
# UTILITY DEVELOPMENT PLANS (UDP)

## LONG-TERM UTILITY DEVELOPMENT

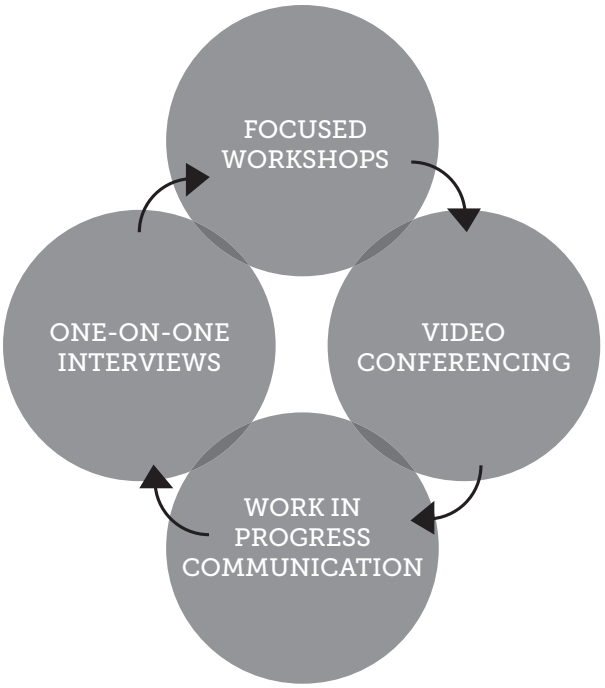
PLANNING YOUR CARBON REDUCTION STRATEGY TO MEET PUBLIC OBLIGATIONS

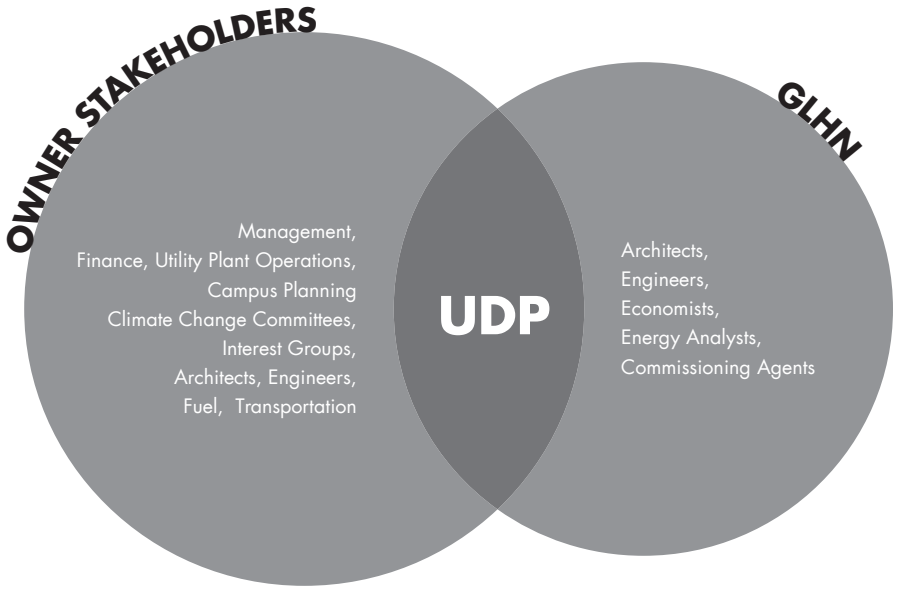
GLHN Architects & Engineers, Inc. is committed to helping our public entities reduce their net greenhouse gas emisions and assisting higher educational institutions in meeting their Presidents Climate Commitment. This is a complex challenge that involves operations, finance, and utility infrastructure. While the end objectives and schedule may be clear, the path to implementation is not. A carbon reduction program must not only hold up to technical scrutiny, but also satisfy the financial standards of the institution. The way forward can be established through analysis of reduction alternatives and development of a comprehensive long-range strategy.

## GLHN'S PROVEN THREE-STAGE APPROACH

FORMING AN EFFECTIVE MANAGEMENT TEAM AND ESTABLISHING THE WORK FLOW

GLHN's approach to Utility Development Planning provides a framework on which a carbon reduction strategy can be based. It is a highly interactive "management team" approach engaging all owner stakeholders committed to meaningful reduction of greenhouse gas emissions and those with the fiduciary responsibility of financing and bonding capital improvement projects. The GLHN team sets the pace and performs much of the analysis, while the owner team provides real-time input, tests model assumptions, and makes the essential long-range decisions. The work is accomplished using focused workshops, one-on-one interviews, video conferencing, and interim work-in-progress e-mail.



# LONG-TERM UTILITY DEVELOPMENT

## PLANNING YOUR CARBON REDUCTION STRATEGIES TO MEET YOUR PUBLIC OBLIGATIONS

GLHN applies a staged planning methodology successfully employed at over a dozen higher educational campuses nationwide, resulting in significant savings in energy consumption. The process starts with the team defining its planning goals and objectives.

