Advanced Energy Conference 2018

Development of NYC Energy Storage Permitting Process

Sustainable CUNY - Smart DG Hub and *DNV GL*

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

DNV·GL

Overview - NYSERDA Storage Soft Costs Reduction Initiative

Permitting Development, Training & Assistance

Customer Analysis, Identification & Outreach

Vendor Outreach & Education

M&V and Performance Analysis

NYC Permitting Process

Where we started

- Guide for ESS, relating exclusively to Lead Acid systems
- Moving goal posts

Where we are today

- Considered broad areas of technical concern
- Outdoor and rooftop Lithium ion ESS Permitting Guide to be published imminently

Where we are heading

- Data collection to provide additional certainty and support rule development
- Indoor installations discussions in process
- Expansion of guidelines throughout New York State

Areas of discussion or “buckets”

1. Life cycle management
2. Status communications
3. Cascading protections
4. Ventilation and exhaust
5. Fire protection, suppression, and extinguishing
6. Siting
7. Signage

Basis for guidelines // Industry overview

- *There is no single definitive set of standards currently in force for energy storage*
- DNV GL / Con Ed / NYSERDA testing experience
- DNV GL general battery expertise, based on interactions with manufacturers and verification efforts on systems in service
- FDNY field experience
- Current NYC Fire, Building, Mechanical, and Electrical code
- Current and developing standards
  - NFPA 855 (draft), NFPA body of standards as applicable
  - Proposal F95
  - IFC – 2018 and 2021 (draft)
  - IBC – 2018
  - NEC 2017
  - UL body of certification requirements/standards as applicable

Guidelines – Considerations and iterations

	DNV GL Recommendation	Basis for recommendation	Recommendation		
Bucket / topic			Small	Medium	Large
Explosion analy		Capicators: Small = 3 kWh; Med/Large = require testing; Sodium: Remove, as not	Per IFC, minimal data availability encourages full review with other technologies	Other: 0 kWh	Other: > 0 kWh	Other: > 0 kWh
Ventilation req	Hazard/risk/fai	Zoning definition and requirements	Must comply with zoning regulations per zoning area and equipment category	In place codes and standards	Must comply with zoning regulations per zoning area and equipment category	Must comply with zoning regulations per zoning area and equipment category
Exhaust	Bucket / topic	Sign physical requirements	Sign will comply with following: - 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	In place codes and standards	Sign will comply with following: - 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 comply with following: - 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 comply with fol - Dimensions at least 8.5 - Made of durable mater - Must have non-glare fi characters must contrast background - If sign fades, a new on replace it - Characters must be a m 0.5" in height - Sign must be securely a approximately 5 ft
			Sign will include following or equivalent: - Space/container contains energized battery systems - The container contains energized electrical circuits - SME phone number in case of emergency		Sign will include following or equivalent: - Space/container contains energized battery systems - The container contains energized electrical circuits	Sign will include following or equivalent: - Space/container contains energized battery systems - The container contains energized electrical circuits	Sign will include followi equivalent: - Space/container contai energized battery systen - The container contains electrical circuits

Guidelines – Lifecycle Management

- Permits and inspections required:
  - Electrical
  - Construction
  - Operational (annual)
- Developer must supply installation, commissioning, and decommissioning plans
- Maintenance:
  - Must maintain records of maintenance completed
  - Provide O&M manual at request
  - Replacement in kind does not require repermitting – increased capacity or change in battery type will
- Battery disposal
  - End of life
  - Emergency plan – SME available forthwith and within 24 hours

Guidelines – Status communication

- Monitoring of voltage, current, and temperature required 24/7
- Approved controller must balance voltage, current, and temperatures within manufacturer specifications, and be capable of shutting down in case of detected issue
  - Detection thresholds must be identified
  - Alarms and notifications must activate at thresholds / warnings
- System status (off; idle; on; fault and nature of issue) must be displayed on container
- If off-site monitoring identifies issue deemed non-recoverable, SME shall contact local fire department

Guidelines – Cascading protections

- Required tests/certifications:
  - UL 1973
  - UL 1741
  - UL 9540
  - UL 9540a
- Must utilized approved controller which is capable of managing system to prevent thermal runaway
  - System must include auto-stop and emergency stop capabilities

Guidelines – Ventilation and exhaust

- Normal operations
  - Ventilation only required in support of maintaining normal operating temperatures, per manufacturer specifications and environmental conditions
- Abnormal operations
  - Ventilation or exhaust required for medium and large systems to maintain LFL below 25% under abnormal conditions
- Explosion analysis and first responder safety
  - Required for medium and large systems based on UL 9540a test data
  - Engineering judgement shall be utilized based on explosion analysis, designed so that exhaust, flame, or explosion is directed away from first responders

Guidelines – Fire Protection, suppression, extinguishing

- FMEA and hazard analysis required (approved by NYS PE)
- Sprinkler/sprayers required for systems over 250 kWh
  - When UL 9540a test data becomes available, this will be revisited
- Non-water suppression is permitted, but is not primary suppression agent
- Water must be accessible and meet standard pressure requirements
- Cabinet/container requirements
  - Non-combustible and secure
  - Limitations are not placed on arrangement of items within container
  - Size may be restricted on individual containers, per local zoning determinations
- Maximum allowable quantities per container and site
  - Limited by threshold sizes; AHJs must be notified if other systems are already on property
- Compliance with NYC electrical code (NEC 2017 recommended)

Guidelines – Siting (1)

- Compliance with in-place construction codes
  - Including seismic, flood, weather, and vehicle impact protections
- Compliance with separation distances from site features and structures
  - Site specific zoning requirements
  - AND 10’ from lot lines, public ways, buildings, stored combustible material, hazardous material, high piled stock, other exposure hazards, means of egress, and required exits
  - AND separation from other energy storage systems per explosion analysis, OR a minimum of 3 ft between containers over 250 kWh
  - OR can install a line of protection approved by AHJ
  - OR under 20 kWh may install adjacent to building, with additional structure protection requirements
  - OR if testing demonstrates otherwise and is not in conflict with zoning requirements

Guidelines – Siting (2)

- Rooftop installations require compliance with all standards previously noted and…
  - Class A roof assembly (NYC BC 15) OR non-combustible surface underneath, extending 3 ft beyond footprint
  - Dunnage must have 1 – 2 hr fire rating
  - Installations on rooftops below 100 ft must comply with NYC FC 504.4
  - Installations must comply with zoning setbacks and height limits
  - Medium and large systems must provide standpipe connection at ground level for dry sprinkler system
- Electrical disconnects should be accessible, compliant with NEC 706 and ADA

Guidelines – Signage

- Physical requirements
  - 8.5” x 11”, installed at approximately eye level (~5 ft)
  - Durable material with non-glare finish, and contrasting letters of at least 0.5”
  - Must be replaced if fades
- Content requirements
  - Space/container contains energized battery system and electrical circuts
  - Identification of type of system and any chemistry-specific hazards
  - SME contact information
- Location of signage
  - On containers and at entrances to area
  - Identification of location of emergency shut off, if not within sight of battery system
  - Signage by emergency shut off, identifying purpose
- All other labels as required by NYC MC and EC

