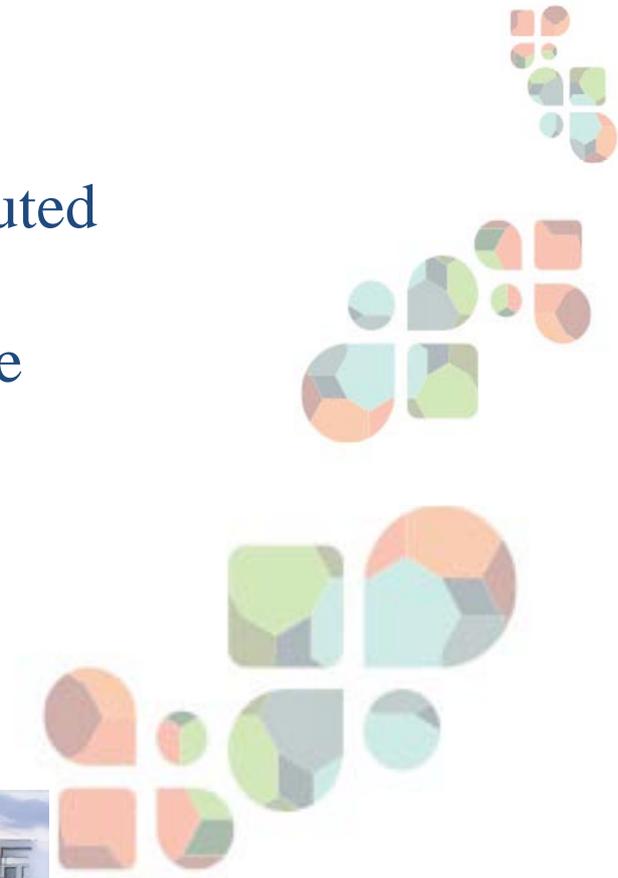




Building the future one block at a time.

# Living City Block

“Using Aggregation to Engender Distributed  
Generation at the Community Scale”  
NYSERDA NECHPI CHP Conference  
June 22, 2012

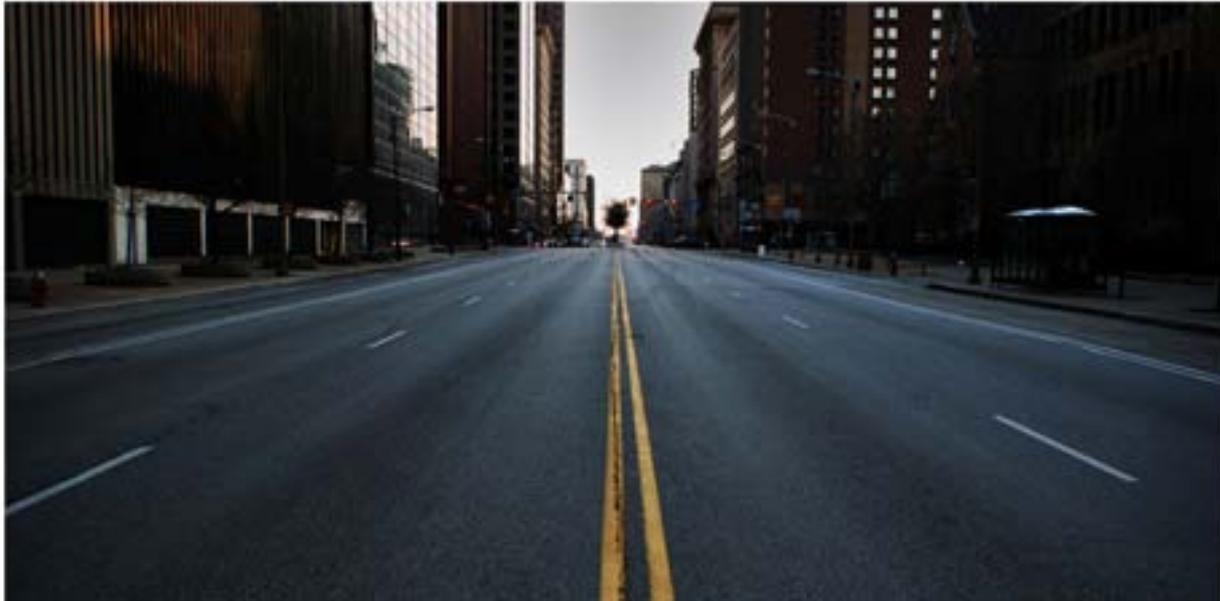


[www.LivingCityBlock.org](http://www.LivingCityBlock.org)



Nearly **80%** of the world's population  
will live in cities by 2050

# WHAT KIND OF CITIES WILL THEY LIVE IN?



# WHAT KIND OF CITIES WILL THEY LIVE IN?



# VISION AND MISSION

Regenerative and resilient cities that are culturally thriving, energy and resource hyper-efficient, and economically sustainable.

To create and implement a replicable, exportable, scalable, and economically viable framework for the resource-efficient regeneration of existing cities.



# WHAT WE DO

We work as an *implementation partner* to transform existing urban communities into:

hyper-resource efficient, economically sustainable, socially and culturally thriving urban neighborhoods.



# SUSTAINABILITY AS EQUALIZER



Government Policy  
& Incentives –  
Mitigation of  
perverse market  
barriers

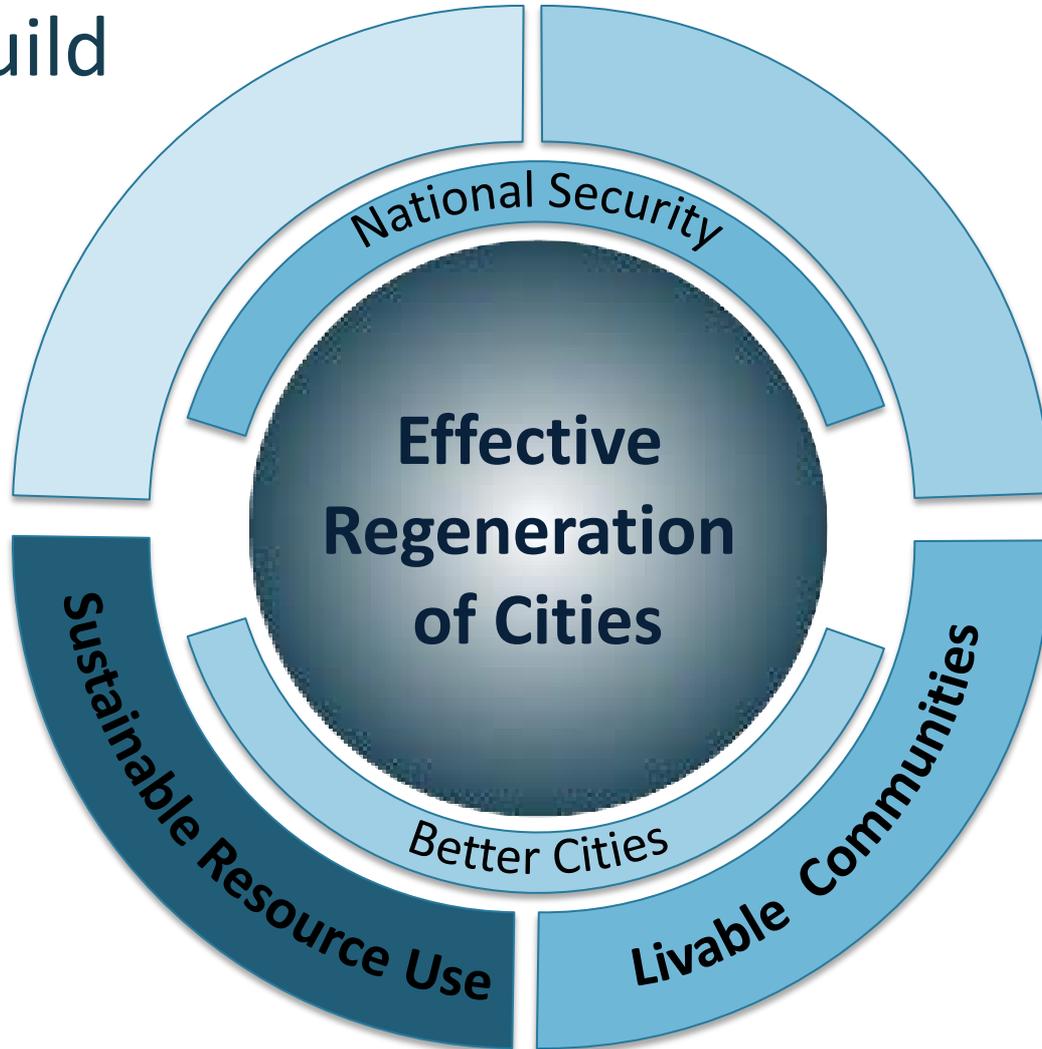
Civil Society Organizations  
funded, trained and with the  
capacity to take the lead on  
affordable housing &  
sustainable development

Private Market Players  
properly aligned with  
valid financial incentives  
and long term value  
proposition



# OPPORTUNITY

By addressing the challenges as a system, we can build



by moving forward with the same work at once.