**STAGE 1**, Field Survey, involves a detailed assessment of systems to characterize the existing assets and catalog known deficiencies. Systems considered for evaluation are Potable Water, Fire Protection, Irrigation, Sanitary Sewer, Storm Drain, Natural Gas, Electric Power, Exterior Lighting, Communications, High Temperature Hot Water Production and Distribution, Steam, and Chilled Water.

**STAGE 2**, Strategy Development, derives a set of technically viable solutions and prepares annual operational models of their thermodynamic and economic performance. A menu of possibilities is shaved down to a prioritized slate of practical and economically viable concepts. Specific building energy efficiency improvements are compared to plant energy conversion improvements, fuel source alternatives, combined heat and power, alternative fleet fuels, improvement in campus commuter links, etc. Cost estimates are developed to construct realistic cash flow models. The potential for carbon tax in one of various forms may be considered. A life cycle cost study of the alternatives provides a basis of comparison.

**STAGE 3**, the final UDP, develops selected strategies into phased actions. Significant operational considerations are identified, site plans are developed, a sequencing diagram is created, and a summary of estimated costs for each utility system is established. The final deliverable is an actionable plan, broken into discrete projects arranged within a realistic planning time frame. The ideal plan will meet the combined objectives of meaningful reduction in greenhouse gas emissions, improvement in thermodynamic efficiency, sound economic performance, and future flexibility.

STAGE ONE

### FIELD SURVEY

- Survey existing conditions
- Verify as-builts
- Clarify utilities ownership
- Examine programmed growth
- Establish future loads

STAGE TWO

### STRATEGY DEVELOPMENT

- Identify concept strategies
- For each possible strategy:
  - Describe the strategy
  - List actions
  - Summarize costs
  - Develop site plan
  - Develop time frame

STAGE THREE

### FINAL UDP

- Develop the selected strategies in detail
- Identify significant operational conditions
- Site plans for different time frames
- Sequencing diagram for corrective actions
- Summarize estimated costs for each utility
- Identify funding for UDP opportunities

## UTILITY DEVELOPMENT PLANNING SERVICES MAY INCLUDE:

Chilled water production improvement
Chilled water distribution improvement, conversion to Direct Primary, Delta T improvement
Steam plant production improvement, air quality improvement evaluation, efficiency improvements, conversion to hot water
Combined heat and power performance modeling
Combined heat and power cost and feasibilty studies assessment of renewable
Energy alternatives
Campus distribution systems and building efficiency
Fleet operation and fueling alternatives, fuel source procurement alternatives
Commuter and travel costing
Federal and State grant application
Carbon and Renewable Energy Credits
Legislative review

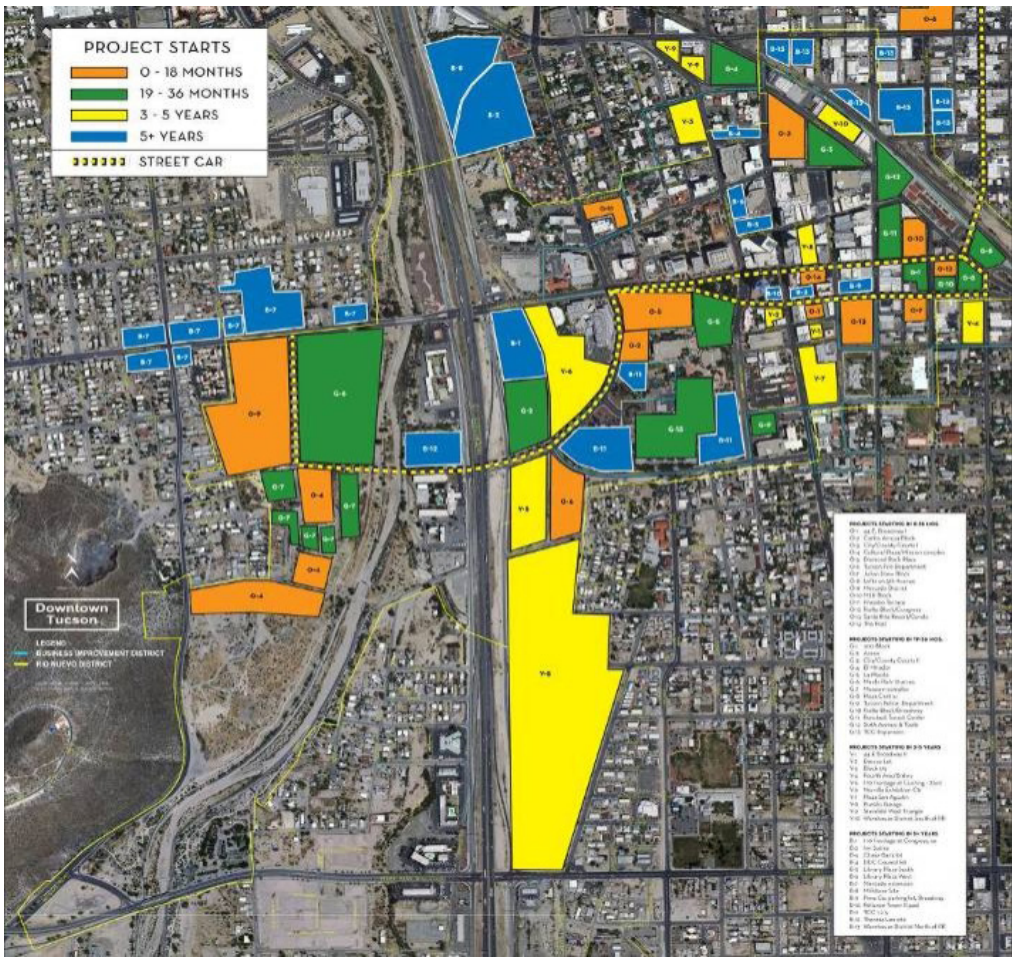
**GLHN** ARCHITECTS & ENGINEERS, INC | 2939 E Broadway Blvd, Tucson, AZ 85716 | T 520.881.4546 F 520.795.1822 | GLHN.com

