

# Getting to Zero Energy: New Challenges & Opportunities for Programs and Policies

## 2019 DOE Energy Code Conference

*Dave Epley, DCRA Green Building Division*



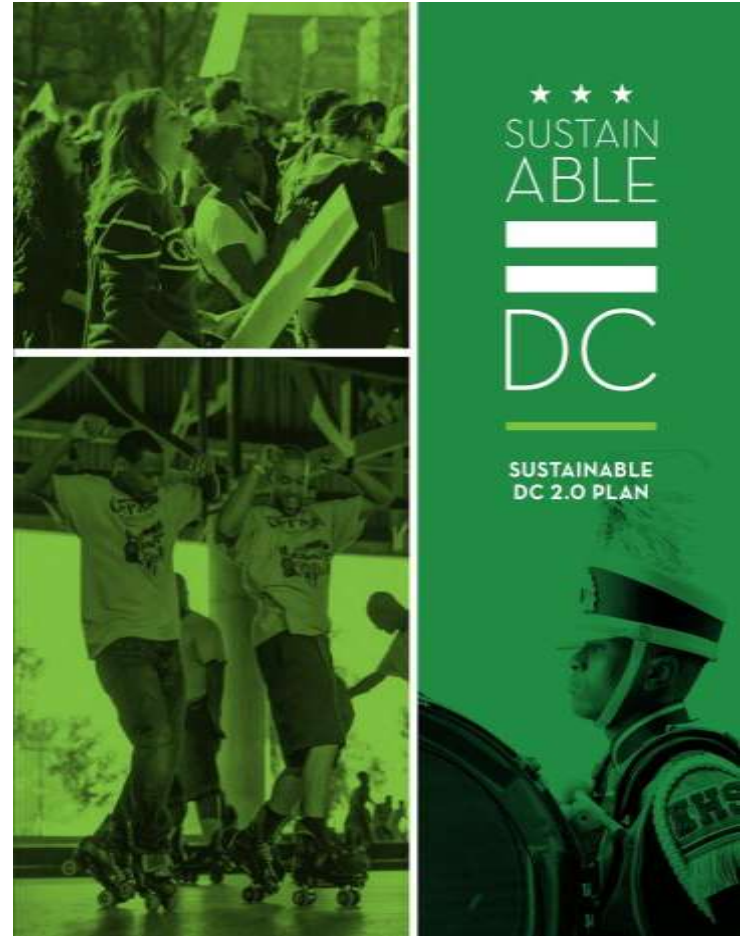
# DISTRICT GOALS, PLANS, REGS & PROGRAMS

## GOALS

- Maintain Paris Agreement (1.5 C)
- 50% GHG reduction by 2032
- Carbon Neutrality by 2050

## FRAMEWORK / PLANS

- Sustainable DC 2.0
- Clean Energy DC Plan
- Climate Ready DC



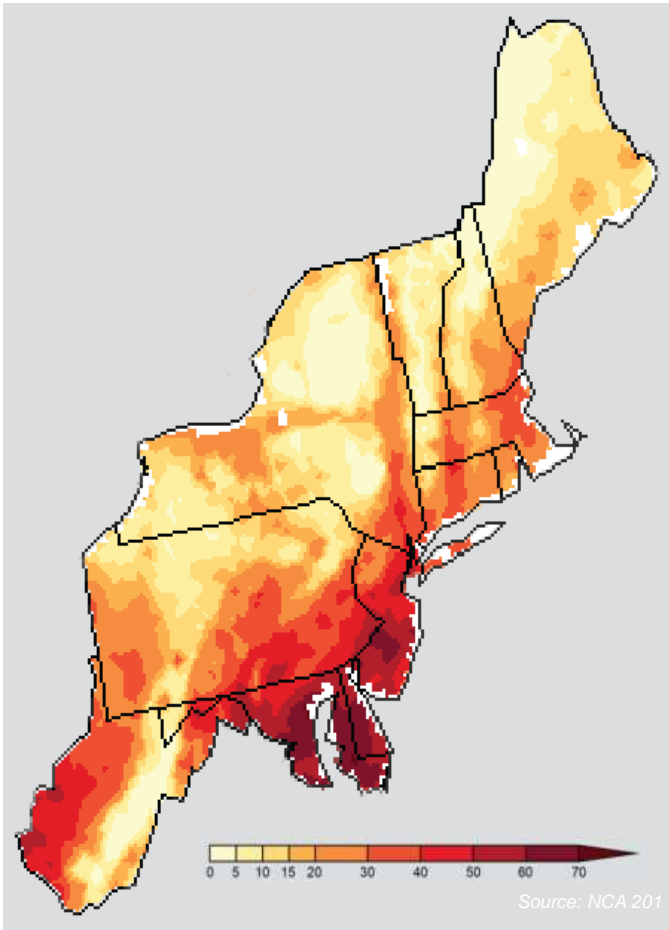
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# DISTRICT GOALS, PLANS, REGS & PROGRAMS

