campus buildings

- Heating
  - High pressure steam boilers
  - Heating capacity: 72,000 MBH
- Cooling
  - Electric centrifugal chillers
  - Cooling capacity: 4,500 tons
- Electricity
  - Electricity is distributed to campus via four 13.2 kv utility feeders
- Gallaudet owns all distribution infrastructure
- Annual budget to procure energy and provide central plant O&M: **~$7 million**

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Opportunity to expand central plant

In the Fall of 2015 Gallaudet began exploring potential to generate electricity on-site via CHP and solar PV.

Project objectives:

- **Improve financial health of university**
  - Reduce utility costs
  - Address growing backlog of deferred maintenance
  - Free up capital for other projects
  - Potentially sell energy services to neighboring properties
- **Create educational and employment opportunities for students**
- **Demonstrate institutional leadership**
  - Increase operational resiliency in event of grid outage
  - Reduce GHG emissions associated with Gallaudet's operations
  - Help address energy infrastructure needs of adjacent development projects

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Initial effort to evaluate project feasibility was unsuccessful

Lacking in-house expertise, Gallaudet elected to contract out project feasibility study.

- **Constrained Budget:** Given high probability of project being shelved, budget for initial feasibility study was capped at **$50k**
- **Extensive Scope:** Proposed scope of initial feasibility study was based on EPA's CHP Partnership guidelines for Level 2 feasibility study

- Released RFP for initial feasibility study in Feb 2016
  - Sent to six firms with extensive experience in CHP and Microgrids
- Two teams responded
  - Proposals ranged from **$180k to $230k**

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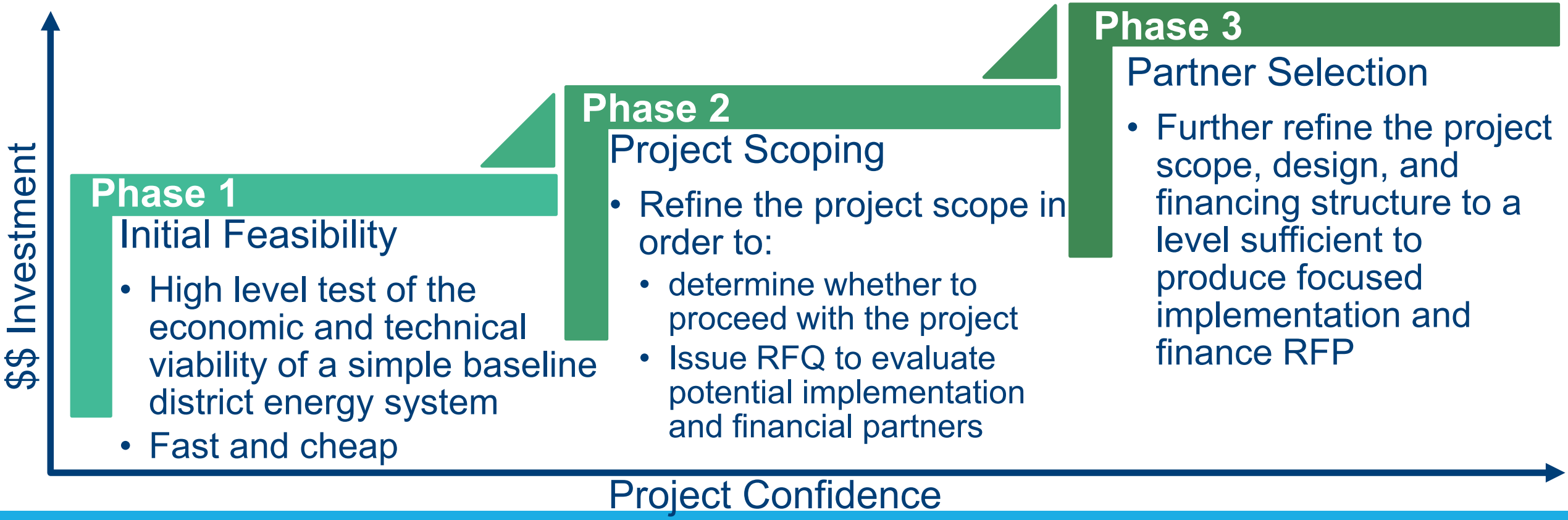
Phased approach to due diligence

