Strategies for Successful Early Phase District Energy Development

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Overview

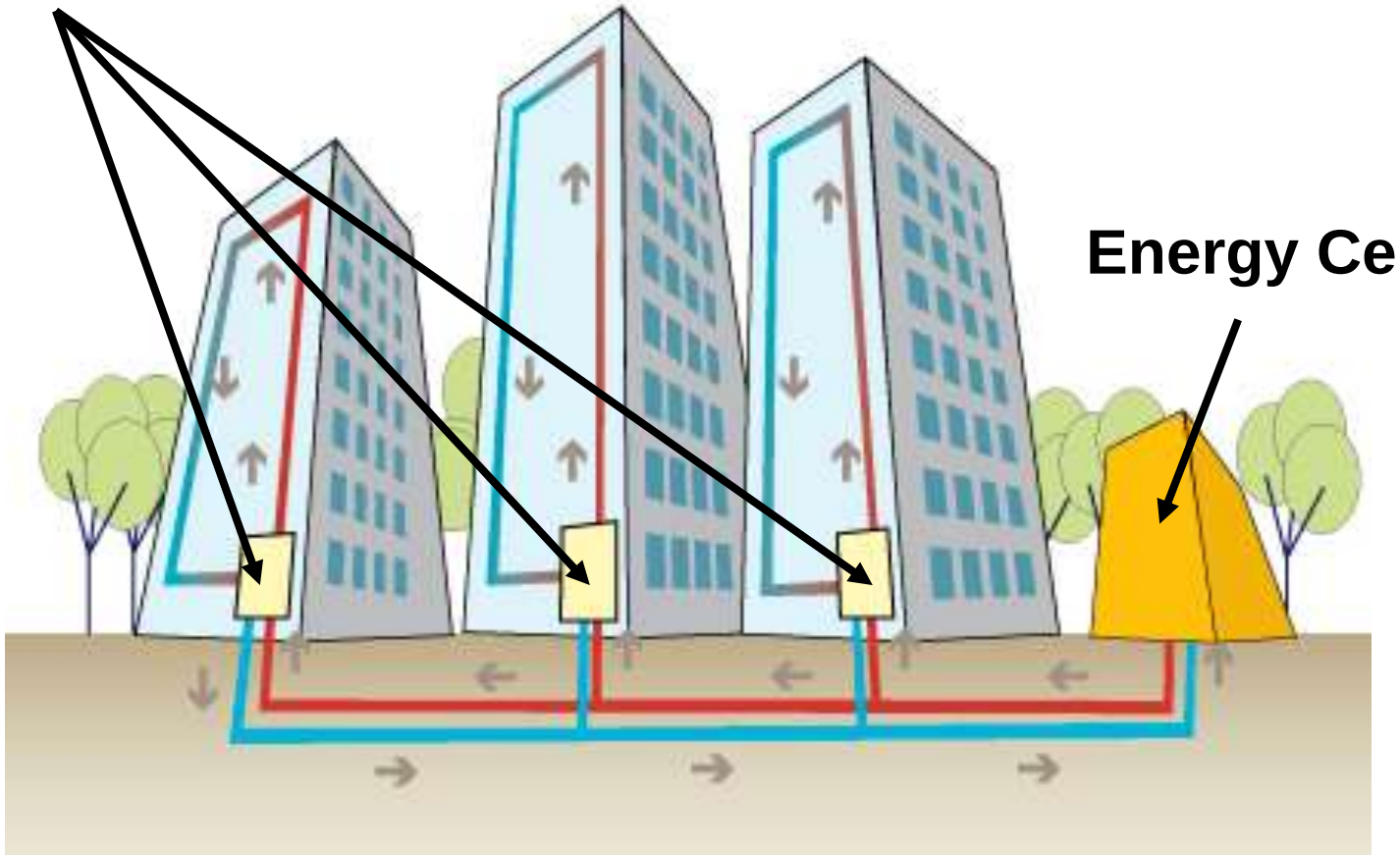
- Content applies to:
  - Expanding existing DE utility
  - Replacing existing DE utility
  - Creating a new DE utility

- Planning for DE in a new or growing community

- Strategies to defer capital investment

Terminology

Energy Transfer Stations (ETS)



Challenges with Developing New DES

- DE is capital intensive
- DE serving new neighbourhoods can have significant financial challenges
- Key is to match capital investment to revenue

