welcome.

be ex
building energy exchange

NYC Retrofit ACCELERATOR

NYC Mayor's Office of Sustainability

During this session, you may submit questions via **www.slido.com** using event code # **CMA**

NYC Climate Mobilization Act

Local Laws 92 + 94 of 2019

Mayor's Office of Sustainability

Climate Mobilization Act

LOCAL LAWS 92 AND 94

requiring that the roofs of certain buildings be covered in green roofs or solar PV systems

LOCAL LAW 95

a building energy efficiency grade

LOCAL LAW 96

establishing a sustainable energy loan program (ie. PACE)

LOCAL LAW 97

the commitment to achieve certain reductions in greenhouse gas emissions by 2050

Local Law 92 + 94 of 2019

NYC requires green roofs or solar on all new rooftops.

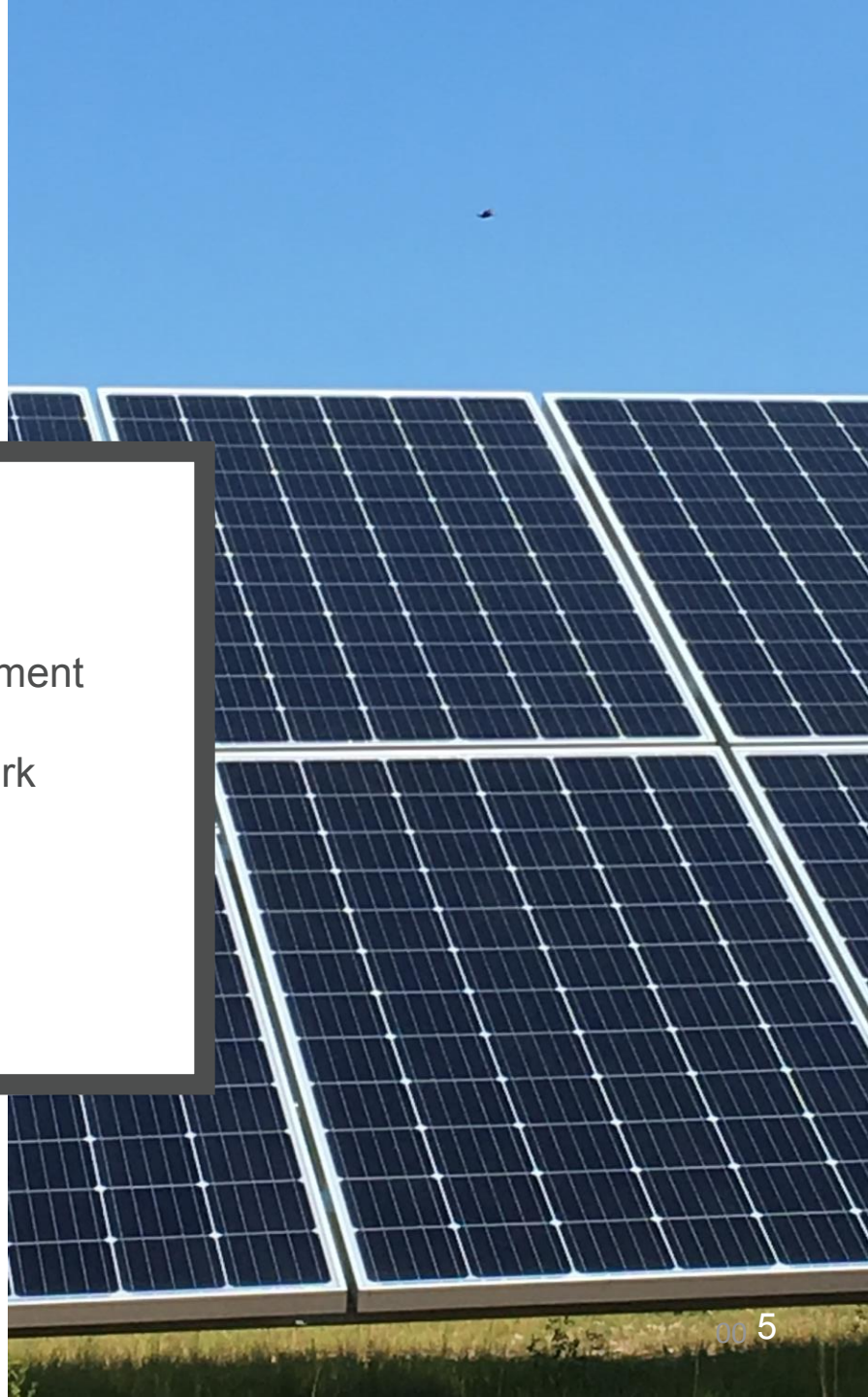
Sustainable Skyline

- NYC now has the strongest sustainable roofing policy in North America.
- By 2030, the policy will result in:
  - 300 MW of new solar capacity
  - 15m gallons of new stormwater management capacity
  - 1m tons of greenhouse gas reductions
  - Hundreds of green jobs

Applicability

When do requirements apply?

- Starting Nov 15, 2019
  - New construction
  - Full “decking” or “assembly” replacement
  - Vertical or horizontal extensions
  - NOT required for roof membrane work
- All building types and sizes
- Alternative compliance for affordable housing for 5 years



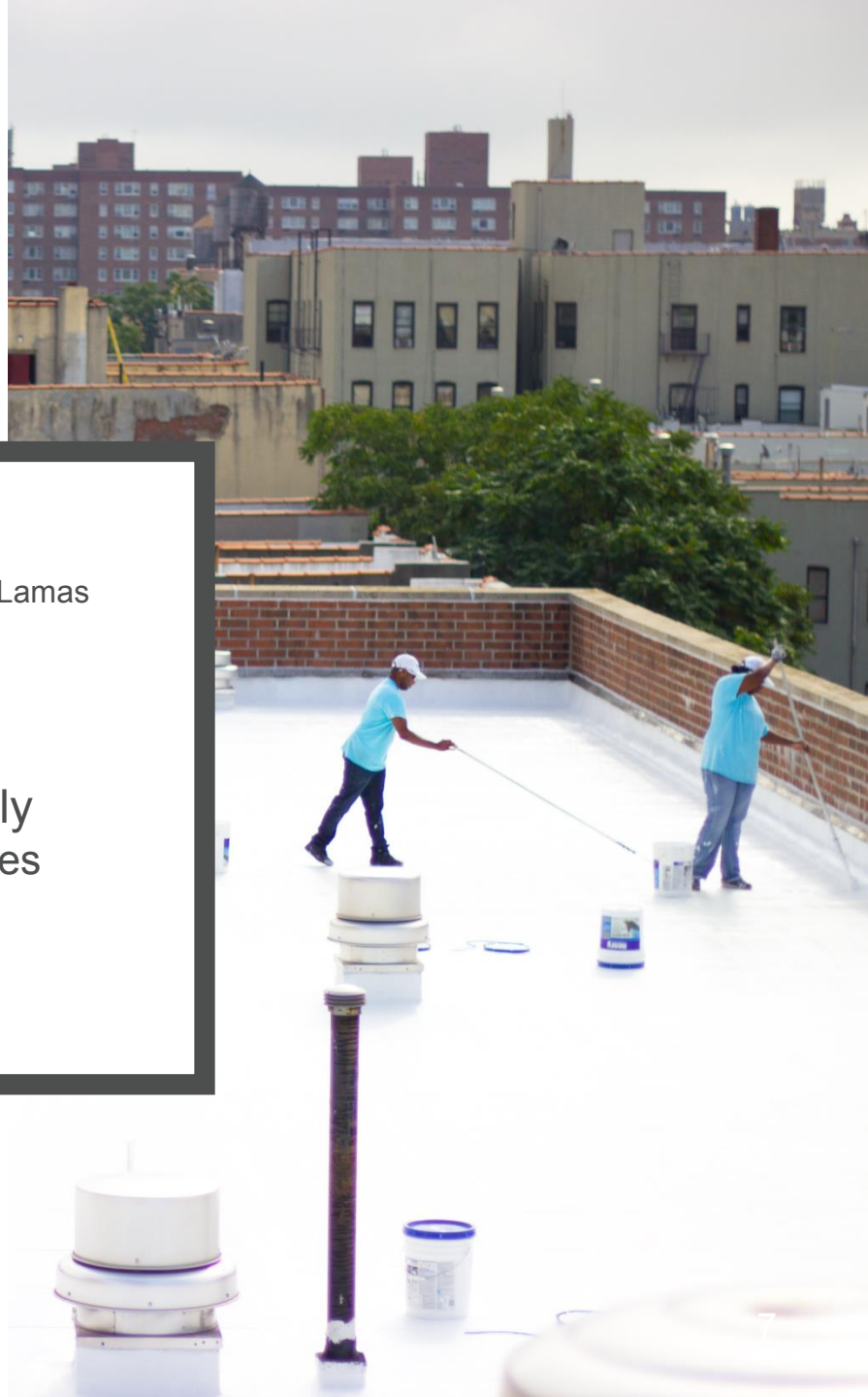
Applicability

What does entire “roof assembly or deck” mean?

- ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof deck, substrate or thermal barrier, insulation, vapor retarder and roof covering.
- ROOF DECK. The flat or sloped surface not including its supporting members or vertical supports.

Applicability

5-year alternative for some affordable housing



- 5-year alternative compliance for:
  - Buildings with City/State subsidies
    - E.g., HPD/DHCR loans, HDFCs, Mitchell Lamas
    - 420-c tax incentives
  - Buildings in HPD's AEP program
  - Buildings under HPD's jurisdiction
- Some affordable housing must comply
  - Stand-alone 421-a, J-51 tax incentives
  - Buildings w/rent regulated units not subject to any of the above
- Cool Roofs still required

Requirements

What are building owners required to do?

- Choose green roof, solar, or both
- Use all available roof space
- Meet expanded cool roof requirements
  - Higher reflectance/emittance standards
  - Now applies to both pitched and flat roofs
  - Still required for affordable housing

Exemptions

What does “available” roof space mean?

- Excludes areas occupied by:
  - Rooftop structures
  - Mechanical equipment
  - Towers
  - Parapets
  - Guardrails
  - Solar thermal systems
  - Appurtenances
  - Cisterns

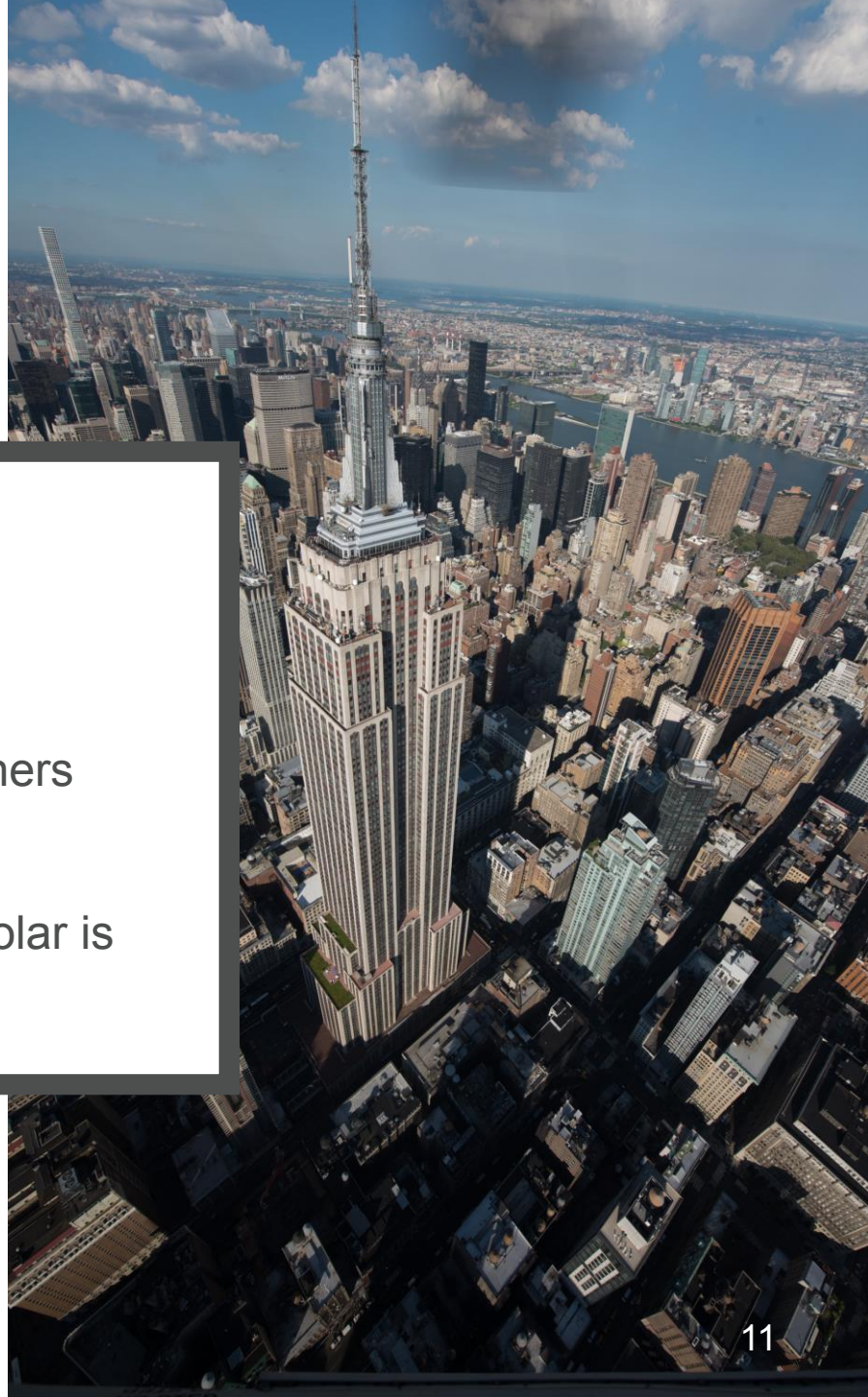
Exemptions

What does “available” roof space mean?

- FDNY access pathways
- Zoning setbacks
- Recreational spaces recorded on Certificate of Occupancy

Exemptions

When are solar/green roof not required?



- Not enough available roof space
  - <100 sqft of green roof for 1-5 story residential
  - <200 sqft of green roof for all others
  - <4kW of solar capacity
- Where a green roof is not feasible, solar is required and vice versa

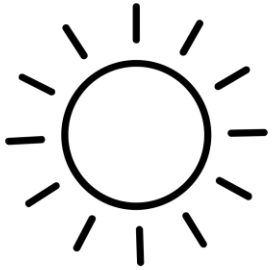
Exemptions

Technology-specific exemptions

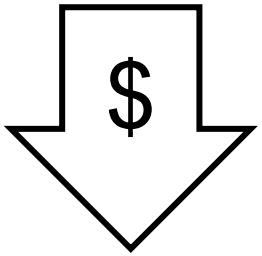
- Green roofs aren't required on sloped roofs
- Solar isn't required where shaded
- Other "site conditions" that may impact feasibility

Benefits: Cool Roofs

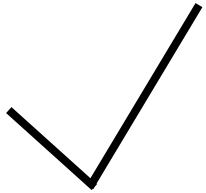
Mitigates Urban Heat Island Effect



Improves thermal comfort



Saves on building energy costs

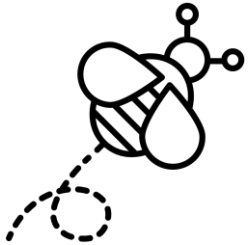


Easy and affordable to install.

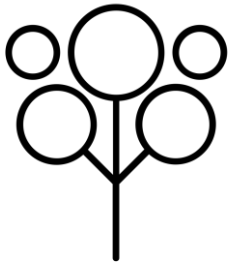
Benefits: Green Roofs

Reduces heat, saving energy and lives

Reduces flooding from rainstorms



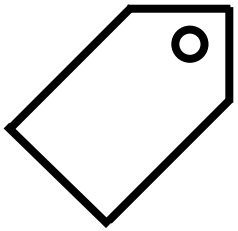
Provides wildlife habitat



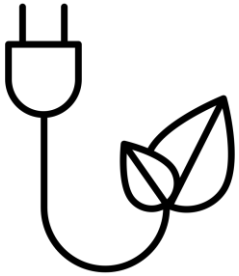
Serves as an amenity for building occupants