Began working with Urban Ingenuity in Spring of 2016

Proposed phased approach to tie due diligence costs to level of uncertainty



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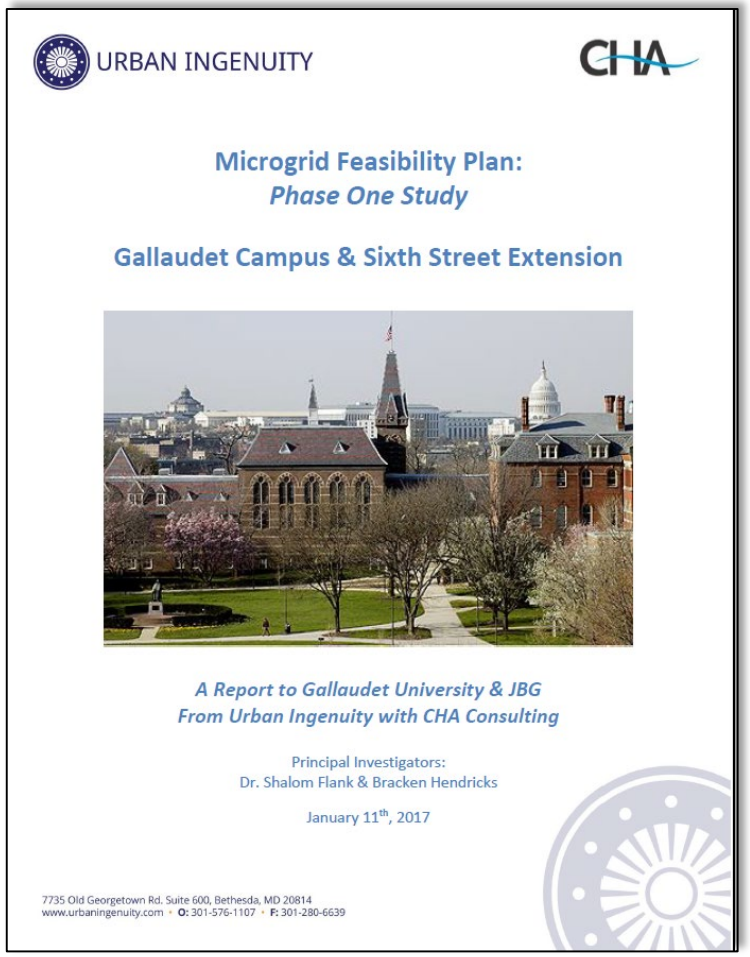
Phase 1: Initial Feasibility Study

Initial Feasibility Study verified that an "Existence Proof" Microgrid at Gallaudet was:

- ✓ Financially Self Sustaining
- ✓ Low Technical Risk
- ✓ Clearly Beneficial



Note: Initial introduction between Urban Ingenuity and Gallaudet was supported by a microgrid contract from the DC Government