FDNY ESS Process

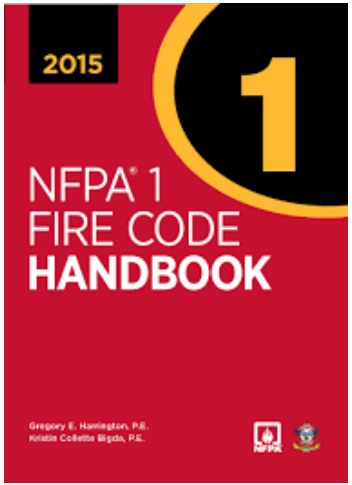
Lt Paul Rogers

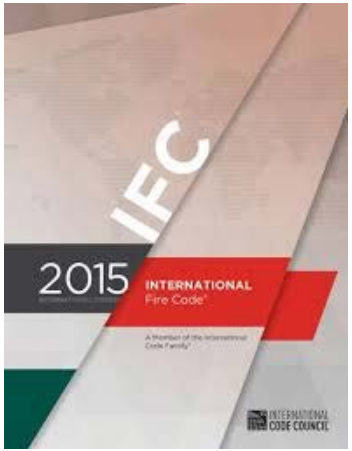
FDNY - HAZ Mat Operations

FDNY's Unique Challenge

Challenges

- Power Shortage
- Policy
- Codes / Standards
- Safety
- Unknown risks





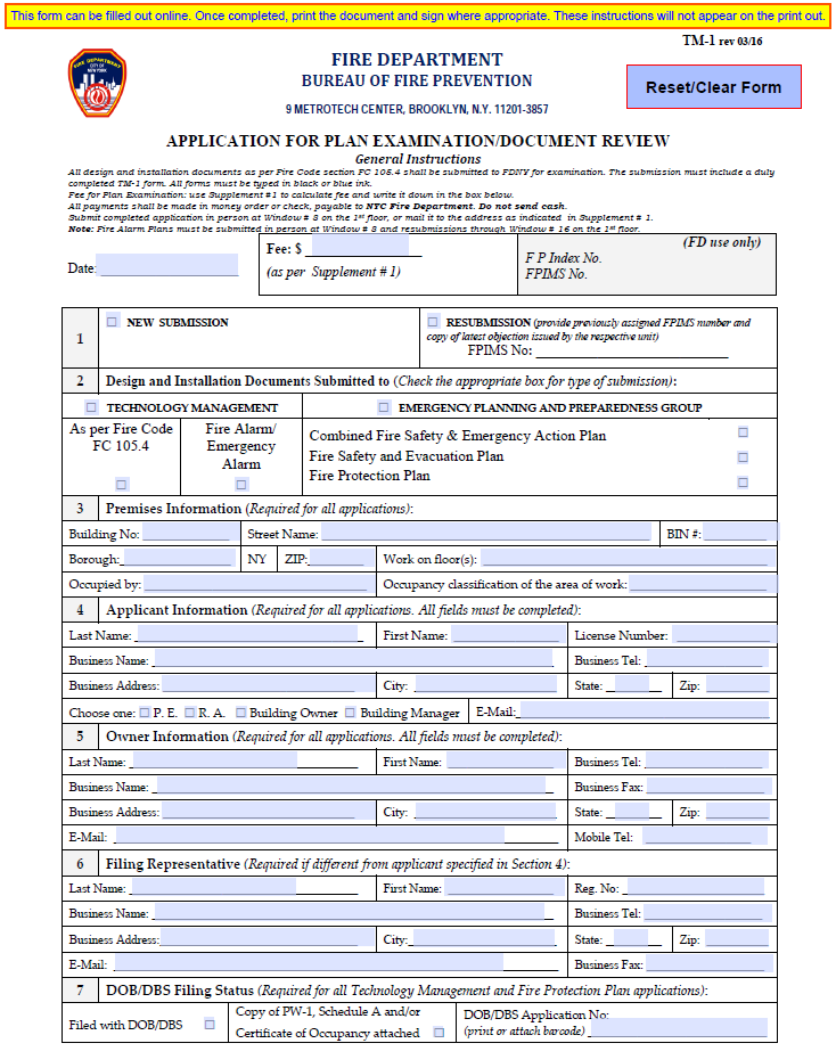
OUTDOOR\ROOFTOP

REQUIREMENTS ONLY

INDOOR

Sample Form: FDNY TM1

- This is the initiating form to begin with FDNY's review process
- Details to include:
  - Project location info, applicant, owner and filing rep info, DOB status and required signatures
- $420 fee required at time of submission



This form can be filled out online. Once completed, print the document and sign where appropriate. These instructions will not appear on the print out.

TM-1 rev 03/16

FIRE DEPARTMENT
BUREAU OF FIRE PREVENTION
9 METROTECH CENTER, BROOKLYN, N.Y. 11201-3857

Reset/Clear Form

APPLICATION FOR PLAN EXAMINATION/DOCUMENT REVIEW

General Instructions

All design and installation documents as per Fire Code section FC 106.4 shall be submitted to FDNY for examination. The submission must include a duly completed TM-1 form. All forms must be typed in black or blue ink.
Fee for Plan Examination: use Supplement #1 to calculate fee and write it down in the box below.
All payments shall be made in money order or check, payable to ***NYC Fire Department. Do not send cash.***
Submit completed application in person at Window # 8 on the 1st floor, or mail it to the address as indicated in Supplement # 1.
Note: *Fire Alarm Plans must be submitted in person at Window # 8 and resubmissions through Window # 16 on the 1st floor.*

Date:

Fee: $ _____ *(as per Supplement # 1)*

(FD use only)
F P Index No.
FPIMS No.

1 ☐ NEW SUBMISSION ☐ RESUBMISSION *(provide previously assigned FPIMS number and copy of latest objection issued by the respective unit)* FPIMS No: _____

2 Design and Installation Documents Submitted to *(Check the appropriate box for type of submission)*:

☐ TECHNOLOGY MANAGEMENT
As per Fire Code FC 105.4 ☐ | Fire Alarm/ Emergency Alarm ☐

☐ EMERGENCY PLANNING AND PREPAREDNESS GROUP
Combined Fire Safety & Emergency Action Plan ☐
Fire Safety and Evacuation Plan ☐
Fire Protection Plan ☐

3 Premises Information *(Required for all applications)*:

Building No: | Street Name: | BIN #:
Borough: | NY | ZIP: | Work on floor(s):
Occupied by: | Occupancy classification of the area of work:

4 Applicant Information *(Required for all applications. All fields must be completed)*:

Last Name: | First Name: | License Number:
Business Name: | Business Tel:
Business Address: | City: | State: | Zip:
Choose one: ☐ P. E. ☐ R. A. ☐ Building Owner ☐ Building Manager | E-Mail:

5 Owner Information *(Required for all applications. All fields must be completed)*:

Last Name: | First Name: | Business Tel:
Business Name: | Business Fax:
Business Address: | City: | State: | Zip:
E-Mail: | Mobile Tel:

6 Filing Representative *(Required if different from applicant specified in Section 4)*:

Last Name: | First Name: | Reg. No:
Business Name: | Business Tel:
Business Address: | City: | State: | Zip:
E-Mail: | Business Fax:

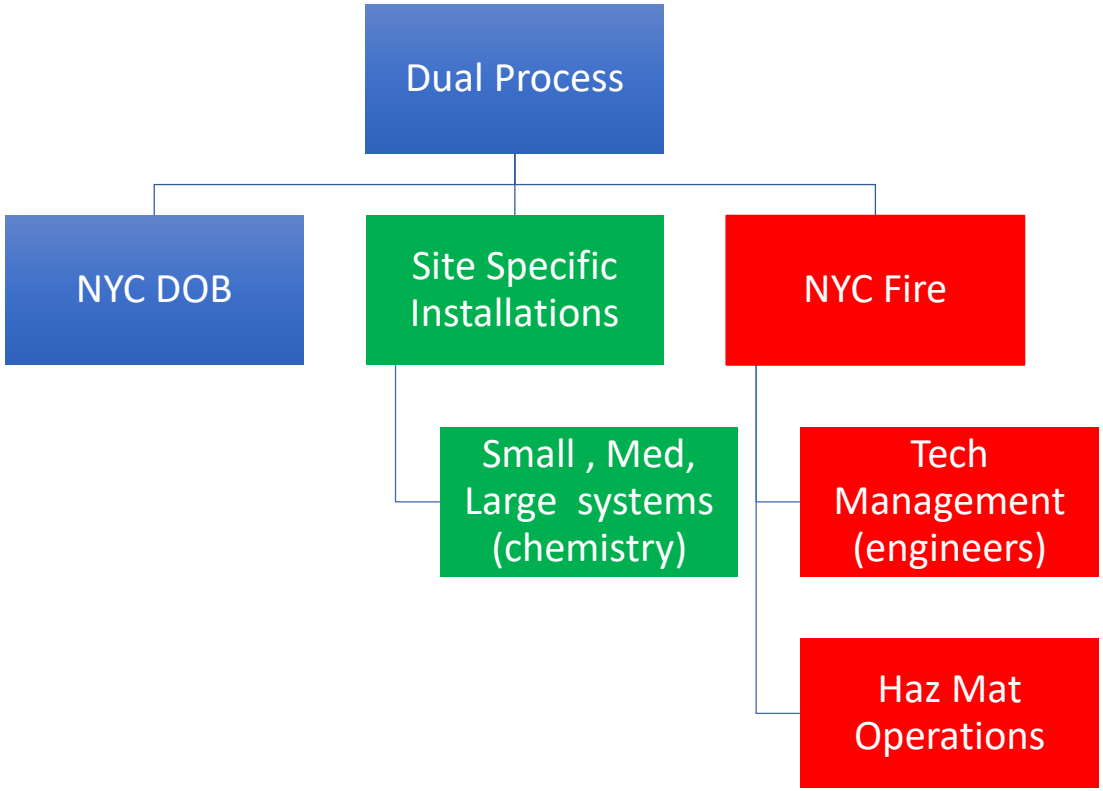
7 DOB/DBS Filing Status *(Required for all Technology Management and Fire Protection Plan applications)*:

Filed with DOB/DBS ☐ | Copy of PW-1, Schedule A and/or Certificate of Occupancy attached ☐ | DOB/DBS Application No: *(print or attach barcode)*

With TM1 Submittal

- Location/Layout ESS (space)
- Hourly resistance rated assemblies
- Quantity & Types of Storage batteries
- Manufacturer Spec of System
- BMS Info
- Signage Info
- UL Listings
- Fire suppression\Detection
- Gas detection
- Ventilation systems
- Emergency Shutdown procedures
- Storage Arrangements of batteries
- Commissioning and Decommissioning Plan

ESS NYC Permitting



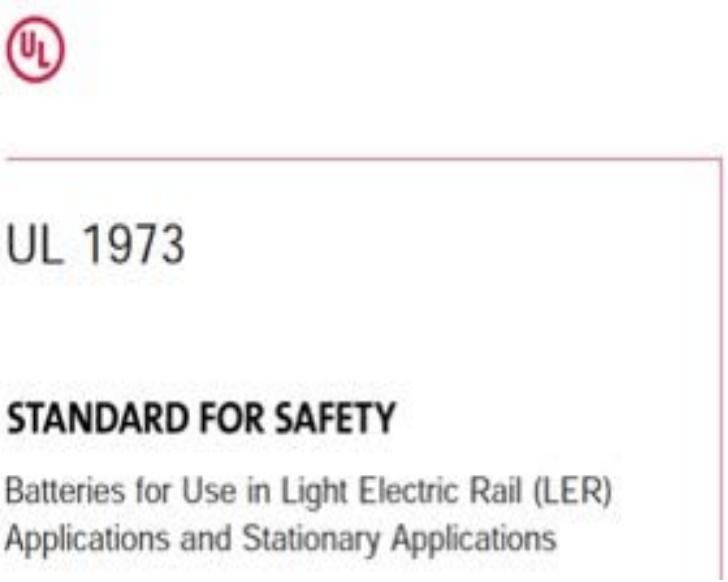
Thresholds

Battery Technology	Aggregate Physical Capacity		
	Small	Medium	Large
Lead Acid	≤70 kWh	>70 kWh and ≤ 250 kWh	> 250 kWh
Nickel Cadmium	≤70 kWh	>70 kWh and ≤ 250 kWh	> 250 kWh
Li-ion	≤20 kWh	>20 kWh and ≤ 250 kWh	> 250 kWh
Flow	≤20 kWh	>20 kWh and ≤ 250 kWh	> 250 kWh
Other	0 kWh	0 kWh	0 kWh

COMPLIANCE REQUIRED	SMALL	MEDIUM	Large
Permits.	No	Yes	Yes
Equipment Approvals.	Yes	Yes	Yes
Testing Requirements.	Yes	Yes	Yes
Inspection.	No	Yes	Yes
Fire Protection	No[a]	Yes	Yes
Detection Features	No[a]	Yes	Yes
Ventilation system	No	Yes	Yes
Electrical requirements	Yes	Yes	Yes
Location and Construction	Yes	Yes	Yes
Location Specific Requirements	Yes	Yes	Yes
Signage	Yes	Yes	Yes
Maintenance and Repair	Yes	Yes	Yes
Commissioning/Decommissioning	Yes	Yes	Yes

PRODUCT LISTINGS

UL1973
UL1741
UL9540
UL9540 A



UL 9540A

UL 9540A

STANDARD FOR SAFETY

Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

Data test

- Separation Distances
- Suppression Requirements
- Ventilation\Exhaust
- Re-ignition