# HOW WE ARE GOING TO DO IT

An Integrated Approach with Multiple Benefits.

- Prove the business/finance case
- Prove the economic development case
- Prove the livable communities case



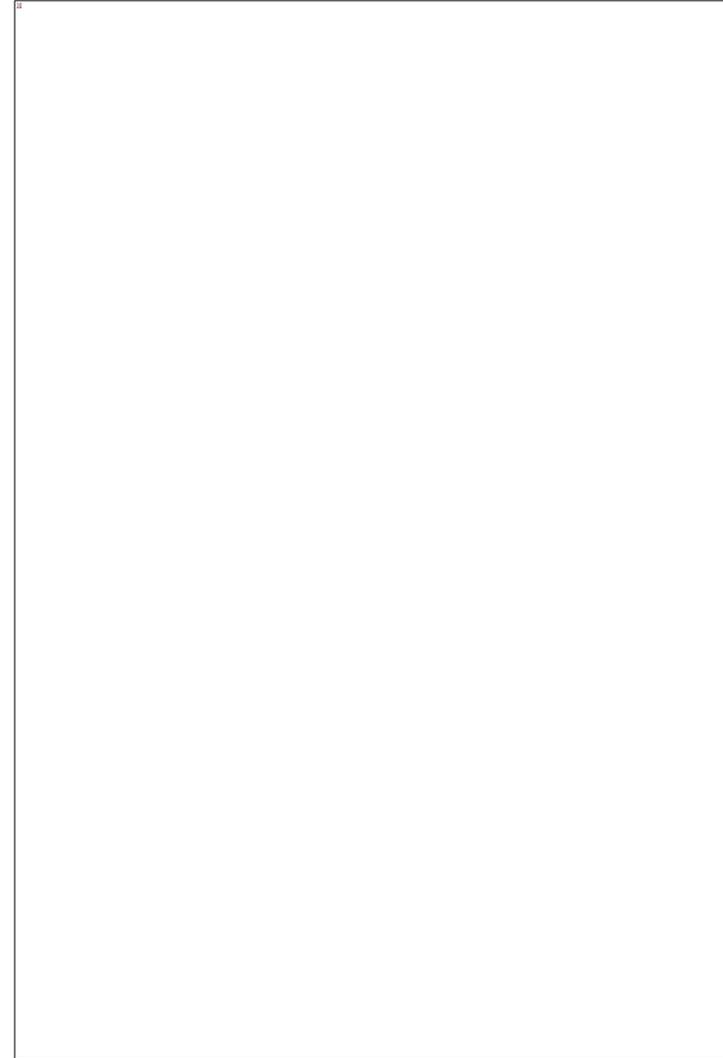
# COMMUNITY BUILDING & BEHAVIOR CHANGE

We Make a 6-10 Year Commitment to Each Community

We Need to Stay Long Enough to Help Behavior Change  
Become Culture Change



# NEW CONSTRUCTION and LARGE BUILDINGS



This level of work is being achieved in ground-up construction and large buildings.

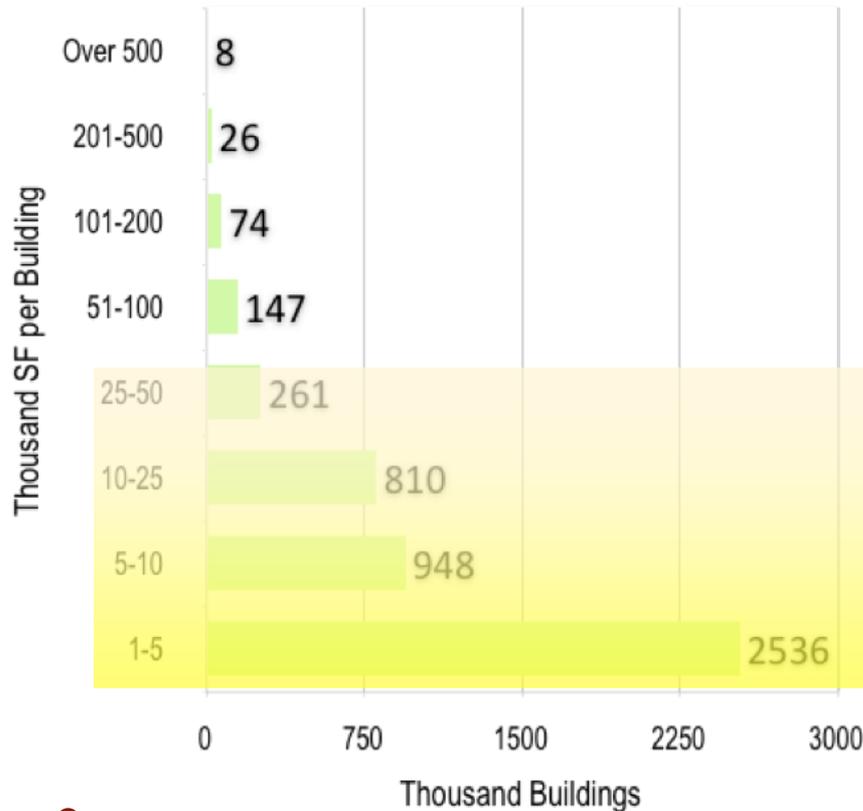
**Our challenge is to achieve the same thing, or better, in existing small to medium sized buildings.**



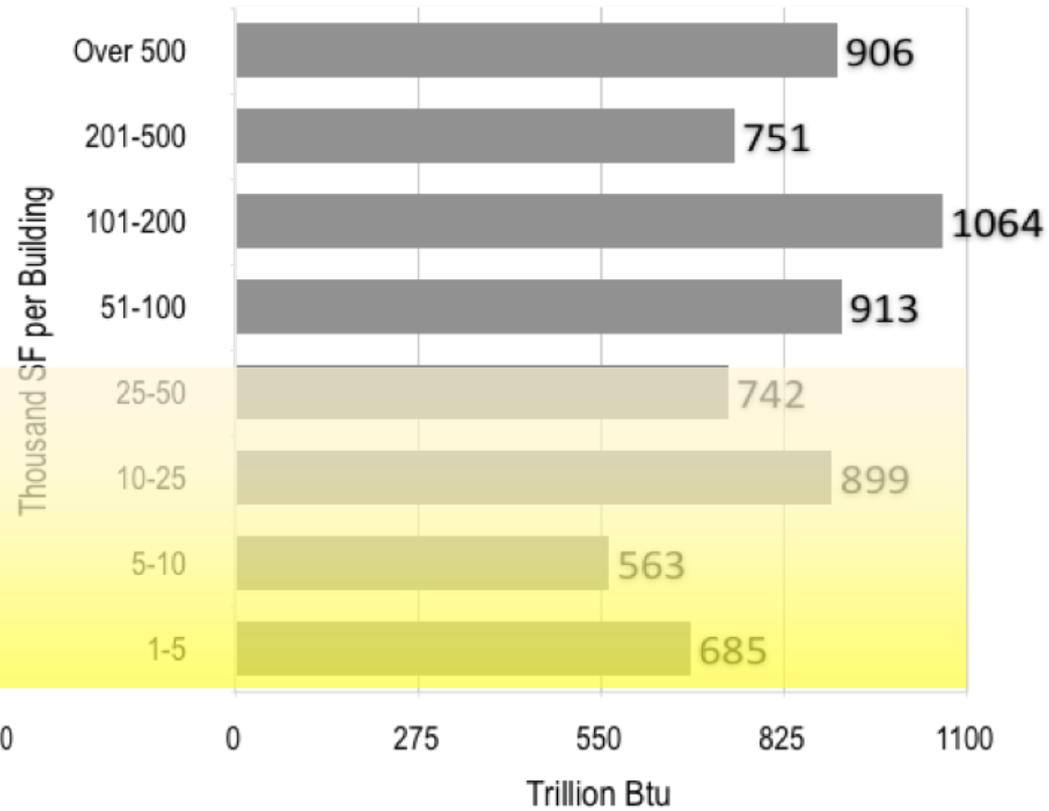
# 95% of U.S. commercial building owners own small to mid-sized commercial buildings

