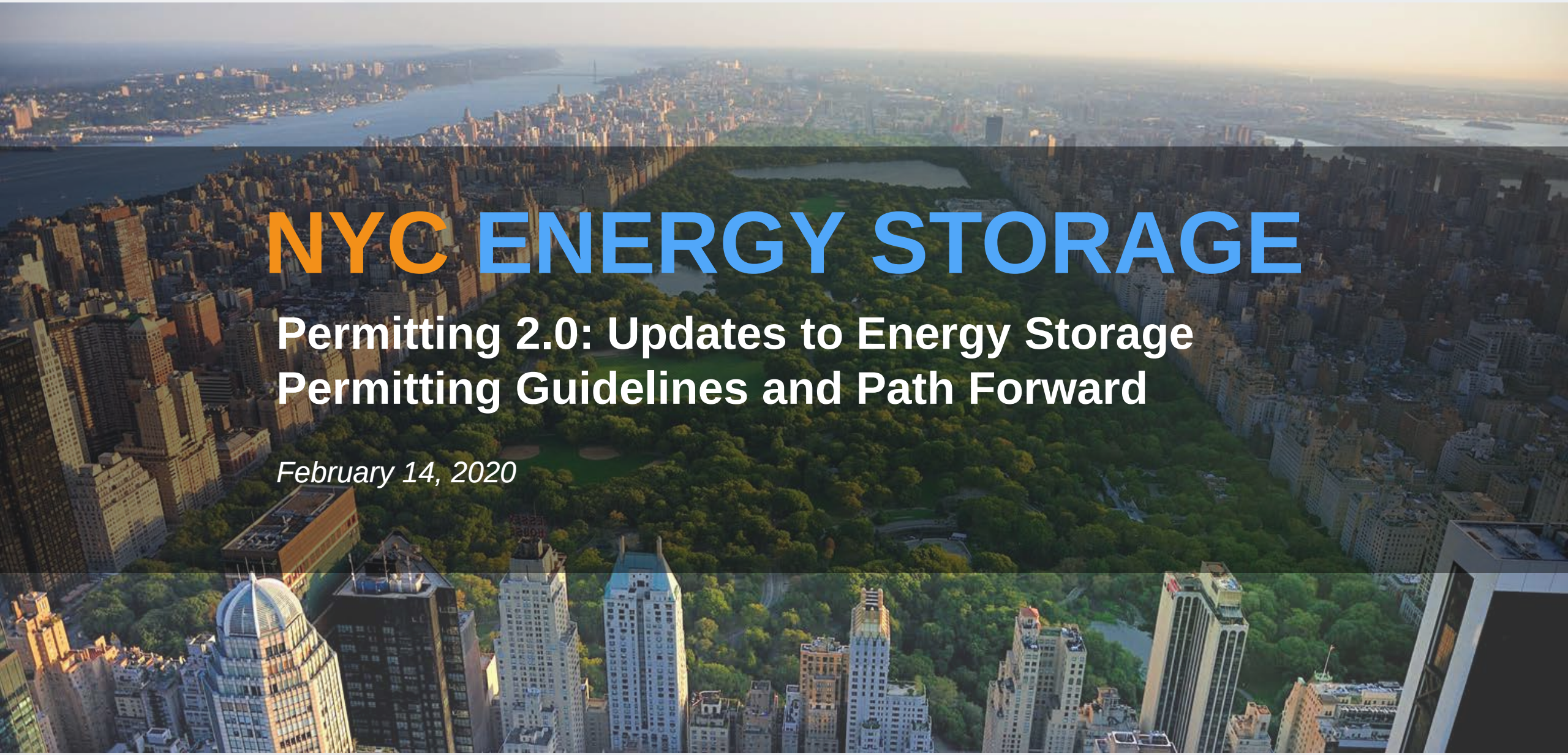

NYC ENERGY STORAGE

Permitting 2.0: Updates to Energy Storage Permitting Guidelines and Path Forward

February 14, 2020

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CUNY SMART DG HUB

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With key technical assistance from UL

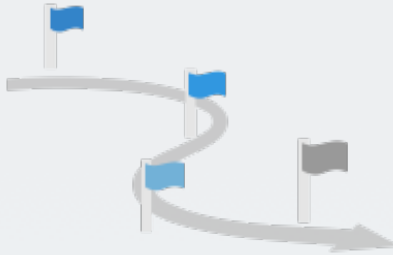
Today's Agenda

- Introductions
- Progress to date
- Energy Storage Permitting Guidelines: An Introduction
- Key changes in the Guidelines
  - Overarching process
  - DOB Bulletins
  - FDNY Rule
- Next steps
- Q&A

Smart DG Hub: Success Through Partnership

ENGAGEMENT OF STAKEHOLDERS

PATHWAYS TO PROGRESS



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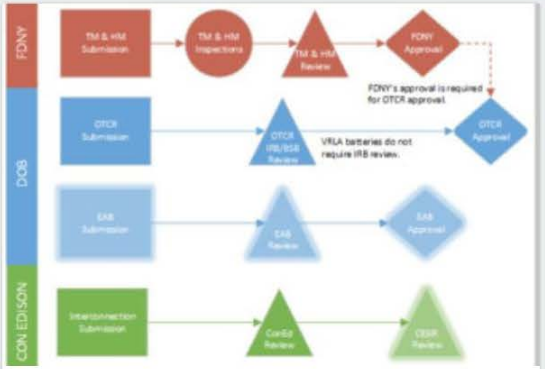
Smart DG Hub Projects: smartdghub.org

NY SOLAR MAP | Going Solar | Installing Solar | Financing Solar | Solar+Storage | Resources | *NYC Solar* | About | NY Solar+Storage Summit