Strategies to Control Cost

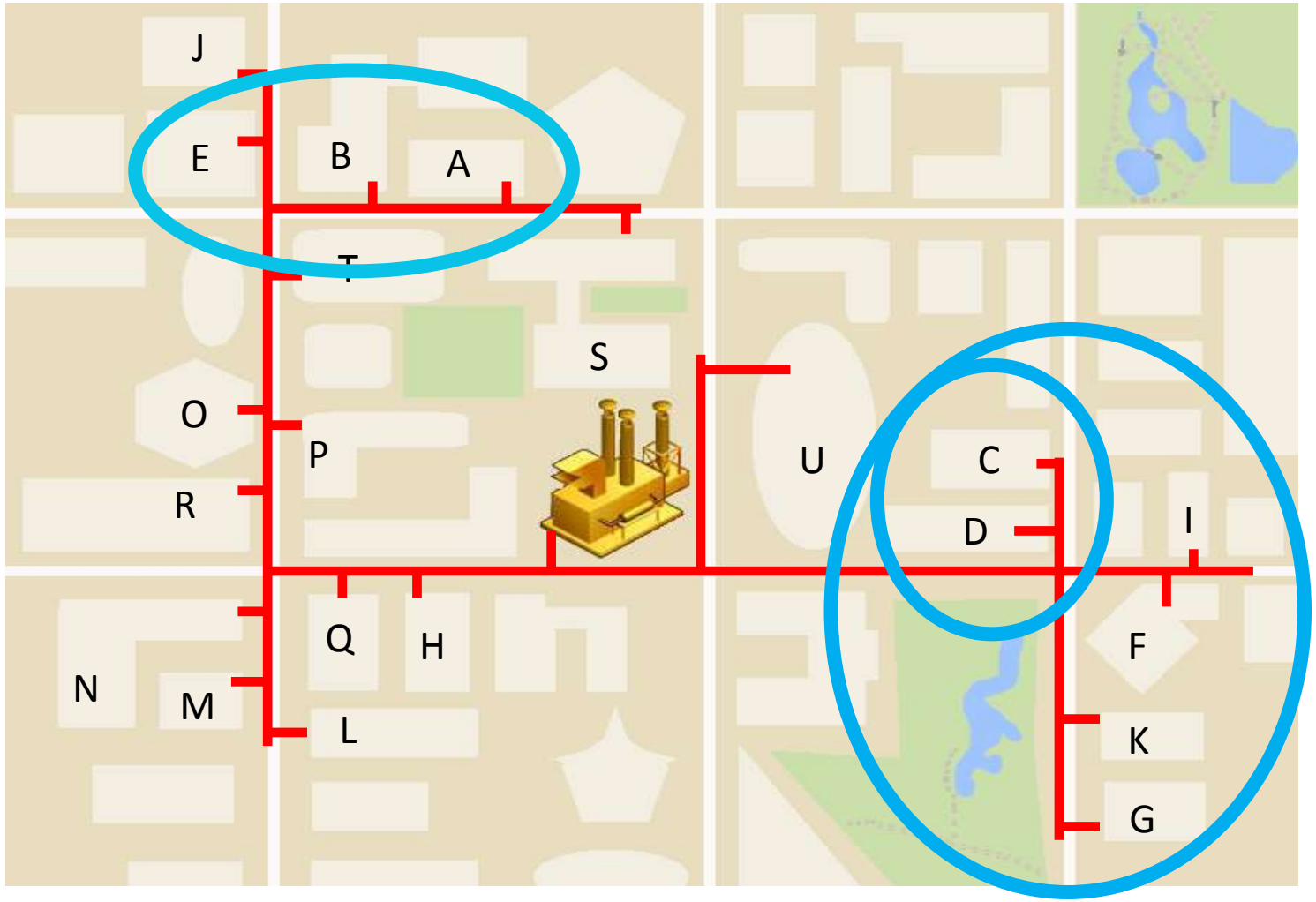
- Minimize amount of DPS installed early
- Avoid pre-servicing future development sites
- **Consider small, modular Energy Centres**

Changes to the Development Timeline

- **Changes in market conditions**
- Developer's schedule
- Funding availability for larger DE infrastructure