ESS Grid Support

- White Hat program
  - Supervisors
  - Assets
  - Procedures

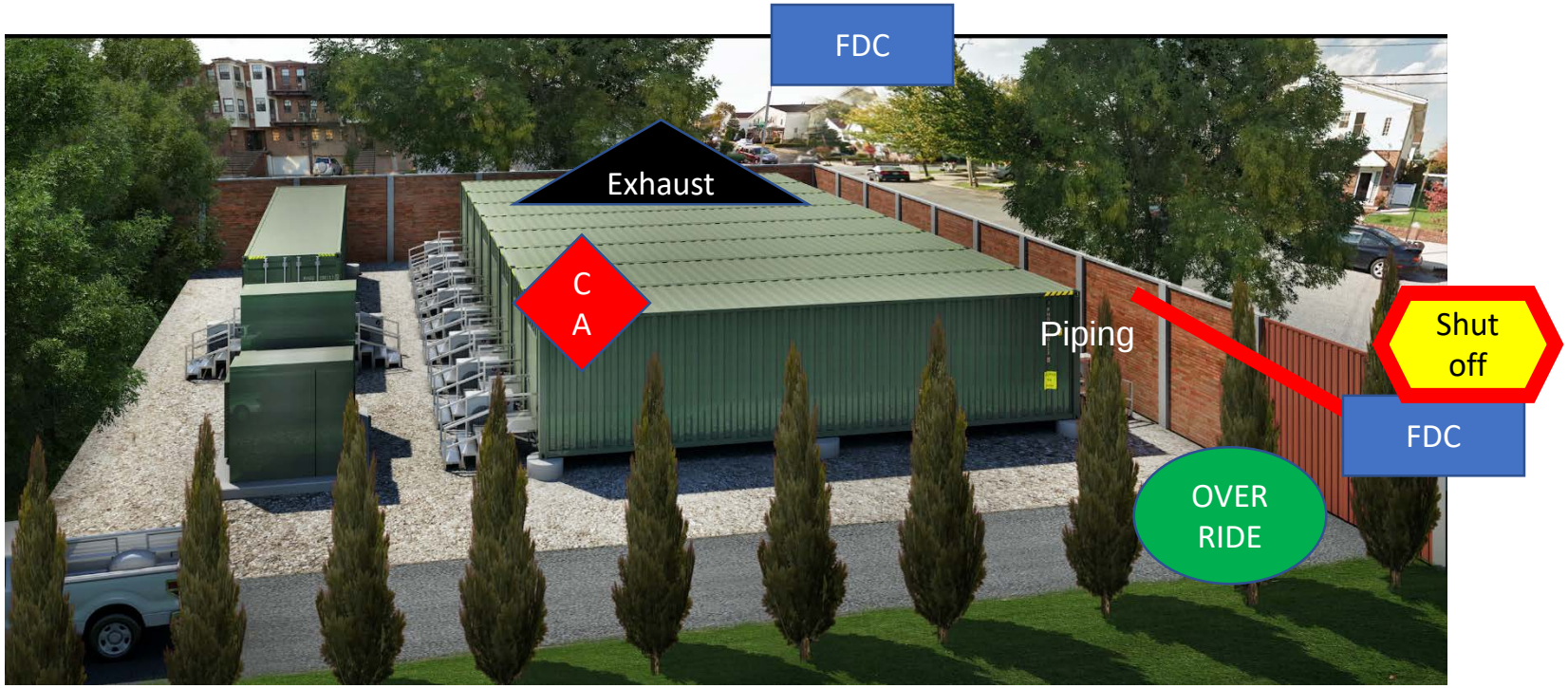
BMS

RISING TEMPERATURE TRENDS

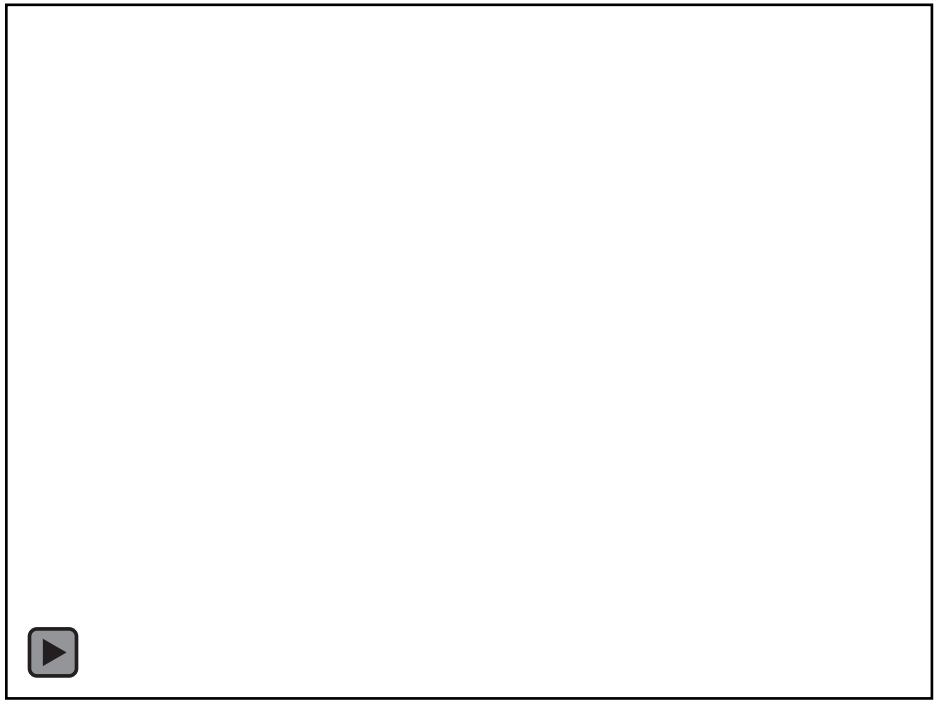
Permitting in NYC

- **Commission**
  - Operational Permit (C of F)
  - Inspection
- **Decommission**
  - Fire\Emergency
  - End Of Life

12 MW of Stored Energy



FDNY BIGGEST CONCERN

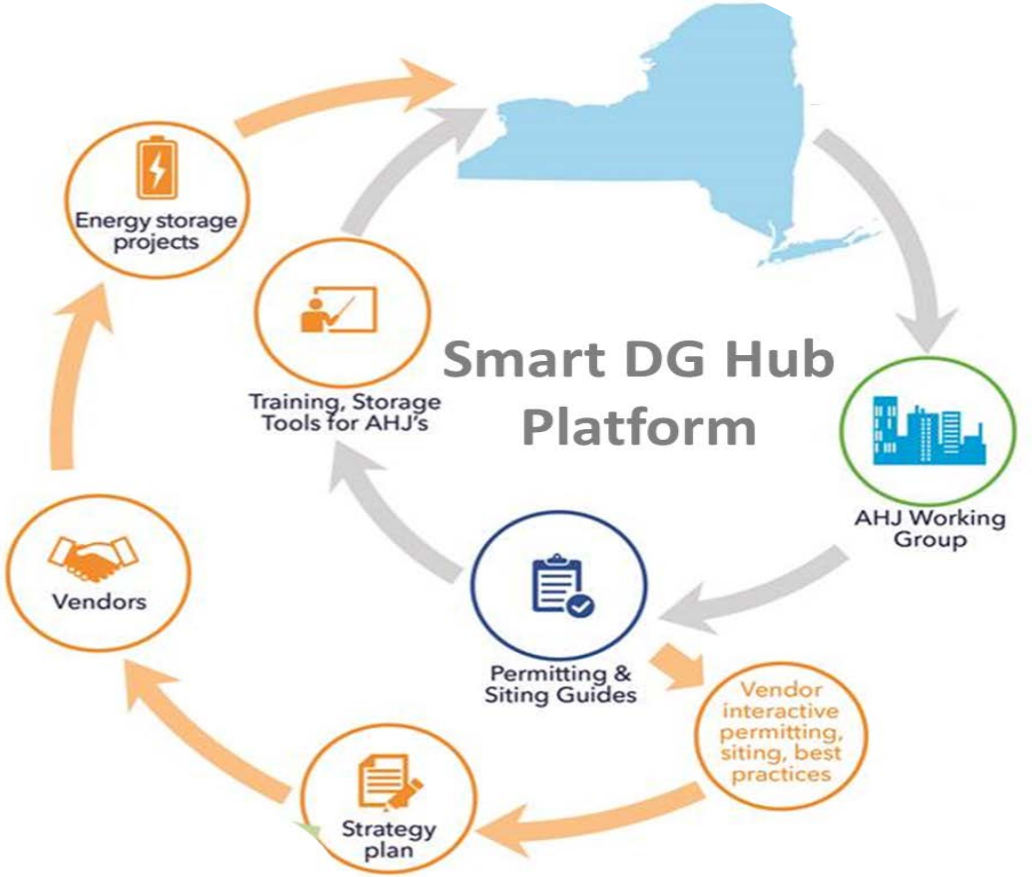


Thank You !!!!

Permitting Development - Soft Costs Reduction Initiative

Sustainable CUNY
DNV-GL
Meister Consultants Group

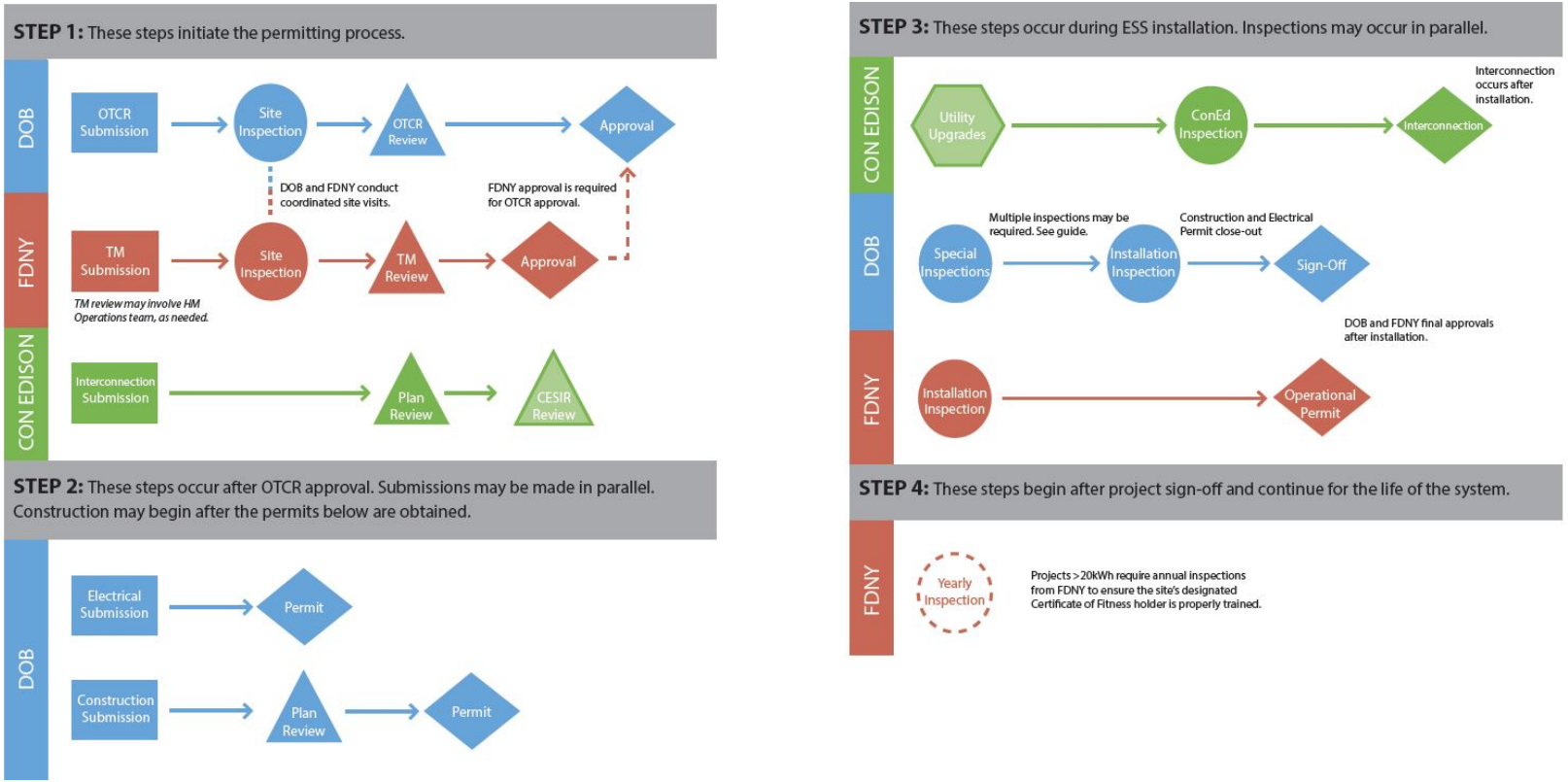
- **AHJ Support**
- **Development of permit process & guides**
- **Best Practices Guidance for Energy Storage Vendors**
- **Technical Assistance with permitting**