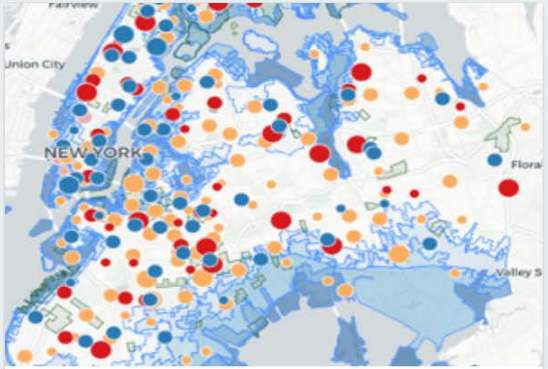
Learn More About Our Storage Projects

REDUCING STORAGE SOFT COSTS



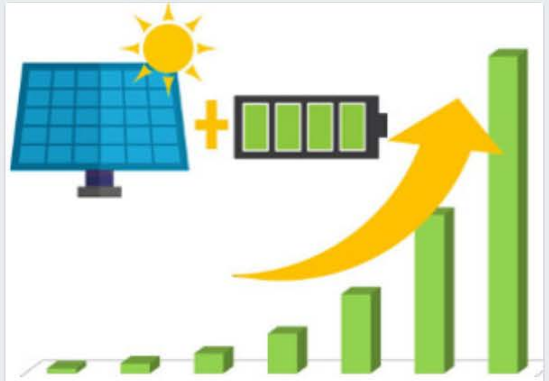
RESOURCES, PERMITTING AND GUIDES

RESILIENT SOLAR PROJECT



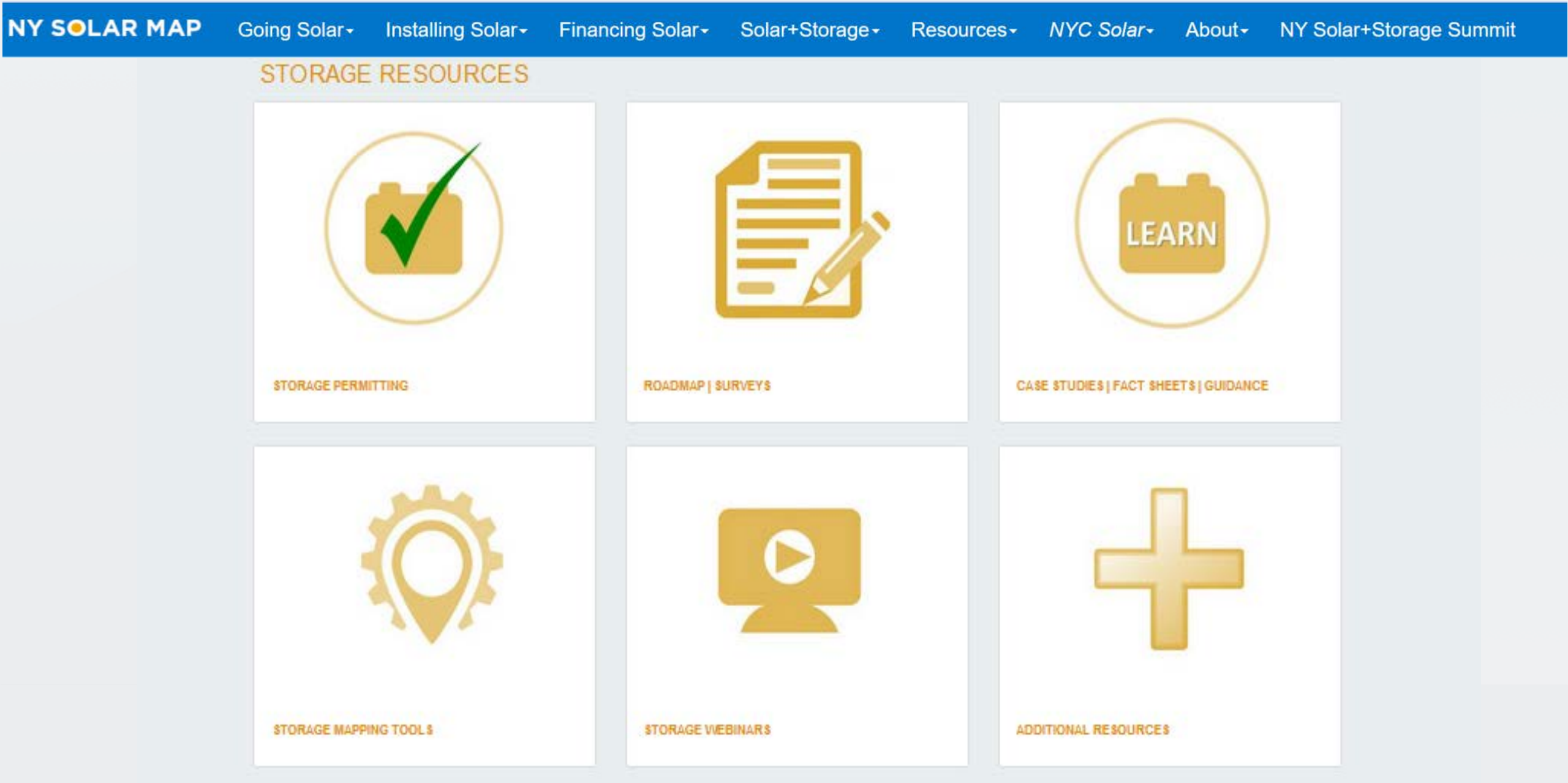
CRITICAL FACILITY SOLAR+ EVALUATOR

STORAGE ROADMAP & TRACKER

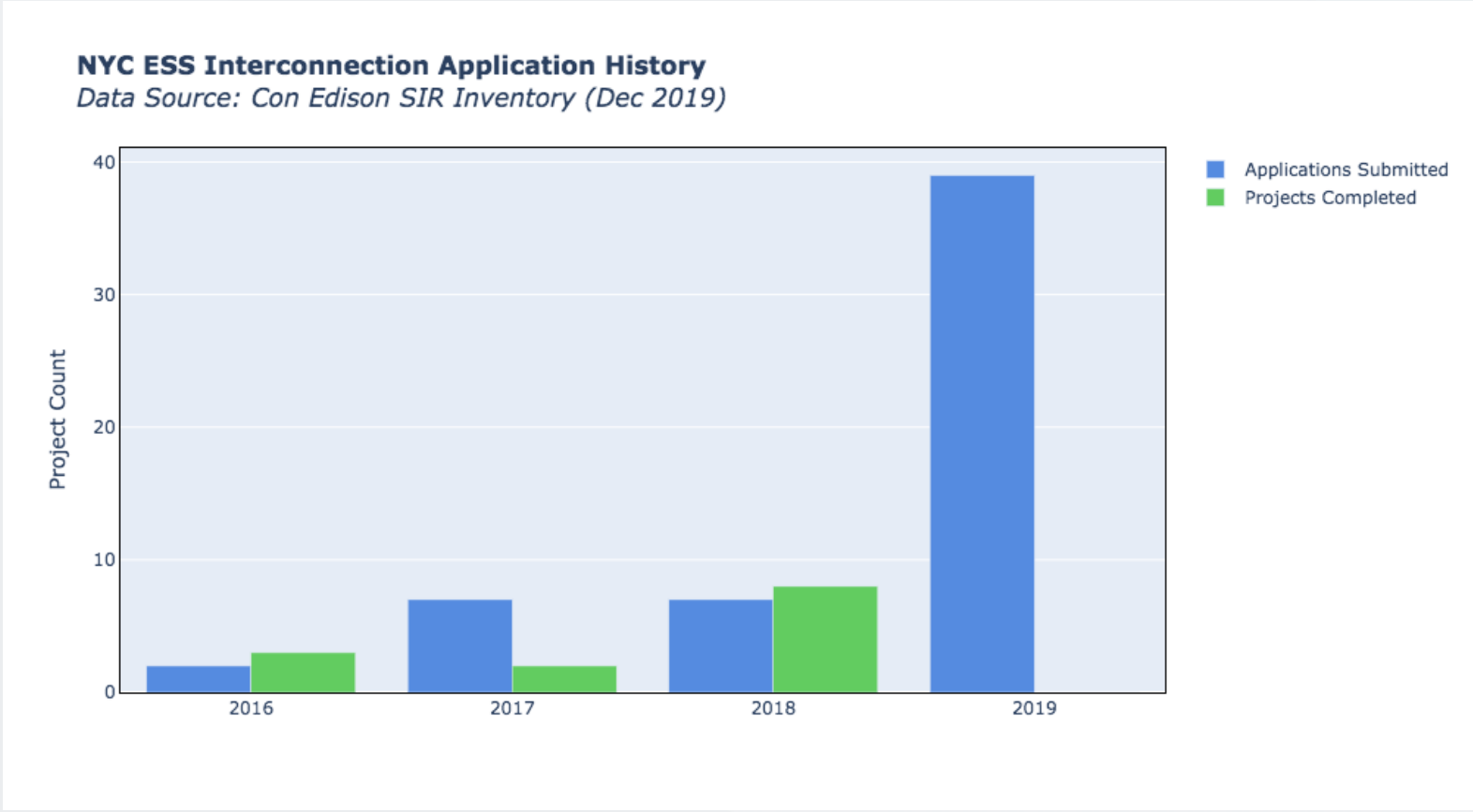


STORAGE 101

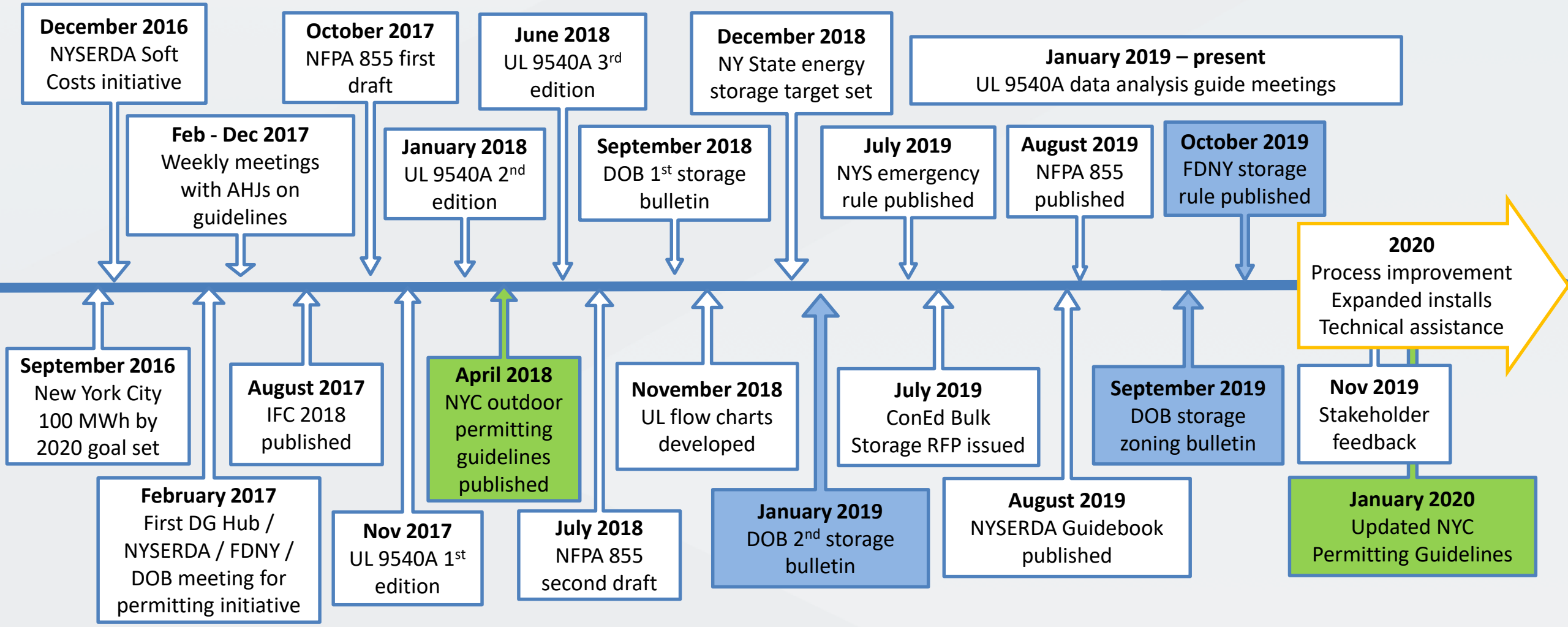
Storage Resources: smartdghub.org



NYC ESS Interconnection Application History



Timeline: Where We Came From → Where We Are Going



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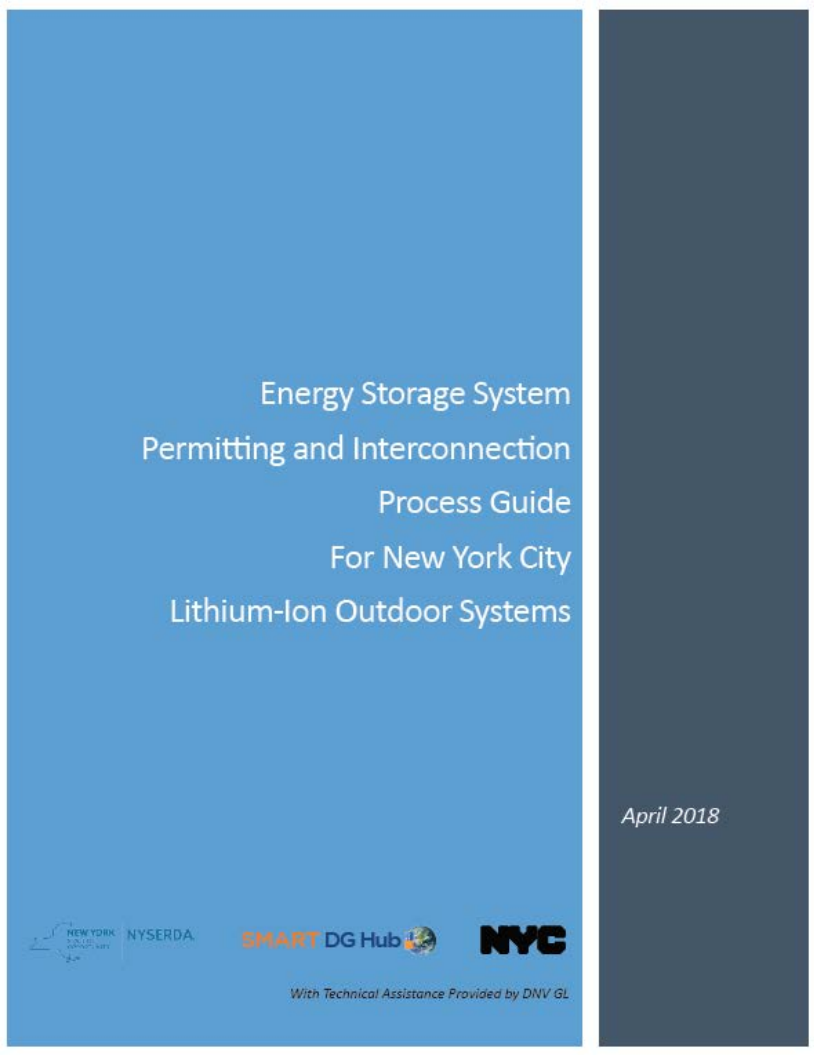
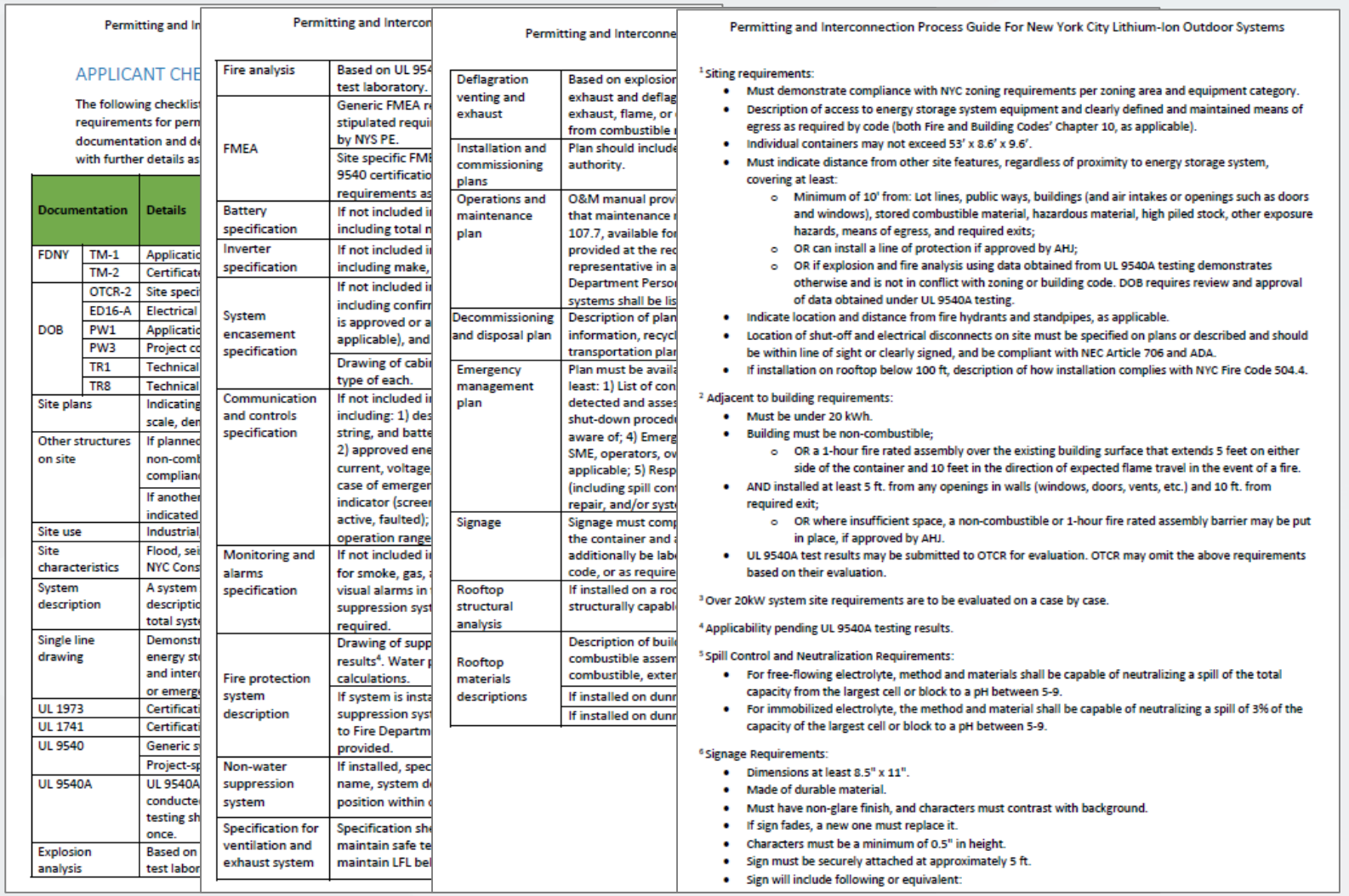
2018 Permitting Guide: Overview





Permitting and Interconnection Process Guide For New York City Lithium-Ion Outdoor Systems

APPLICANT CHE

The following checklist requirements for perm documentation and de with further details as

Documentation		Details
FDNY	TM-1	Applicatio
	TM-2	Certificat
DOB	OTCR-2	Site speci
	ED16-A	Electrical
	PW1	Applicatio
	PW3	Project co
	TR1	Technical
	TR8	Technical
Site plans		Indicating scale, den
Other structures on site		If planned non-combl complian
		If another indicated
Site use		Industrial
Site characteristics		Flood, sei NYC Cons
System description		A system descriptio total syst
Single line drawing		Demonstr energy st and inter or emerg
UL 1973		Certificat
UL 1741		Certificat
UL 9540		Generic s
		Project-sp
UL 9540A		UL 9540A conducte testing sh once.
Explosion analysis		Based on test labor