## REGULATIONS & PROGRAMS

- New construction
  - Mandatory Net-Zero Energy Codes targeted for...
    - Residential by 2022
    - Commercial by 2026
  - Voluntary NZE Program
    - Commercial: Appendix Z & Alternative Compliance Pathways
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  - 100% RPS by 2032
  - Energy Benchmarking step-down to 10,000 SF+

# CLIMATE READY DC - IMPACTS



**HEAT**



**PRECIPITATION**



**SEA LEVEL RISE**



**EXTREME WEATHER**



**STORM SURGE**

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# SUSTAINABLE DC 2.0 SCOPE

To help you navigate this plan, we have created a short summary of what each section covers so you can decide which sections you wish to read in more detail.

## GOVERNANCE

- Ensuring plan implementation and accountability by the District Government.

## EQUITY

- Improving equity in District Government planning, starting with Sustainable DC

## BUILT ENVIRONMENT

- Equitably accommodating population growth
- Strengthening existing neighborhoods
- Making existing buildings more sustainable
- Making new buildings more sustainable

## CLIMATE

- Reducing greenhouse gas emissions (climate mitigation)
- Increasing resilience to climate change (climate adaptation)

## ECONOMY

- Growing green jobs and economy
- Training residents for green jobs

## EDUCATION

- Educating students about the environment
- Educating community members about sustainability

## ENERGY

- Improving energy efficiency
- Increasing renewable energy
- Modernizing energy infrastructure

## FOOD

- Expanding urban agriculture
- Increasing access to healthy food
- Growing the food economy
- Reducing wasted food

## HEALTH

- Enabling active lifestyles for residents
- Increasing healthy places for residents
- Improving community-level health

## NATURE

- Protecting and expanding aquatic wildlife and habitat
- Protecting and expanding land wildlife and habitat
- Improving residents' access to nature

## TRANSPORTATION

- Increasing transit use
- Increasing the number of bikers and walkers
- Reducing dependency on single occupant vehicles
- Reducing emissions from transportation

## WASTE

- Reducing the amount of waste created
- Increasing reuse and recovery of materials
- Increasing recycling and composting

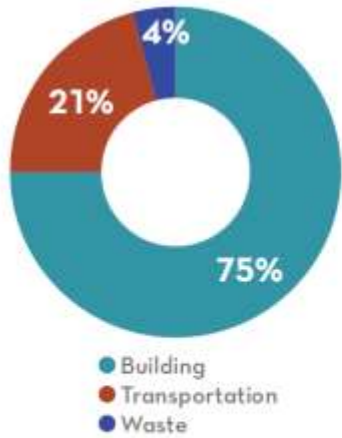
## WATER

- Making waterways fishable and swimmable
- Reducing the amount of stormwater runoff
- Reducing the amount of potable water used
- Ensuring safe drinking water