Benefits: Solar

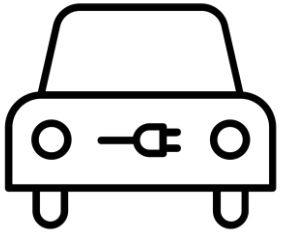
Saves on energy bills



Often available at no up-front cost



Helps building comply with LL97



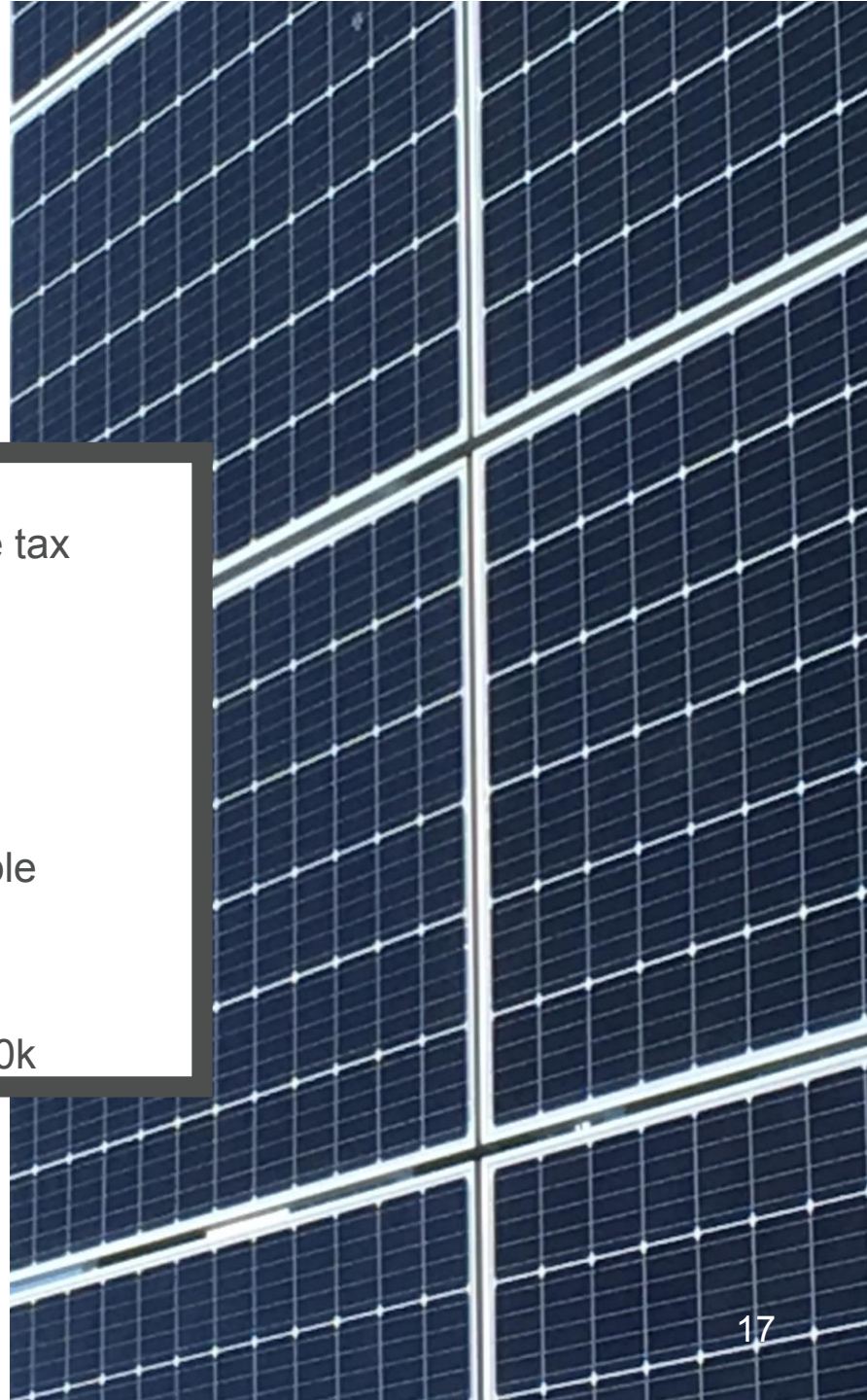
Pairs well with electric vehicles, batteries

Benefits: Integrated systems

Solar works best on top of a cool or green roof

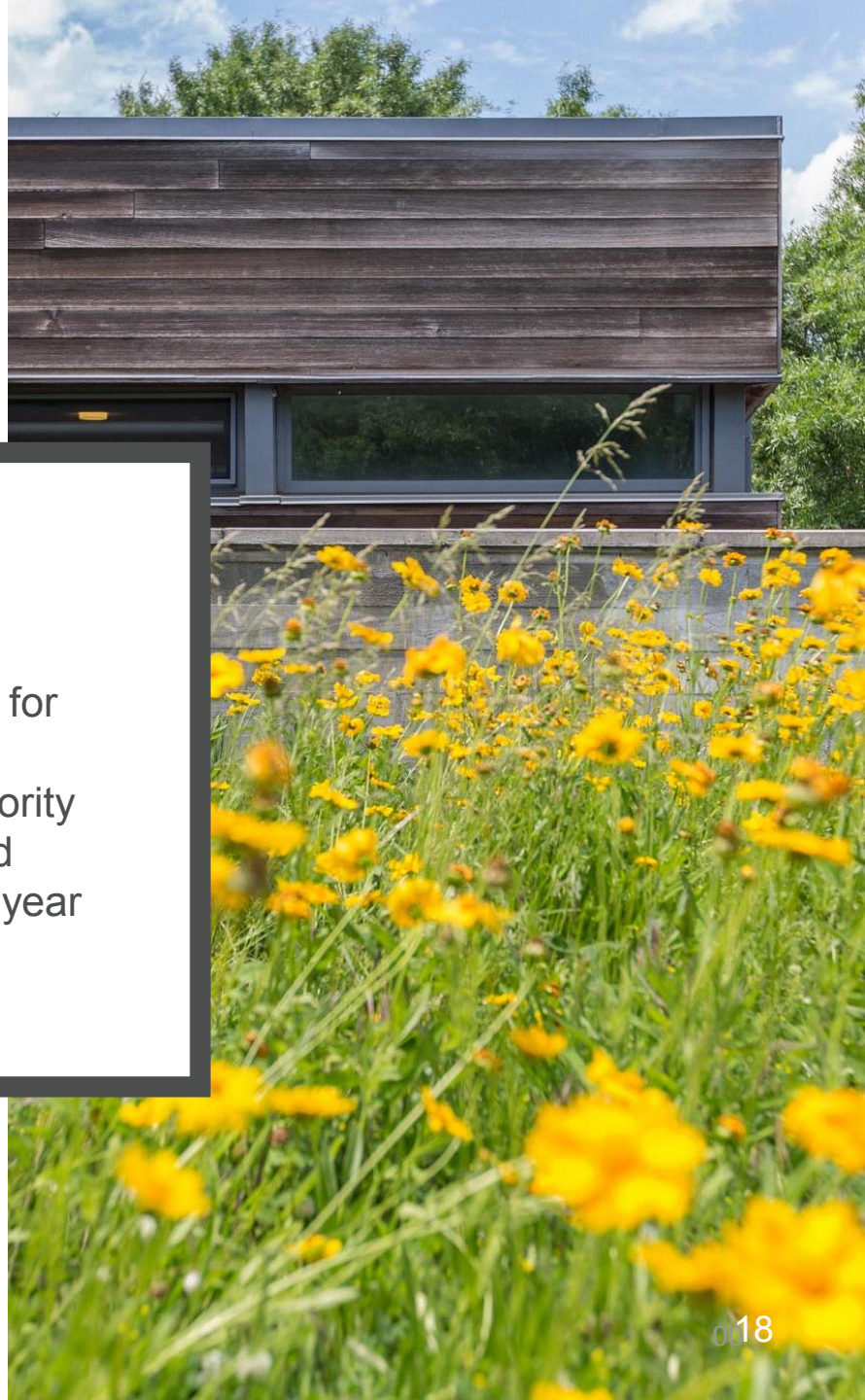
- Increases panel efficiency
- Maximizes energy savings
- Provides shade for plants

Solar Incentives



- Investment Tax Credit (Federal)
  - 30% of costs applied against income tax
- NY-Sun Incentive (State)
  - Up-front capacity-based incentive
  - Current incentives
    - $0.30 / Watt (single family)
    - $0.60 / Watt (other)
  - Added incentives for certain affordable housing, canopies, others
- Property Tax Abatement (City)
  - 20% of costs over 4 years up to $250k

Green Roof Incentives



- Green Roof Property Tax Abatement (City)
  - $5.23 per square foot tax abatement for green roof installation
  - $15 per square foot abatement in priority community districts, to be announced
  - Tax abatement capped at $200k per year for 5 years