Outdoor Li-Ion ESS Size Ranges:

Small	**≤20kWh**
Medium	**>20kWh – ≤250kWh**
Large	**>250kWh**

Sample from Li Outdoor Permitting Process Guide (ESS >250kWh)



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SMART DG Hub

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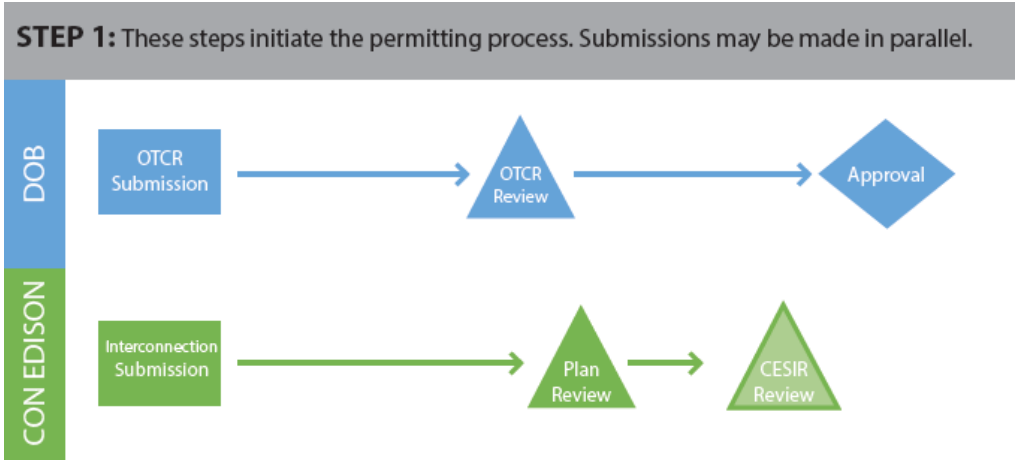
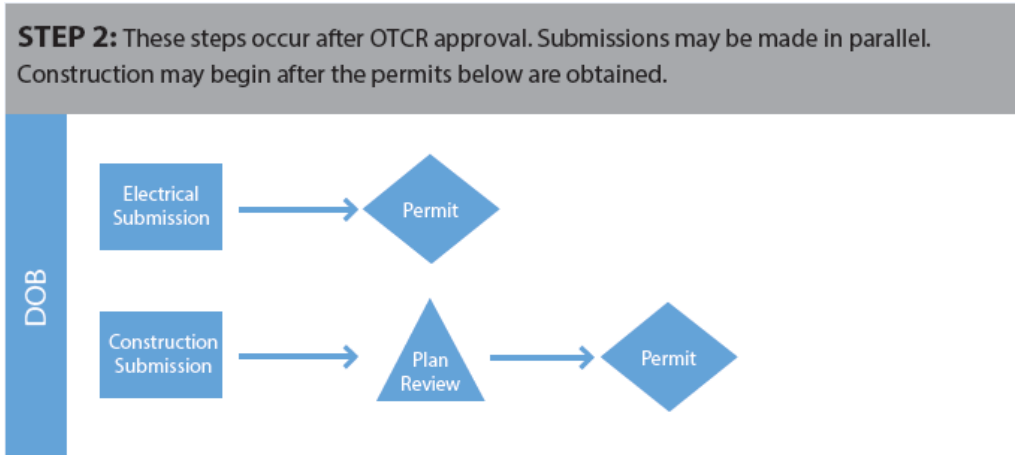
Permitting review flow and timeline – Step 1 (ESS ≤20kWh)

- These steps initiate the permitting process
- Submissions may be made in parallel
- ConEd requires submittal on any grid-tied system, but utility upgrades are unlikely for small scale systems



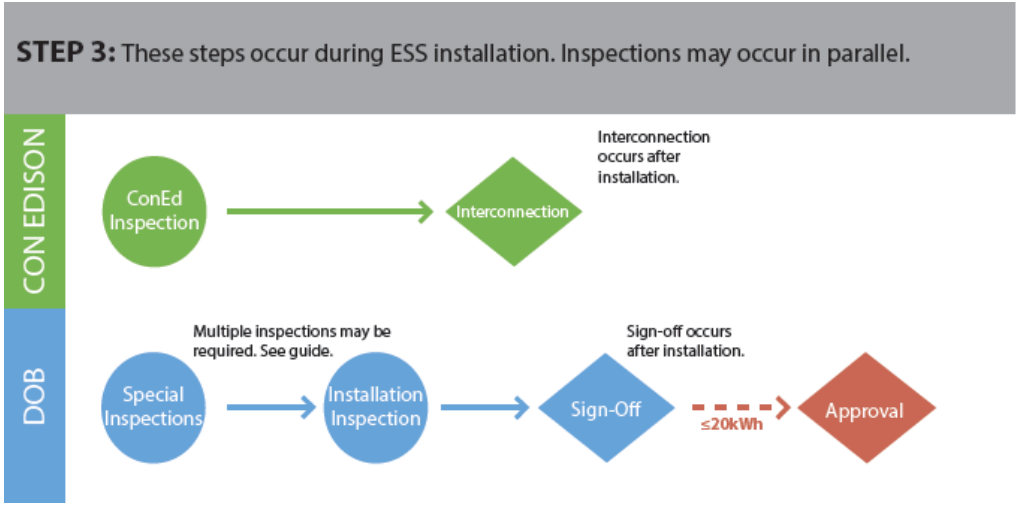
Permitting review flow and timeline – Step 2 (ESS ≤20kWh)

- These steps occur after OTCR approval
- Submissions may be made in parallel
- Electrical permits are applied for online
- Construction permits can be applied for through the HUB or Borough Offices
- Construction may begin after the permits noted here are obtained