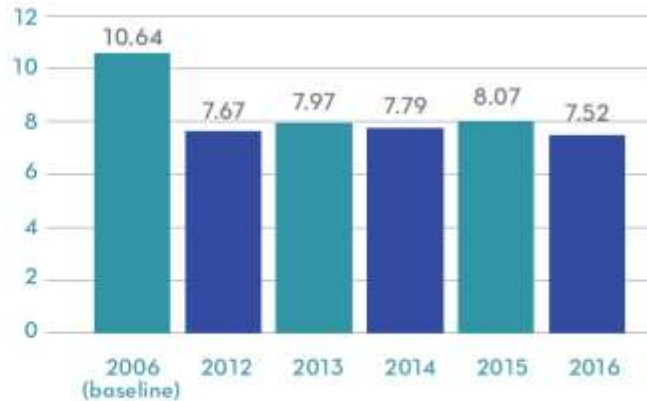


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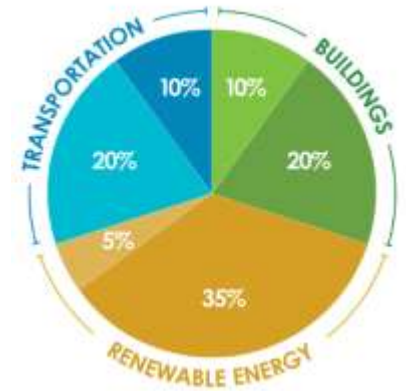
# CLEAN ENERGY DC PLAN



Greenhouse Gas Emissions by Sector (2016)<sup>xiv</sup>



Citywide Greenhouse Gas Emissions  
All figures are in MMTCO<sub>2</sub>e  
(million metric tons of carbon dioxide equivalent)<sup>xv</sup>



## CONSTRUCTING NET-ZERO BUILDINGS

Require highly efficient and zero emission new buildings

## RAMPING UP RETROFITS

Expand and intensify energy use reductions in existing buildings

## SHIFTING TO CLEAN ENERGY

Move from fossil fuels to clean and renewable energy

## GROWING LOCAL SOLAR

Maximize local renewable energy generation

## ELECTRIFYING TRANSPORTATION

Electrify bus transit, vehicle sharing, and personal vehicles

## SHIFTING TRANSPORTATION

Increase the use of walking, biking, and mass transit

**75%** of the District's GHG emissions come from buildings.<sup>xix</sup>

**1** metric ton of GHG emissions is equivalent of **2,451** miles driven by an average car.<sup>xviii</sup>

The District's GHG emissions are down **29%** from the 2006 baseline.<sup>xvi</sup>