NYC Retrofit ACCELERATOR

MAKING ENERGY EFFICIENCY EASIER

Free, personalized advisory services to streamline the process of energy efficiency improvements

- Trusted advisor to buildings
- Insights into building needs
- Custom approach
- Simplified process
- Ongoing assistance

https://retrofitaccelerator.cityofnewyork.us/
info@nycretrofit.org

Thank You

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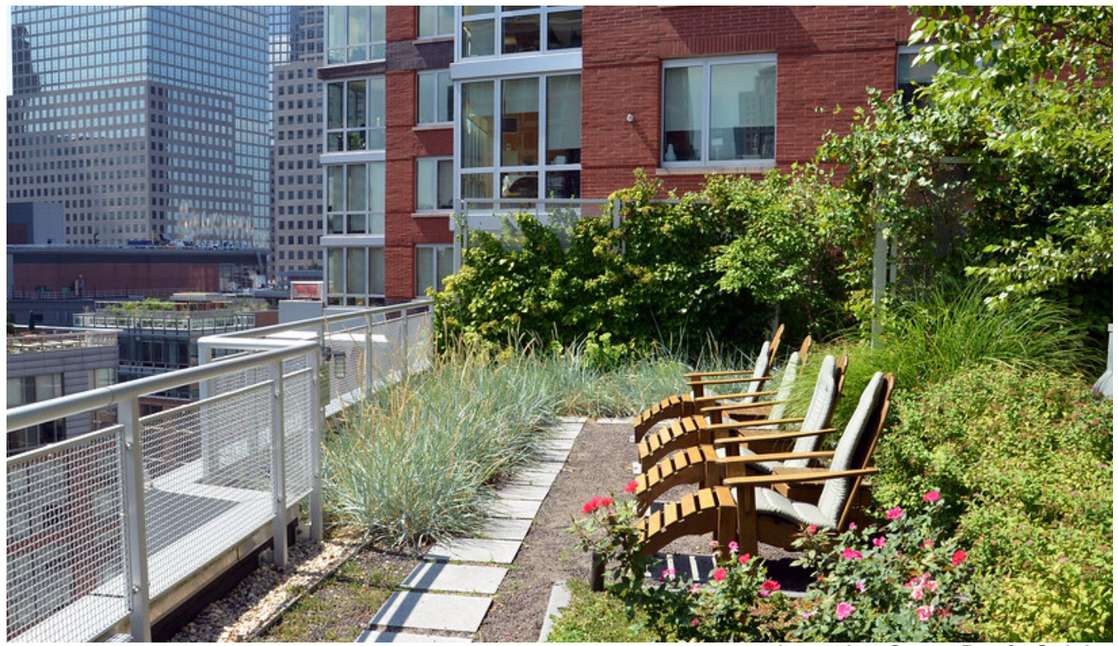
LL 92 / 94

GREEN ROOF INTEGRATION

WHAT IS A GREEN ROOF? - INTENSIVE



Intensive Green Roof - Solaire

Intensive Green Roof - Gracie Square Hospital

INTENSIVE ROOF

- Greater than 6 inches deep
- Higher maintenance: Irrigation and fertilizer is recommended
- Plants usually include:
  - Trees
  - Shrubs
  - Grasses and groundcover
- Heavier - These can weigh as much as 50-100 pounds per square foot
- Water retention rates can be 2-5 gal/sf

WHAT IS A GREEN ROOF? - EXTENSIVE

Extensive Green Roof - Barclays Center

Extensive Green Roof - Javits Center

EXTENSIVE ROOF

- Shallow substrate/ soil depth, 2.4 in- 6 in
- Lower maintenance with no to low irrigation
- Plants usually include:
  - Mosses
  - Sedums
  - Succulents
  - Few grasses
- Lightweight- 19 to 30 lbs of additional weight on roof
- Water retention rates can be
- .5- 1.5 gal/sf

WHAT IS A GREEN ROOF? - HYBRID

Hybrid Green Roof - SUNY Brockport

Hybrid Green Roof - Regis High School

HYBRID ROOF

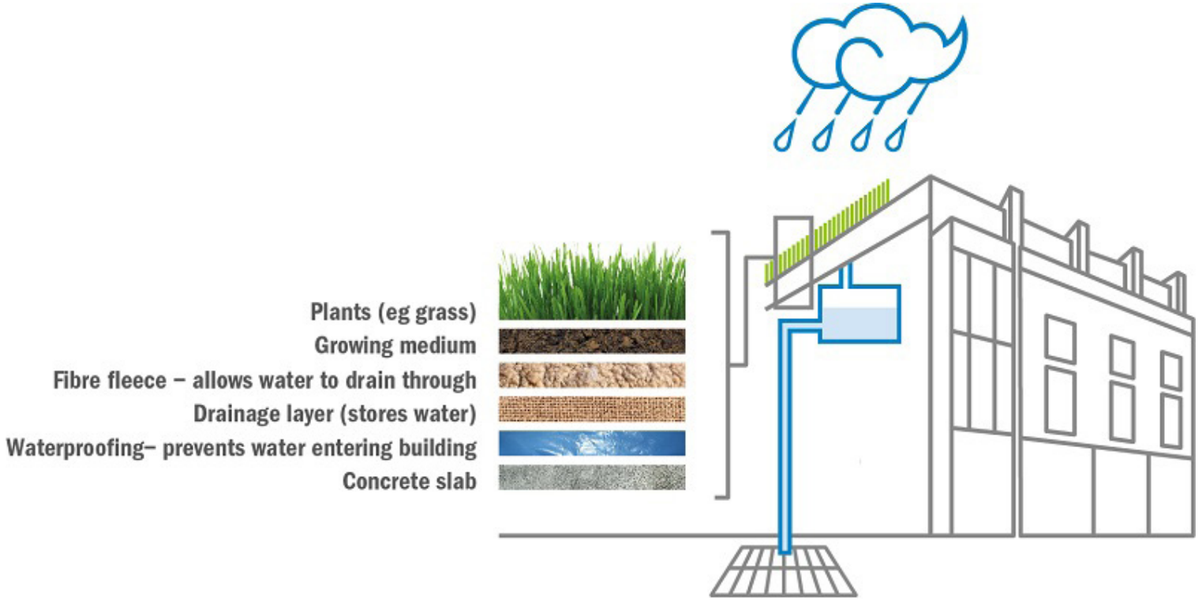
- Soil depth of 4.7 in- 10 in
- Periodic Irrigation and maintenance
- Plants usually include:
  - Grass
  - Shrubs
  - Likely can't support trees
- Weight can be 30-40 lbs/ sf
- Water retention can be 1-2.5 gal/sf

WHAT IS A GREEN ROOF? - BLUE ROOF GREEN ROOF

Osborne Center Blue Green Roof

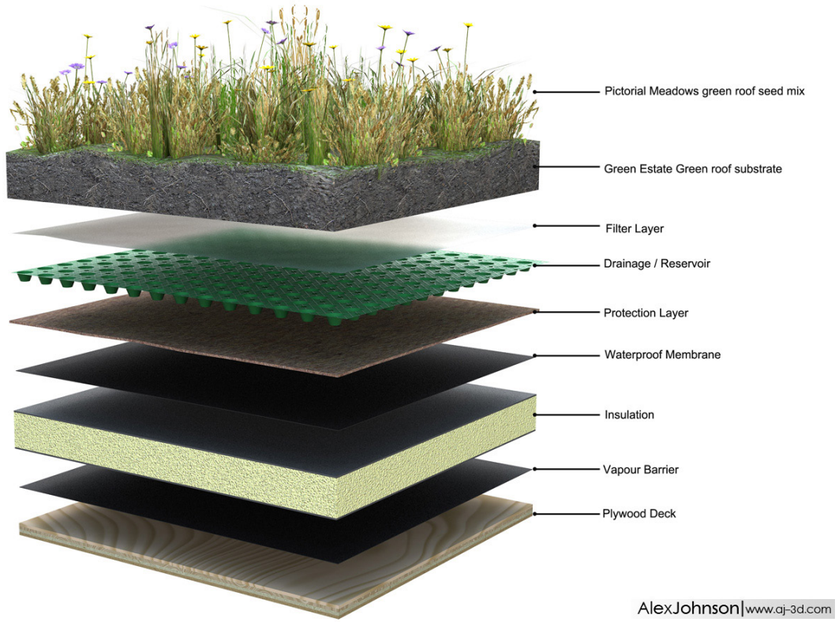
BLUE ROOF GREEN ROOF

- Captures water on the roof and controls the amount of water released
- Can be used with both intensive and extensive roofs and can make up a drainage and support layer for green roofs



