



# Greening Brownfields –

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Energy-efficient Locations, Green Jobs,  
and Energy Production

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# Northeast-Midwest Institute

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## Brownfields Federal Policy supported by the Brownfields Inner Circle





# Redevelopment Economics

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- Green Job Strategies
- Climate Benefits of Smart Growth
- Brownfields Strategies
- Site Redevelopment Analysis and Financing
- Incentives to Support Smart Growth
- Economic Impact Analysis

# Brownfields, Green Buildings, and Energy-efficient Locations

- Brewer's Hill, Baltimore

- \$125 million mixed use

- Building and site characteristics:

- Green – MD Green Bldgs. Tax credit
- Rehab vs. demo/new construction



- VMT characteristics

- Density
- Mixing of uses/internal design
- Close to Job Center
- Degree of connectedness to the existing grid
- Access to transit





# Energy-efficient Locations, Green Jobs, and Energy Production

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1. Green job growth
2. Strategies that place green jobs and renewable energy on brownfields
3. Model projects - green jobs and renewable energy on brownfields
4. Brownfields and energy-efficient locations
5. Model projects that combine energy-efficient locations with energy production



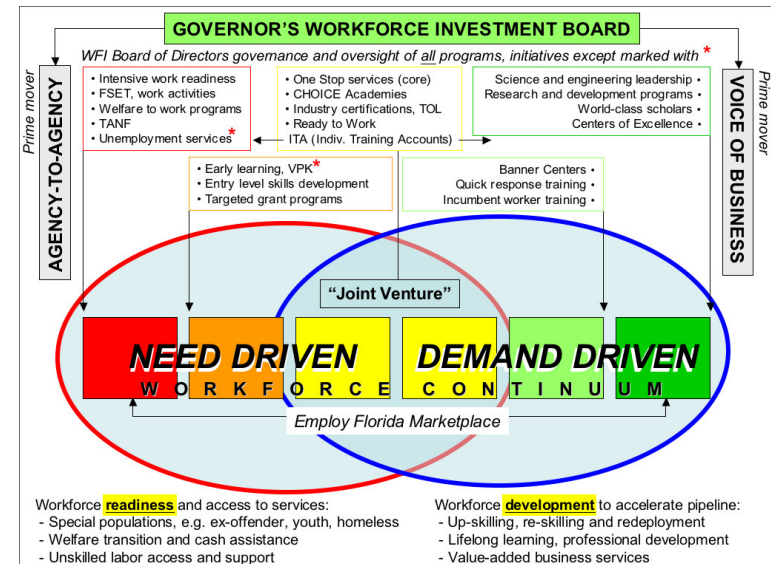
# Brownfields and Green Jobs

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- Green job growth should go to sustainable locations:
  - Infrastructure in place
  - Near transit and close to urban activity centers
  - Close to lower income populations

# Defining Green Jobs - Florida

- Workforce Florida:
  - **"A green job increases the conservation and sustainability of natural resources for the benefit of Floridians. This includes jobs that reduce energy usage or lower carbon emissions, and protect Florida's natural resources. Green jobs should provide worker-friendly conditions, pay sustainable wages and offer opportunities for continued skill training and career growth."**



## US Green Job Growth

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- USCM projection:
  - 750,000 currently to more than 4.2 million by 2038.
- Apollo Alliance:
  - 380,000 in component parts manufacturing for renewable energy
- Pew Climate:
  - Jobs in renewable energy grew 9.1% annually, 2003-2007
- American Solar Energy Society (ASES)
  - Jobs in energy efficiency and renewables grew by 8.4 mil in 2007
  - Will grow to 38 mil by 2030 (35% of the economy).