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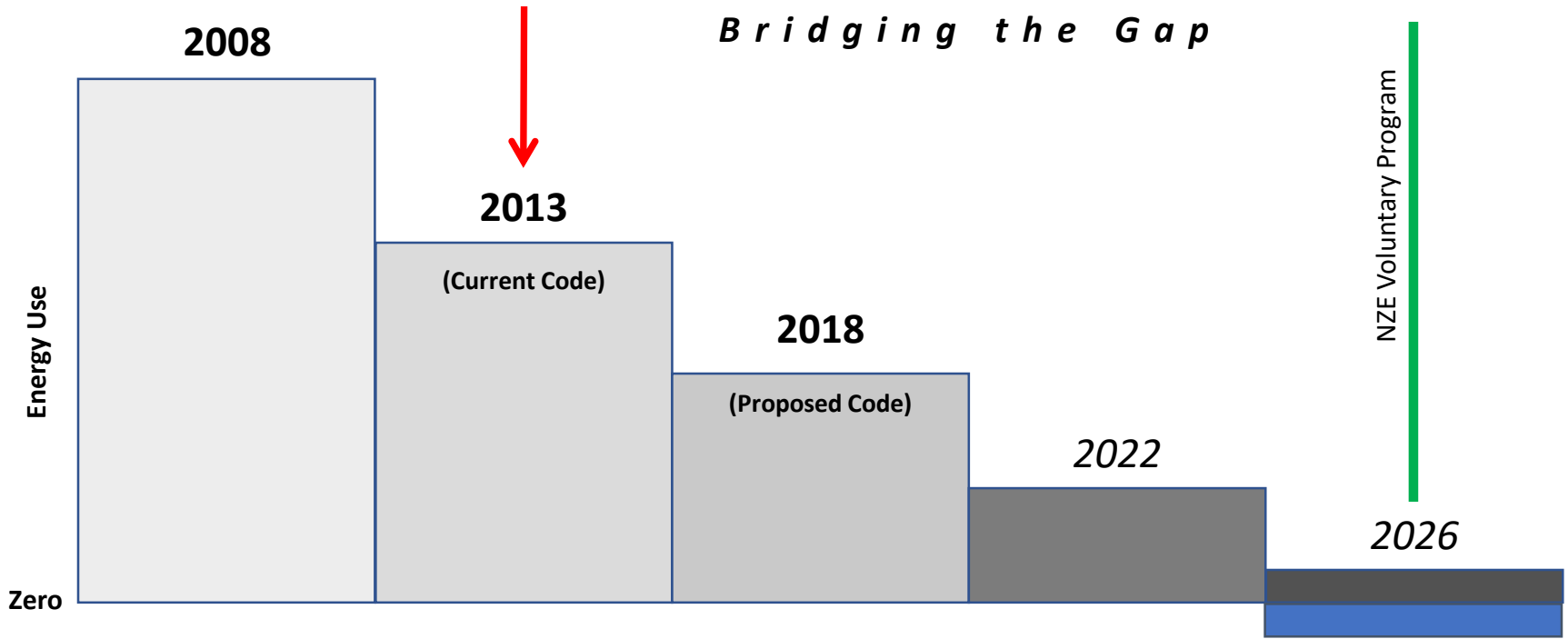
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# THE PATH TO NET-ZERO ENERGY BUILDINGS



## Net-Zero Energy Code requirements per **Clean Energy DC Plan & Sustainable DC 2.0**

- **2026** Net-Zero Commercial Energy Code / **2022** Net-Zero Residential Energy Code

**DCRA is working with project teams interested in being early NZE adopters**

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# NET-ZERO ENERGY VOLUNTARY PROGRAM PATHWAYS (COMMERCIAL)

- DCRA NZE Pathway (Appendix Z)
  - Design, construction, and outcome based NZE Code
- Appendix Z basics:
  - Meet a ZEPI of 30 using equation  **$zEPI = 50.4 (EUI_p/EUI)$**
  - Calculated in accordance with Appendix G to ASHRAE 90.1-2016
  - Meet maximum annual heating demand of **4.2 kBtu/ft<sup>2</sup>**
  - Meet maximum annual cooling demand of **6.4 kBtu/ft<sup>2</sup>**
  - Building Commissioning of building envelope, airtightness testing, HVAC, lighting, DHW, renewable systems
  - No on-site combustion allowed
  - Renewables: Minimal on-site + off-site (with specific guidance)
  - Metering and energy benchmarking
  - Performance verification within 24 months
- Alternative Compliance Pathways (Commercial)
  - LBC Energy Petal, ILFI Zero Energy Building, [PHIUS+, PHI, or DOE NZE-Ready + solar], LEED Zero Energy, LEED Zero Carbon

# ALTERNATIVE COMPLIANCE PATHWAYS

**101.10.6 Alternative Compliance Paths for Commercial Building Projects.** In lieu of the requirements of the *Energy Conservation Code-Commercial Provisions*, commercial building projects that comply with one of the alternative compliance paths set forth in Sections 101.10.6.1 through 101.10.6.7 shall be deemed to comply with the *Energy Conservation Code-Commercial Provisions*.

**101.10.6.1 Appendix Z.** Demonstrate compliance with all sections of Appendix Z with the exception of Z5.2 of the *Energy Conservation Code-Commercial Provisions*.

