The Living Laboratory

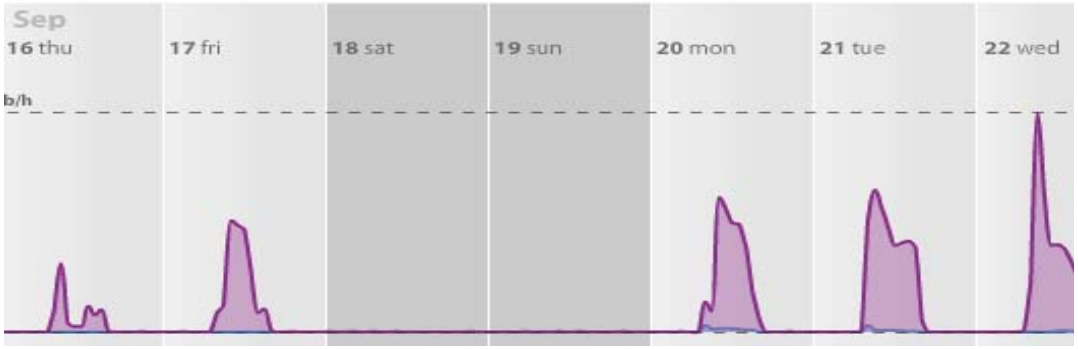
Pushing Past 33%

Pushing past 33 percent

- Reduce campus GHG emissions by 67% by 2020
- How can this be done?
- Shifting away from carbon intensive forms of energy use
  - Natural gas
- Using energy more efficiently
- Reducing absolute consumption

Barriers to overcome

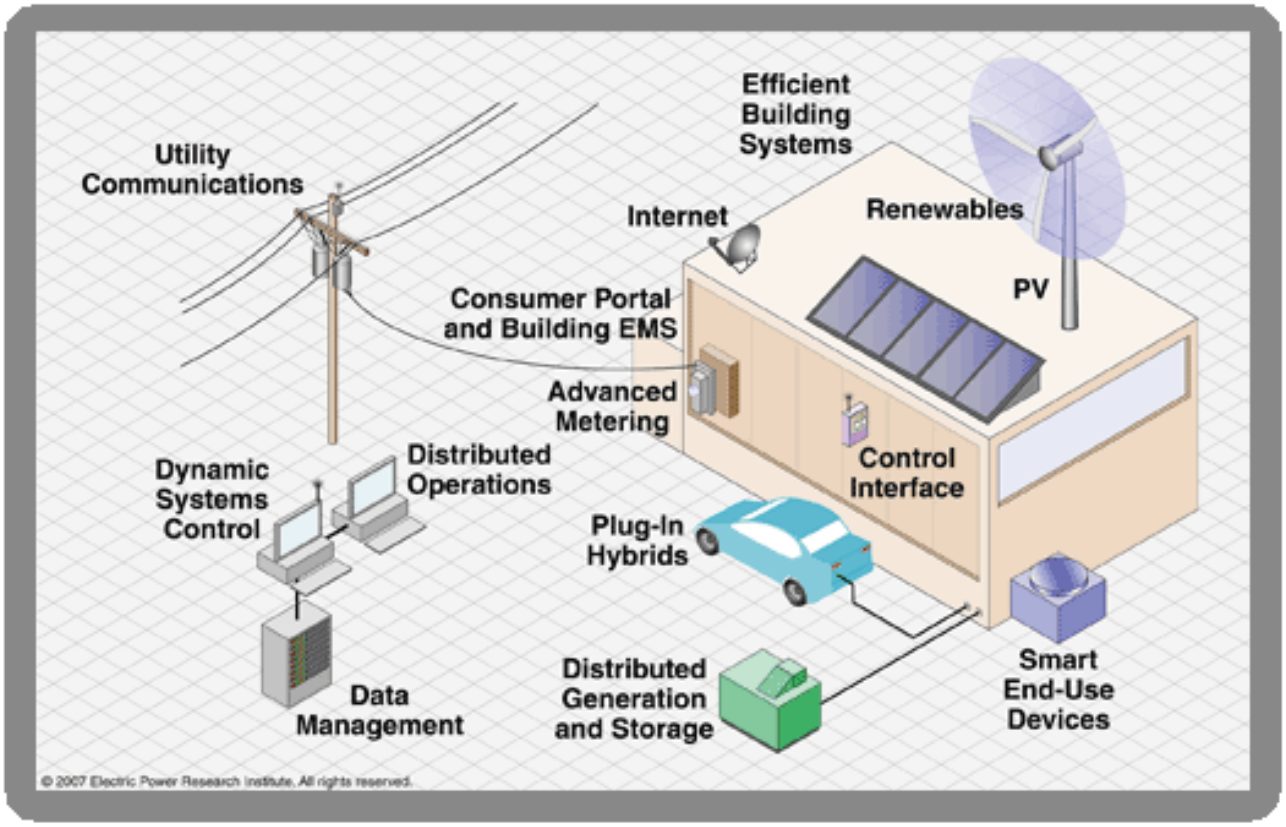
- Lack of real-time information and control of systems
- Integrating intermittent renewable and non-traditional sources of energy is complex
- Behavioural change
- Peak load and demand profiles