- ⇒ 45% of all commercial sq footage
- ⇒ Consuming 44% of annual commercial building en

All Commercial Buildings



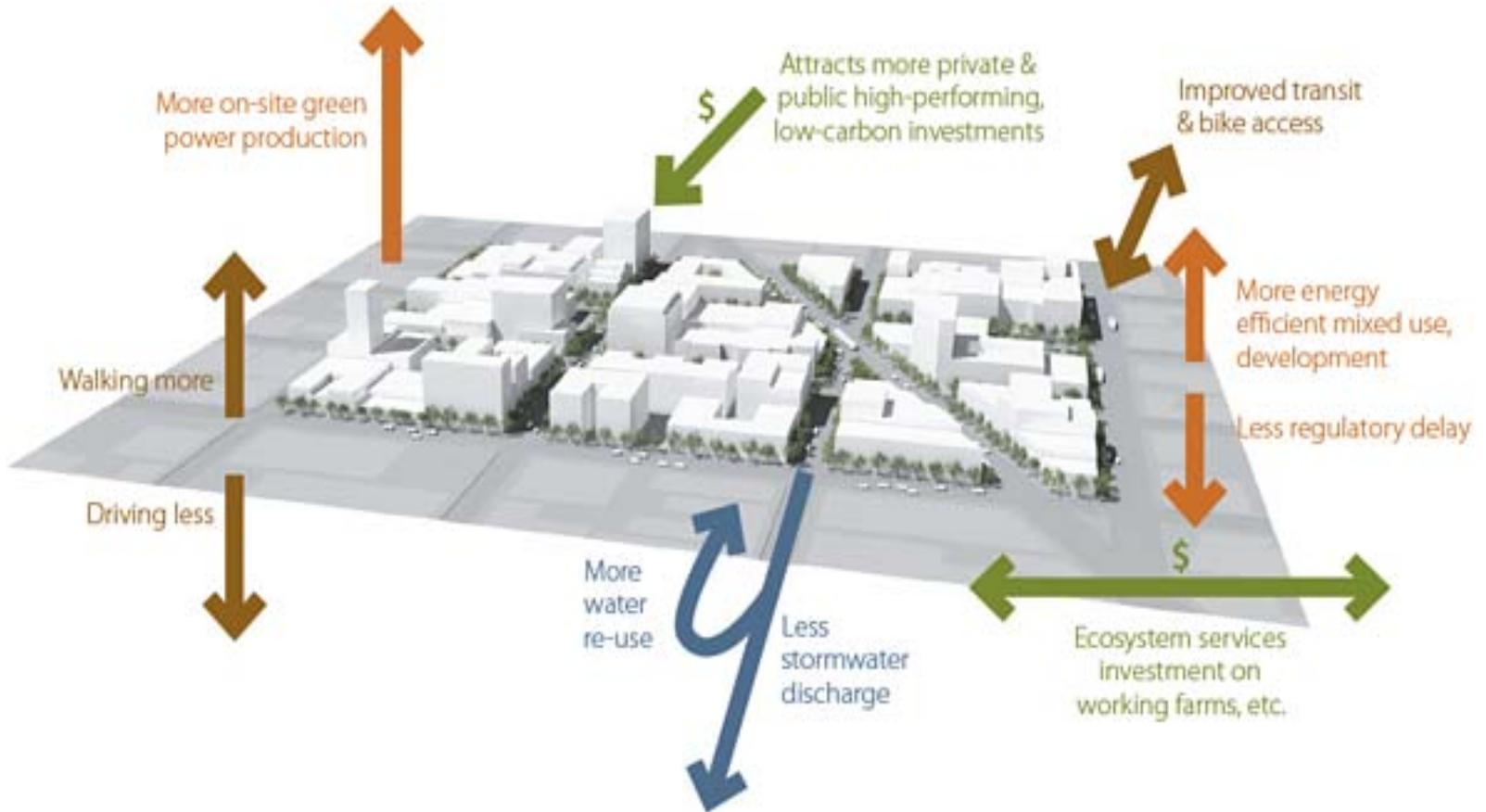
All Commercial Buildings





Living City Block approaches the incredibly complex challenge of transforming cities by breaking it down into “bite-sized,” (we like to say “block-sized”) components.