**101.10.6.2 Compliance Utilizing ILFI Living Building Challenge.** Design, construct and certify to the International Living Future Institute's Living Building Challenge program for either full Living Building Challenge or Energy Petal certification. The owner shall provide documentation to the *code official* confirming registration with the Living Building Challenge program prior to permit issuance. The owner shall have an 18-month period from the date of issuance of the first certificate of occupancy, or from approval of the final inspection, to submit official evidence of certification to the *code official*. The *code official*, for good cause and upon written request, is authorized to extend the period to submit evidence of certification.

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**101.10.6.3 Compliance Utilizing ILFI Zero Energy Building.** Design, construct and certify to the International Living Future Institute's Net Zero Energy Building Certification. The owner shall provide documentation to the *code official* confirming registration with the Net Zero Energy program prior to permit

# NET-ZERO ENERGY VOLUNTARY PROGRAM PATHWAYS (RESIDENTIAL)

- DCRA NZE Residential Energy Calculator
- Alternative Compliance Pathways (residential)
  - LBC Energy Petal, ILFI Zero Energy Building, [PHIUS+, PHI, or DOE NZE-Ready + solar], LEED Zero Energy, LEED Zero Carbon
- Residential Calculator creates an NZE pathway for all small residential (even those who can install solar on-site)
  - Designed for SF detached, attached, townhomes, small multifamily
  - Sets a target EUI for the building (24 kbtu/sf annual or better)
  - Sets an on-site renewable energy KW system size
  - As the building increases in stories, the target EUI is lowered
  - Addresses situations where building footprint and number of stories necessitate off-site renewable energy purchase
  - Addresses situation where there is shading and on-site solar not an option
  - No combustion on site

# NZE VOLUNTARY PROGRAMS

## **Program**

- Net-Zero Energy Program for all buildings types
- Administered by Building Department (DCRA Green Building Division)

## **Outreach**

- Branding/marketing Development
- NZE Regional Coalition

## **Green Ambassador Program**

- Two-part incentive program designed to encourage and assist early adopters

# NZE DRAFT: GREEN AMBASSADOR INCENTIVE PROGRAM PHASE

## Design | Plan Review\*

- Accelerated Permitting
  - DCRA / DOEE
- Decreased Permit Fees
- Technical Assistance
- DCSEU Incentive
- Financing (Green Bank, DC PACE)

## Occupancy

- Pay-for-performance
- Case Studies
- Professional Directory
- Technical Assistance

\*Additional incentives for high-impact projects (affordable housing, schools)

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# DC GREEN CONSTRUCTION CODE

- Green Building Act (GBA)
  - Original green building law that established the DC Green Fund, Green Building Advisory Council, Public/private green building regs
- 2013 DC Green Construction Code
  - Adoption of 2018 IgCC required under the SDC 2.0
  - Applies to new construction, additions and alterations 10,000 SF and up, filling in gaps left by GBA

Green Fund Activity	FY12	FY13	FY14	FY15	FY16	FY17
Revenues	\$ 809,086	\$1,688,587	\$1,821,433	1,917,286	2,024,426	1,896,147

Table 1. District of Columbia Green Building Fund Revenue, FY12 – FY17. Source: [District of Columbia Green Building Report](#).

## Building a green code program from the ground up

APRIL 28TH, 2015  
by David Eppler

PERSONAL PERSPECTIVES, TECHNICAL TOPICS



The Green Building Division of the District of Columbia's Building Department, the Department of Consumer and Regulatory Affairs.

Act of 2006, and had a progressive development community that had embraced LEED certification as a standard practice across larger buildings, this gave them hesitation. Construction in the District was booming, and the code board was wary of assigning the building department additional authority and responsibilities that might slow development, especially given the building department did not have dedicated or experienced green building staff, and the code contained elements that were complicated and potentially unenforceable.