Blue Green Roof Diagram

GREEN ROOF BENEFITS



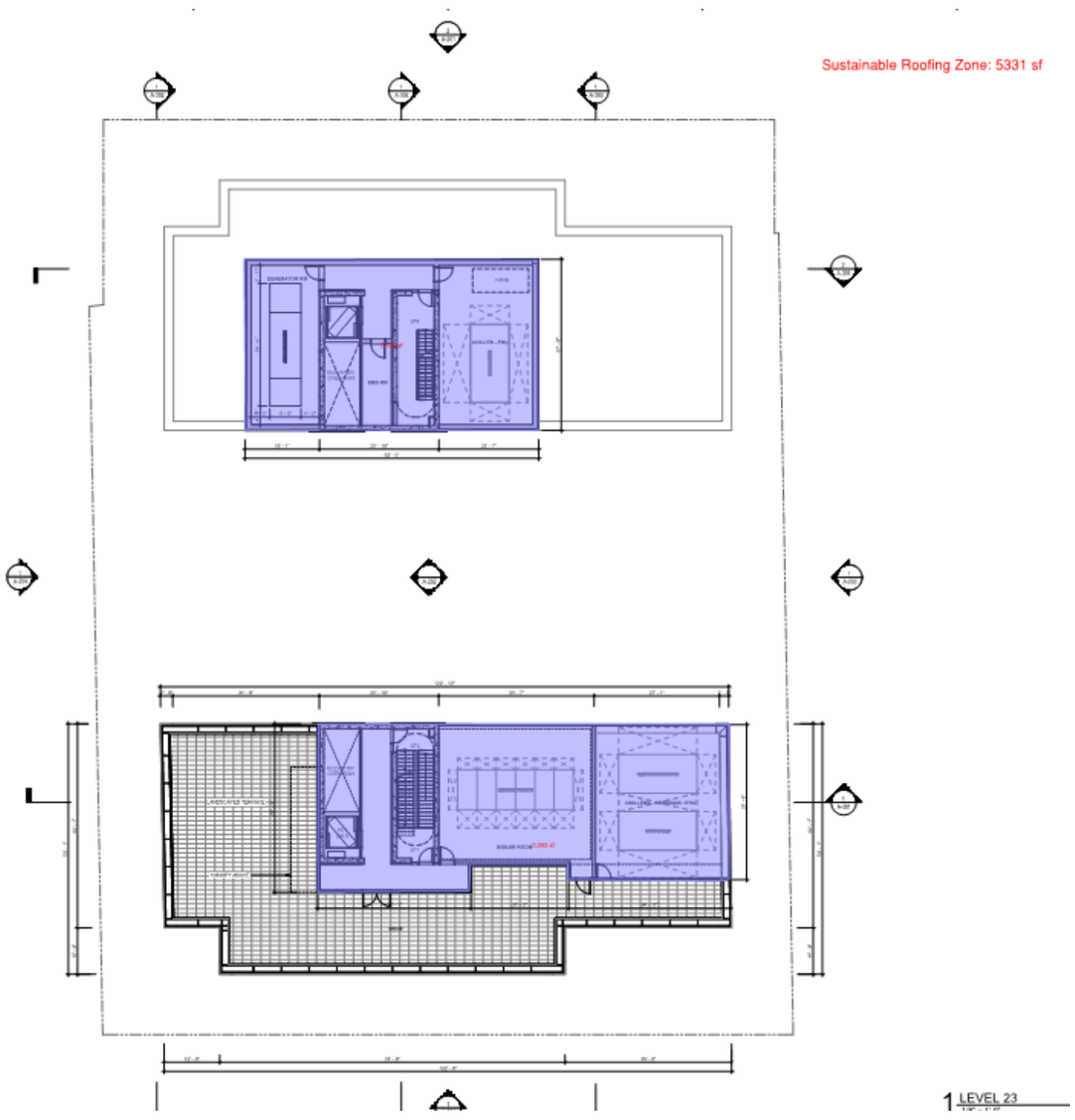
Green Roof Diagram

COOKFOX Green Roof

Benefits

- **Reduce the amount of stormwater runoff which impacts the CSO**
- **Mitigate urban heat island effect**
- **Extend the service life of roofs**
- **Reduce the energy required for heating and cooling due to insulating properties**
- **Remove CO2 from the atmosphere and air pollutants**
- **Create wildlife habitats and create green space**
- **If occupiabe, can connect users to natural systems and reinforce biophilia**

LL92/94 Sustainable Roofing zone



Sustainable Roofing Zone

Sustainable Roofing Zone

- **The project must define its “sustainable roofing zone”**

Exceptions:

- **Terraces on setbacks comprising less than 2% of the area of the largest floor plate in the building**
- **Any portion of a roof covered by a green roof system, including a system with agricultural plantings**
- **Any portion of a roof used as outdoor recreation space by occupants**
- **Ballasted roofs, provided that the ballast has a minimum initial solar reflectance of 0.2**
- **Any portion of a roof composed of glass, metal, clay or concrete tile, wood, or slate**
- **Any space required by FDNY**
- **Any space occupdied by mech equipment**
- **Any roof, if the amount of rooftop space not subject to exceptions is in the aggregate less than 100 sf**

THANK YOU

SOLARone

Design and deliver innovative education, training, and technical assistance that fosters sustainability and resiliency in diverse urban environments.

Green Design Lab

Green Workforce

Stuyvesant Cove Park

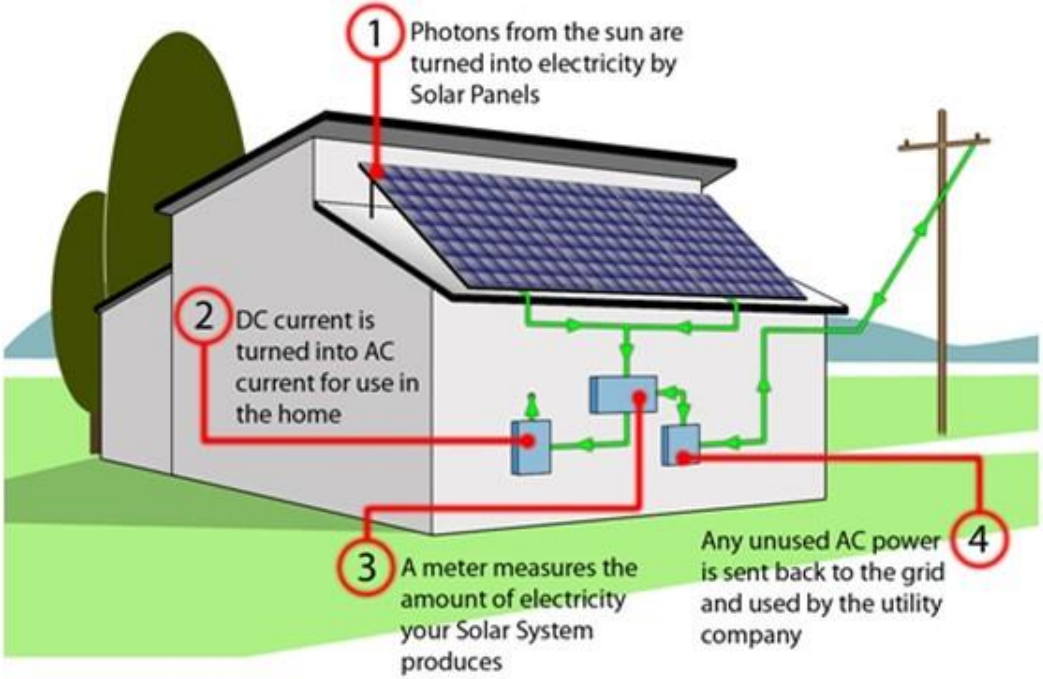
Energy Connections

Here Comes Solar

HERE COMES SOLAR

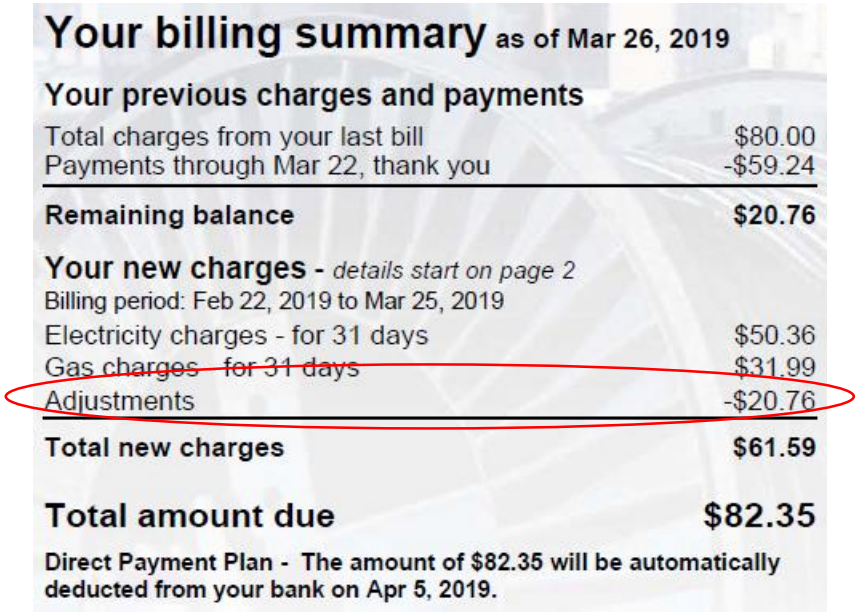
- Solar feasibility assessment
- Knowledge building
- Financing and incentive consultation
- Bulk procurement and solar installer selection
- Consumer advocacy during installation

How Does Solar Work?