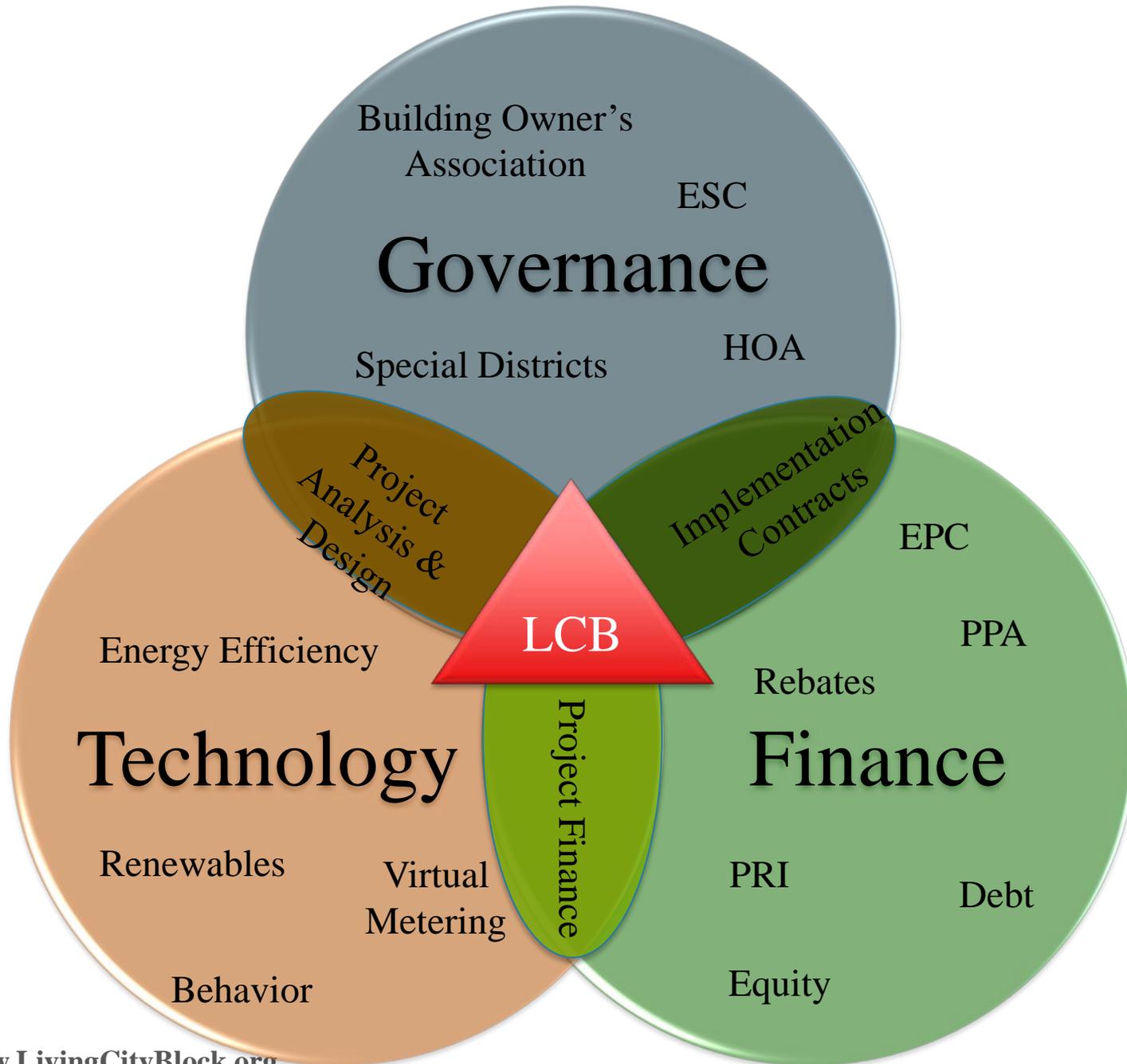




We identify target blocks, which we call *Living City Blocks*, areas that can have a disproportionate impact on their local surroundings.



# LIVING CITY BLOCK AGGREGATION MODEL



# THE PROCESS

## Phase 1 - Neighborhood Selection

Scouting  
locations,  
securing local  
partners,  
identification of  
local funding

## Phase 2 – Secure Partnerships

Lock in  
location as  
well as utility  
and  
academic  
partners,  
community  
workshop,  
and draft  
master  
plans

## Phase 3 – Project Kickoff

Baselining,  
Energy  
modeling,  
Financial  
modeling,  
analysis of  
EEMs and  
District  
Systems

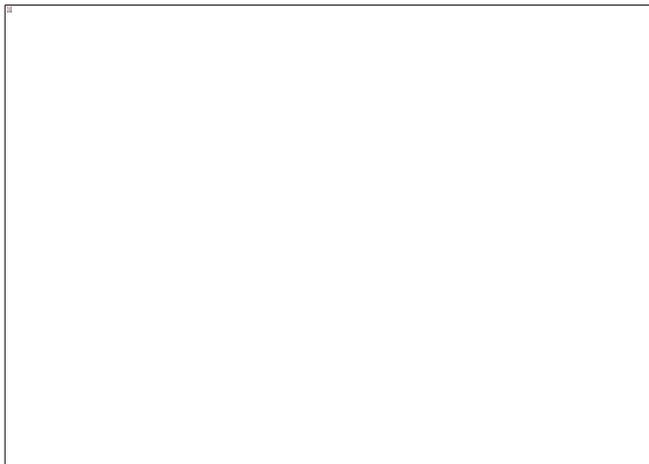
## Phase 4 – Project Implementat ion

Installation  
of EEMs  
and District  
System,  
Green  
Concierge,  
M&V, Living  
Communitie  
s work

## Phase 5 – Track and Validate Economic Value Increases

Monitor  
behavioral  
changes and  
measure and  
validate  
results

Projects all begin with a visioning and diagnostic process to shape our local project, needs, identity and goals. We call this our:  
**Community Innovation Workshop**





Building the future one block at a time.

# Living City Brooklyn

GOWANUS

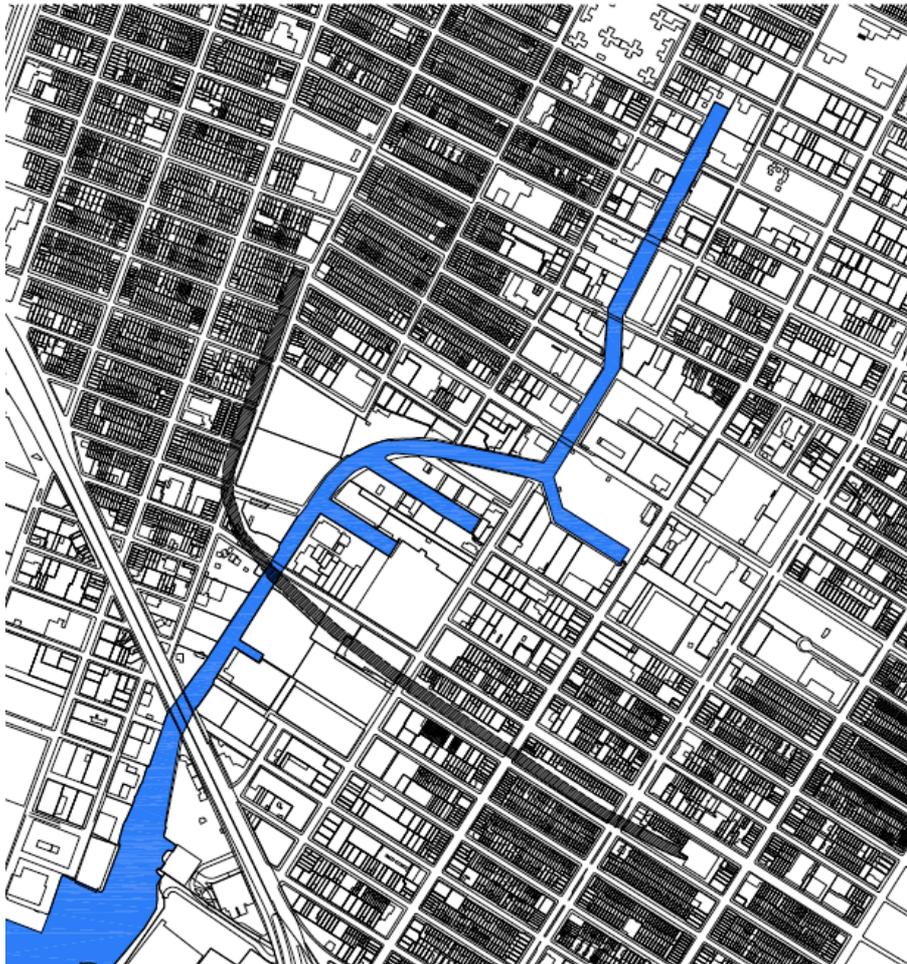




Building the future one block at a time.

# Living City Brooklyn

GOWANUS



GOWANUS BROOKLYN NY  
SCALE: 1:200



[www.LivingCityBlock.org](http://www.LivingCityBlock.org)