It was in this climate that I took my first job in codes as a green code official, establishing what would become the Green Building Division at the District of Columbia's Building Department, the Department of Consumer and

In late 2012, Washington, D.C., was in the middle of a major code adoption cycle, the first in almost five years. The mayor-appointed, private-public sector code adoption committee, the Construction Codes Coordinating Board, was excited yet nervous about the adoption of the 2012 International Green Construction Code (IgCC). At that point, no other major jurisdiction had adopted the 2012 IgCC (with all major chapters) as a mandatory code.

Even though the District of Columbia was a national green building leader that had pioneered the Green Building

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# CLEAN ENERGY DC OMNIBUS ACT OF 2018

- Benchmarking threshold drop
- Third-party data verification every 3 years

• **Implement Building Energy Performance Standards (BEPS)**



• **BEPS Working Group/Task Force**

## Details on BEPS

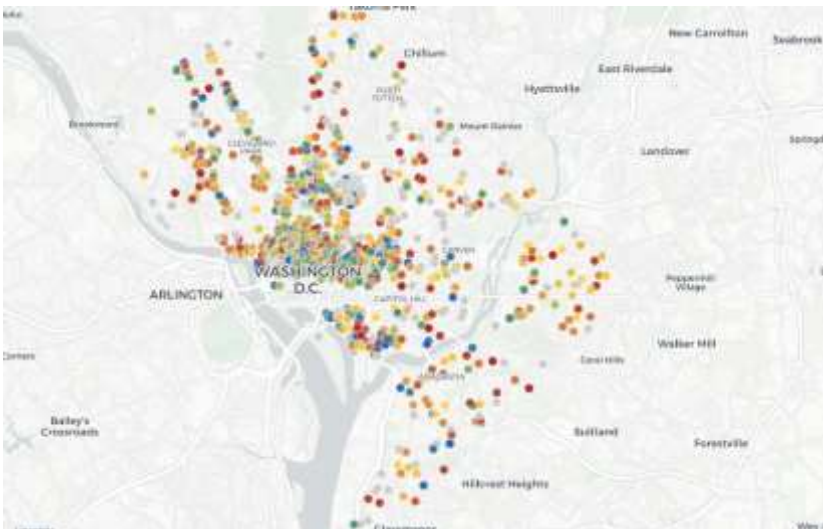
Local Median ENERGY STAR Score by Building Type

1st Compliance Cycle Begins 2021

5-year compliance cycles

If below standard, two compliance paths:

- Performance: Reduce energy usage 20%
- Prescriptive: Implement Cost-effective Energy Efficiency Measures



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# DC GREEN BUILDING INCENTIVES



- ▶ SPECIAL TAX ASSESSMENT
- ▶ CASH-FLOW POSITIVE



DC  
SUSTAINABLE ENERGY  
UTILITY

- ▶ REBATES
- ▶ PAY FOR PERFORMANCE



- ▶ COMMUNITY SOLAR
- ▶ LMI BENEFITS



- ▶ CREDIT ENHANCEMENTS
- ▶ LOANS AND INVESTMENTS

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# GREEN BUILDING DIVISION

- **Plan review** and permitting
- Green/energy **Inspections**
- Post-occupancy data & tracking
- Policy & **code** development
- **Solar** and other green tech
- Community **outreach** & **education**
- **Technical assistance** to building industry
- **Net-Zero Energy** Assistance

[Green.building@dc.gov](mailto:Green.building@dc.gov)



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# ENFORCEMENT OF REGS & NZE PATHWAYS



