

Energize Phoenix:

Transformation through Behavior and Retrofits along the Green Rail Corridor

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Evolution of the Green Phoenix Concept

Initiated in the Spring of 2009

concept of a partnership between the City of Phoenix and Arizona State University to prioritize capital investments that might originate from ARRA to make Phoenix a more sustainable city.

Application to the Light Rail Corridor

original concept of the entire city was refined to an initial demonstration of sustainability along the new Light Rail corridor in Central Phoenix

Numerous Concepts to Pursue as Funding Available

17 initial concepts were refined to 4 most viable options to apply to the “Green Rail Corridor”

Promoting Green Phoenix

Green Phoenix Brochure

circulated through ASU and COP mechanism

Mayor's Initiative

key publicity from the State of the City address in 2009

Collaborative Promotion

ASU President Michael Crow and Mayor Phil Gordon



1. Greener Neighborhoods

Train unemployed workers to rehabilitate distressed homes for water and energy efficiency. Creates green jobs, improves performance of housing stock, increases housing affordability, reduces greenhouse gas emissions, stimulates housing market.



2. Solar City

Install solar PV and solar water heaters in existing public facilities, require in public new facilities, incentivize in residential and commercial sectors. Reengineer city landfill to accommodate public-private solar thermal generation plant. Increases green jobs, reduces greenhouse gas emissions, relieves peak load on power grid and utilities, reduces reliance on foreign oil.



3. Urban Mobility

Extend Phoenix Light Rail line, complete connector to Phoenix Sky Harbor airport, provide bicycle rentals at light rail stops, solarize stops and accompanying park and ride facilities, improve regional bus connectivity. Creates construction jobs, stimulates economic development, encourages urban infill, uses renewable energy, reduces GHG emissions.



4. Green Your Home and Business

Engage philanthropic or partnership strategies to develop energy and water audits of homes and small businesses; provide subsidies for insulation, replacement of old fixtures, solar PV, irrigation system timers, low-flow shower heads, CFL light bulbs, weather stripping. Increases green jobs, reduces energy waste, reduces water consumption and treatment, reduces expenditures for home and business owners.



5. Desert Hydroscape

Create unique sustainable desert water features that leverage existing water infrastructure such as canals, storm drainage, and water treatment; harvest rain water, reclaim air conditioning condensate, utilize hydropower energy. Creates multipurpose public spaces, upgrades neighborhoods, stimulates urban infill, attracts tourism, creates green and construction jobs.



6. Public Buildings LEED Retrofit

Bring public buildings up to new LEED equivalent retrofit standards. Reduces greenhouse gas emissions, reduces operational costs of public buildings, creates green jobs, provides high-visibility model for green redevelopment.



8. Discovery Triangle Smartscape

Deploy innovative, sustainable building design in blighted area of Discovery Triangle district using smart materials, landscaping, shading strategies through incentives for private developers. Creates green jobs, creates construction jobs, improves public health, reduces heat, reduces energy/water demand.



10. Efficient City Lights

Convert public outside illumination to very high efficiency and dark skies compliant lighting; convert traffic signals to LED. Provides cost savings, enables night sky viewing, creates green jobs.



12. Canalscape

Develop Phoenix's canal system for recreation, green enterprise and multi-modal non-motorized transportation. Creates construction jobs, leverages heritage, improves recreation opportunities, raises property values.



14. Phoenix Regional Desalt

Enable a renewable source of water for the region by constructing a regional desalination facility using existing technologies to enhance water quality through removing dissolved salt from treated waste water and brackish groundwater. Creates construction and professional jobs, expands renewable water supply, recycles wastewater.



13. Beyond Sustainable Schools

Educate and deploy students to develop sustainability assessments, recommendations and monitoring programs for area high schools. Creates entry-level jobs, reduces greenhouse gas emissions, reduces operating costs of public schools, educates next generation on sustainable practices.