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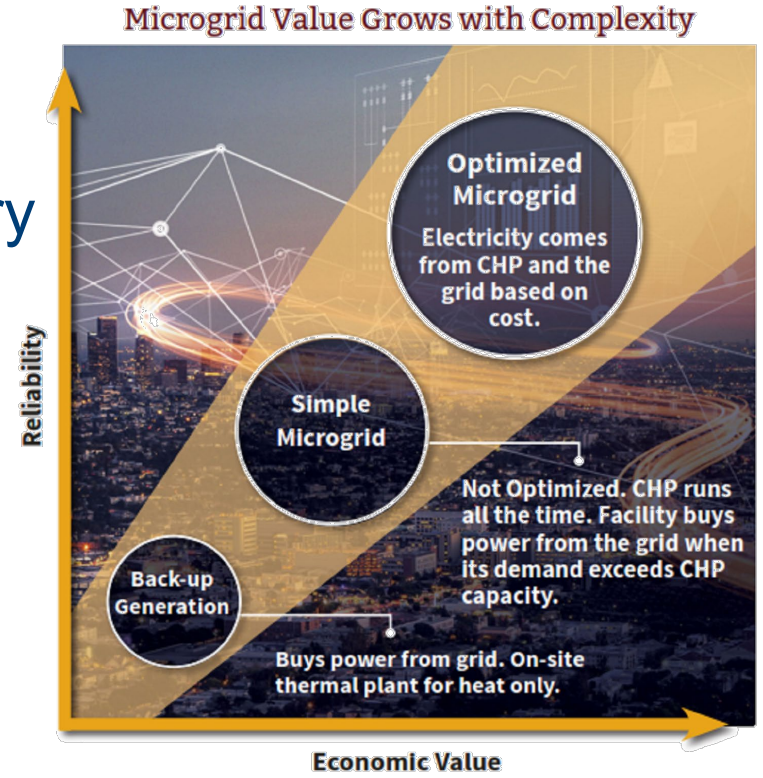
Lessons Learned: "Existence Proof" System

☒ **DON'T: Attempt to fully design the system**

☑ **DO: Use standard design parameters that can easily be assessed for financial and engineering feasibility:**

- CHP – Two 2MW recip natural gas engines
  - Middle-of-the-road HRSG and hot-water heat recovery
  - Two 200-ton single-effect absorption chillers
- Keep existing steam and chilled water systems
- PV – 2 MW rooftop system, Helioscope-only analysis
- Ignore other potential benefits (avoided capital costs, thermal storage, grid sales, competitive grants, etc.)
- **SYSTEM ONLY GETS BETTER FROM HERE**



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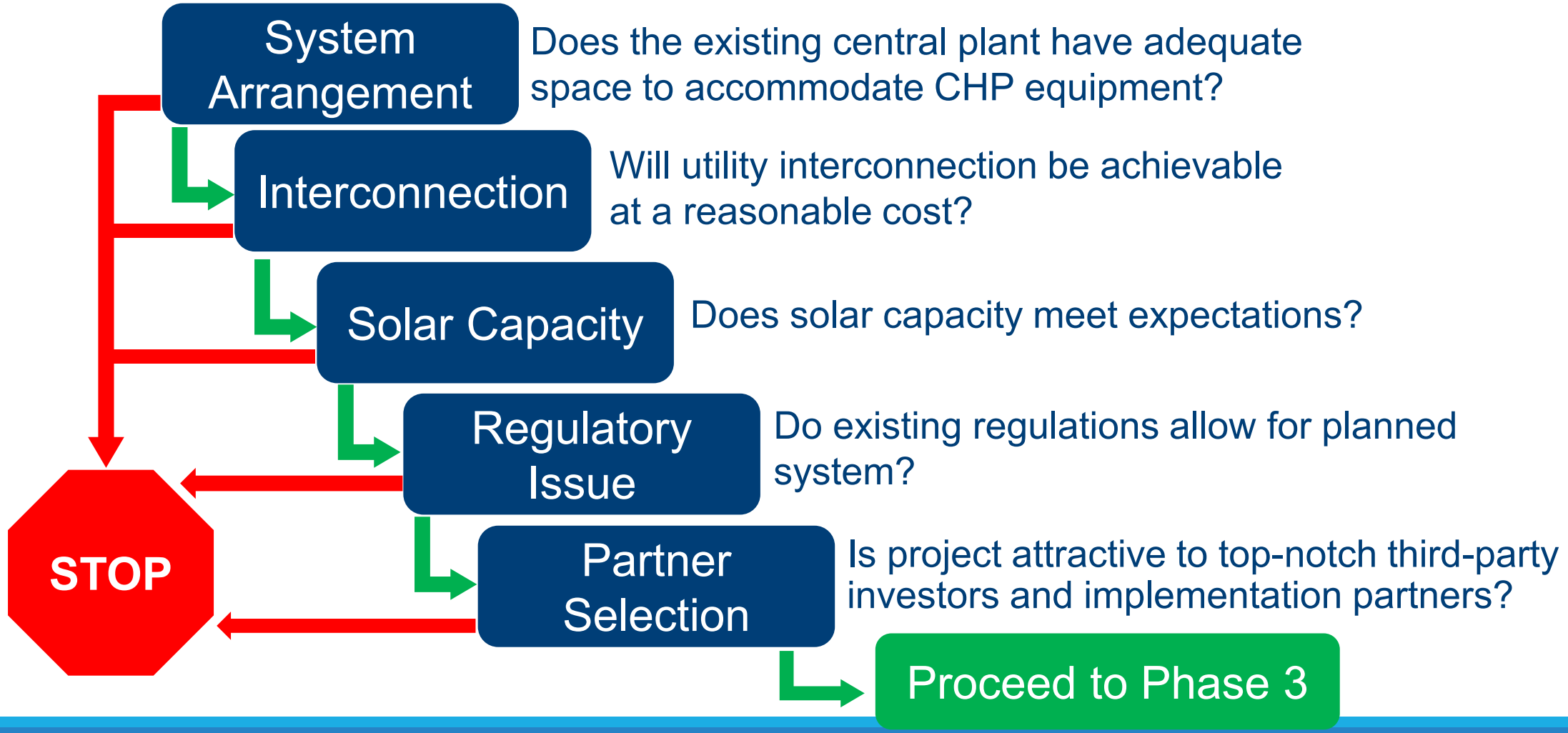
Phase 2: Project Scoping