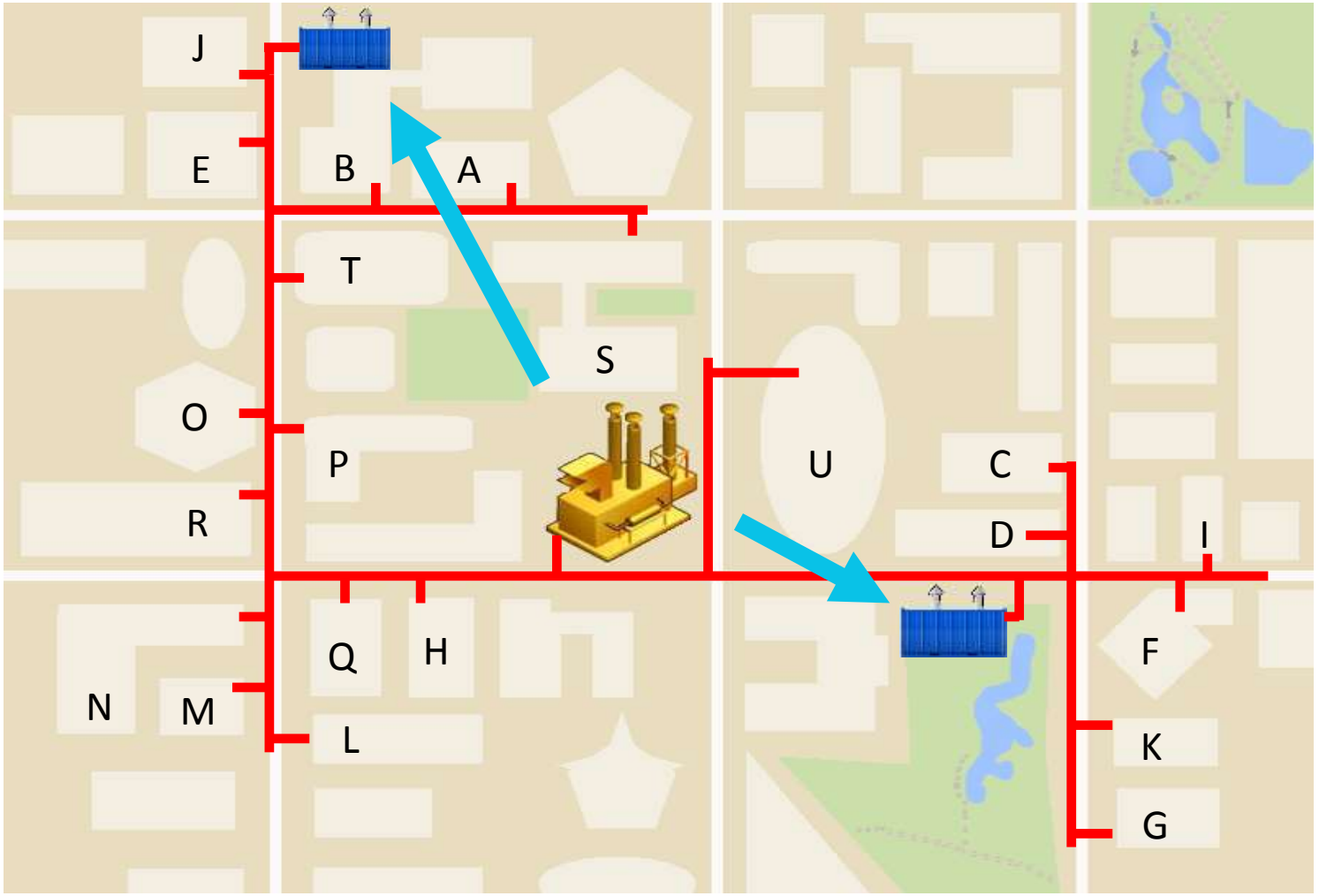
- DE owner needs to manage risks

Deferring Capital Investment



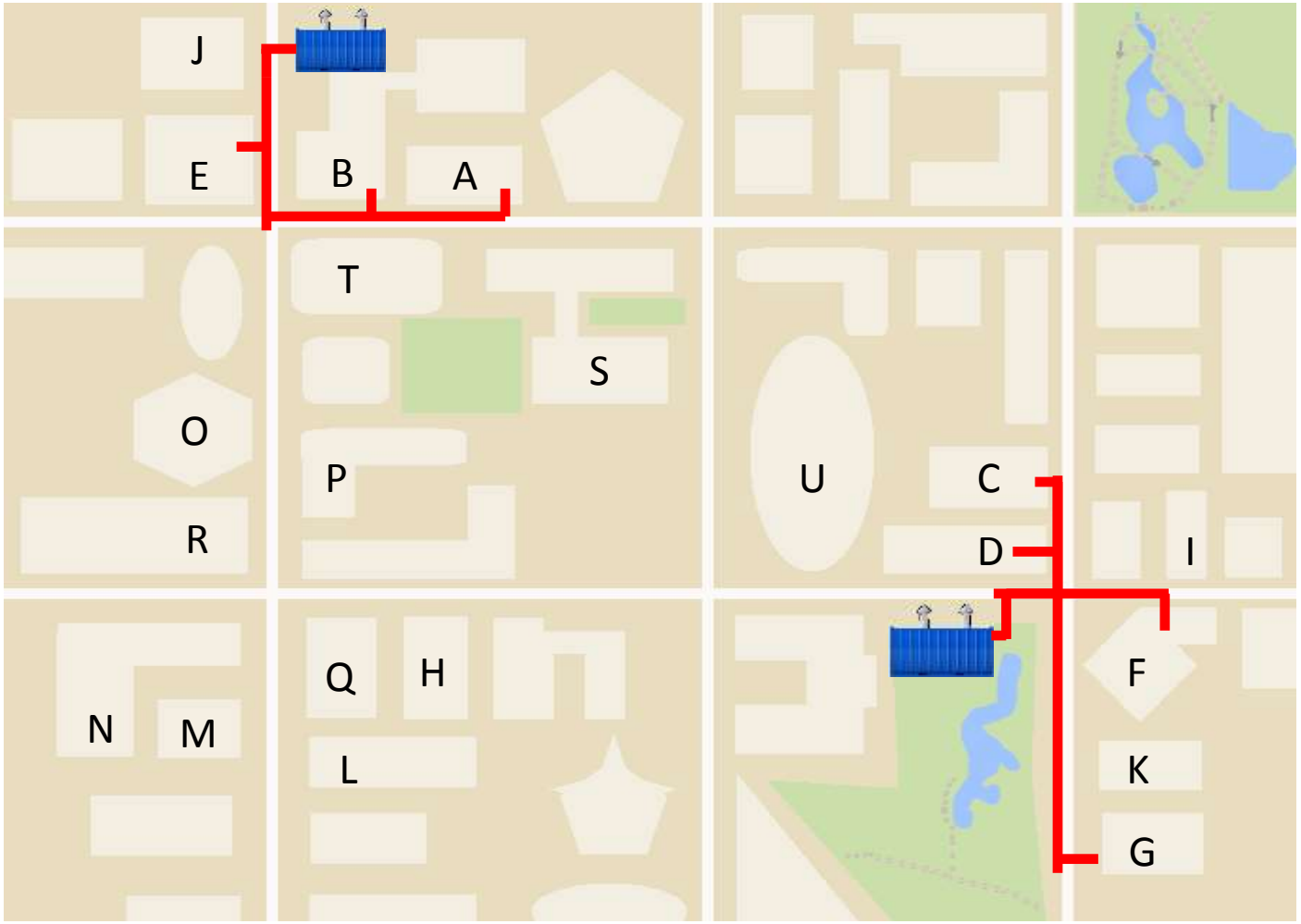
- Identify groups for early energization

Deferring Capital Investment



- Modular Energy Centers with micro-grids can defer large up front capital investment

Deferring Capital Investment



- Modular Energy Centers with micro-grids can defer large up front capital investment
- Reduce the DPS required to get started
- Quick start
- Defer construction of main plant

Modular Energy Centre

- Prefabricated, assembled off site
- Mobile: Containerized or Skid-mounted
- Various capacities and configurations possible
- Generally want to avoid on-site operator supervision

Modular Energy Centers

- Defer capital investment on permanent energy center
- Defer capital investment on DPS
- Quick implementation / lean construction
- Start construction before completing full build-out plan
- Variable development plans
- Hard to access locations
- Green field applications

Oval Village, Richmond, BC

- 2 x 4 MW_t coil-tube natural gas hot water boilers in a 53ft shipping container

UniverCity at SFU, Burnaby, BC

- TEC1: 3 x 1 MW_t natural gas hot water boilers in a 40ft shipping container
- TEC2: 2 x 3 MW_t natural gas hot water boilers in a 53ft shipping container

River District Energy, Vancouver, BC

- 5 x 700 kW_t natural gas condensing hot water boilers in a custom container

Skid-mounted ECs

- 2 x 1.5 MW_t coil-tube natural gas hot water boilers
- Skid-mounted in a pre-engineered building

Challenging Locations

- Forests and parks
- Tight spaces
- Temporary locations
- Barren lands

UBC Neighbourhood, Vancouver, BC

Other Options

- In customer building
- District Cooling – e.g. air-cooled chillers
- Air-source heat pumps

Gain Trust

- Community Members
  - Proven Technology
  - Utility gains presence in community

- Funding Authorities
  - Proven business case in phases
  - Proven schedules
  - Proven technology