Fire analysis	Based on UL 954 test laboratory.
FMEA	Generic FMEA r stipulated requi by NYS PE.
	Site specific FM 9540 certificatio requirements as
Battery specification	If not included i including total n
Inverter specification	If not included i including make,
System encasement specification	If not included i including confirr is approved or a applicable), and
	Drawing of cabi type of each.
Communication and controls specification	If not included i including: 1) des string, and batte 2) approved ene current, voltage case of emerger indicator (scree active, faulted); operation range
Monitoring and alarms specification	If not included i for smoke, gas, visual alarms in suppression syst required.
Fire protection system description	Drawing of supp results[4]. Water calculations.
	If system is insta suppression syst to Fire Departm provided.
Non-water suppression system	If installed, spec name, system d position within
Specification for ventilation and exhaust system	Specification sh maintain safe te maintain LFL bel

Deflagration venting and exhaust	Based on explosion exhaust and deflag exhaust, flame, or from combustible
Installation and commissioning plans	Plan should include authority.
Operations and maintenance plan	O&M manual prov that maintenance 107.7, available fo provided at the rec representative in a Department Perso systems shall be lis
Decommissioning and disposal plan	Description of plan information, recycl transportation plar
Emergency management plan	Plan must be availa least: 1) List of con detected and asse shut-down proced aware of; 4) Emerg SME, operators, ov applicable; 5) Resp (including spill con repair, and/or syst
Signage	Signage must comp the container and additionally be labe code, or as require
Rooftop structural analysis	If installed on a roo structurally capabl
Rooftop materials descriptions	Description of buil combustible assem combustible, exter
	If installed on dunn
	If installed on dunn

[1] Siting requirements:

- Must demonstrate compliance with NYC zoning requirements per zoning area and equipment category.
- Description of access to energy storage system equipment and clearly defined and maintained means of egress as required by code (both Fire and Building Codes' Chapter 10, as applicable).
- Individual containers may not exceed 53' x 8.6' x 9.6'.
- Must indicate distance from other site features, regardless of proximity to energy storage system, covering at least:
  - Minimum of 10' from: Lot lines, public ways, buildings (and air intakes or openings such as doors and windows), stored combustible material, hazardous material, high piled stock, other exposure hazards, means of egress, and required exits;
  - OR can install a line of protection if approved by AHJ;
  - OR if explosion and fire analysis using data obtained from UL 9540A testing demonstrates otherwise and is not in conflict with zoning or building code. DOB requires review and approval of data obtained under UL 9540A testing.
- Indicate location and distance from fire hydrants and standpipes, as applicable.
- Location of shut-off and electrical disconnects on site must be specified on plans or described and should be within line of sight or clearly signed, and be compliant with NEC Article 706 and ADA.
- If installation on rooftop below 100 ft, description of how installation complies with NYC Fire Code 504.4.

[2] Adjacent to building requirements:

- Must be under 20 kWh.
- Building must be non-combustible;
  - OR a 1-hour fire rated assembly over the existing building surface that extends 5 feet on either side of the container and 10 feet in the direction of expected flame travel in the event of a fire.
- AND installed at least 5 ft. from any openings in walls (windows, doors, vents, etc.) and 10 ft. from required exit;
  - OR where insufficient space, a non-combustible or 1-hour fire rated assembly barrier may be put in place, if approved by AHJ.
- UL 9540A test results may be submitted to OTCR for evaluation. OTCR may omit the above requirements based on their evaluation.

[3] Over 20kW system site requirements are to be evaluated on a case by case.

[4] Applicability pending UL 9540A testing results.

[5] Spill Control and Neutralization Requirements:

- For free-flowing electrolyte, method and materials shall be capable of neutralizing a spill of the total capacity from the largest cell or block to a pH between 5-9.
- For immobilized electrolyte, the method and material shall be capable of neutralizing a spill of 3% of the capacity of the largest cell or block to a pH between 5-9.

[6] Signage Requirements:

- Dimensions at least 8.5" x 11".
- Made of durable material.
- Must have non-glare finish, and characters must contrast with background.
- If sign fades, a new one must replace it.
- Characters must be a minimum of 0.5" in height.
- Sign must be securely attached at approximately 5 ft.
- Sign will include following or equivalent:

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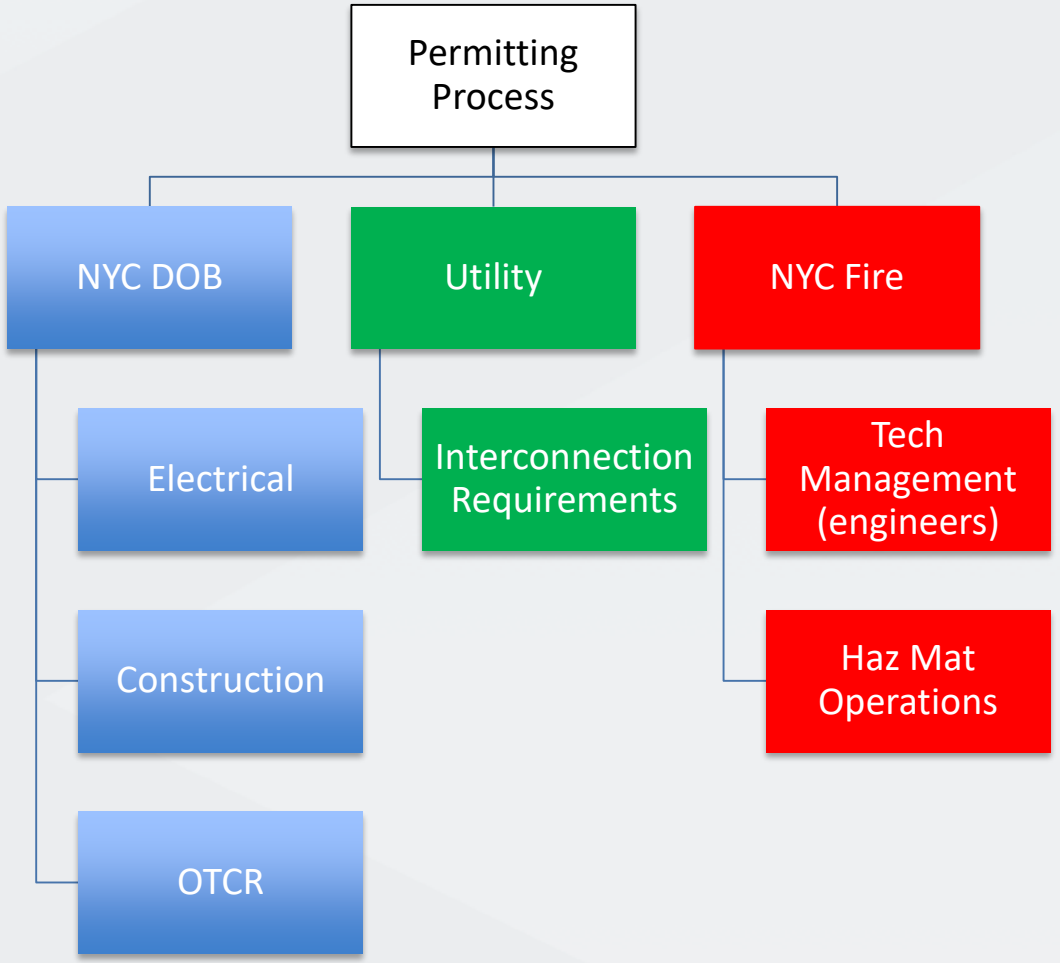
2018 Permitting Guide: Overview

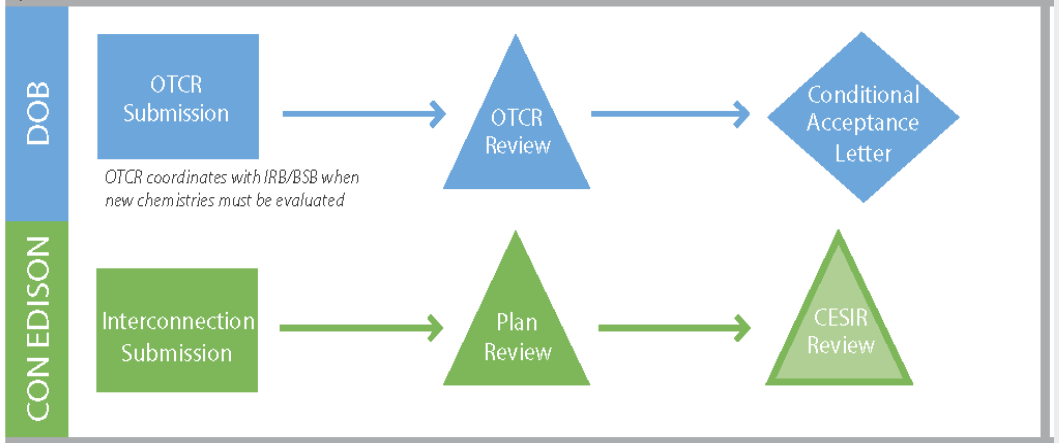
- Published in 2018, with detailed input and discussion with stakeholders
- Addressed the ConEd, DOB, and FDNY application processes
- Created a checklist for critical permitting requirements, prior to the adoption of code, addressing:
  - Lifecycle management
  - Sizing differentiators (small, medium, and large)
  - Ventilation/exhaust requirements
  - Fire protection, suppression, and extinguishing
  - Siting requirements
  - Testing / certifications
  - Signage
  - Submission details (forms, documentation requirements, and costs)