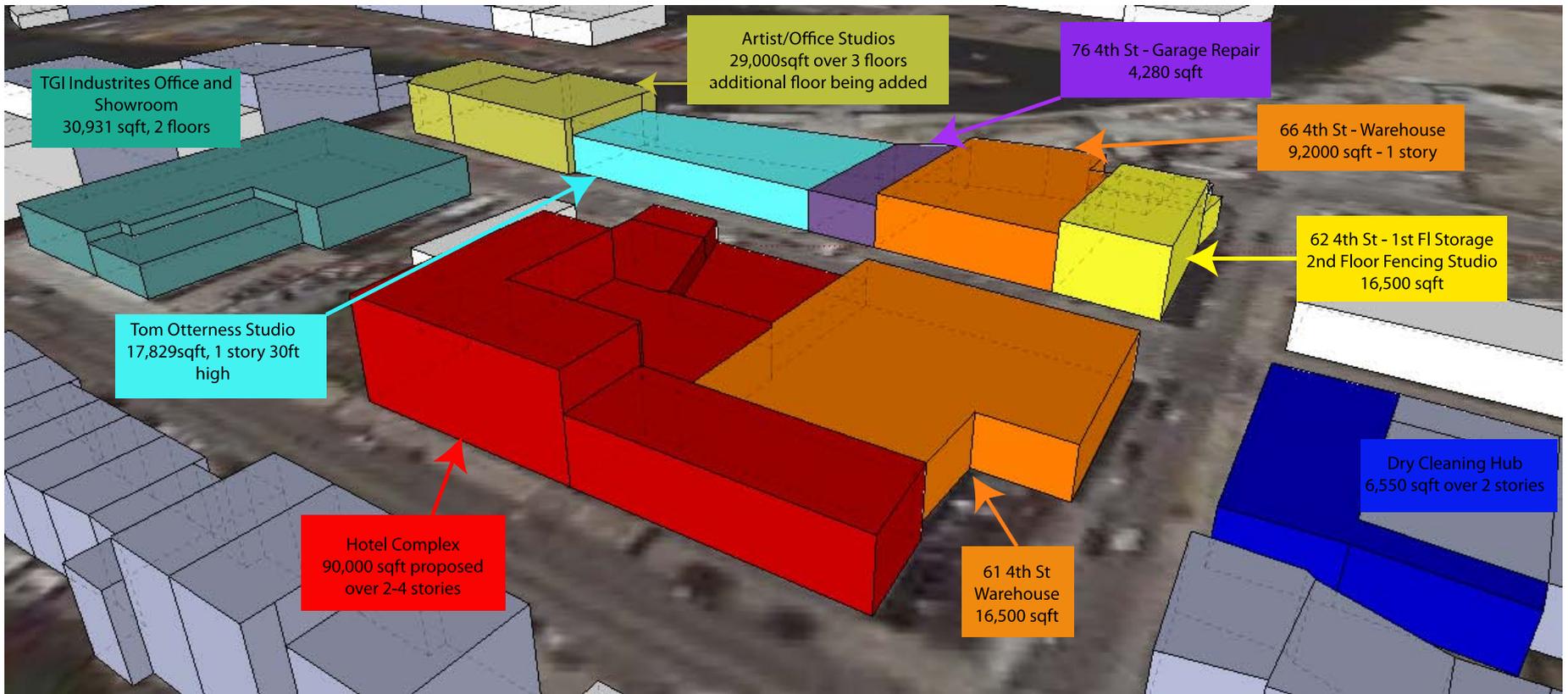
CITY OF NEW YORK  
DEPARTMENT OF CITY PLANNING

January 2007  
BROOKLYN OFFICE

# PHASE 1: C&I DISTRICT

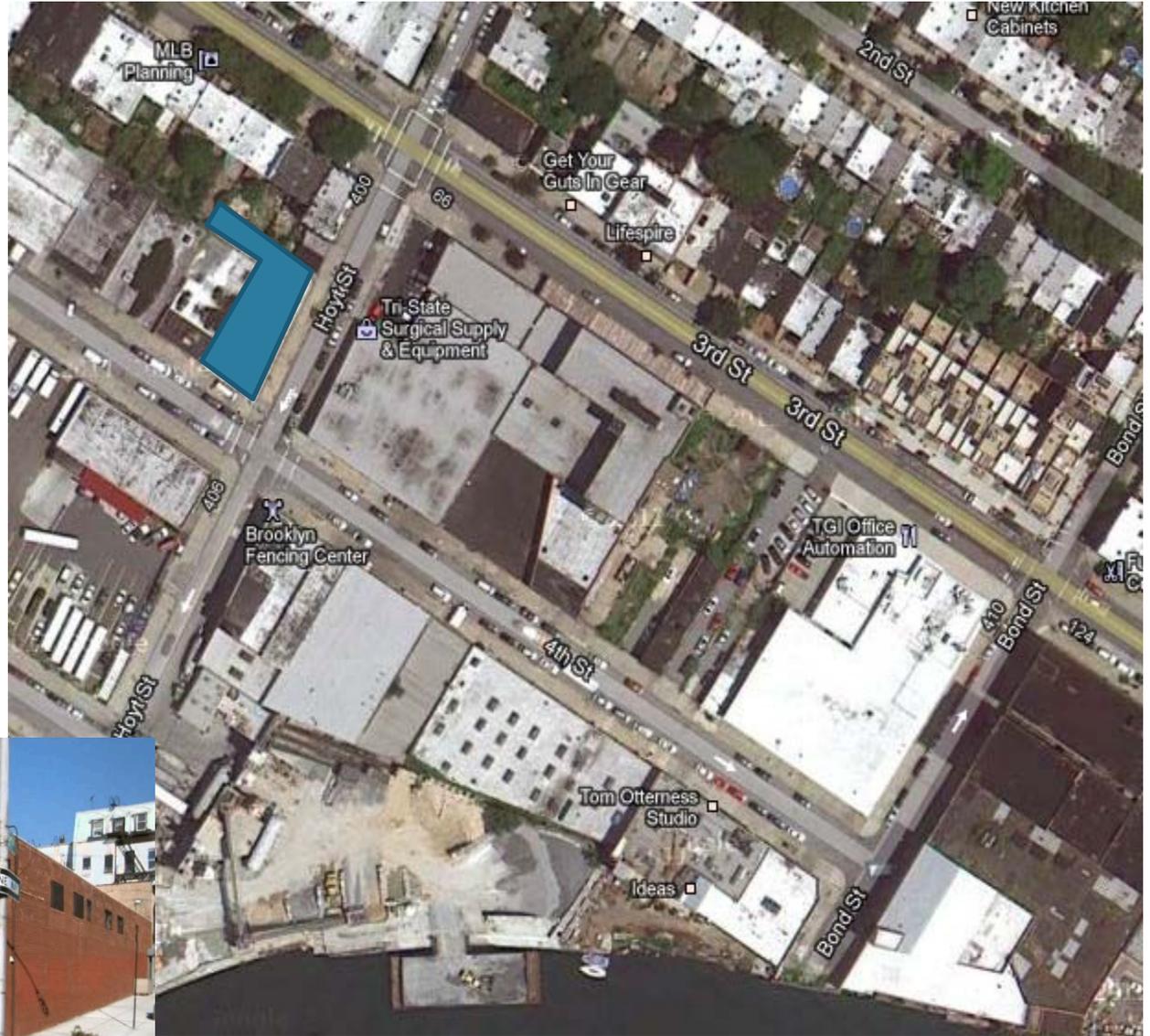


# PHASE 1 – Commercial/Industrial District



# KONG CLEANERS

- 6,550 sq. ft.
- Dry cleaning hub for stores throughout S. Brooklyn
- 24 hour operations
- Baseload: 53kW
- Peak load: 70-85kW