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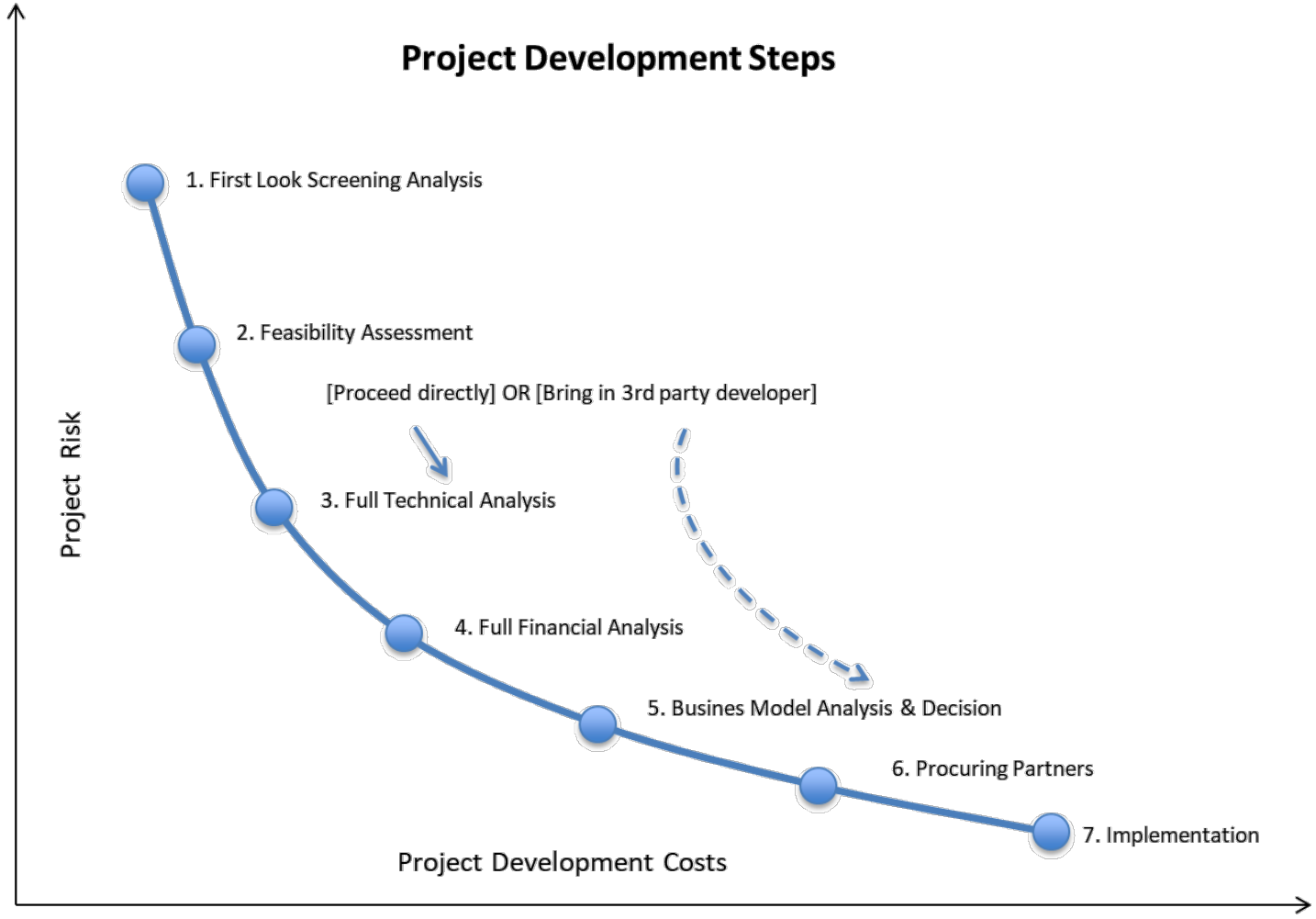
Lessons Learned: Look for “Red Lights”