2018 - 2020 Permitting Guides: Authority Processes

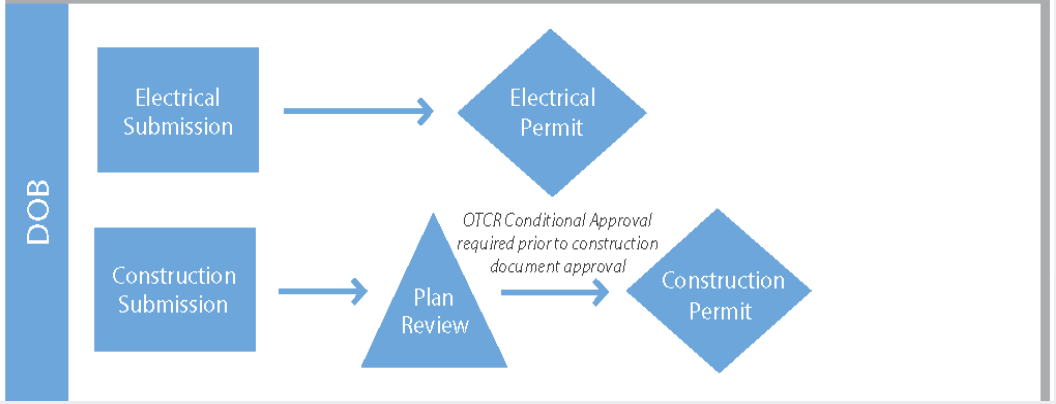


2020 Permitting Guide: Small systems

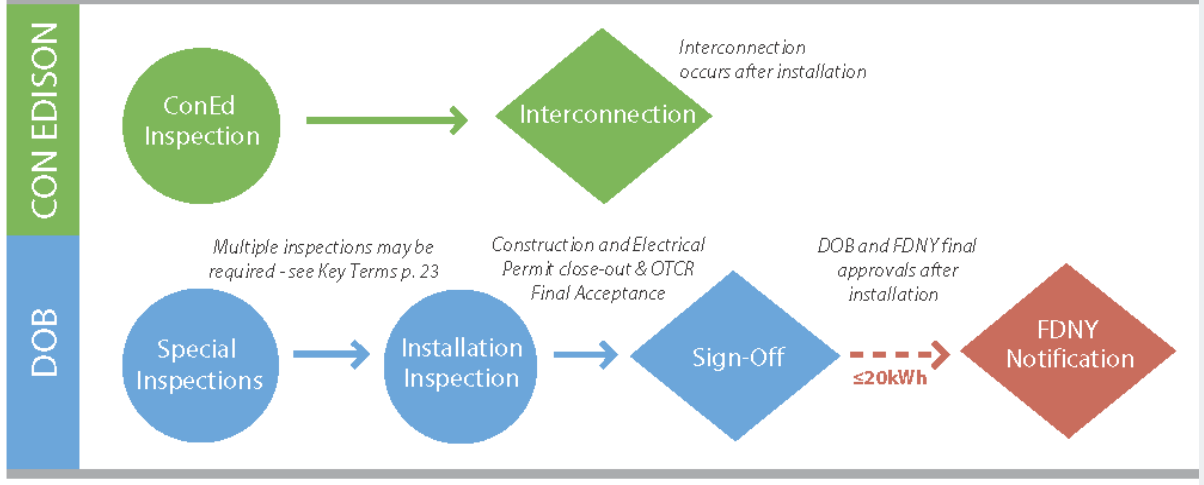
STEP 1: These submissions initiate the permitting process. Submissions may be made in parallel.

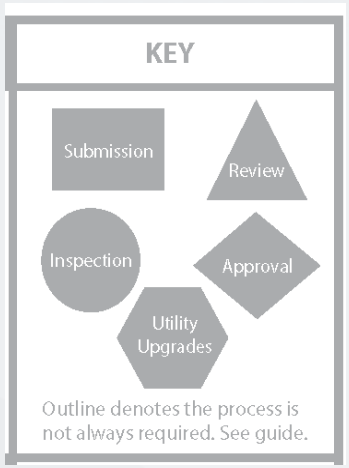


STEP 2: These submissions occur after OTCR conditional approval. Submissions may be made in parallel. Construction may begin after the permits below are obtained.



STEP 3: These steps occur during ESS installation. Inspections may occur in parallel.





ACRONYMS

TM: Technology Management

HM: Hazardous Materials

OTCR: Office of Technical Certification and Research

IRB: Innovation Review Board

BSB: Buildings Sustainability Board

CESIR: Coordinated Electric System Integration Review

TIMELINE

The timeline for these processes vary by project size and location, product listings, completeness of required documentation, and other factors.

Applicants may need to resubmit documentation as requested. Currently, FDNY, DOB and Con Edison cannot provide a projected timeline.