## Green Job Growth - Florida

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- CERES - Fla job growth due to cap-and-trade:
  - 48,000 to 78,000 jobs
- American Council Energy Efficient Economy (ACEEE)
  - Energy-efficient standards and strategies –
    - save \$28 billion
    - create 14,000 jobs by 2023
- Renewable Energy Policy Project:
  - 9,000 jobs in component manufacturing
- Center for Climate Strategies:
  - Implementing the state Climate Action Plan would create 148,000 jobs



Strategies for Renewable Energy on Brownfields

## **EPA Repower America**

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- Renewable energy – land needs. States with Renewable Energy Portfolio requirements – 6,700 MW by 2025
- EPA tracks:
  - 480,000 sites/15 million acres contaminated properties
  - 10,000 abandoned coal mines
- Screening – 5,000 sites and 1.1 million acres potentially suitable for PV

## **Locating Renewable Energy on Brownfields– State Model**

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- Arizona Bureau of Land Management examining 42 brownfield sites totaling 26,000 acres, including:
  - Landfills
  - abandoned mine lands
  - gravel pits
  - hazardous material sites
  - former airfields
  - trash dumps

# Climate Strategies that Target Brownfields – Local Models

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- Cincinnati counts redeveloped brownfields as part of carbon reduction:
  - For every 0.23 acres of existing forest that is maintained, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
  - For every 0.01 acres of deforestation of greenfield properties avoided, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
  - For every 25.6 tree seedlings planted on a redeveloped brownfield site, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
  - For every 680 pounds of waste not placed in a landfill by incorporating recycling of construction and demolition materials into brownfield redevelopment, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
  - For every 0.18 cars eliminated from the roadways as a result of building businesses closer to the urban population through brownfield redevelopment, approximately 1 metric ton of CO<sub>2</sub> emissions is saved.
  - For every person that resides in a clustered mixed-use development instead of a suburban-style residential subdivision, approximately 2.7 metric tons of CO<sub>2</sub> emissions is saved

# Green Job Strategies that Target Brownfields – Local Models

- Los Angeles

- Developed a “clean tech” campaign
- Targeted a 20-acre brownfield site for a green tech cluster
- Established two green job incentive funds:
  - a \$15 million port-related Technology Advancement Program (TAP);



- Los Angeles City Employees' Retirement System - \$46 million set aside.

# Green Job Strategies that Target Brownfields – Local Models

- Kansas City “Green Zone” – Concentrates resources to 150 under-served area:
  - Job training
  - human resource services
  - business incentives



Green Jobs Energy on Brownfields

## PA Steel Mill Anchored by Renewable Energy Component Manufacturers

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Keystone Industrial Port  
Complex in 2,400-acre US  
Steel, Fairless Hills, PA

- Start-up solar material manufacturer AE Polysilicon Corporation,
- Spanish wind energy manufacturer Gamesa Wind US LLC, and
- Bard Bio-fuels, a 60 Mgy soybean-based biodiesel plant



**Incentives** - \$11.92 million in  
loans, grants, tax incentives

**Dollars Leveraged:** \$104  
million

**Jobs Leveraged:** 450

Green Jobs on Brownfields

# Detroit (Wixom) Bets on Energy Park Reuse of Ford Plant

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- Renewable energy park
- 2,800 jobs
- Xtreme Power (advanced battery manufacturer)
- Clairvoyant Energy (PV manufacturers)
- \$100 million in tax breaks