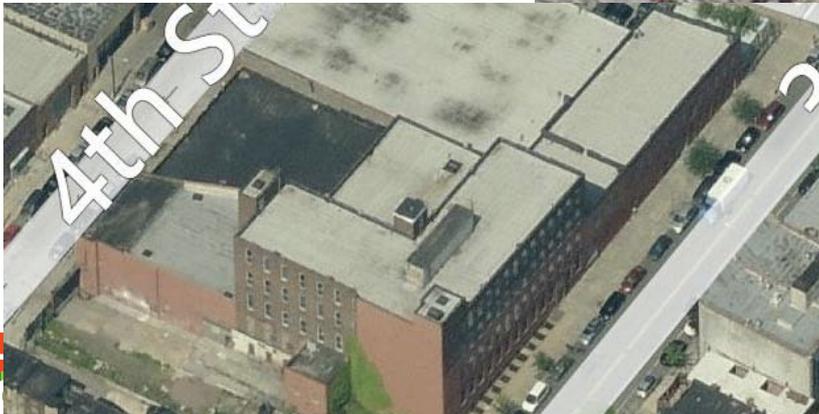
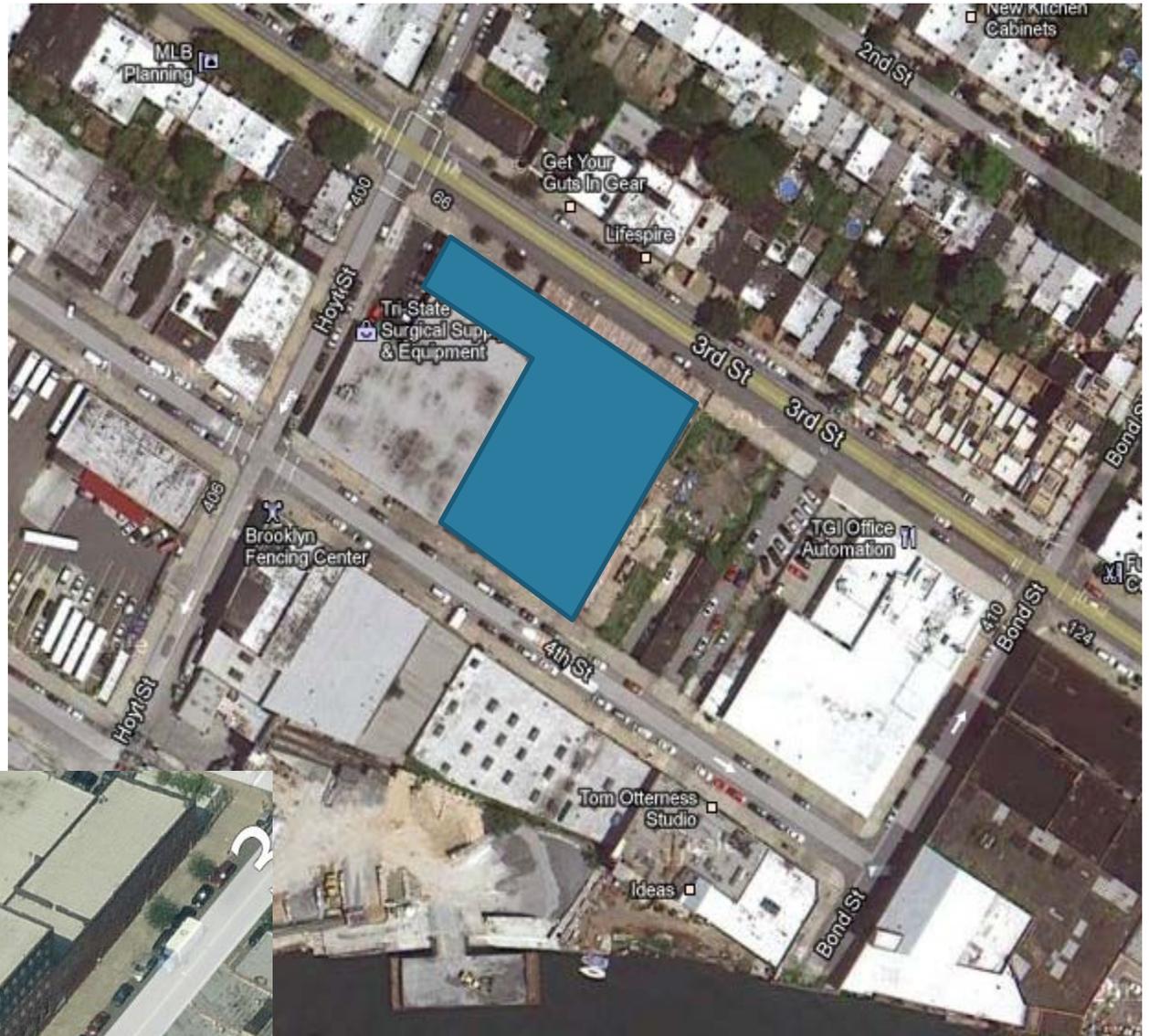
# TRI-STATE SURGICAL SUPPLY

- 16,500 sq. ft.
- Warehouse for surgical supplies, small office space
- Base load: 6kW
- Peak load: 8-15kW



# HOTEL COMPLEX

- Approx. 90,000 sq. ft. planned
- Planned Boutique Hotel (100 rooms), Office space/artist work + gallery space, light manufacturing, commercial kitchen
- Baseload: 72kW
- Peak load: 88-128kW



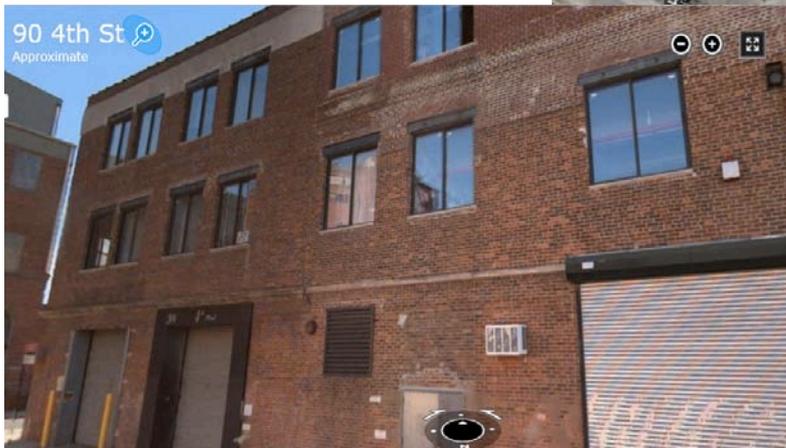
# TGI INDUSTRIES

- 30,931 sq. ft.
- Corporate headquarters, equipment showroom/warehouse
- Warehouse – 16 hrs per day, Office approx. 12 hrs per day
- Baseload: 72kW
- Peak load: 87-129kW



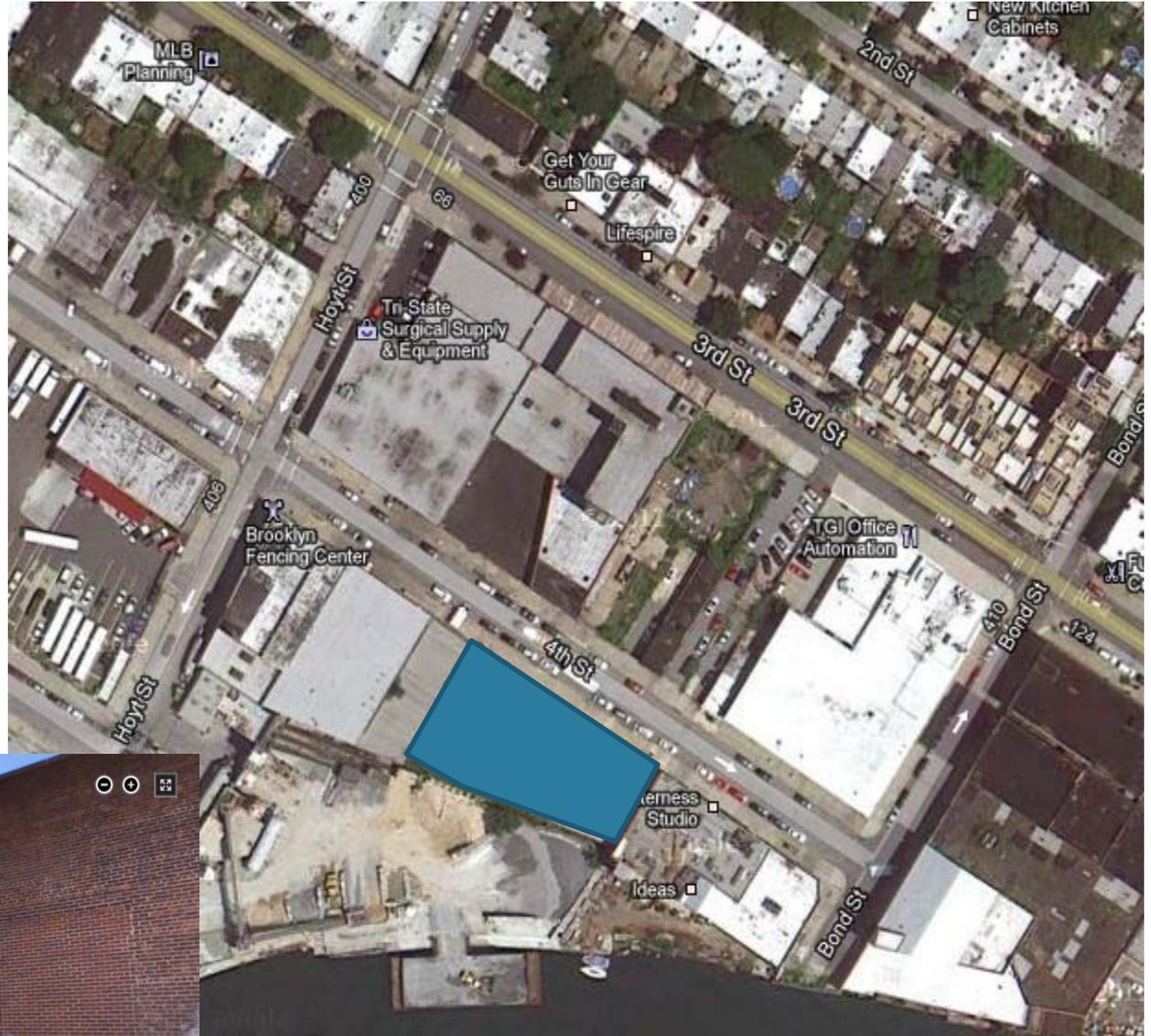
# 4<sup>TH</sup> AND BOND

- Individual artist and office space for approx. 24 tenants
- Expect partial occupancy for 24 hrs per day
- Baseload: 40kW
- Peak load: 38-123kW