Distribution Piping System

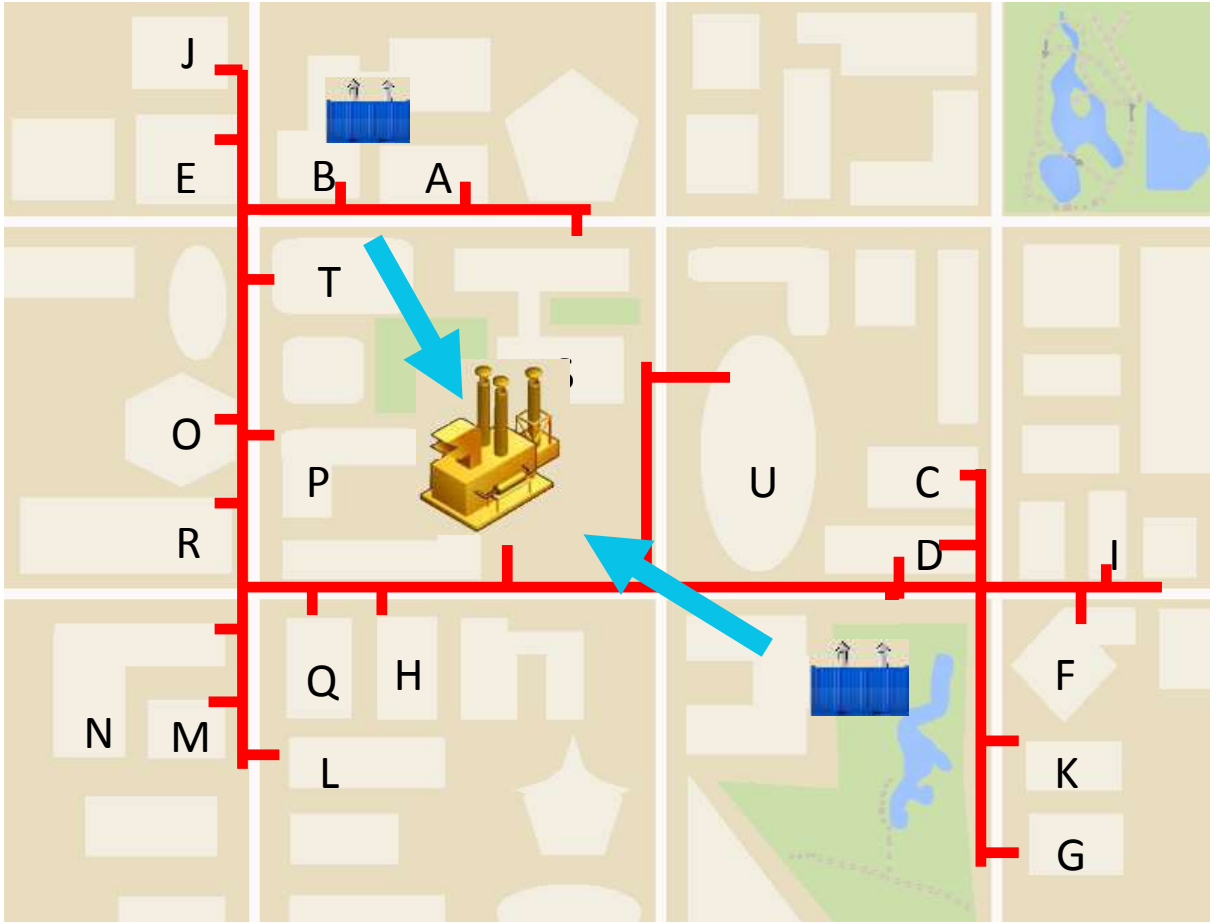
- Strategic design and layout
- Minimize amount of installed pipe
- Optimize System ΔT
- “Right size” DPS:
  - Competing interests of future growth vs. controlling costs

Energy Transfer Stations

- “Right-size” ETS
- Locate close to DPS entry
- Possibly modular or prefabricated

When to Move On?

- When modular Energy Centre(s) reach capacity
- When load justifies fuel-switch
- **When DES can afford it**



Good Rate Design

- Appropriate selection of rate type
  - –energy, capacity (fixed) and/or connection charges
- Appropriate initial rate and manage rate escalation
- Possible use of rate stabilization or deferral accounts

Summary

- Plan for the future. Build for the present.

- Prove project success with smaller phases (micro-grids)
- Plan for change
- Manage project risks

- Modular Energy Centres
  - Defer early large investments
  - Allow for variable development plans
  - Quick implementation
  - Flexible Energy Centre locations

Questions