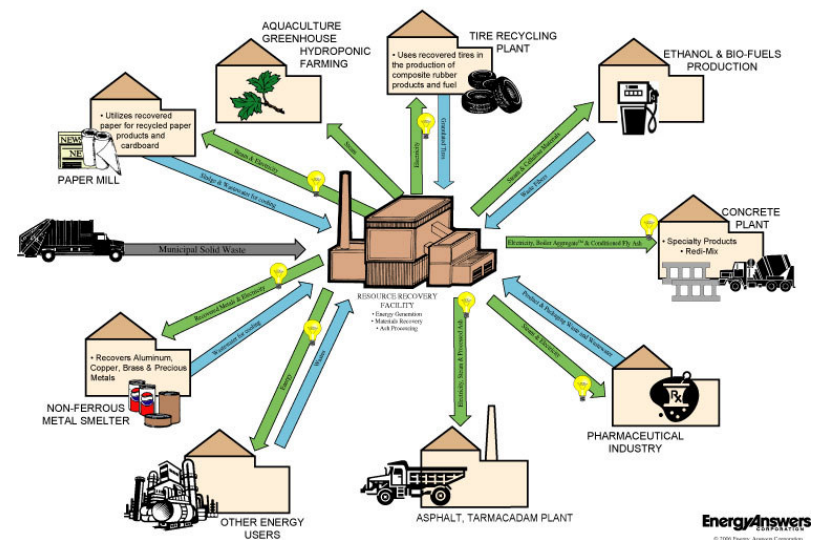




# Baltimore – CHP Plant could Anchor Industrial Redevelopment

- Energy Answers – Combined Heat and Power reuse of FMC fertilizer plant
- 120 MW plant
- 150-160 jobs
- Using 20 acres of 120 FMC plant, remainder complimentary industrial

## Resource Recovery Based Eco-Industrial Park



## Renewable Energy on Brownfields

# Baltimore – Landfill Gas Fuels CHP plant which Provides Energy to Coast Guard

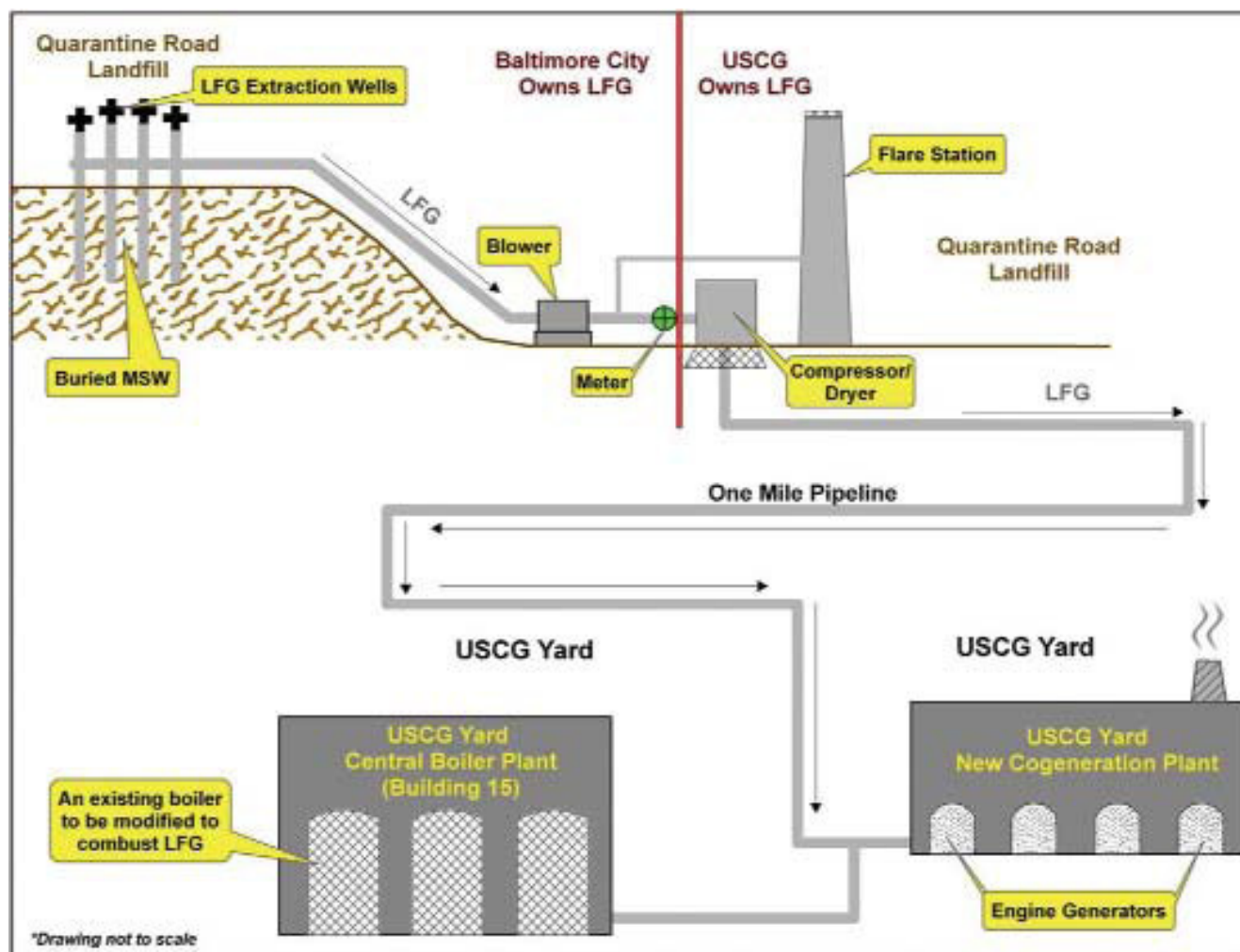
Landfill gas-supplied CHP plant provides 100% of the Yard's electricity requirement independent of the regional electric grid