Saving/Making Money with Solar

1. Save money on utility bill through generation of solar energy



Your billing summary as of Mar 26, 2019

Your previous charges and payments

Total charges from your last bill	$80.00
Payments through Mar 22, thank you	-$59.24
Remaining balance	**$20.76**

Your new charges - *details start on page 2*

Billing period: Feb 22, 2019 to Mar 25, 2019

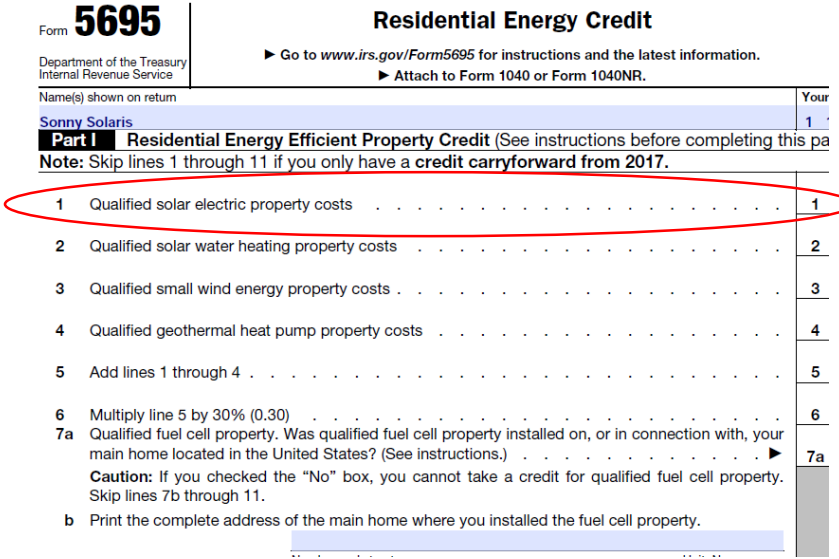
Electricity charges - for 31 days	$50.36
Gas charges - for 31 days	$31.99
Adjustments	-$20.76
Total new charges	**$61.59**

Total amount due **$82.35**

Direct Payment Plan - The amount of $82.35 will be automatically deducted from your bank on Apr 5, 2019.

Saving/Making Money with Solar

2. Claim tax incentives



Form **5695**

Department of the Treasury
Internal Revenue Service

Residential Energy Credit

▶ Go to *www.irs.gov/Form5695* for instructions and the latest information.
▶ Attach to Form 1040 or Form 1040NR.

Name(s) shown on return — Your

Sonny Solaris — 1

Part I **Residential Energy Efficient Property Credit** (See instructions before completing this pa

Note: Skip lines 1 through 11 if you only have a **credit carryforward from 2017.**

1	Qualified solar electric property costs	1
2	Qualified solar water heating property costs	2
3	Qualified small wind energy property costs	3
4	Qualified geothermal heat pump property costs	4
5	Add lines 1 through 4	5
6	Multiply line 5 by 30% (0.30)	6
7a	Qualified fuel cell property. Was qualified fuel cell property installed on, or in connection with, your main home located in the United States? (See instructions.) ▶	7a

Caution: If you checked the "No" box, you cannot take a credit for qualified fuel cell property. Skip lines 7b through 11.

b Print the complete address of the main home where you installed the fuel cell property.

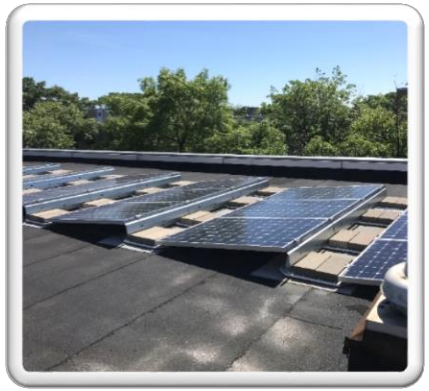
Solar Incentive Eligibility

Building Type	NY-SUN Incentive	26% Federal Tax Credit	25% State Tax Credit	Accelerated Depreciation	20% Property Tax Abatement	Historic Tax Credit
Owner-Occupied Co-op/Condo	✓	✓	✓	?	✓	?
For-Profit Rental/Business	✓	✓	✗	✓	✓	?
Non-Profit	✓	✗	✗	✗	✗	?

Solar for New Construction

- Design considerations
- Capturing value
- Financing

Solar for New Construction: Design Considerations



Ballasted Array

- Low profile
- No roof penetrations
- Cheaper and easier

Planar Array

- Mechanically Integrated
- More solar production
- Best for space-constrained roofs

Canopy Array

- Raised 9’ high
- Can cover entire roof area with room below
- Most expensive option

Solar for New Construction: Design Considerations

- Unshaded space
  - Maintain open space south of obstructions such as bulkheads and HVAC equipment
  - Plan for walkways and fire paths to be located in shaded areas
- Electric
  - Conduit for running electric
  - Space for inverter in electrical room

Solar for New Construction: Capturing Value

Scenario 1: Size system for anticipated common area consumption

- One common area meter and multiple residential meters
- Offset some or all of common area utility bill
- Residential electricity bills are unaffected

Solar for New Construction: Capturing Value

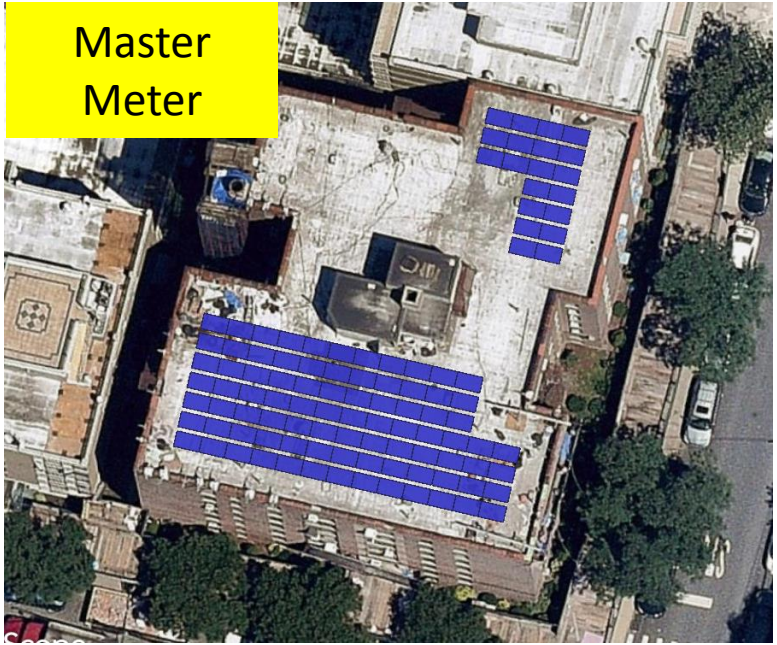
Scenario 2: Size system based on maximum roof capacity and utilize onsite community shared solar

- Generate more solar than common area scenario
- Solar energy credits are allocated to common area and residential accounts
- Good for co-ops and condos