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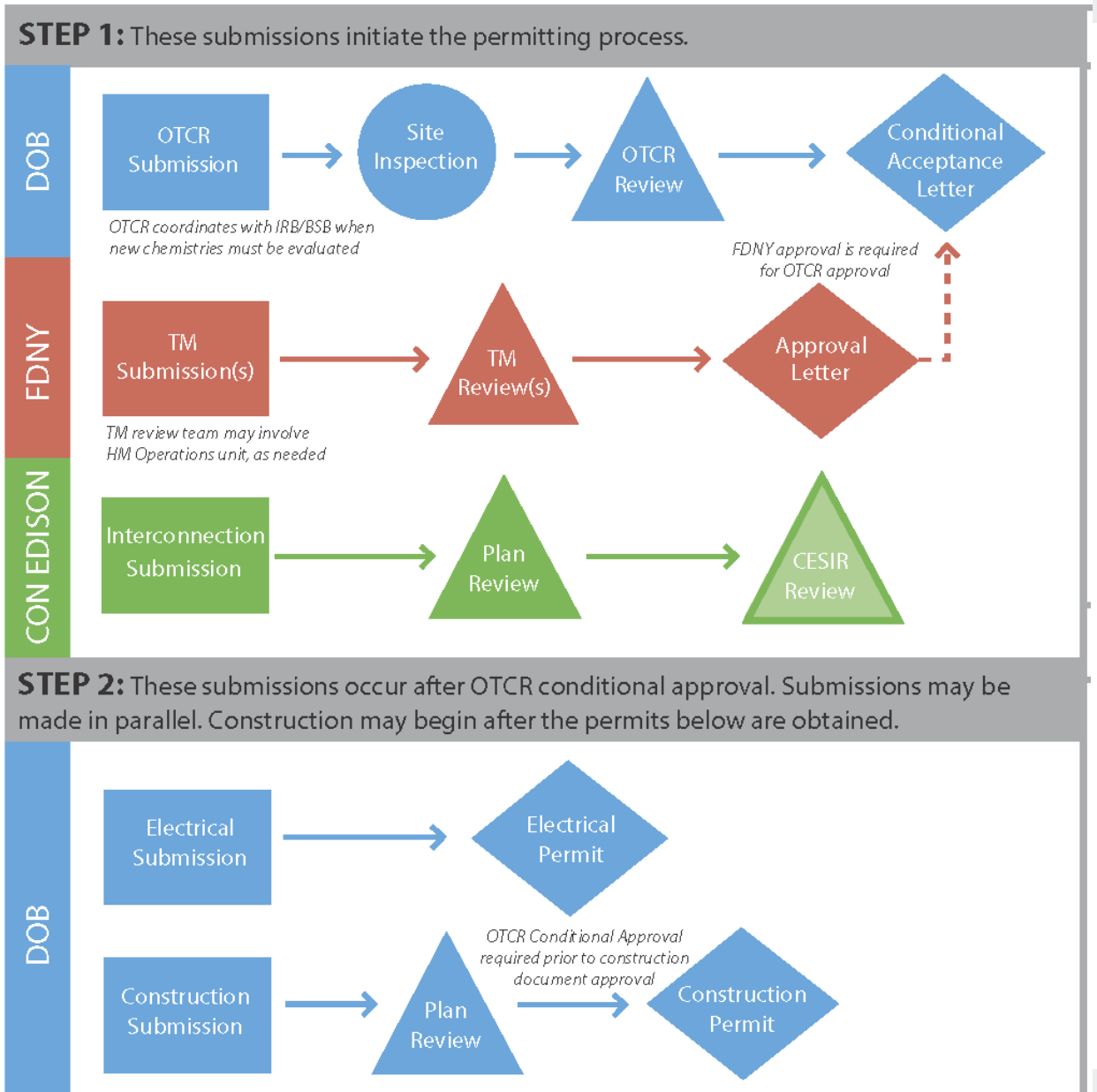
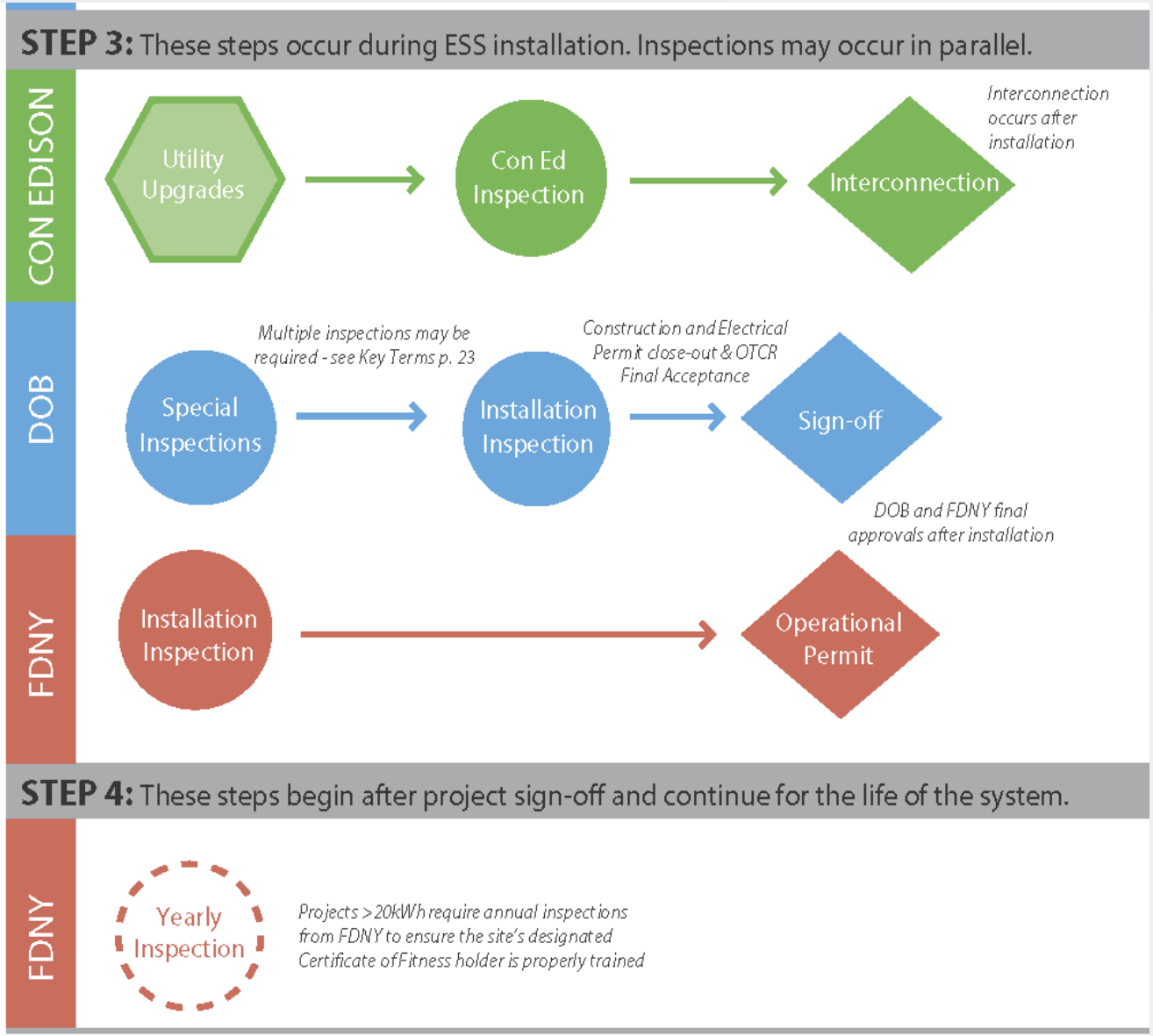
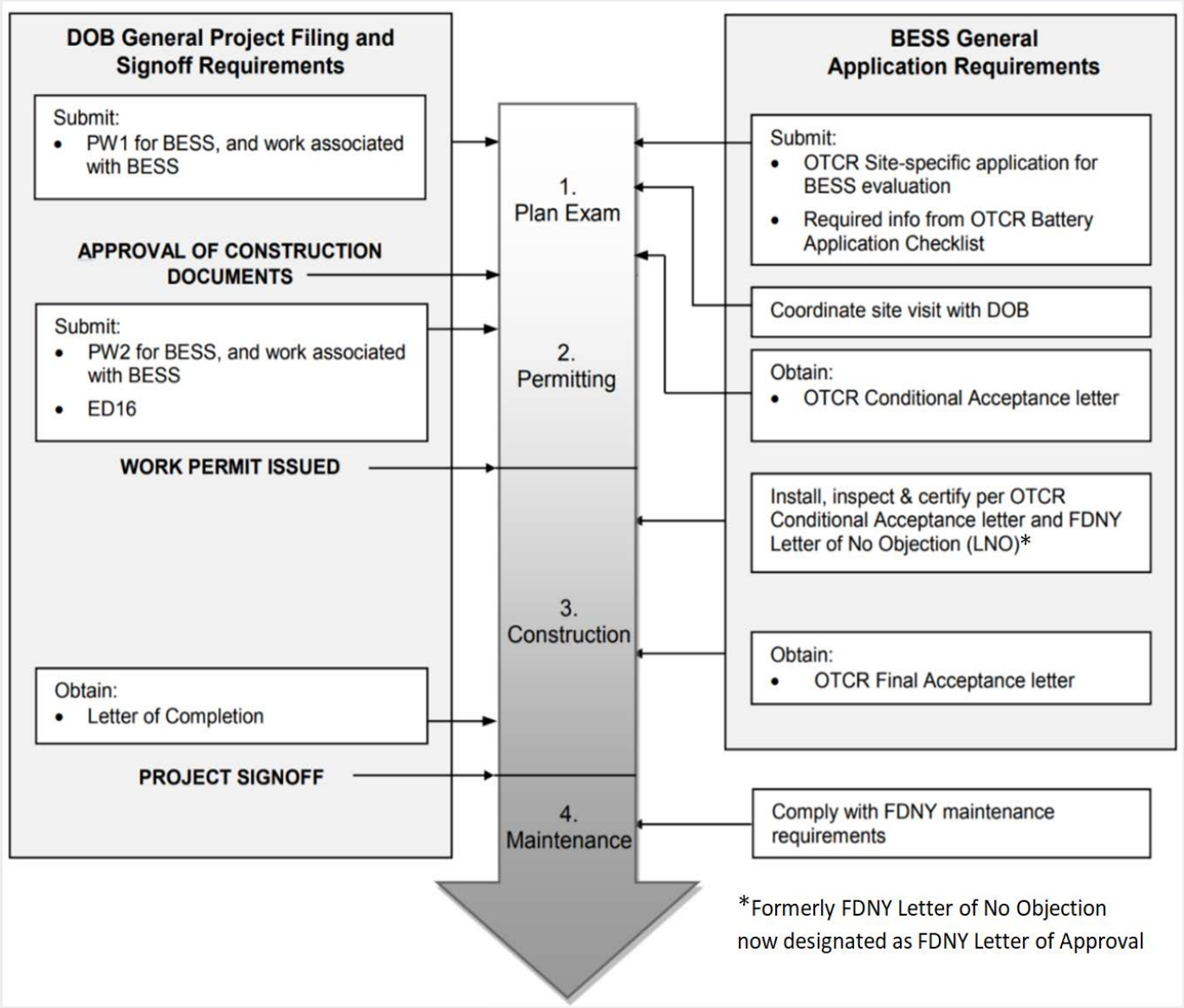
2020 Permitting Guide: Large/medium systems