- ☒ **DON’T: Try to *solve* problems during the Project Scoping phase**
- ☑ **DO: Identify key issues with highest potential to block successful project development**
- ☑ **DO: Provide “Off-ramps” to limit expense in the event that an issue derails the project**

Phase 3: Partner Selection



- "Existence Proof" sufficient to show solid returns
- Scoping analysis sufficient to show project does not face any "Red Lights"
- ESA, not EPC: No further investment by Gallaudet needed to attract industry-leading partners

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Lessons Learned: Broad RFQ, then Narrow RFP

☒ **DON'T: Ask industry to respond to a massive and wide-open RFP**

☑ **DO: Start with information-rich quals-only RFQ to identify short-list for RFP**

- RFQ released Feb 2018
  - Asked only for quals – but on precisely parallel projects
  - Included all analysis from Phase 1 & 2:
    - Financial analysis
    - Baseline system specs
    - Proposed equipment arrangement
    - Regulatory pathways
  - **Received 26 responses**
- RFP released Aug 2018
  - Invited four most qualified teams to respond
  - Requested substantial B&P investment, design work, and financial modeling

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Final Lesson Learned: Team with Skilled Owner's Rep

☒ **DON'T: Try to save $$ by using in-house procurement team for a complex project requiring 3rd-party investment**

☑ **DO: Develop partnership with Owner's Representative / Owner's Engineer that aligns interests**

Teaming agreement with Urban Ingenuity:

- Ensure transparency, cost control, and aligned objectives
- Compensation mix of limited T&M plus Performance Bonuses
- Bonuses based on modeled long-term financial results

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Summary/ Lessons Learned

- ☒ DON'T: Try to design the system during Initial Feasibility phase
- ☒ DON'T: Try to *solve* problems during the Scoping Analysis phase
- ☒ DON'T: Ask industry to respond to a massive and wide-open RFP
- ☒ DON'T: Try to use in-house procurement team for a complex project with 3rd-party investment

- ☑ DO: Use design parameters that are easiest and lowest-cost to assess financial and engineering feasibility
- ☑ DO: Identify any issues with the potential to block successful project development, with "Off-ramps" to limit Gallaudet's expense
- ☑ DO: Start with information-rich quals-only RFQ to identify short-list for RFP
- ☑ DO: Develop close partnership with Owner's Representative / Owner's Engineer

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Questions?

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