15. Transportation-ICT Synergy

Leverage current broadband penetration to develop joint planning, design, and management protocols that connect transportation, information and communications technology (ICT) systems to optimize travel, reduce travel time, reduce air pollution. Reduces traffic congestion, mitigates air quality issues, conserves energy/water resources, increases economic productivity.



7. Central City Green

Clean-up and redevelop brownfield sites in downtown; convert to mixed-use infill projects; augment natural and built shade. Decontaminates land, reduces toxic exposure, recycles land back into the market, adds value to blighted neighborhoods, creates green employment, provides remedies for environmental inequities.



9. Renewable Energy

Go "beyond solar" by using untapped renewable energy sources such as landfill gas, waste heat, biomass, biodiesel, and photovoltaic algae to power businesses and public institutions. Reduces greenhouse gas emissions, creates green jobs, reduces load on power grid and utilities, extends landfill life.



11. Hometown Agriculture

Increase markets and options for regional food growers by promoting networks, Community Supported Agriculture business models and community gardens. Reduces food contamination, reduces transport, reduces heat island effect, creates agriculture jobs, provides low cost/high nutrition foods in low-income neighborhoods.



17. Envision Sustainable Phoenix

Establish large-scale public consensus on a comprehensive sustainability plan through broad-based public engagement, community forums and town halls, widely disseminated multi-media visualizations of alternative futures, extensive policy analysis. Creates unity, leverages economies of scale, addresses inequalities, reduces ecological impact.

16. Urban Riparian Waterways Rehab

Incorporate ecological principles into flood management and water delivery systems in riparian; retrofit homes and neighborhoods to capture runoff, redesign permeable storm water conveyance systems, install retention systems for filtration. Increases groundwater recharge, reduces water demand, improves flood control, improves water quality, creates recreation spaces and wildlife habitats.



"Green Phoenix" is a plan to make Phoenix carbon neutral and the most sustainable city in the country. Partnering with the federal government, the first phase will leverage the success of the region's new, 20-mile light-rail line and \$4 billion of recent investment in the area. It also will build on success from federal stimulus dollars already at work to make Phoenix a more sustainable community.

This Green Rail Corridor Demonstration Project will utilize public-private partnerships to create 1,500 green jobs, sustain quality of life for residents and boost the environment. The themes are energy, neighborhoods and water.



Here is what the plan can accomplish:

Energy:

- Solar panels/renewable energy – installation of six to eight additional 100 to 150 kW solar projects on existing city facilities to support on-site energy requirements
- Energy efficiency – a new city energy plan, additional energy audits at city facilities and implementation of recommended improvements and retrofits will save thousands of dollars through cost avoidance
- High-efficiency lighting will complete conversion of the city's traffic signals to LED technology
- New strategies will be developed to leverage light rail to impact regional mobility patterns

Neighborhoods:

- Partner with ASU to apply the latest research to "turn down" the heat island effect
- Weatherize more than 1,000 homes in the Green Rail Corridor to increase energy efficiency and reduce utility bills for low-income residents
- Use pervious pavement materials on public works projects in the Corridor to reduce the heat island effect and allow groundwater infiltration
- Construct expanded shade structures at light rail stations with built-in solar lighting and cooling devices
- Launch the Green Phoenix Learning Center in the Corridor, a charter high school and adult learning center focused on the green jobs of the future

Water:

- Implement rainwater and condensate recapture on city facilities in the Corridor for landscape irrigation
- Upgrade the streetscape along the Corridor to provide shade, reduce water use and retain storm runoff
- Conduct water use audits on 1,000 homes in the Corridor to save water and reduce residents' utility bills

PHOENIX

TEMPE

MESA

Results – The Green Rail Corridor

Demonstration project will design, engineer and build green installations and developments along the light rail line. ASU and Phoenix will track performance and share results with other communities, with the goals of creating good jobs and providing even better service to Phoenix residents.