- Removes 4 MW (approximately equivalent to 2,500 homes) of electricity from the regional electric grid the project



## Renewable Energy on Brownfields

# Baltimore – Landfill Gas Fuels CHP plant which Provides Energy to Coast Guard - Ameresco



Renewable Energy on Brownfields

## **Buffalo – Wind farm on Contaminated Bethlehem Steel Property**

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- EPA Fact Sheet – “construction could occur without excavating the contaminated soil. Instead, the windmill foundations, service roads and green space cover the contamination.”
- Wind turbines will generate over 50 million kilowatt-hours of electricity each year, enough electricity to power 9,000 homes.



Renewable Energy on Brownfields

## **Philadelphia Naval Shipyard – Solar on Contaminated Waste Site**

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- Part of 1,000-acre shipyard redevelopment
- 1.5 megawatt solar on 7-acre brownfield, former landfill and incinerator
- On-going remediation and deed-restricted land use limits.







Renewable Energy on Brownfields

## **Wind and Solar as an Interim Use**

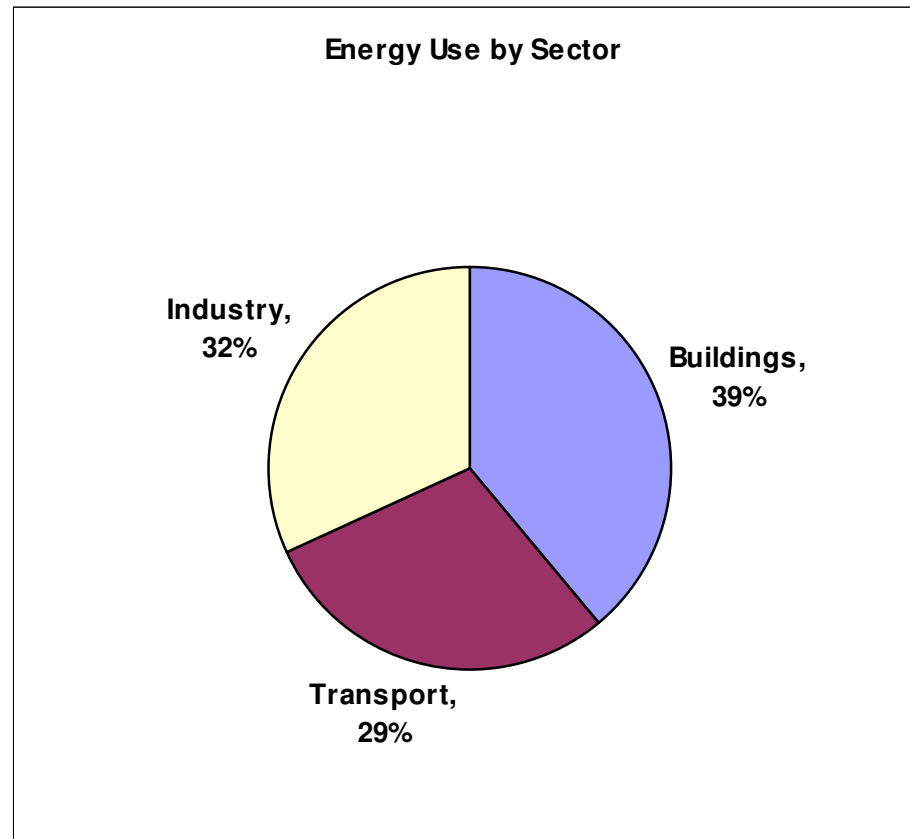
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- Milwaukee – Solar unit designed as an interim use
- Chicago – wind unit designed as interim use