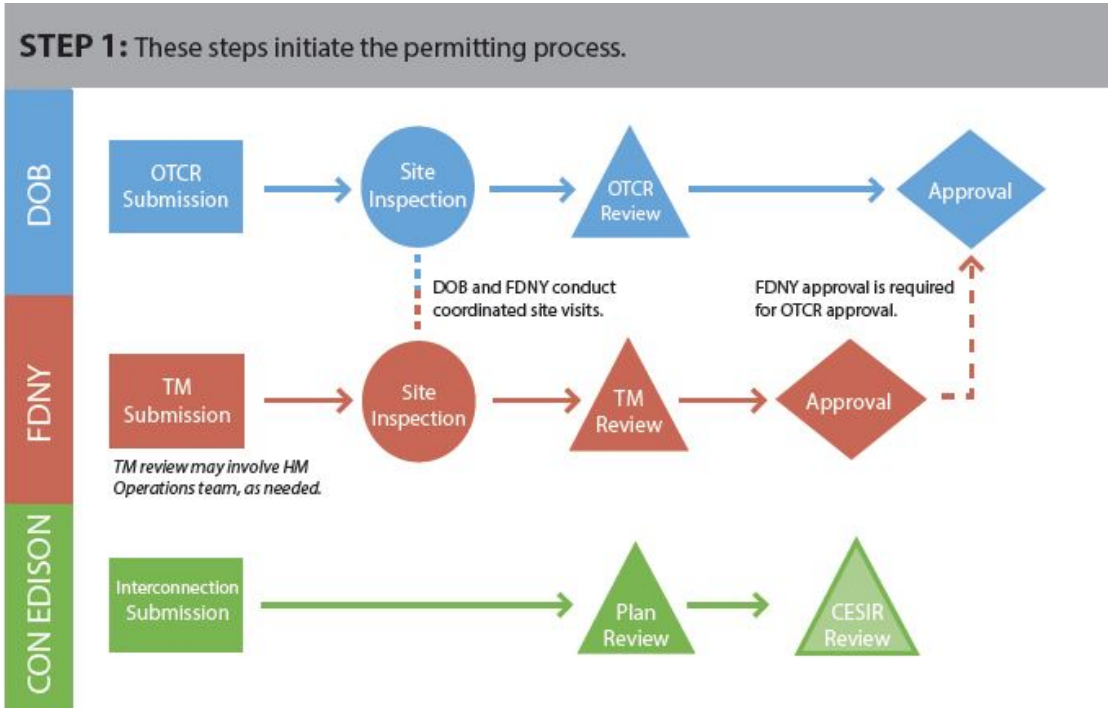
Permitting review flow and timeline – Step 3 (ESS ≤20kWh)

- These steps occur during the installation phase
- System interconnection may occur after successful DOB inspection
- DOB special inspections occur during construction
- After DOB final sign-off, FDNY is notified of project installation



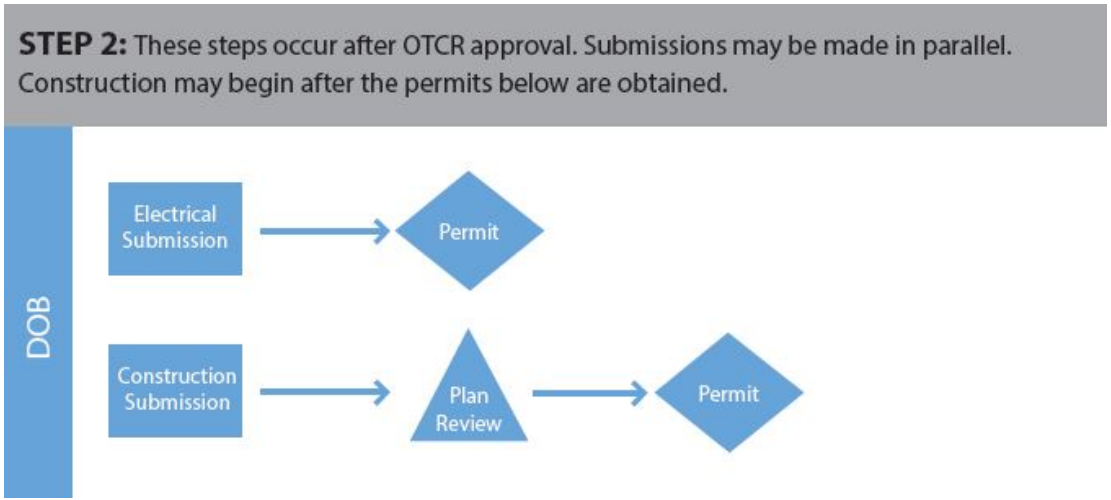
Permitting review flow and timeline – Step 1 (ESS >20kWh)

- These steps initiate the permitting process
- Submissions may be made in parallel
- Joint site visits with DOB and FDNY are scheduled
- FDNY approval is required before OTCR approval



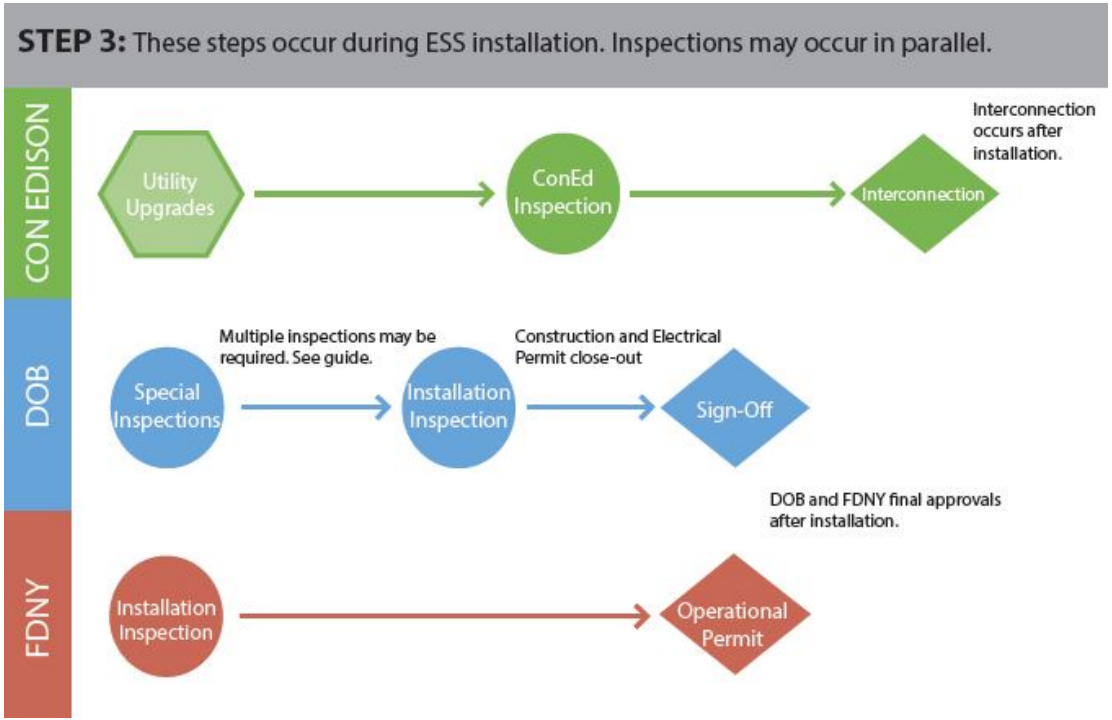
Permitting review flow and timeline – Step 2 (>20kWh)

- These steps occur after OTCR approval
- Submissions may be made in parallel
- Electrical permits are applied for online
- Construction permits can be applied for through the HUB or Borough Offices
- Construction may begin after the permits noted here are obtained



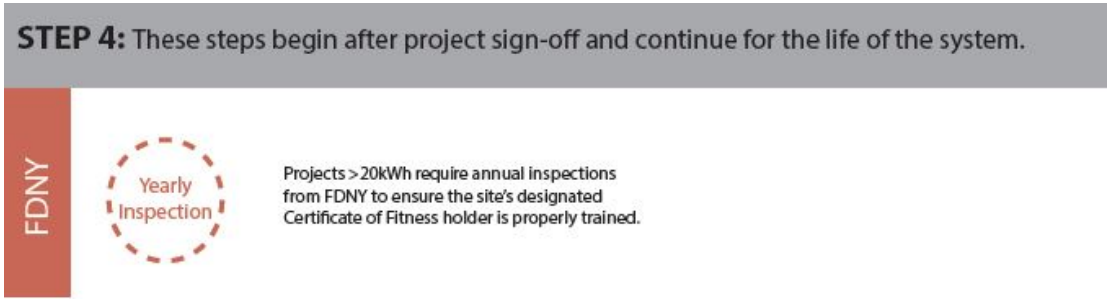
Permitting review flow and timeline – Step 3 (>20kWh)