Best Practices in the Corridor

The new Phoenix Convention Center harnesses the Valley's abundant sunshine with solar panels. It is one of the greenest convention centers in the world and the building is LEED Silver certified.



Phoenix's new Downtown Civic Space Park utilizes sustainable design techniques like extensive shade, solar panels, heat-reduction surfaces and trees planted with a system to protect roots.



Work is underway on the PHX Sky Train to carry passengers between light rail and Sky Harbor International Airport's terminals. Nearly 100,000 passengers will ride every day. It will eliminate more than 100 buses from circulating around the airport, reduce greenhouse gas emissions by 3,500 tons and create 3,900 jobs. PHX Sky Train will be one of the first LEED-certified transit systems in the nation.

Energy Efficiency and Conservation Block Grant (EEECGB) Program

Existing Program Expanded with ARRA Funding

the existing formula driven EECBG program was expanded with \$454 M in ARRA funding for competitive awards

Innovative Approaches

key to the competitive awards was novel approaches to energy efficiency in defined neighborhoods to reach a scale of efficiency not yet seen through EECBG formula funding

Highly Competitive

from ~800 early participants to several hundred full proposals to fund 25 projects

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Our approach:

relies on market and financial mechanisms instead of regulatory structure

focuses on residents, businesses, institutions and commuters using the light rail corridor

leverages private and public funds and create a self-sustaining revenue stream for energy efficiency

determine the social-marketing techniques that best spur behavior change

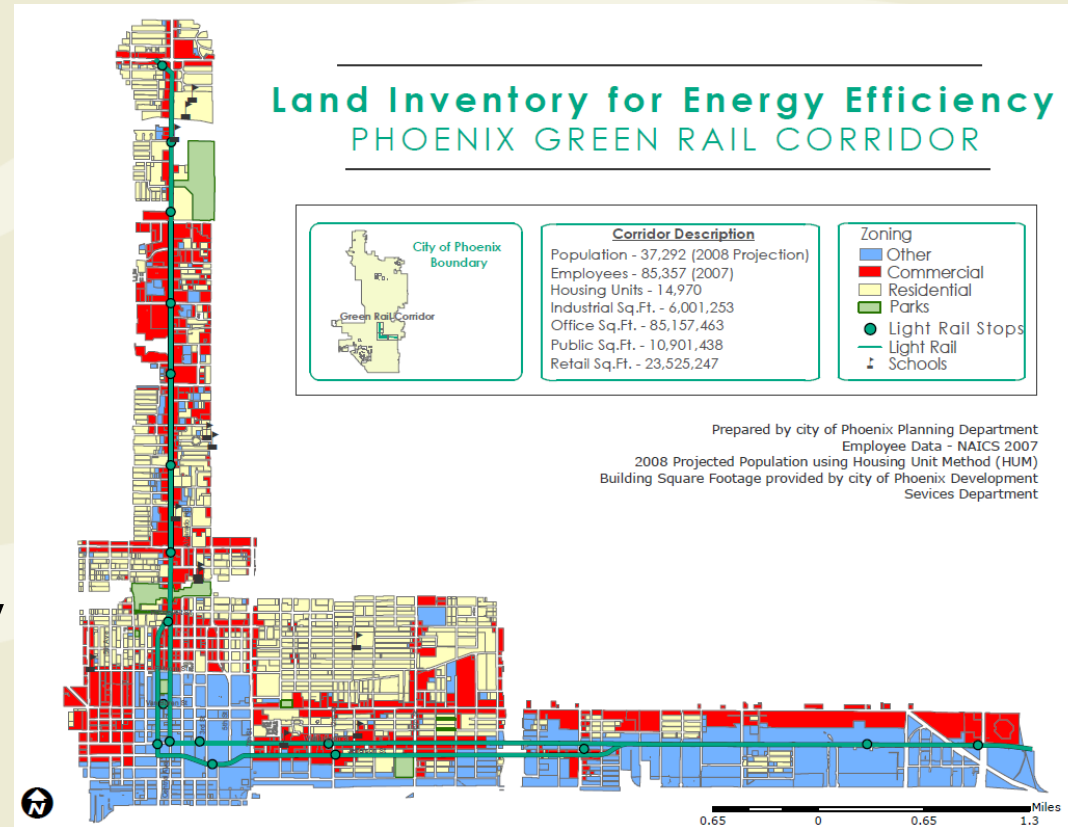
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Mixed Use Technology Corridor
similar to other transportation corridors in other cities