# Brownfields and Energy-Efficient Locations

## Energy Demands by Sector

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# Brownfields, Green Buildings, and Energy-efficient Locations

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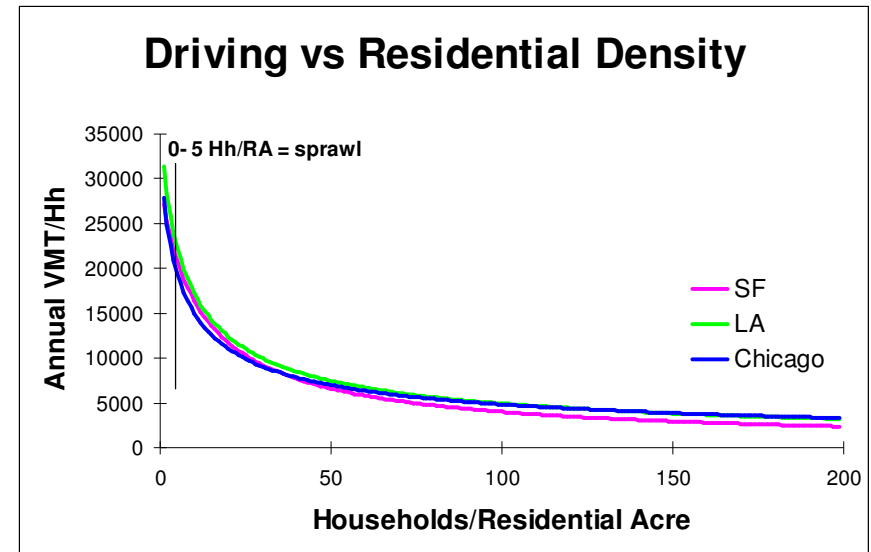
- **The Demographic Opportunity**
- **Transportation and VMT's**
  - Density
  - Close to urban center
  - Mixed use
  - Connected to the Urban grid
  - Access to transit
- **Building-Related Energy Use:**
  - Green Buildings
  - Density
  - Rehab vs. new construction
- **Site related Energy Use:**
  - Infrastructure
  - Carbon sink value
  - Distributing energy
  - Distributed energy



# Transportation/VMT's

## ULI Report – “Growing Cooler”

- 20% – 40% VMT reduction due to “compact in-fill” development.
- Factors affecting the range, in rank order:
  - Residential density
  - Mixing of uses/internal design
  - Proximity to city center or job center
  - Degree of connectedness to the existing grid
  - Access to transit



- Can brownfields projects claim the VMT reductions attributed to dense/compact development?