# TOM OTTERNESS STUDIO

- 17,977 sq. ft.
- Sculptors workshop, office, kitchen, loading dock
- 12-16 hour daily operation
- Baseload: 35kW
- Peak load: 39-66kW



# ROBERT B. SAMUELS, INC.

- 4,280 sq. ft.
- Auto Service Shop
- Baseload: 4kW
- Peak load: 4-15kW



# LIG IMPORTS

- 9,200 sq. ft.
- Dry Storage
- Baseload: 13kW
- Peak load: 14-50kW



# BROOKLYN FENCING CENTER

- 16,500 sq. ft.
- Fencing school, warehouse space
- Mostly after school and weekend operation
- Baseload: 12kW
- Peak load: 9-29kW



# PHASE 1: C&I DISTRICT

Total Baseload: approx 300kw

Peak Range: 350 – 634kW



# LCBG PHASE 1 DISTRICT APPROACH

Blockwide Efficiency PLUS District Systems



# POTENTIAL ENERGY PROGRAM:

- Energy Efficiency: Reduction and Optimization Plan
- Peak Shaving
- Demand Response
- Cogeneration – Baseload Power and Thermal Consumption
- Solar PV – Peak Load Production
- Power Storage
- Ancillary Grid Services



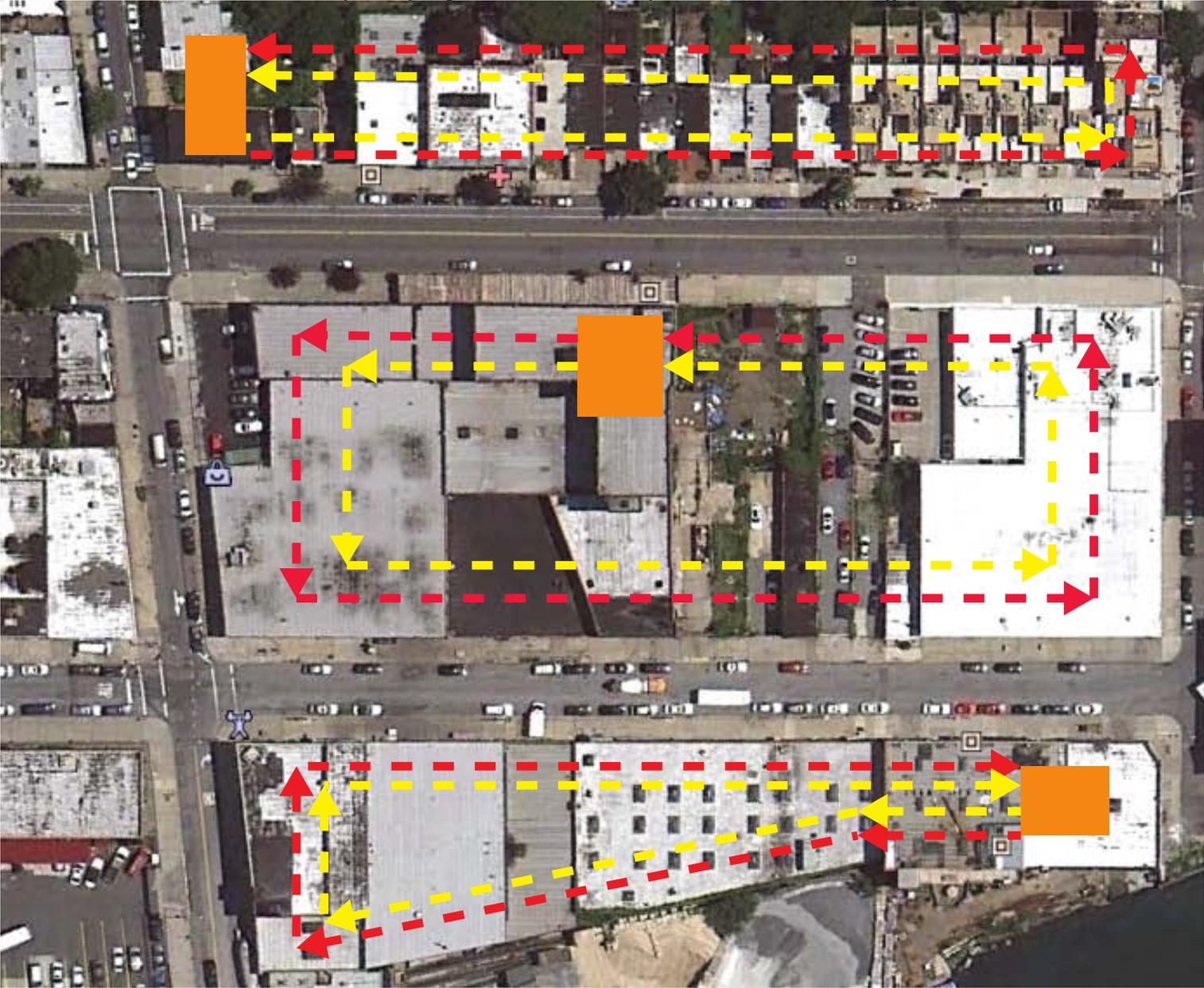
# DISTRIBUTED GENERATION ARRANGEMENTS

Means to establishing Single Customer status  
Shared Infrastructure on a Physical Loop



# DISTRIBUTED GENERATION ARRANGEMENTS

Means to establishing Single Customer status



# SOLAR POTENTIAL

Option #1



## FUEL CELL ROUGH ANALYSIS

- 300 kW System (small!)
- \$12,000/kW Installed = \$3,600,000 Total
- Approx \$1,800,000 in Incentives/Grants
- Save Approx \$280,000 per year in heating and power expenses
  
- Simple Payback: 5.3 Years

### Assumptions:

- Previous Incentives remain available (performance and installation)
- System operates 24/7 – 95% availability
- 56% total heat utilization



# CREATIVE FINANCING

## Based on Fuel Cell Rough Analysis

### **Distributed Generation in Existing Buildings and Districts is Expensive:**

- Premium on trenching, connecting buildings, and crossing roads (add 50-100%)

### **Must cover True Baseload**

### **Dreams of Market Solutions**

- Demonstration Project – Relies on grant/incentive funding – for now
  - 15-16 year payback without incentives
  - 6-7 year payback with incentives

### **24/7 Baseload Operation Necessary**

### **Alternative Revenue Streams Necessary**

- Demand Response
- Ancillary Services?
- Storage (thermal and electrical)
- Net Metering



## NET METERING ALLOWANCES

| <b>Electric Generating Equipment</b> | <b>Total Rated Capacity</b> | <b>Maximum Amount</b> |
|--------------------------------------|-----------------------------|-----------------------|
| Residential micro-CHP                | 1 to 10 kW                  | \$350                 |
| Residential fuel cells               | up to 10 kW                 | \$350                 |
| Residential micro-hydro              | up to 25 kW                 | \$350                 |
| Solar                                | up to 25 kW                 | \$350                 |
| Wind                                 | up to 25 kW                 | \$750                 |
| Farm waste                           | up to 1,000 kW              | \$5,000               |
| Farm wind                            | above 25 kW up to 500 kW    | \$5,000               |
| Nonresidential solar or wind         | above 25 kW up to 2,000 kW  | Company's actual cost |
| Non-residential fuel cells           | up to 1,500 kW              | Company's actual cost |
| Non-residential micro-hydro          | up to 2,000 kW              | Company's actual cost |