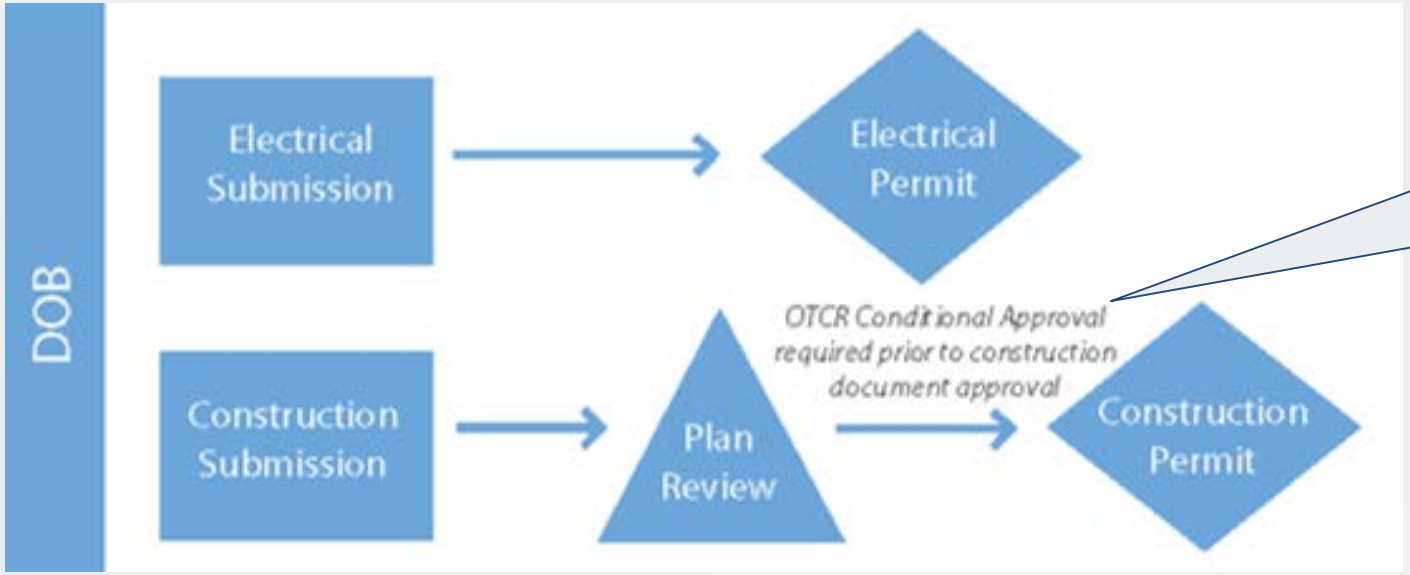


Department of Buildings: Bulletin 2019-002

- Effective date: January 30, 2019
- Applicable to:
  - Lithium ion, flow batteries, lead acid, and valve regulated lead acid
  - All system sizes
  - All installation types
- Key takeaways / steps
  - Complete a PW1 and submit all site-specific data required in the OTCR application checklist
  - Schedule site visit with DOB
  - Submit PW2 and ED16
  - Install, inspect, and Certify per OTCR Conditional acceptance



Department of Buildings: Bulletin 2019-002



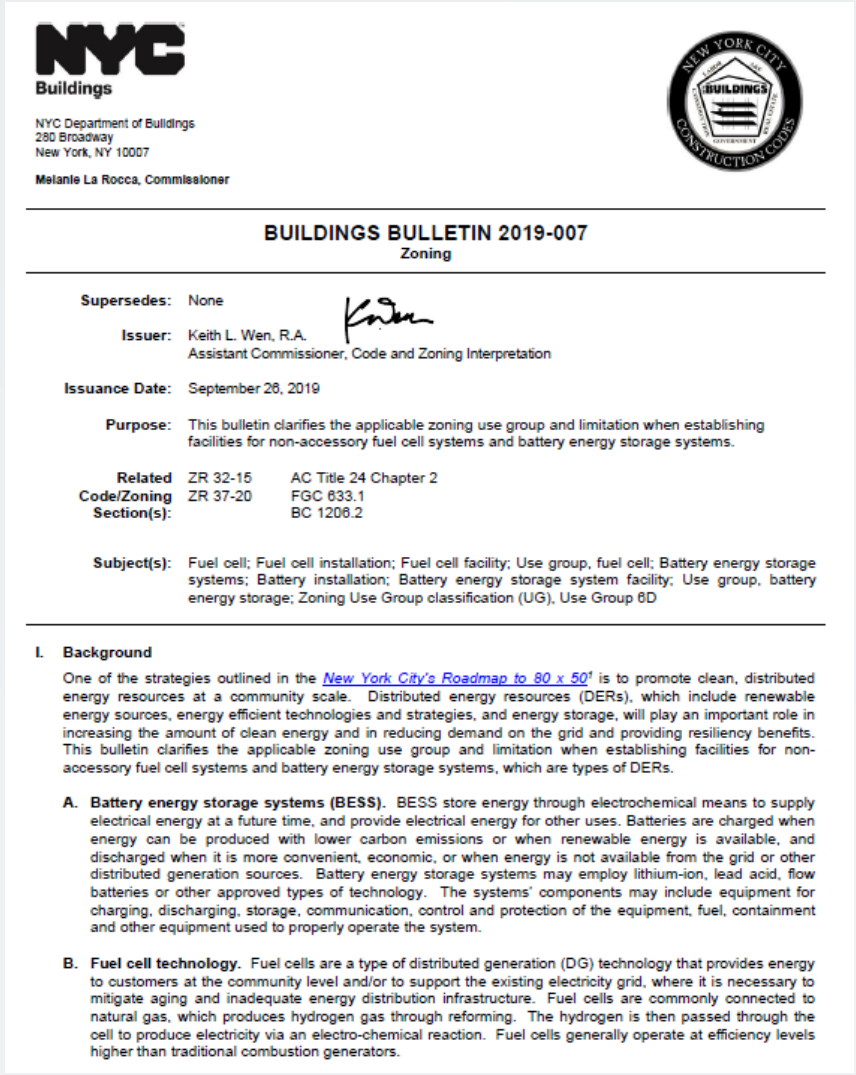
OTCR Conditional Approval required prior to construction document approval

2020 Permitting Guide: DOB Updates

- Online submissions primary submission method through e-filing portals
- Order of application submissions clarified alongside DOB responses
  - Submissions:
    - Construction Permits: PW1, PW2, TR1, TR8
    - Special approvals: OTCR-2
    - Electrical Permits: ED16
  - DOB responses:
    - OTCR Conditional Acceptance, Inspections and Permits, OTCR Final Acceptance
- IRB and BSB review not required for Li-ion
- Zoning analysis must be submitted with construction permit application
- UL 9540A test report required for all submissions
- Updated forms and reference links

Department of Buildings: Bulletin 2019-007

- Issuance Date: September 26, 2019
- Zoning interpretation for energy storage systems
- Key takeaways:
  - Non-Accessory use – energy provided to grid, not to building on site
  - Use Group 6D, Electric Utility Substation (ZR 32-15)
    - Size - 10,000 sf limit
    - Open or enclosed
    - Comply with ZR (yards, fencing)
  - Over 10,000 sf – Use Group 17C *"Public transit, railroad or electric utility substations, open or enclosed, with no limitation as to size"*



NYC Buildings

NYC Department of Buildings
280 Broadway
New York, NY 10007

Melanie La Rocca, Commissioner

BUILDINGS BULLETIN 2019-007
Zoning

Supersedes: None

Issuer: Keith L. Wen, R.A.
Assistant Commissioner, Code and Zoning Interpretation

Issuance Date: September 26, 2019

Purpose: This bulletin clarifies the applicable zoning use group and limitation when establishing facilities for non-accessory fuel cell systems and battery energy storage systems.

Related Code/Zoning Section(s): ZR 32-15, ZR 37-20, AC Title 24 Chapter 2, FGC 633.1, BC 1206.2

Subject(s): Fuel cell; Fuel cell installation; Fuel cell facility; Use group, fuel cell; Battery energy storage systems; Battery installation; Battery energy storage system facility; Use group, battery energy storage; Zoning Use Group classification (UG), Use Group 6D

I. Background

One of the strategies outlined in the New York City's Roadmap to 80 x 50' is to promote clean, distributed energy resources at a community scale. Distributed energy resources (DERs), which include renewable energy sources, energy efficient technologies and strategies, and energy storage, will play an important role in increasing the amount of clean energy and in reducing demand on the grid and providing resiliency benefits. This bulletin clarifies the applicable zoning use group and limitation when establishing facilities for non-accessory fuel cell systems and battery energy storage systems, which are types of DERs.

A. Battery energy storage systems (BESS). BESS store energy through electrochemical means to supply electrical energy at a future time, and provide electrical energy for other uses. Batteries are charged when energy can be produced with lower carbon emissions or when renewable energy is available, and discharged when it is more convenient, economic, or when energy is not available from the grid or other distributed generation sources. Battery energy storage systems may employ lithium-ion, lead acid, flow batteries or other approved types of technology. The systems' components may include equipment for charging, discharging, storage, communication, control and protection of the equipment, fuel, containment and other equipment used to properly operate the system.