# Transportation, Brownfields and VMT's

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- Redevelopment of  
American Can, Baltimore

- Density ☒
- Close to job center ☒
- Mixing of uses/internal design ☒
- Degree of connectedness to the existing grid ☒
- Access to transit ☒





# Transportation/VMT's – Brownfields and VMT's

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- New (unreleased) EPA Case Studies of 5 sites:
  - 21% - 58% lower VMT's
- Clean Air-Brownfields Project:
  - Dallas and Baltimore case studies: Brownfields vs greenfields, saves:
    - 22% - 55% VMT's
    - 40% - 87% - NOX
    - 36% - 73% - VOC's
- Atlantic Station EPA Analysis
  - Atlantic Steel (vs. 3 alternate suburban sites) saves:
    - 14% - 52% VMT's
    - 37% - 81% - NOX
    - 37% - 81% - VOC's

# Transportation/VMT's Atlantic Steel to Atlantic Station

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- 6 mil sq ft office
- 5,000 DU's
- 2 mil sq ft retail
- 1,000 hotel rms
- 11 acres open space



## Transportation/VMT's – Brownfields and VMT's

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	Region	Atlantic Station Residents	Atlantic Station vs. Region - % Reduction
<b>Individuals - ave VMT per day</b>	<b>32.4</b>	<b>8.6</b>	<b>73.5%</b>
	Region	Atlantic Station Workers	Atlantic Station vs. Region - % Reduction
<b>Commuting miles per day</b>	<b>18.9</b>	<b>12.0</b>	<b>36.3%</b>



## Going beyond VMT's – Building Factors

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- Buildings account for 39% of energy demand
- Ways to reduce GHG's attributable to Buildings:
  - Green/energy efficient buildings
  - Efficiencies in heating and air conditioning  
higher density structures (fewer exposed surfaces)
  - Rehab vs. New Construction
  - Some projects PRODUCE energy



# Building Factors – Green Buildings

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- Green Buildings and Brownfields
  - Consultants – market forces favor large-scale mixed use urban/brownfields projects going green;
  - ALL four large-scale TIF projects cited in a recent NEMW report are going green



# Building Factors – Green Buildings

## Mega-Brownfields Projects – Going Green



Atlantic Station, Atlanta



Gates Rubber, Denver



Gateway South, Baltimore



Cleveland Flats East Bank, Cleveland





## Building Factors - Density

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- Efficiencies in heating and air conditioning more dense structures (fewer exposed surfaces)
  - Multi-family housing averages  $\frac{1}{2}$  the electricity use of single-family housing;
  - ULI report – 20% differential when control for socioeconomic factors and DU size



# Going beyond VMT's – Site Factors

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- Infrastructure-related energy demands
  - Cost differential –
    - \$55,000/DU/Suburban vs.
    - \$7,500/DU/brownfields
  - Infill 25% lower than greenfields (EESI)
- Greater efficiency (lower “line-loss”) in transmitting energy
- Carbon sink value of retained forest
  - 0.23 acres forest retained equals 1 metric ton of CO<sub>2</sub> emissions is saved
- Distributed Energy
  - Waste-to-energy plants serve many urban core areas

# Going beyond VMT's – Site Factors – Distributed Energy

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- Waste-to-Energy plants
  - 89 waste-to-energy plants operating in 27 states;
  - Generate 2,500 megawatts electricity to 2.3 million homes;
  - 1500-ton/day facility saves **270,000 tons** CO<sub>2</sub> annually



Baltimore's waste to energy plant – BRESCO – serves Baltimore's core/Downtown

## Brownfields/Mixed Use with Energy Production

# **Belmar Mixed Use Development, Lakewood, Colorado**

- 22-city block mixed use redevelopment of failed downtown mall
- Garage roof solar installation 1.7 MW array
- EPA Brownfields Funding
- Rebate from Xcel Energy, driven by Colorado's renewable portfolio standard



# Portland – South Waterfront

- Energy Production:
  - *Solar energy – sunshades*
  - *Combined Heat and Power (CHP)*
- Green Buildings
- VMT characteristics





# Brownfields/Mixed Use with Energy Production

## Georgetown Land Development, Redding, CN

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- Energy Production
  - *Hydro-electric power generation*
  - *Photovoltaics*
  - *Fuel Cell energy production*
- Green Buildings
- TOD
- VMT characteristics





# Brownfields and Energy Policy Implications

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- Reward “Double Benefit” sustainable urban redevelopment:
  - Development Incentives
  - Energy Policy
    - “Cap and trade”



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