- These steps occur during the installation phase
- System interconnection occurs after DOB and FDNY final approvals
- DOB special inspections occur during construction
- DOB and FDNY final inspections occur after install to close permits



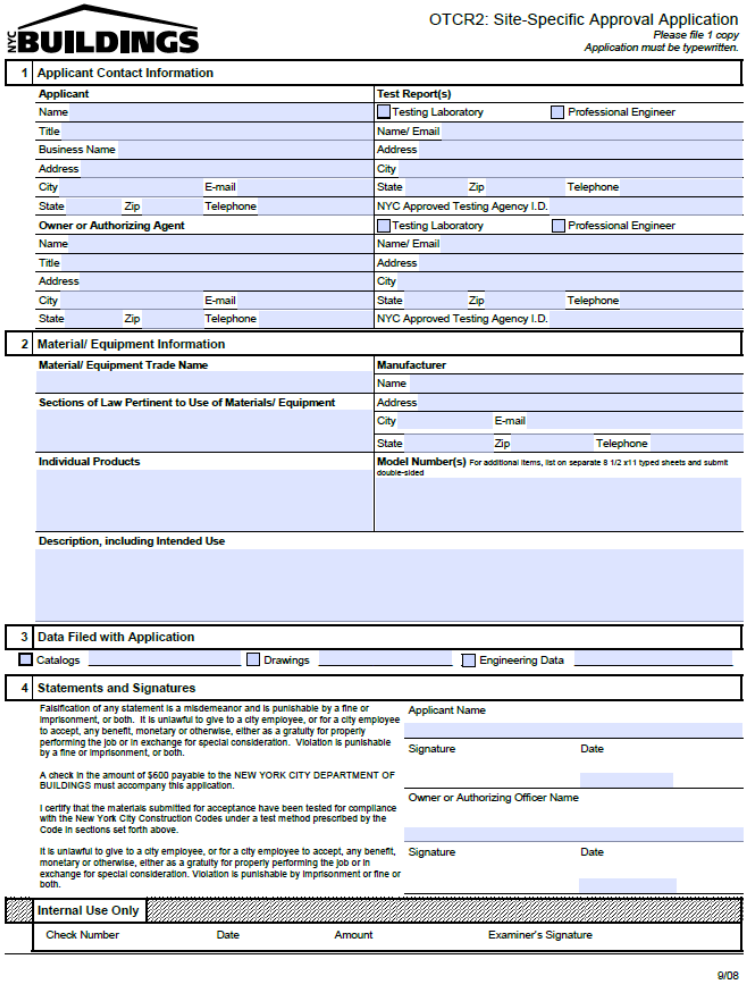
Permitting review flow and timeline – Step 4 (>20kWh)

- This step begins after project sign-off
- FDNY requires Medium and Large systems to have a Certificate of Fitness holder designated
- The inspection noted here continues annually for the life of the system



Sample Forms: OTCR2

- This is the initiating form to begin the review process with DOB OTCR
- Details to include:
  - applicant, PE, and owner contact info and signatures
  - Brief summary of proposed project and equipment
- $600 fee required at time of submission



NYC BUILDINGS

OTCR2: Site-Specific Approval Application

Please file 1 copy

Application must be typewritten.

1 Applicant Contact Information

Applicant			**Test Report(s)**		
Name			☐ Testing Laboratory	☐ Professional Engineer	
Title			Name/ Email		
Business Name			Address		
Address			City		
City		E-mail	State	Zip	Telephone
State	Zip	Telephone	NYC Approved Testing Agency I.D.		
Owner or Authorizing Agent			☐ Testing Laboratory	☐ Professional Engineer	
Name			Name/ Email		
Title			Address		
Address			City		
City		E-mail	State	Zip	Telephone
State	Zip	Telephone	NYC Approved Testing Agency I.D.		

2 Material/ Equipment Information

Material/ Equipment Trade Name	**Manufacturer**
	Name
Sections of Law Pertinent to Use of Materials/ Equipment	Address
	City E-mail
	State Zip Telephone
Individual Products	**Model Number(s)** For additional items, list on separate 8 1/2 x11 typed sheets and submit double-sided

Description, including Intended Use

3 Data Filed with Application

☐ Catalogs ☐ Drawings ☐ Engineering Data

4 Statements and Signatures

Falsification of any statement is a misdemeanor and is punishable by a fine or imprisonment, or both. It is unlawful to give to a city employee, or for a city employee to accept, any benefit, monetary or otherwise, either as a gratuity for properly performing the job or in exchange for special consideration. Violation is punishable by a fine or imprisonment, or both.

A check in the amount of $600 payable to the NEW YORK CITY DEPARTMENT OF BUILDINGS must accompany this application.

I certify that the materials submitted for acceptance have been tested for compliance with the New York City Construction Codes under a test method prescribed by the Code in sections set forth above.

It is unlawful to give to a city employee, or for a city employee to accept, any benefit, monetary or otherwise, either as a gratuity for properly performing the job or in exchange for special consideration. Violation is punishable by imprisonment or fine or both.

Applicant Name

Signature Date

Owner or Authorizing Officer Name

Signature Date

Internal Use Only

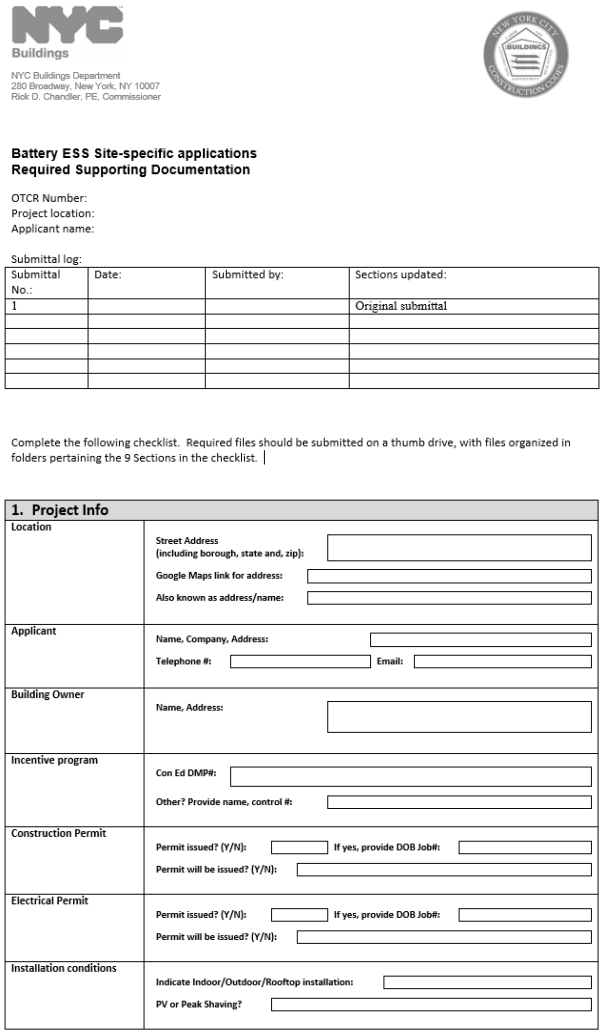
Check Number Date Amount Examiner's Signature

9/08

Sample Forms:
OTCR Project Checklist

- This checklist must also be filled out and submitted to DOB OTCR

- Primarily a list of where to find supporting documentation like certifications, equipment data sheets, monitoring systems, etc.