Solar for New Construction: Capturing Value

Scenario 3: Size system based on maximum roof capacity and master meter building

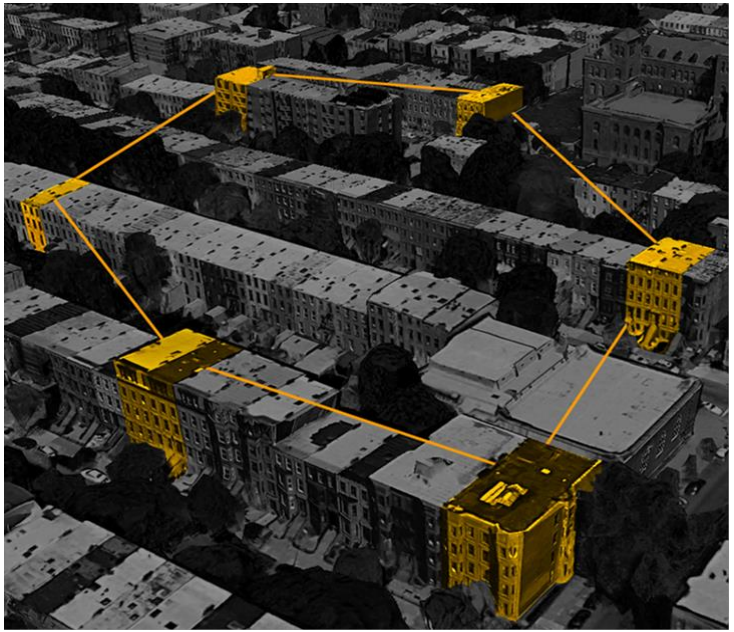
- Generate more solar than common area scenario
- Owner(s) pays electricity bill for the whole building and is the full beneficiary of solar
- Submeter residences and bill them for their portion of consumption



Solar for New Construction: Capturing Value

Bulk procurement across building portfolio

- Secure competitive pricing by bidding out multiple buildings at once



Solar for New Construction: Capturing Value

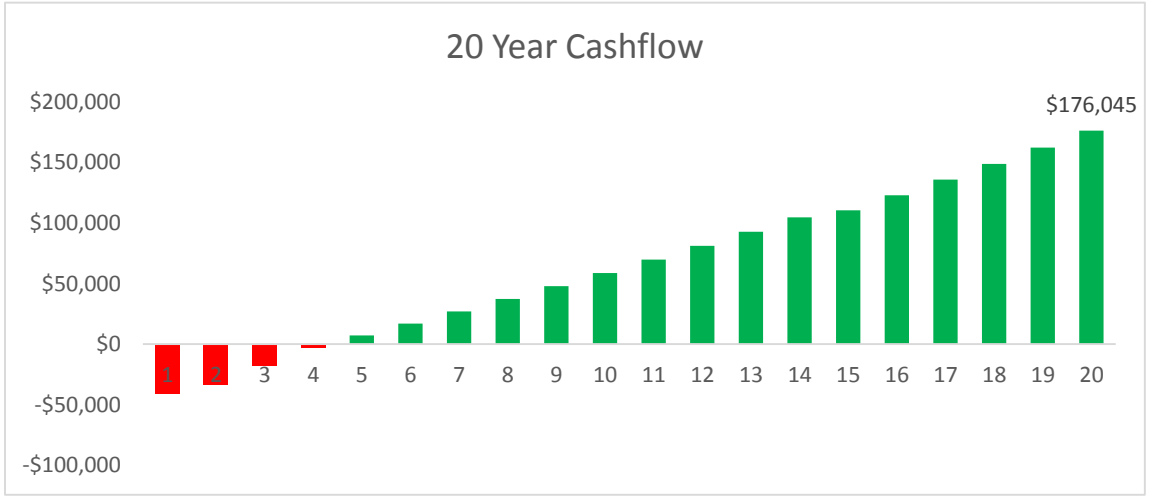
Other Considerations: Lease your roof to a solar developer

- No investment
- Revenue from lease payments
- Claim fewer tax credits

Financing Solar: Direct Purchase

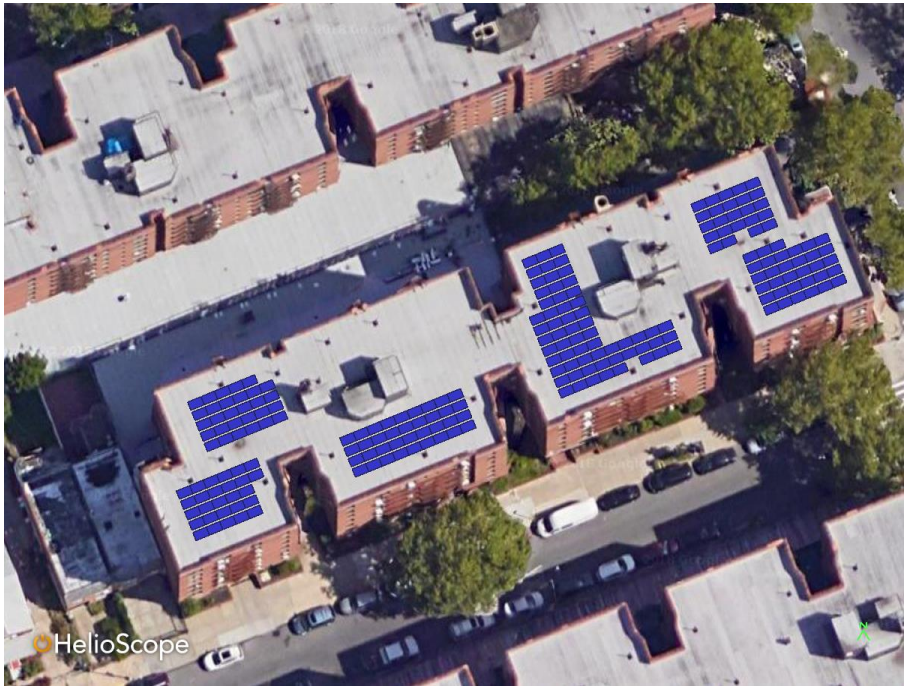
Building owner owns the system and receives the full benefit of the tax credits and electricity savings

- Pay for system upfront
- Highest financial return
- Sole beneficiary of tax incentives
- Responsible for O&M



Direct Purchase Case Study

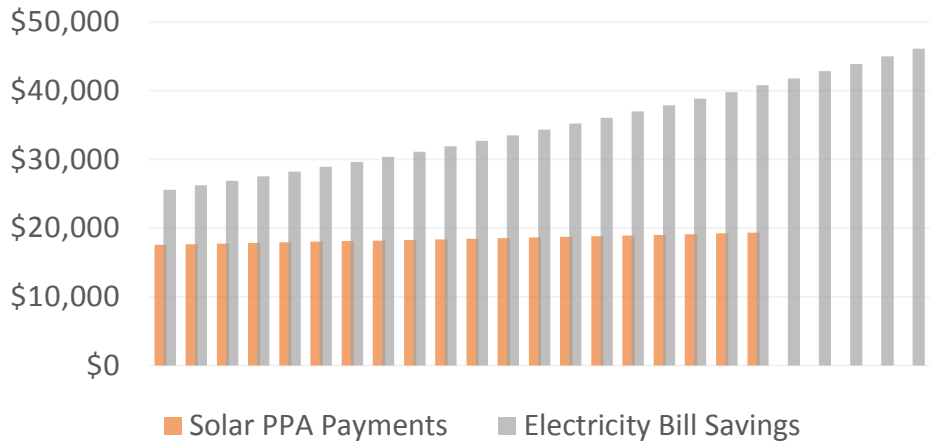
- 122 unit rental property in Queens
- 66 kW system
- Upfront cost: $1.6 million
- 5 year payback
- Lifetime net savings: $2 million



Financing Solar: Power Purchase Agreement

Solar company owns the system and you pay for the electricity it generates at a discount

- Little to no upfront cost
- The solar company passes on a portion of the benefit of the tax credits
- The solar company is responsible for the system for 20 years
- You can buy out the system for a reduced rate after 10 years