The Solution is Smart

- **Smart technologies** that transmit information about themselves and provide controls
  - Real-time data, 'lights are on', 'Reduce fan speed'
- **Smart (integrated) systems** that collect, track, and analyze the information and make decisions, enable decision-making
  - Biomass is cheap; switch from natural gas
  - Wind stopped blowing; switch to BC Hydro electricity

What is a Smart (integrated) Energy System?



Smart Energy System….now what?

- How can we use the Smart Energy System to **reduce GHG emissions?**
- Supply side
  - Integrate renewable/alternate sources of energy
    - Bio-mass
    - Waste Heat (Triumf, Data Centres)
    - Wind, Solar, Waste-to-Energy, Energy Storage
- Demand Side
  - Manage Energy Use
    - Peak Load Shedding
    - Incentivize New Behaviours
    - Time of Use and Amount Cost Structures

The Campus as a Living Laboratory

The Concept…

To go beyond 33% we will need to:

1. Adopt Leading-edge Technology – demonstrate/develop new innovative technology in partnership with the private sector

2. Establish and Entrench Cultural & Behavioural Change

3. Determine what is Economically Viable - Capital and Operating costs, Research Opportunities

The Campus as a Living Laboratory

In Addition to Energy, what are the Synergies…

- To be world leaders in sustainability
- To be part of the clean technology innovation pipeline; to create wealth
- Research, Teaching and Interdisciplinary Collaboration Opportunities
- Learning opportunities for everyone