# POLICY & REGULATORY BARRIERS- OPPORTUNITIES

## OBSTACLES TO OVERCOME

- Few Precedents of Privately Produced Energy Crossing Property Lines
- Limits to Net-Metering, Low Buy Back Rates
- Lack of Aggregated Models for Doing Multi-Stakeholder Projects
- Lack of Models for Integrating Water, Waste & Energy Resource Work
- Rules for Behind the Meter Generation as Demand Response
- Insufficient Interval Data on Record for Smaller Buildings

## WHAT DOES WORK OR WOULD REALLY HELP

- Policies that Encourage/Allow Competitive Distribution & Encourage Resource Efficiency (RPS, DSM)
- Allow Produced Energy to be Sold/Shared Across Property Lines
- Open Net-Metering, Market Buy Back Rates
- Building Codes & Land Use Regulation to Encourage Shared Resource Efficiency & Production Services
- Tax Incentives, Rebates, Other New Industry Support Mechanisms



# NEW YORK CITY SUSTAINABILITY DISTRICTS WORKSHOP SERIES

A Series of 3 Workshops Designed to help create Sustainability Districts in New York City. These workshops will be held in September, October & November of this year.

- Energy and Potable Water
- Green Infrastructure
- Waste Systems

After the three workshops there will be a three month report writing process resulting in a series of recommendations to the city and other stakeholders

## **Committed Participant Organizations**

Colombia University Earth Institute

PACE Climate & Energy Center

Pratt Institute

Mayors Office of Long Term Planning & Sustainability

City Council Speakers Office

Office of Design and Construction

NRDC

Enterprise Green

Goldman Harris

Regional Planning Authority

Parsons Brinkerhoff      General Electric      Johns Manville

YRG Consulting      Green Building Council      HRK      GeoSyntec



# FINANCE & GOVERNANCE MODELING

"The additional capital needed for today's hyper efficient buildings can be achieved by monetizing future energy savings."



# FINANCE & GOVERNANCE MODELING

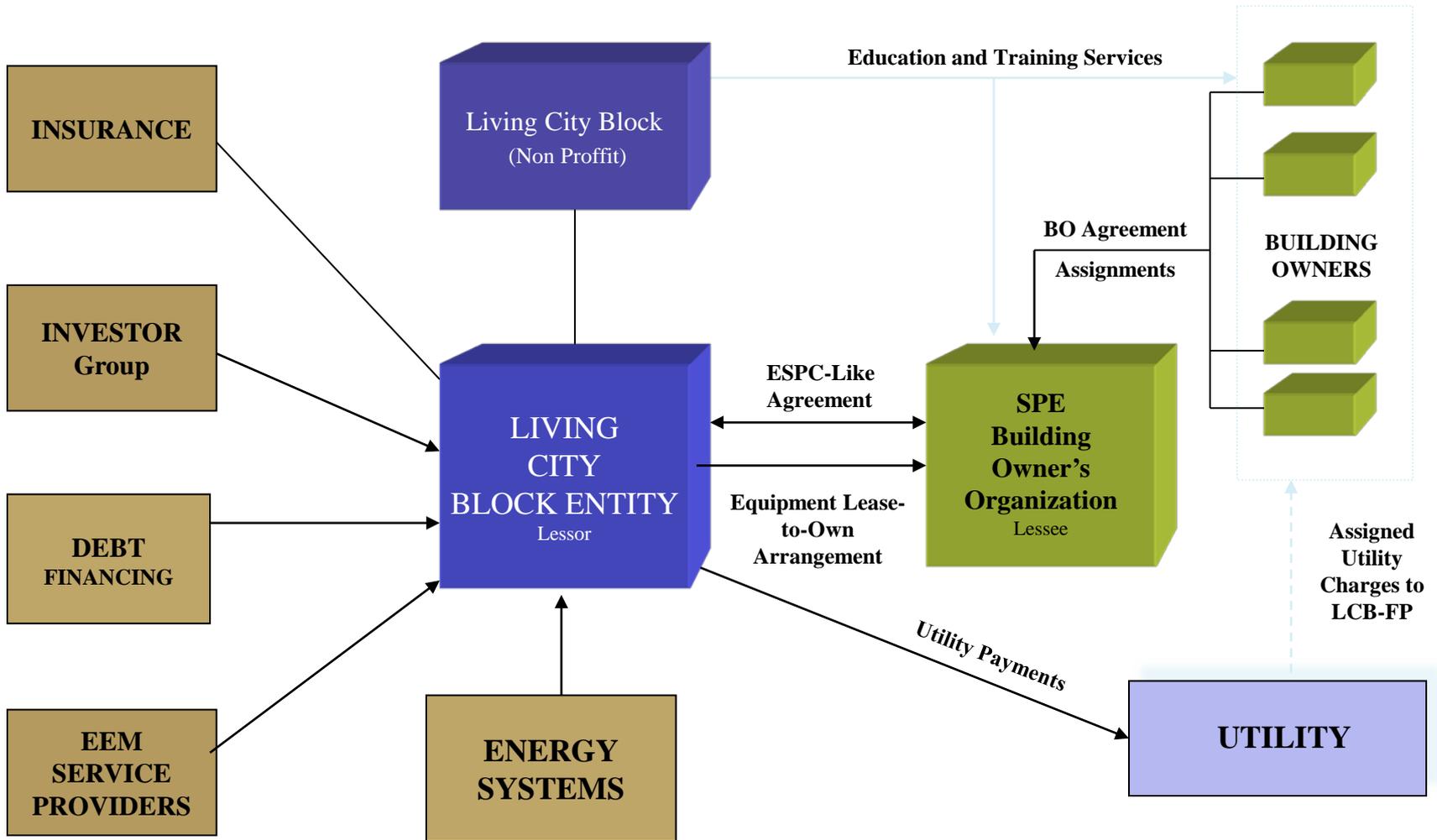
## NEW & HYBRID FINANCE TOOLS

- Negawatt or Energy Efficiency PPA
- RESCO – Resource and Energy Service Co.
- Project Finance model
- PRI - Program Related Investments
- CDM Model
- Disparate Owners Come Together in Block Wide Consortia



# Living City Block

## Urban Sustainable Community Governance Model



# FINANCE & GOVERNANCE MODELING

## FINANCE MODELING LCB PROJECTS

|                          |             |   |
|--------------------------|-------------|---|
| Equity                   | 20%         | Private (15-20% IRR), Social Equity (8-12% IRR) |
| Tax Credits              | 10%         | Historic, LIHTC, NMTC, etc.                     |
| Rebates                  | 10-15%      | 179D, Local Utility, Federal/State, etc.        |
| Public                   | 10-15%      | CRA, Bonds, QECBs, ARRA, EECBG, CDFI            |
| Sub/Mezz Debt            | 20%         | Various Sources                                 |
| Senior Debt              | 25-30%      | Capitalized cash flow from EE savings           |
| <b>PROJECT FINANCING</b> | <b>100%</b> |   |



The gleam of an heroic act  
Such strange illumination  
The Possible's slow fuse is lit  
By the Imagination.

— Emily  
Dickinson

There is nothing more  
difficult to take in hand,  
more perilous to  
conduct, or more  
uncertain in its success,  
than to take the lead in  
the introduction of a new  
order of things.

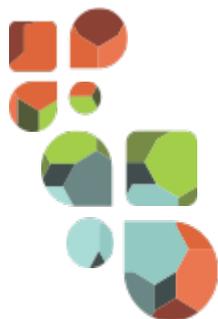
**We turn the possible** — Nicolo Machiavelli  
**Into the practical**  
*The Prince*

REPLICABLE  
SCALABLE  
EXPORTABLE

RESILIENT  
VIBRANT  
EFFICIENT

FRAMEWORK

CITIES



Building the future one block at a time.

Living City Block

INTEGRATION  
COLLABORATION

COMMUNITY