Financing Solar: Other Considerations

- Loans customized for solar
- Prepaid Power Purchase Agreement

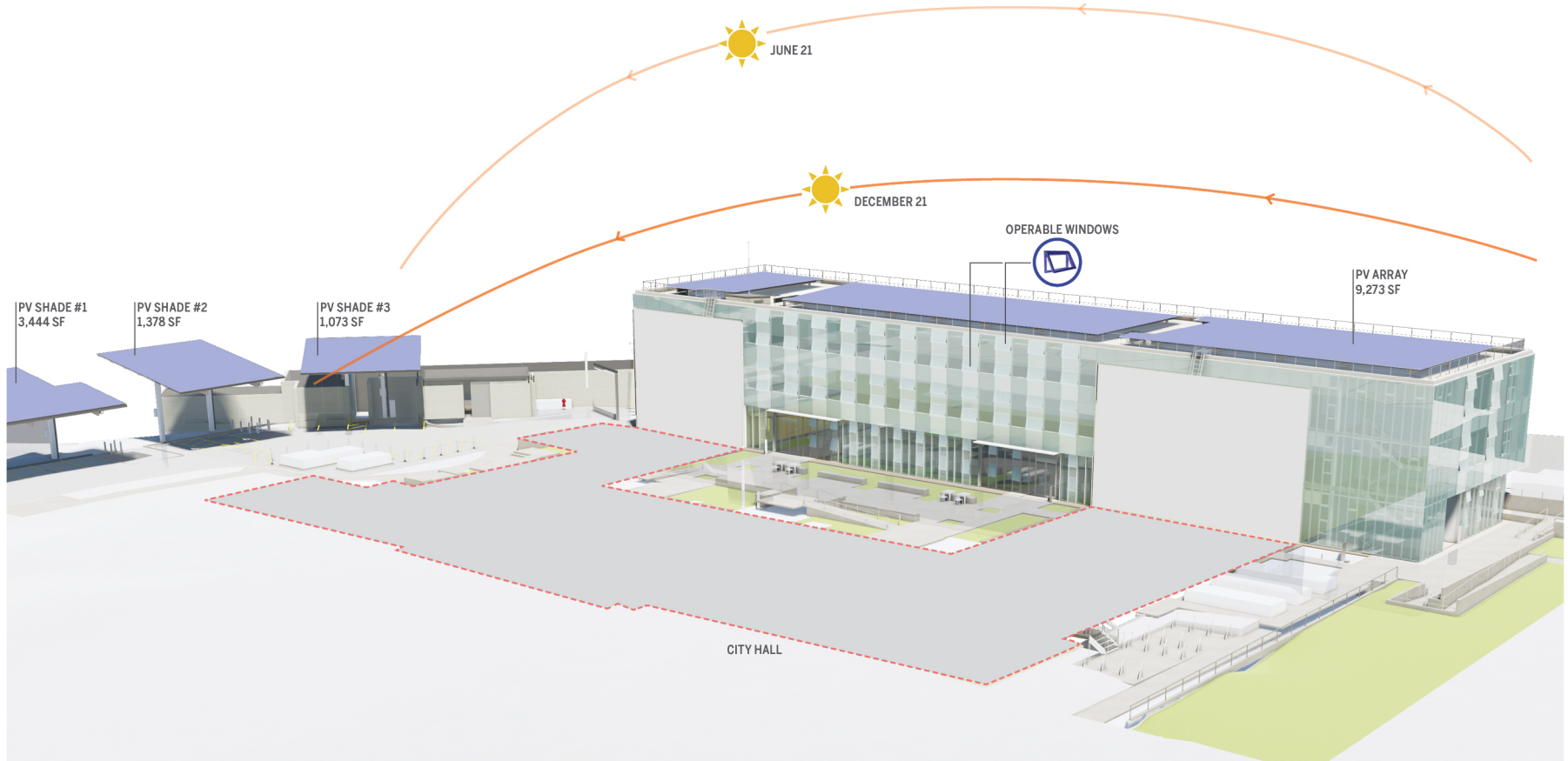
Takeaways

- Solar is a smart investment for new and existing buildings
- There are many ways to finance solar and to capture value
- Building developers should be aware of key solar principles as they move forward with projects
- Reach out to Solar One!

Marigo Farr
Multifamily Solar Program Manager
marigo@solar1.org
646-515-7871

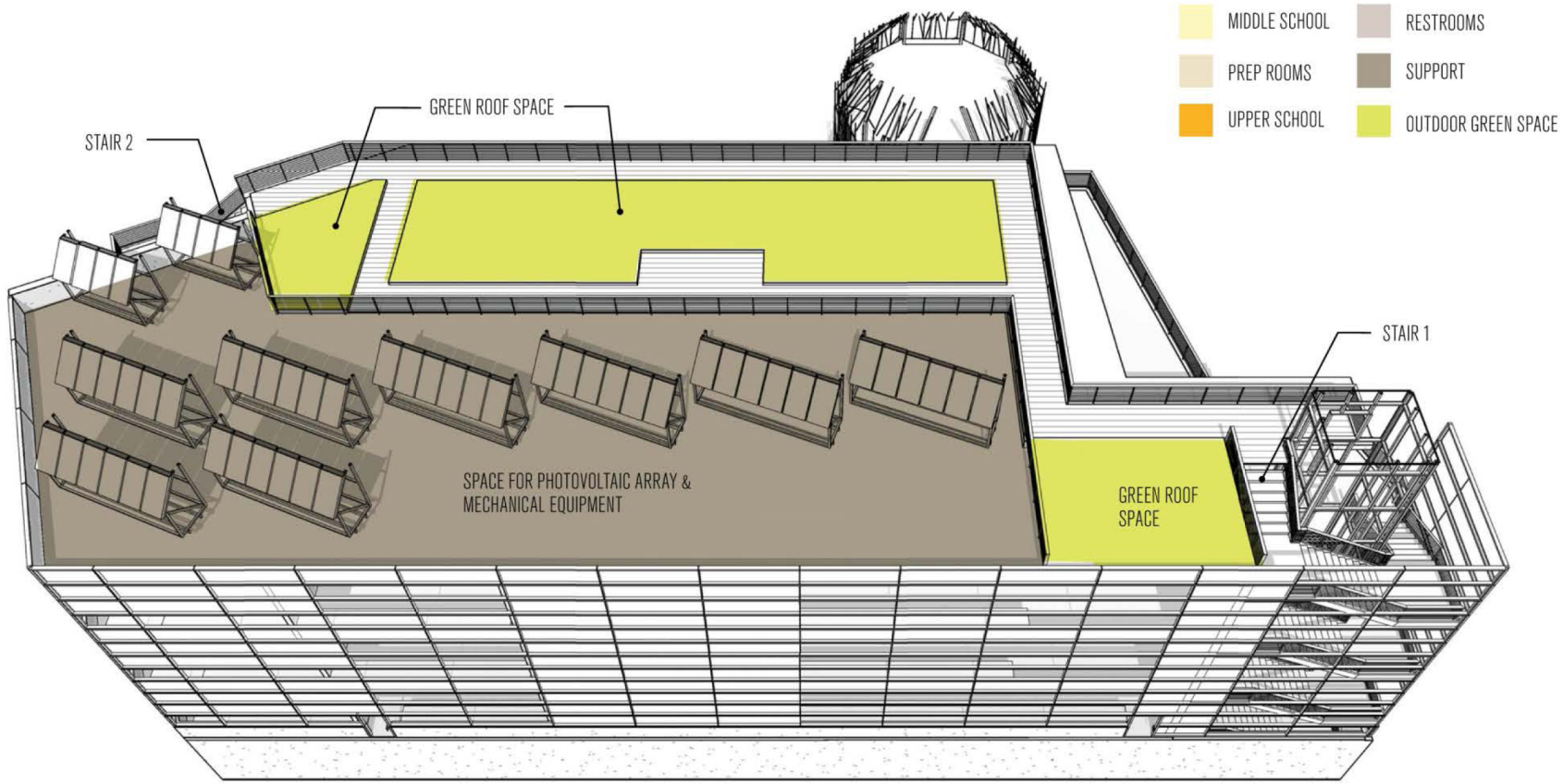
Santa Monica City Services Building

- First Composting Toilet System in SoCal
- First Potable Rainwater System in SoCal
- First Municipal Living Building in US
- Largest Living Building Project in US


JUNE 21
DECEMBER 21
OPERABLE WINDOWS
PV SHADE #1
3,444 SF
PV SHADE #2
1,378 SF
PV SHADE #3
1,073 SF
PV ARRAY
9,273 SF
CITY HALL


Crossroads School for Arts & Science

ROOF PLAN


MIDDLE SCHOOL
PREP ROOMS
UPPER SCHOOL
RESTROOMS
SUPPORT
OUTDOOR GREEN SPACE
GREEN ROOF SPACE
STAIR 2
STAIR 1
SPACE FOR PHOTOVOLTAIC ARRAY &
MECHANICAL EQUIPMENT
GREEN ROOF
SPACE
N

Otis College of Art and Desig

discussion.

During this session, you may submit questions via **www.slido.com**
using event code # **CMA**