The Campus as a Living Laboratory

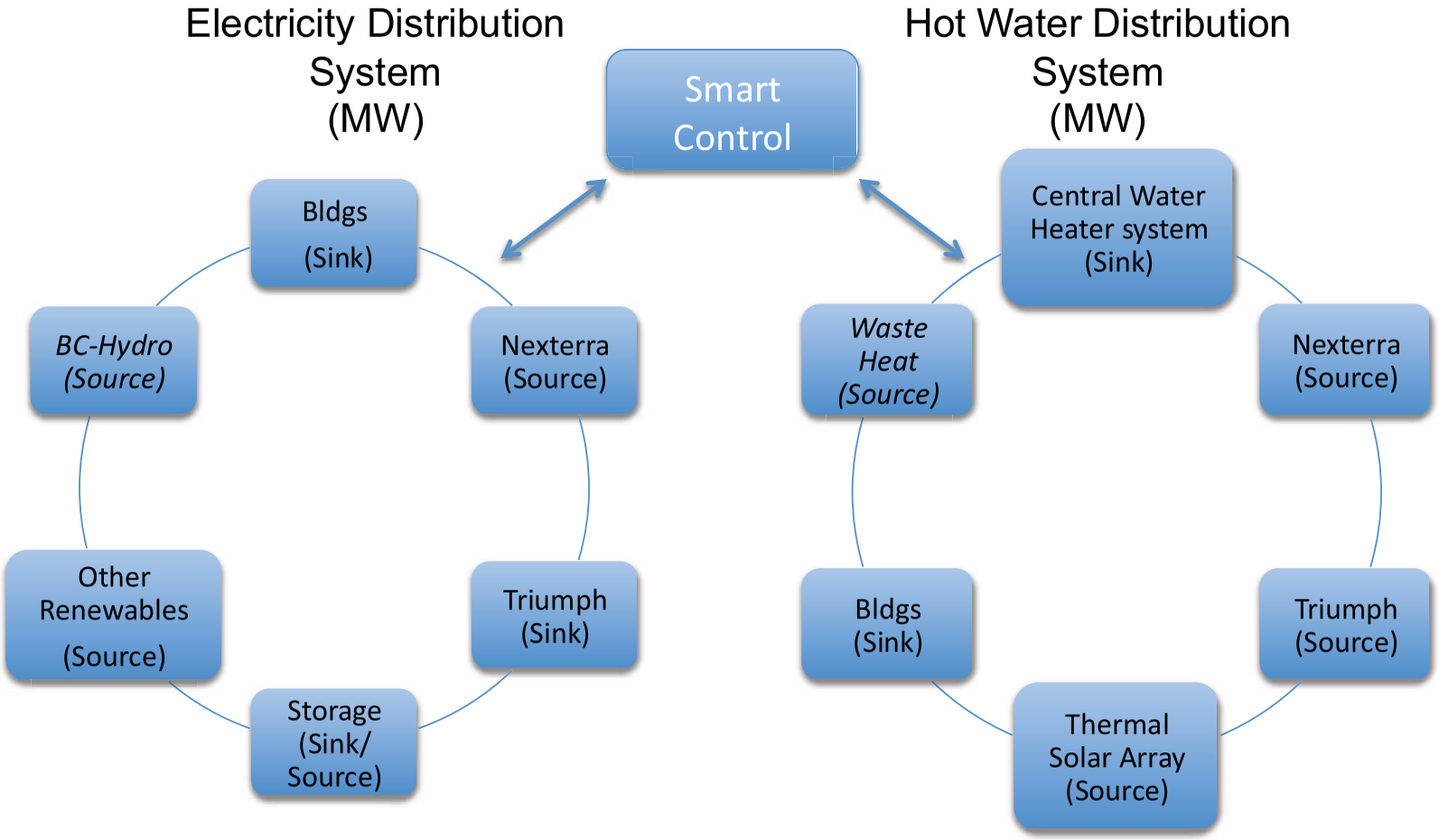
The Future

Two key pieces of infrastructure:

- Hot Water Distribution System (the current system is steam-based provides 85% of the campus thermal energy requirement and is inefficient)

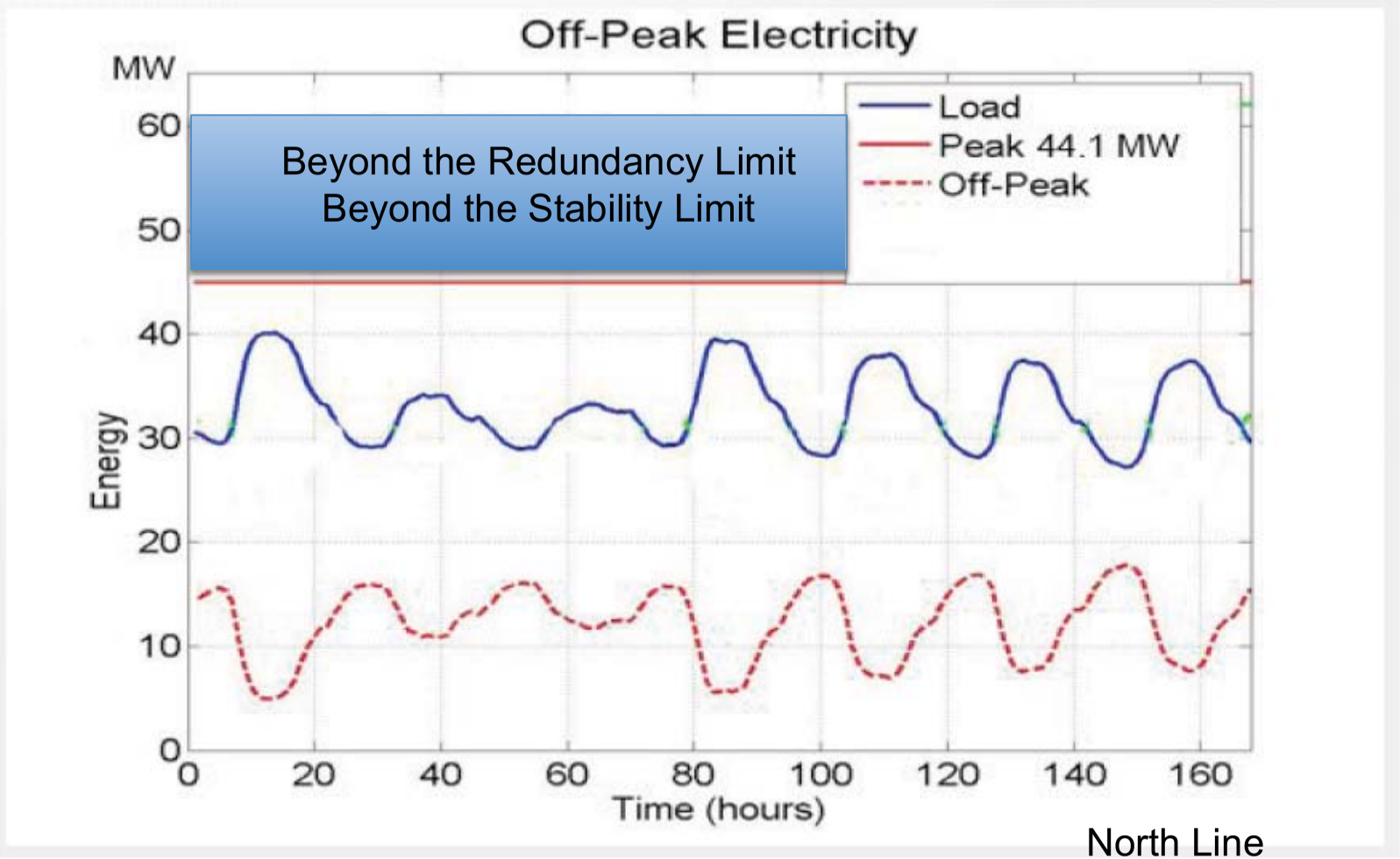
- Smart Energy Grid – We anticipate to achieve our goals we will need to manage a diverse portfolio of energy on the supply and generation side and be able to accommodate demand side management at the individual building level