B. Fuel cell technology. Fuel cells are a type of distributed generation (DG) technology that provides energy to customers at the community level and/or to support the existing electricity grid, where it is necessary to mitigate aging and inadequate energy distribution infrastructure. Fuel cells are commonly connected to natural gas, which produces hydrogen gas through reforming. The hydrogen is then passed through the cell to produce electricity via an electro-chemical reaction. Fuel cells generally operate at efficiency levels higher than traditional combustion generators.

Zoning Bulletin 2019-007: DG Hub Matrix Interpretation

				Standard Permitting Requirements		Special Permits/Other Requirements	
Battery type/category	**Use Cases**	**Zoning District**	**Use Group**	**FDNY**	**DOB**	**BSA / CPC**	**Other (CEQR, Cert of Occ)**
Accessory Use (Building/Site Support)*	**This use case includes projects that primarily supply power to the existing building on a site. They may or may not be physically connected to the electric grid, but do not function primarily as a grid-supporting asset.* Example Projects: -ESS on roof of a 1-4 family home storing surplus solar generation -ESS on warehouse property providing demand response and peak management for the building**	R	N/A	Permits/requirements as outlined in FDNY RCNY 608.1, unless sited on property outside of NYC AHJ jurisdiction***	Permits/requirements as outlined in DOB Bulletin 2019-002, unless sited on property outside of NYC AHJ jurisdiction***	N/A	N/A
		C	N/A				
		M	N/A				
Non-Accessory (Grid Support) ≤ 10,000 sf**	**This use case would include projects that function primarily as grid-supporting assets, owned and operated by a utility or other third party in order to provide grid support/optimization services. Example Projects: -Con-Ed owned and operated ESS that connects directly to the grid for peak load support -Generator-owned ESS providing ancillary services such as frequency regulation and spinning reserves**	R	6D	Permits/requirements as outlined in FDNY RCNY 608.1, unless sited on property outside of NYC AHJ jurisdiction***	Permits/requirements as outlined in DOB Bulletin 2019-002, unless sited on property outside of NYC AHJ jurisdiction***	BSA special permit	CEQR and new/amended Cert of Occupancy
		C	6D			N/A for zones C1, C2, C4, C5, C6 (except C6-1A), and C8. For zones C3, C6-1A, and C7, use group 6D is not allowed as of right.	N/A
		M	6D			N/A	N/A
Non-Accessory (Grid Support) > 10,000 sf	**This use case would include large projects that provide grid support and/or peak power supply, owned and operated by a utility or other third party. Example Projects: -Generator-owned ESS that replaces a closing fossil-powered peaker plant and connects directly to the grid**	R	17C or other	Permits/requirements as outlined in FDNY RCNY 608.1, unless sited on property outside of NYC AHJ jurisdiction***	Permits/requirements as outlined in DOB Bulletin 2019-002, unless sited on property outside of NYC AHJ jurisdiction***	CPC special permit (if 17/17C)	CEQR and new/amended Cert of Occupancy (if 17/17C)
		C	17C or other			BSA special permit (if 17/17C, 10,000-40,000sf) CPC special permit (if 17/17C, >40,000sf)	CEQR and new/amended Cert of Occupancy (if 17/17C)
		M	17C or other			N/A	N/A

FDNY Rule 608-01: Outdoor Stationary Storage Battery Systems

- Rule 3RCNY 608-01 enacted October 1, 2019
- Implemented to establish standards, requirements, and procedures for the design, installation, operation and maintenance of **outdoor stationary storage battery systems**
- Rule provides requirements for:
  - Permit, supervision, obligations of owner and operator
  - Listing and full-scale testing standards
  - Equipment and installation approval
  - Commissioning and decommissioning
  - General design and installation requirements
  - Enclosure design and installation requirements
  - O&M and recordkeeping requirements

For more information visit:
https://rules.cityofnewyork.us/content/3rcny-608-01-outdoor-stationary-storage-battery-systems-0

FDNY Rule 608-01: Outdoor Stationary Storage Battery Systems

- Rule provides tables outlining requirements based on system size and chemistry

Table 1
Stationary Storage Battery System Size Thresholds

Battery Technology	Aggregate Rated Energy Capacity		
	Small	Medium	Large
Lead Acid Battery	≤70 kWh	>70 kWh and ≤ 500 kWh	> 500 kWh
Ni-Cd Battery	≤70 kWh	>70 kWh and ≤ 500 kWh	> 500 kWh
NiMH Battery	≤70 kWh	>70 kWh and ≤ 500 kWh	> 500 kWh
Li-ion Battery	≤20 kWh	>20 kWh and ≤ 250 kWh	> 250 kWh
Flow Battery	≤20 kWh	>20 kWh and ≤ 500 kWh	> 500 kWh

Table 2
Stationary Storage Battery System Compliance Requirements

Section	Compliance Requirement	Small	Medium	Large
(c)	**General Provisions**			
(c)(4)	Permit	No	Yes	Yes
(c)(5)	Supervision (Certificate of Fitness)	Yes	Yes	Yes
(c)(6)	Obligations of Owner and Operator	Yes	Yes	Yes
(c)(7)	Listing and Full-Scale Testing Standards			
(c)(7)(A)	• Listing			
	○ *Lead Acid Battery*	Yes	Yes	Yes
	○ *Ni-Cd or NiMH Battery*	Yes	Yes	Yes
	○ *Li-Ion Battery*	Yes	Yes	Yes
	○ *Flow Battery*	Yes	Yes	Yes
(c)(7)(B)	• Full-Scale Testing			
	○ *Lead Acid Battery*	No	No	No[g]
	○ *Ni-Cd Battery*	No	No	No[g]
	○ *NiMH Battery*	No	No	No[g]
	○ *Li-Ion Battery*	Yes	Yes	Yes
	○ *Flow Battery*	No	No	No[g]

FDNY Rule 608-01: Listing and Full-scale Testing Standards

- **All stationary storage battery systems** shall be tested and listed by a nationally recognized testing laboratory to the following standards:

  (1) UL Standard 1741

  (2) UL Standard 1973

  (3) UL Standard 9540

- When full-scale testing is required, systems shall be tested to **UL Test Method 9540A**: Safety Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems, or other *approved* standard or test data.
- 9540A testing is required for all sizes of li-ion battery systems.

Table 2 (c)(7)(a) Listing

Section	Compliance Requirement	*Small*	*Medium*	*Large*
(c)(7)(B)	• **Full-Scale Testing**			
	Lead Acid Battery	No	No	No[g]
	Ni-Cd Battery	No	No	No[g]
	NiMH Battery	No	No	No[g]
	Li-ion Battery	Yes	Yes	Yes
	Flow Battery	No	No	No[g]

g. Approved test data is required for explosion mitigation measures. If no other approved test data is available, test data from UL Test Method 9540A testing will be required.

FDNY Rule 608-01: General Design and Installation Requirements

General design and installation requirements:

- Location and construction
  - Outdoor locations
  - Fire department access and water supply
  - Separation distances
  - Rooftop locations
  - Physical protection
- Remote monitoring
- Electrical components

Enclosure design and installation requirements:

- Fire extinguishing systems
- Explosion mitigation
  - Deflagration venting in accordance with NFPA 68
  - Explosion prevention in accordance with NFPA 69
- Fire detection systems
- Gas detection systems
- Detector alarm notifications
- Ventilation system
- Manually operated smoke/gas purge system

2020 Permitting Guide: FDNY Updates

Updates include:

- Letter of No Objection → Letter of Approval
- Certificate of Fitness (COF) responsibilities
- Design procedures for explosion mitigation (NFPA 68) and explosion prevention (NFPA 69)
- Decommissioning plan expanded to include emergency failures; FDNY must be notified
- Spacing to FDC at a minimum of 10 ft, but may increase based on test data
- 9540A required for all li-ion systems
- Manually activated exhaust system for large systems
- Dry pipe suppression in accordance with NFPA 15 required for all large systems
- Updated forms and reference links
- Clarifications on TM-2 and TM-1 applications:
  - TM-2 for Equipment Approval - technologies that have not previously received approval
  - TM-1 for each: (1) energy storage system, (2) fire alarm system, and (3) fire suppression system
- In-person courtesy meeting recommended for application kickoff

More work to do: What's next?

- Updated version of Outdoor Guide to be released
- Agency on-going support
  - Development of templated applications or checklists
- Project tracking
- UL 9540A data analysis methodology guidelines
  - Indoor installation progress
  - Example calculations and data consolidation
- Smart DG Hub -Technical Assistance (TA)
- Training webinars
  - Con Ed installer training (in-person) – Fri. March 27, 2020

Q1 2020 through Q4 2020
Updated documentation
Process improvement
Expanded installs
Technical assistance

Thank you!

Questions? Comments?
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