Large Opportunity for Retrofit
125 M ft² commercial and 15,000 residences

Opportunity to Define Community
unlike more traditional “neighborhoods” but has unique advantages



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Initial Project Goals of:

- *reaching electricity savings of 307.4 million kWh/yr;*
- *leveraging \$380M for use in Years 1–3, \$571M over 6 years;*
- *retrofitting of 10,500 homes and 90 million ft² of office and industrial space;*
- *average energy reductions of 30% in residences and 18% in commercial buildings;*
- *3,800–5,300 jobs created in Years 1–3 and 5,700–8,000 total jobs over 6 years; and*
- *determining social-marketing techniques that best modify consumer energy use.*

have been revised with funding available

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To leverage and promote investment, we will pursue market and regulatory transformation to:

- *establish a Revolving Loan Fund (RLF) with 5 banks as a permanent source of capital at competitive interest rates to Energy Service Companies (ESCOs) performing retrofits;*
- *lower multi-unit sales tax on apartments in the GRC that make energy-efficiency retrofits;*
- *commit 100% of financial savings from energy-efficiency projects in city buildings and infrastructure to a revenue stream to sustain the project beyond DOE funding; and*
- *develop a regulatory framework with a Green Development Code that accelerates investments in energy efficiency.*

have not been changed with scope of the project

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Strategic partnerships with APS and ASU will link COP operations, ASU research, and APS energy delivery and measurement:

COP will lead establishing the RLF, retrofit incentives and community information campaigns

ASU will lead the quantitative impact assessment of energy efficiency, social-behavioral change and community-based marketing campaigns

APS will lead the installment of Smart Meters in the Corridor as well as interaction with existing account holders

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Engagement Menu:	Financing Options (years 1-3)	Financing Options (years 4 and on)
Commercial Retrofits	access to RLF utility incentives ESCO financing grant-funded incentives	access to RLF utility incentives ESCO financing
Owner-Occupied Retrofits	access to RLF utility incentives ESCO financing grant-funded incentives	access to RLF utility incentives ESCO financing
Apartment Retrofits	lowered multi-unit use fees access to RLF utility incentives ESCO financing grant-funded incentives	lowered multi-unit sales taxes access to RLF utility incentives ESCO financing
Weatherization of Low to Moderate Income Homes	grant-funded incentives	to be continued at reduced level under existing WAP program
Residential Behavioral Change	grant-funded installation of energy dashboards	to be evaluated for effectiveness for possible funding in out years
Education of residents and visitors at the One-Stop Center	grant-funded incentives	to be evaluated for effectiveness for possible funding in out years

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The approach we've taken is transferable because:

Mixed-use. *The project extends across diverse communities and land uses and can be transferred to mixed-use communities that are increasingly common across the US. Energy and cost savings are achieved in multiple building types and for users in multiple demographics.*

Electricity-dominated. *Because energy use in Phoenix is electricity-dominated and cooling-driven, energy consumption is easy to monitor and evaluate. Monitoring strategies can be transferred to electricity-based systems across the US.*

Market-based. *Arizona law does not permit Property-Assisted Clean Energy (PACE) programs that have been successful in overcoming barriers to residential renovation in other states. Our financing strategies are nonregulatory, market-based incentives that can be replicated in other regions, independent of legislative barriers.*

Behavior-driven. *Marketing strategies dependent on media-buys must be sustained with high capital investment. Long-term behavioral strategies embedded in our marketing approach will can be transferred and integrated into existing utility marketing campaigns.*