Smart Energy Grid at UBC



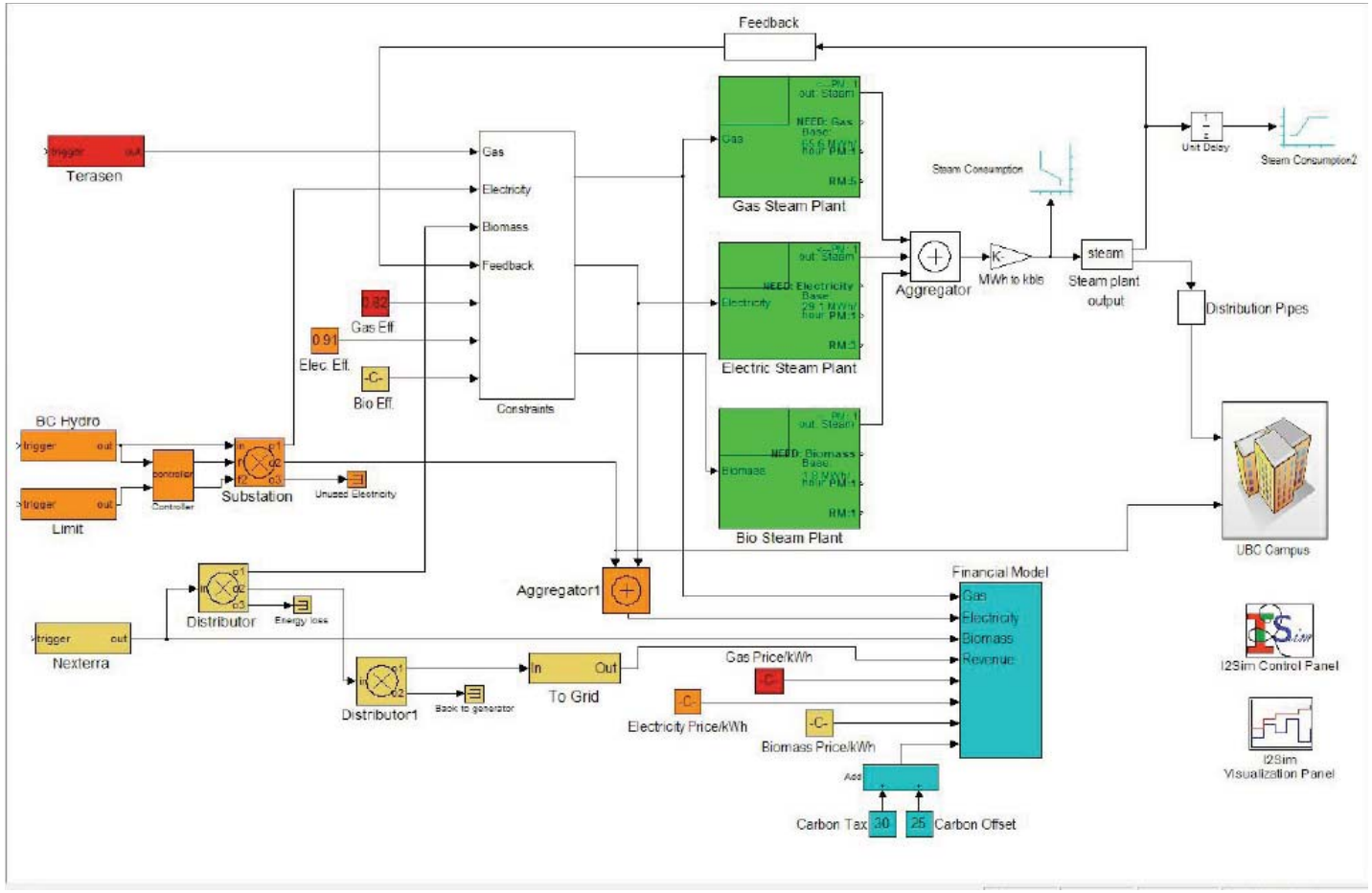
Smart Energy Grid

Smart Energy Grid



North Line

Smart Energy Grid – Model Development Program



Smart Energy System

This is a complex, highly dynamic system – how do we begin to design it, implement it and pay for it:

- to understand what will work technologically
- to understand what will work socially
- to understand what will work economically
- to understand what will work environmentally

Thank you

- Questions