TRANSIT ORIENTED DEVELOPMENT IN BRIDGEPORT, CT:

Recommendations for Implementing Distributed Energy Generation and Green Infrastructure

M.S. SUSTAINABILITY MANAGEMENT

December 6, 2011

Project Team

Suparna Dutta
Jacob Mandell
Erica Marcos
Tineesha McMullen
Lynda Viray
Nicholas Walker

AGENDA

- Background and Project Scope
- Methodology
- Distributed Energy Generation (DEG)
  - Definition
  - Challenges
  - Recommendations
- Green Infrastructure (GI)
  - Definition
  - Challenges
  - Recommendations
- Funding and Governance for TOD
- Project Challenges
- Report Use
- Questions and Feedback

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UNITED STATES OF AMERICA

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

NEW YORK & CONNECTICUT
SUSTAINABLE COMMUNITIES

PROJECT SCOPE

Research sustainability strategy implementation and ways to overcome site obstacles:

DISTRIBUTED ENERGY GENERATION (DEG)

DEG is the generation of electricity from parallel and stand-alone units located within the electric distribution system at or near the end user.

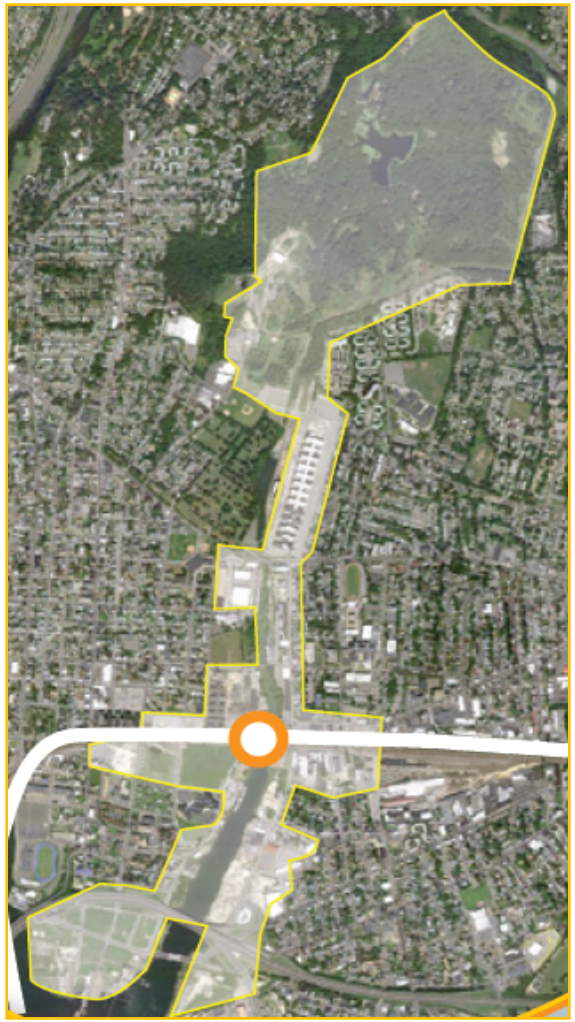
- Solar Photovoltaic
- Microturbine
- Fuel Cell
- Combined Heat and Power (CHP)

GREEN INFRASTRUCTURE (GI)

GI refers to strategies for handling stormwater at the source before it enters the sewer system.

- Vegetated Swales
- Permeable Pavements
- Green Roofs
- Rain Harvesting

BACKGROUND



PT Barnum (Eastside) Train Station
Eastside Development Corridor

COLUMBIA UNIVERSITY
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METHODOLOGY

PHASE I	PHASE II	PHASE III	
STRATEGY	**FEASIBILITY**	**RECOMMENDATIONS**	
• DISTRIBUTED ENERGY GENERATION • GREEN INFRASTRUCTURE **RESEARCH METHODS** Literature Review Case Studies Interviews	• ENVIRONMENTAL JUSTICE • FUNDING • GOVERNANCE **RESEARCH METHODS** Literature Review Case Studies Interviews	DISTRIBUTED ENERGY GENERATION • Cost Analysis • Environmental Justice • Funding • Governance	GREEN INFRASTRUCTURE • Cost Analysis • Environmental Justice • Funding • Governance