Design

Permit

Inspection

C of O

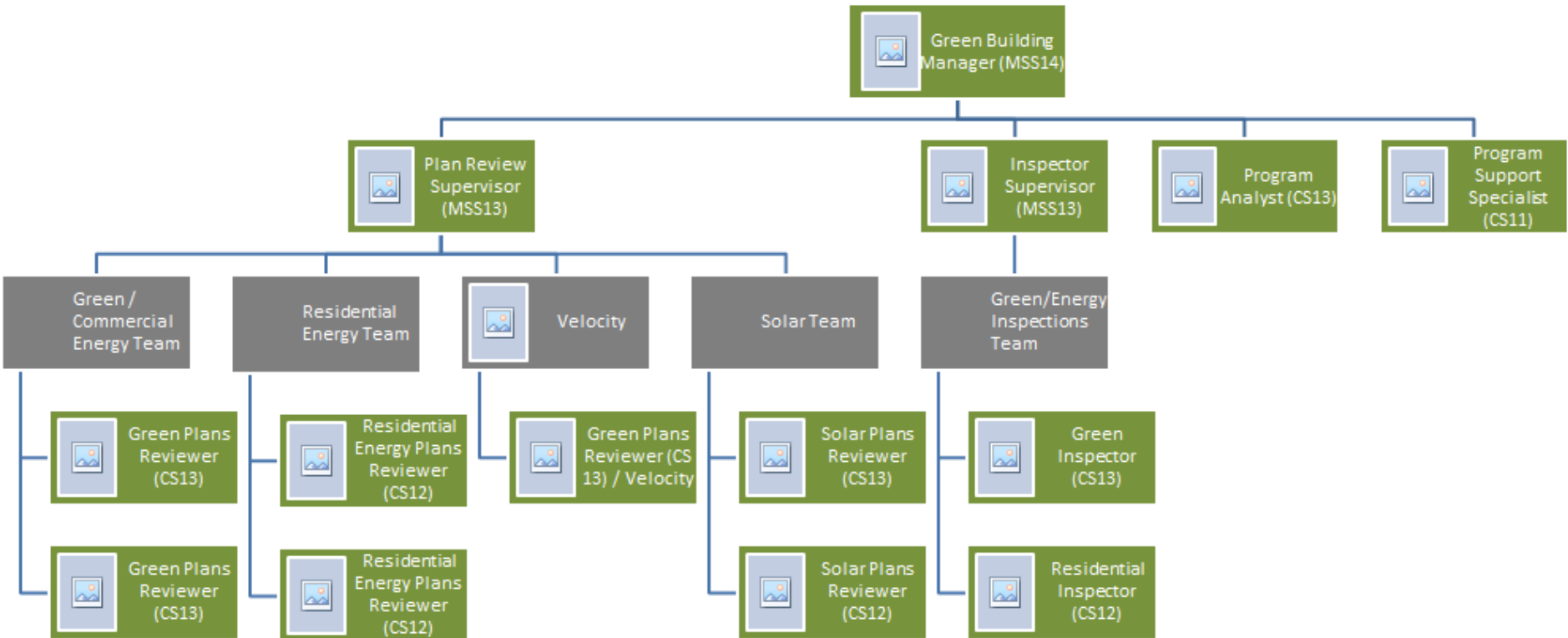
Post  
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# ENFORCEMENT 101

- Permitting
  - Preliminary Screening before plans accepted
  - Hold for comments
  - Approve with comments for inspector to verify in the field
- Inspections
  - Fail inspection, re-inspect
  - Notice of Violation followed by Notice of Infraction (fines)
- Certificate of Occupancy and Post CofO
  - File a legally binding “Financial Security”
  - Issue a temporary, conditional certificate of occupancy
  - Fines and penalties



# BUILDING A GREEN BUILDING PROGRAM IN A BUILDING DEPARTMENT



# ESTIMATING YOUR CAPACITY & NEED

- 4,000 green/energy & 1,600 solar permits annual
- Plan Reviewers
  - Residential Energy Code: 10-15 plans/day
  - Commercial Energy: 10-15 plans/day
  - Commercial Energy + Green Code: 2-5/day
- Inspectors: 5-8 inspections/day
- Certificate of Occupancy & Post-Occupancy
- Program Analysts
- Supervisors
- Administrative work (it takes and AGENCY!)

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