NYC Buildings

NYC Buildings Department
280 Broadway, New York, NY 10007
Rick D. Chandler, PE, Commissioner

Battery ESS Site-specific applications
Required Supporting Documentation

OTCR Number:
Project location:
Applicant name:

Submittal log:

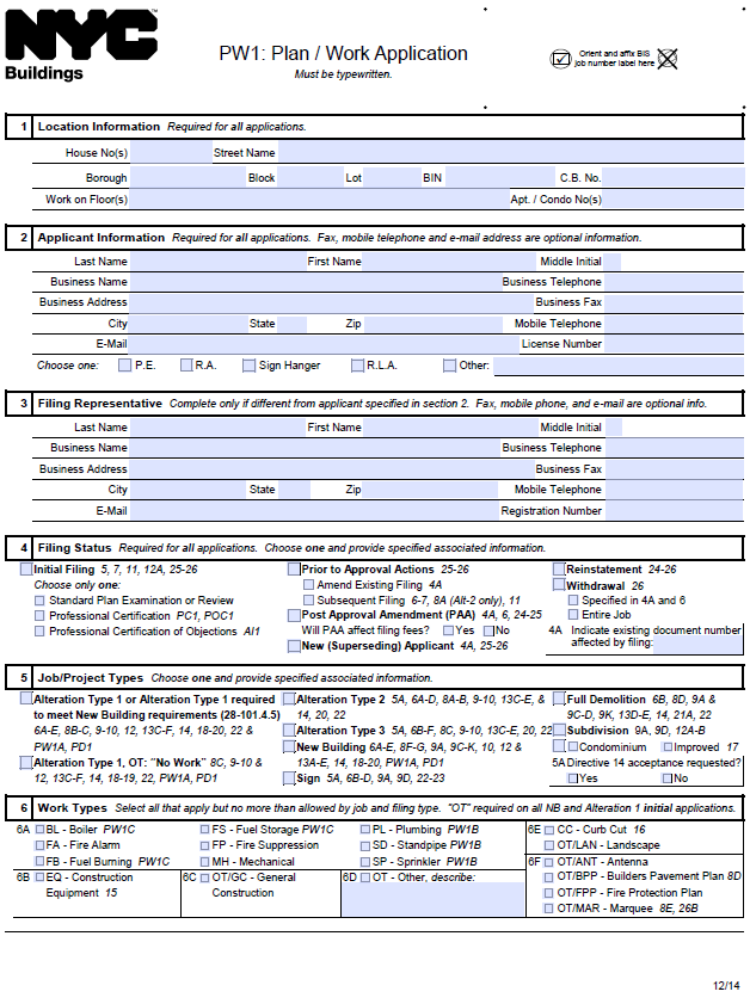
Submittal No.:	Date:	Submitted by:	Sections updated:
1			Original submittal

Complete the following checklist. Required files should be submitted on a thumb drive, with files organized in folders pertaining the 9 Sections in the checklist.

1. Project Info	
Location	Street Address (including borough, state and, zip): Google Maps link for address: Also known as address/name:
Applicant	Name, Company, Address: Telephone #: Email:
Building Owner	Name, Address:
Incentive program	Con Ed DMP#: Other? Provide name, control #:
Construction Permit	Permit issued? (Y/N): If yes, provide DOB Job#: Permit will be issued? (Y/N):
Electrical Permit	Permit issued? (Y/N): If yes, provide DOB Job#: Permit will be issued? (Y/N):
Installation conditions	Indicate Indoor/Outdoor/Rooftop installation: PV or Peak Shaving?

Sample Forms:
DOB PW1

- This form begins the construction permit application process
- Details to include:
  - Project location info, applicant, owner and filing rep info, DOB status and required signatures
- Fees are dependent on project cost estimates



NYC Buildings

PW1: Plan / Work Application

Must be typewritten.

Orient and affix BIS job number label here

1 Location Information *Required for all applications.*

House No(s) | Street Name

Borough | Block | Lot | BIN | C.B. No.

Work on Floor(s) | Apt. / Condo No(s)

2 Applicant Information *Required for all applications. Fax, mobile telephone and e-mail address are optional information.*

Last Name | First Name | Middle Initial

Business Name | Business Telephone

Business Address | Business Fax

City | State | Zip | Mobile Telephone

E-Mail | License Number

Choose one: P.E. R.A. Sign Hanger R.L.A. Other:

3 Filing Representative *Complete only if different from applicant specified in section 2. Fax, mobile phone, and e-mail are optional info.*

Last Name | First Name | Middle Initial

Business Name | Business Telephone

Business Address | Business Fax

City | State | Zip | Mobile Telephone

E-Mail | Registration Number

4 Filing Status *Required for all applications. Choose one and provide specified associated information.*

Initial Filing *5, 7, 11, 12A, 25-26*
Choose only one:
Standard Plan Examination or Review
Professional Certification *PC1, POC1*
Professional Certification of Objections *AI1*

Prior to Approval Actions *25-26*
Amend Existing Filing *4A*
Subsequent Filing *6-7, 8A (Alt-2 only), 11*
Post Approval Amendment (PAA) *4A, 6, 24-25*
Will PAA affect filing fees? Yes No
New (Superseding) Applicant *4A, 25-26*

Reinstatement *24-26*
Withdrawal *26*
Specified in 4A and 6
Entire Job

4A Indicate existing document number affected by filing:

5 Job/Project Types *Choose one and provide specified associated information.*

Alteration Type 1 or Alteration Type 1 required to meet New Building requirements (28-101.4.5) *6A-E, 8B-C, 9-10, 12, 13C-F, 14, 18-20, 22 & PW1A, PD1*
Alteration Type 1, OT: "No Work" *8C, 9-10 & 12, 13C-F, 14, 18-19, 22, PW1A, PD1*

Alteration Type 2 *5A, 6A-D, 8A-B, 9-10, 13C-E, & 14, 20, 22*
Alteration Type 3 *5A, 6B-F, 8C, 9-10, 13C-E, 20, 22*
New Building *6A-E, 8F-G, 9A, 9C-K, 10, 12 & 13A-E, 14, 18-20, PW1A, PD1*
Sign *5A, 6B-D, 9A, 9D, 22-23*

Full Demolition *6B, 8D, 9A & 9C-D, 9K, 13D-E, 14, 21A, 22*
Subdivision *9A, 9D, 12A-B*
Condominium Improved *17*

5A Directive 14 acceptance requested? Yes No

6 Work Types *Select all that apply but no more than allowed by job and filing type. "OT" required on all NB and Alteration 1 initial applications.*

6A
BL - Boiler *PW1C*
FA - Fire Alarm
FB - Fuel Burning *PW1C*
FS - Fuel Storage *PW1C*
FP - Fire Suppression
MH - Mechanical
PL - Plumbing *PW1B*
SD - Standpipe *PW1B*
SP - Sprinkler *PW1B*

6B EQ - Construction Equipment *15*

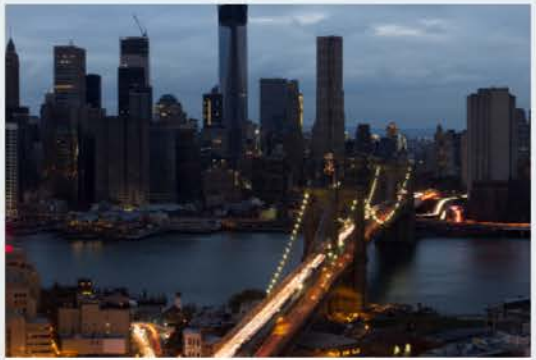
6C OT/GC - General Construction

6D OT - Other, *describe:*

6E CC - Curb Cut *16*
OT/LAN - Landscape

6F OT/ANT - Antenna
OT/BPP - Builders Pavement Plan *8D*
OT/FPP - Fire Protection Plan
OT/MAR - Marquee *8E, 26B*

12/14



SOLAR+STORAGE RESOURCES

INTERCONNECTION AND PERMITTING RESOURCES

FINANCING OPTIONS RESOURCES

ZONING RESOURCES

SURVEY RESOURCES

ARCHIVED REPORTS

Information & Contacts

For questions and assistance related to permitting, contact the Sustainable CUNY Smart DG Hub at **DGhub@cuny.edu**

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