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Proposal submitted on December 14, 2009

Funding announced on April 21, 2010

Currently working with DOE on revised strategy given level of funding

Expect a kick-off event for Summer 2010 with an announcement of details of the program

PROJECT SUMMARY

Project Director: Dimitrios Laloudakis, Energy Manager, City of Phoenix Public Works Department
Partners: City of Phoenix (Departments of Public Works, Neighborhood Services, Development Services, and Community and Economic Development)
Arizona State University's Global Institute of Sustainability
Arizona Public Service Company
Participants: Denise Resnik & Associates Public Relations, Valley METRO Rail, Maricopa Community College District, AZ Department of Commerce, Office of Energy
Title: Energize Phoenix: Transformation through Behavior and Retrofits along the Green Rail Corridor

Project Objectives: Arizona's largest city (1.6 million residents), largest university (68,000 students), and largest utility (1.1 million customers) propose a practical, yet innovative, energy-efficiency project that will transform the local energy market along a newly created "Green Rail Corridor." Project partners—the City of Phoenix (COP), the Global Institute of Sustainability (GIOS) at Arizona State University (ASU) and Arizona Public Service (APS)—have a long history of collaboration on large-scale projects in urban infrastructure, energy efficiency, and community development. The City's Water Conservation program is testimony to its capabilities in transforming behavior and integrating new technologies to create large-scale efficiencies. Phoenix uses the same amount of water today as it did 20 years ago, despite a doubling of population. Over our initial 6-year planning horizon, our goal is to renovate most of residential, commercial, and institutional space (10, 500 homes and 90 million ft² of commercial/institutional space). The transformed Green Rail Corridor will be a readily identifiable, energy-democratizing region bound by a highly visible commitment to energy efficiency.

Project Description: We have a long-term vision to achieve market transformation. Years 1–3 emphasize substantial leveraging of DOE funds, installation of new technology, and a powerful behavioral-change campaign; out-years use our revolving loan fund and new revenue streams to continue energy retrofits, capitalize on the momentum of behavioral change, and institutionalize financial mechanisms. Strategic partnerships with APS and ASU will link COP operations, ASU research, and APS energy delivery and measurement. These relationships encourage retrofits by doubling existing utility incentives, evaluating and verifying participant energy savings, and assessing the degree to which the financial program transforms the market.

Methods: We combine creative financing and community-oriented initiatives that encourage behavioral change. Our fiscal approach is a game-changer for Arizona and substantially leverages DOE's investment. A Revolving Loan Fund with 5 locally operating banks will be a permanent source of capital at competitive interest rates. The City of Phoenix has already initiated a process to enact a Green Development Code and will lower sales taxes on apartments that retrofit. To sustain the project beyond DOE funding, The City will commit 100% of their savings from energy-efficiency projects in the Green Rail Corridor to sustain the program. We will achieve critical mass through a corridor-wide rollout of APS smart meters and deployment of energy dashboards that residents will use to track electricity use and change behaviors in real time. A high-touch marketing campaign will make energy efficiency the option of first choice in the Corridor.

Impacts: Energize Phoenix will model the best practices in the design and operation of transformative energy markets. Our project will occur along a multi-use, light rail line comparable to transportation corridors in many large cities, and lessons learned will be transferrable to cities across the US. Ultimately, the Green Rail Corridor will save 307.4 million kWh/yr translating into savings of more than \$26.2M/yr and reduced CO₂ emissions of 151,000 metric tons/yr. Development of the Green Rail Corridor will create up to 8,000 jobs in the clean-energy industry, boost savings for working families, and stimulate economic growth throughout the region.

Green Phoenix Concept

New opportunities are always being reviewed and pursued

Goal is to target opportunities for:

Green Community Development (HUD Green and Healthy Homes award and new opportunities)

Renewable Energy

Water Conservation