DISTRIBUTED ENERGY GENERATION

STRATEGIES	BENEFITS	CHALLENGES
Solar Photovoltaic (PV)	Renewable Energy Source	High installation costs Intermittency Site-specific conditions
Microturbine	No intermittency Scalable systems to meet kW demand Fuel flexibility	High installation costs Operations and Maintenance Costs
Fuel Cell	No intermittency Scalable systems to meet kW demands Fuel Flexibility	High installation costs Operations and Maintenance costs
Combined Heat and Power (CHP)	Cogeneration of heat and power Increased system efficiency	High installation costs Demand side disparity between heat and power. Operations and Maintenance costs

(California Energy Commission, 2004)

DEG RECOMMENDATIONS

Establish an energy consumption baseline for future comparison

STRATEGIES	RECOMMENDATIONS
Solar Photovoltaic (PV)	Utilize Solar PV systems to meet residential average demand of ~1 kW*
Microturbine and CHP	Utilize Microturbine CHP systems to meet the estimated average commercial office building demand of ~ 24 kW*
Fuel Cell and CHP	Utilize Fuel Cell CHP systems to meet the estimated average commercial office building demand of ~ 24 kW*
Environmental Justice	Utilize the EPA Environmental Justice grant to advertise the benefits of implementing DEG
Funding	Through advertising from EJ, encourage residential and commercial adaptation to DEG so that financial incentives could be fully realized
Governance	Appoint an Energy-Funding Liaison Officer for the East Bridgeport TOD site

* Figures calculated based on data from the Energy Information Administration and The National Renewable Energy Laboratory PV Watts Calculator

GREEN INFRASTRUCTURE

STRATEGIES	BENEFITS	CHALLENGES
Permeable Pavement	Reduces the quantity and flow rate of stormwater runoff Reduces volume, flow rate and pollutant congestion of stormwater runoff	Installation and maintenance are time consuming Cost
Vegetated Swale	Reduces the quantity and flow rate of stormwater runoff Aesthetically pleasing	Maintenance Require allocation of land
Green Roof	Reduces the quantity and flow rate of stormwater runoff Prevents heat island effect Natural carbon capture by roof vegetation	Maintenance Cost
Rain Harvesting	Reduces the quantity and flow rate of stormwater runoff Can be used for irrigation and landscaping	Maintenance Disparity between demand and availability of rainwater

GI RECOMMENDATIONS

STRATEGIES	RECOMMENDATIONS
Permeable Pavements	Designate the development corridor as Green Infrastructure Zone and utilize GI strategies in existing and new developments Design and conduct a measurement plan for CSO at sewer intake and outfalls
Vegetated Swale	
Green Roofs	
Rain Harvesting	
Environmental Justice	Incentivize the upgrade and update of current Bridgeport GIS tools for data collection Determine the most vulnerable regions within TOD vicinity Develop a list from which it prioritizes potential stormwater retrofits within TOD vicinity
Funding	Endorse a creative financing strategy and request that DOT allocates a percentage of their construction costs to Green Infrastructure
Governance	Incentivize zoning regulations through expedited permitting and tax exemptions

PROJECT CHALLENGES

Finding Bridgeport specific data and implementing at the local level

DISTRIBUTED ENERGY GENERATION

Average Demands calculated for State and Regional consumption

- **Energy Information Administration (EIA)**
- **National Renewable Energy Laboratory (NREL) PV Watts Calculator**

GREEN INFRASTRUCTURE

Estimated CSO volumes calculated using data from Save the Sound, a non-profit environmental advocacy group

- **No correlation between rainfall data and CSO occurrences**

REPORT USE

1. **Supplement to RPA knowledge base**
   - Provide background and benefits of recommended strategies

2. **Provides information on existing framework for Consortium members**
   - Governance
     - Stakeholders
     - Laws, Regulations, and Codes
   - Funding Options
     - State Funds
     - Federal Funds

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Thank You

Questions

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