# STRATEGIC PLANNING
## DISTRICT ENERGY SYSTEMS

GLHN is known on a national level for its success in strategic planning and design of campus utility and district energy systems. The process has been successfully applied at university campuses from Fairbanks, Alaska to Fayetteville, Arkansas. The firm is currently under contract to the International District Energy Association to develop simple screening tools that evaluate the economic potential of proposed urban district energy system concepts. The project has evaluated opportunities in Denver, Pittsburgh, Philadelphia, and Oakland. Our approach to energy planning has proven to be scalable, providing valuable insight to facilities under 500,000 SF, including City of Tucson Public Safety Training Facility, Pima Community College West, East, and Downtown campuses, and a five-building W.L. Gore medical manufacturing campus in north Phoenix.

GLHN's approach to Utility Development Planning provides a framework on which a long-range plan for development and carbon reduction strategy can be based. It is a highly interactive "management team" approach engaging all owner stakeholders committed to meaningful reduction of greenhouse gas emissions and those with the fiduciary responsibility of financing and bonding capital improvement projects. The GLHN team sets the pace and performs much of the analysis, while the owner team provides real-time input, tests model assumptions, and makes the essential long-range decisions. Applied to the Ventana Medical Campus, campus development planning will enable rapid assessment of a range of alternative strategies for energy, IT, and water.

In 2006, GLHN developed a comprehensive Utility Master Plan for the entire Downtown Redevelopment District in Tucson. GLHN prepared a conceptual building data and load analysis, which positions existing and future buildings, sets their occupancy and year constructed, and projects utility demands and consumption for chilled water, heating water, electricity, public and telecommunications, natural gas, potable water, reclaimed water, sanitary sewer, and storm drain systems. GLHN also examined district energy strategies. In 2007, GLHN was contracted by the Redevelopment Office and the Tucson Downtown Alliance, to perform a higher-level, high-speed utility master planning effort for the area covering all of downtown Tucson.



# CAMPUS UTILITY MASTER PLANNING

## GLHN'S NATIONWIDE EXPERIENCE AT HIGHER EDUCATIONAL INSTITUTIONS

**University of Arizona, Tucson:** 1992 – 2005, 2012
38,700 students, 380 acres, and 334 buildings

**Northern Arizona University, Flagstaff:** 2004, 2009, 2013
23,000 students, north and south campuses, 738 acres, 98 buildings

**Arizona State University:** 2004 – 2007
68,000 students, four campuses, 1,500 acres, and 556 buildings

**New Mexico State University:** 2003, 2009
16,500 students, 900 acres

**University of New Mexico:** 1999-2002, 2004, 2008
34,600 students, north and south campuses, 100 acres, over 300 buildings

**Pima Community College, Tucson, AZ:** 2009-2010
75,000 students, six campuses totaling more than 450 acres

**Yavapai College, Prescott, AZ:** 2009-2010
4,000 students, five campuses totaling more than 300 acres

**University of Wyoming:** 2007
12,500 students, 785 acres, 82 buildings

**Aims Community College, Greeley, CO:** 2006
5,400 students, 185 acres, 18 buildings

**University of Alaska, Fairbanks:** 2005
9,400 students, 2,250 acres, 70 buildings

**University of Illinois, Chicago:** 1995 -1999, 2001, 2005
26,200 students, 310 acres, 95 buildings

**University of Arkansas, Fayetteville:** 2000 – 2001
19,800 students, 350 acres, 276 buildings

**University of Illinois, Springfield:** 2000
4,800 students, 700 acres, 22 buildings

**University of Illinois, Urbana Champaign:** 1995-1999
31,000 students, 1,460 acres, 286 buildings

**University of Chicago:** 1995 – 1998
14,000 students, 210 acres, 288 buildings

**Colorado College:** 1994 – 1998
2,000 students, 90 acres, 77 buildings