MEMORANDUM

To: Adam Wirtshafter, National Grid Rhode Island

From: Zack Tyler, Betty Tolkin, and Ari Stern, NMR Group

Date: August 18, 2020

Re: Rhode Island Compliance Training and Building Permit Review

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This memo provides documentation of the trainings held by the Rhode Island Code Compliance Enhancement Initiative (CCEI) in the years 2017, 2018, and 2019, and an assessment of the building permit data that is available online in Rhode Island. This information is intended to assist National Grid in developing placeholder values for savings that may be attributable to the CCEI as well as planning for upcoming baseline studies.

Section 1   CCEI Training Documentation

The CCEI conducted 109 trainings from February 17, 2017 through December 17, 2019. These include presentations at various gatherings and in-field site tours as well as stand-alone classroom trainings. Seventy-one trainings had a residential focus and 38 had a commercial focus. NMR reviewed the attendance records and training materials used for all of these trainings.

1.1 ATTENDANCE

The 109 trainings held in the three years studied had a total of 1,858 attendees. While each training collected attendee counts, 86 of these trainings also collected names and, in most cases, the employers and/or occupations of the attendees. The 86 trainings with attendee information list 1,508 individuals. NMR used this information to classify attendees as code officials and building professionals. The latter category includes architects, builders, contractors, energy specialists, and vocational students. As shown in Table 1, code officials made up about 40% of attendees at the trainings which had this information.

Many individuals attended multiple trainings; based on the 1,508 names provided, the 86 2017-2019 trainings with attendee information had 537 unique attendees. The unique attendee analyses show that code officials, as expected, are much more likely to attend both residential and commercial trainings than building professionals.

Table 1: CCEI Training Attendance

Type of Training	All Attendees	Code Officials	% of Attendees	Building Professionals	% of Attendees
All trainings	1,858	na	na	na	na
--All residential trainings	1,221	na	na	na	na
--All commercial trainings	637	na	na	na	na
Trainings with attendee information	1,508	603	40%	905	60%
--Residential trainings	1,020	376	37%	644	63%
--Commercial trainings	488	227	47%	261	53%
Unique attendees	537	121	23%	416	77%
--Residential trainings	428	107	25%	321	75%
--Commercial trainings	273	101	37%	172	63%

Code officials attending the CCEI trainings worked in 32 of the 39 Rhode Island cities and towns. As shown in Table 2, the three-year average of residential units permitted in Rhode Island between 2017 and 2019 was 1,281. The municipalities covered by the code officials attending the trainings accounted for 1,133 or 88% of these units.

Table 2: Rhode Island Municipalities Covered by Training Attendees

Municipality	Residential Units Permitted*	Municipality	Residential Units Permitted*
Barrington	31	Newport	8
Bristol	21	North Kingston	97
Burrillville	26	North Providence	12
Charlestown	38	North Smithfield	29
Coventry	57	Portsmouth	27
Cranston	61	Providence	67
Cumberland	67	Richmond	56
East Greenwich	9	South Kingston	93
East Providence	1	Tiverton	36
Exeter	16	Warren	40
Foster	9	Warwick	69
Jamestown	25	West Greenwich	27
Johnston	20	West Warwick	21
Lincoln	44	Westerly	43
Middleton	33	Woonsocket	10
Narragansett	27	Total—municipalities covered	1,133
New Shoreham	13	Total—all Rhode Island	1,281

*Three-year (2017-2019) average

1.2 TRAINING CONTENT

NMR reviewed 24 documents used by the CCEI for trainings from 2017 to 2019. These consisted of the following:

- Ten residential training presentations

- Two fact sheets distributed at residential home tours

- Eight commercial training presentations

- Four fact sheets distributed at commercial building tours

Given the frequency and duration of the different trainings conducted and the documents used for each training, NMR has estimated the approximate number of hours spent on each topic. Of the 71 residential trainings conducted, 60 consisted of classroom trainings or presentations at various gatherings totaling just over 106 hours. Table 3 shows the approximate amount and percentage of time spent on each topic during the 60 residential classroom trainings and presentations. Building envelope topics accounted for more than two-fifths of training hours followed by HVAC and net zero energy home topics.

Table 3: CCEI Residential Training Focus—Classroom Trainings and Presentations

Topic	Estimated Hours	Percentage
Building Envelope		
--Insulation	22.2	21%
--Air leakage, air sealing, and air barriers	18.1	17%
--Vapor barriers	2.5	2%
--Windows	2.2	2%
HVAC		
--HVAC equipment sizing	9.8	9%
--Ventilation	7.3	7%
--Ductwork	7.2	7%
--Heat pump installation	4.3	4%
--Indoor air quality considerations	4.2	4%
--Maximizing condensing boiler performance	3.0	3%
--Customer education re heat pumps	1.0	1%
Net zero energy homes	15.5	15%
Stretch code	4.6	4%
Miscellaneous*	4.4	4%

*Includes utility incentives and support, permit and inspection forms, lighting and appliances, and code overview

The CCEI also conducted 11 residential in-field trainings and site tours from 2017 through 2019 totaling twenty and one-half hours. Most of this time was spent demonstrating blower door testing. Table 4 shows the approximate amount and percentage of time spent on each topic during these events.

Table 4: CCEI Residential Training Focus—In-field Trainings and Site Tours

Topic	Estimated Hours	Percentage
Blower door and duct testing	6.0	29%
Blower door and shell tightness	5.5	27%
Multifamily blower door testing	3.0	15%
Duct blaster	3.0	15%
Net zero energy home	1.5	7%
Insulation materials and installation	1.0	5%
Affordable multi-family building	0.5	2%

The CCEI conducted 38 commercial trainings from 2017 through 2019; of these, 30 consisted of classroom trainings or presentations at various gatherings totaling 52 hours. Table 5 shows the

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approximate amount and percentage of time spent on each topic during the 30 commercial classroom trainings and presentations. The most popular topics, centering around mechanical systems and HVAC, accounted for almost one-third of the training hours. The next largest portions of hours were spent on building envelope and zero net energy building topics.

Table 5: CCEI Commercial Training Focus—Classroom Trainings and Presentations

Topic	Estimated Hours	Percentage
Mechanical Systems and HVAC		
--Maximizing condensing boiler performance	4.5	9%
--Mechanical systems--general	3.6	7%
--HVAC equipment sizing	1.3	2%
--Service water heating	1.2	2%
--Ductwork	1.1	2%
--Ventilation	1.1	2%
--Economizers	1.1	2%
--HVAC controls	0.8	2%
--Motors and transformers	0.8	2%
Building Envelope		
--Air barriers, air leakage and tightness testing	5.9	11%
--Vapor barriers	1.5	3%
--Insulation	1.1	2%
--Fenestration	0.6	1%
Zero Net Energy Buildings	7.5	14%
Commercial Stretch Code	4.9	9%
Lighting	4.8	9%
National Grid code Support and Incentives	2.2	4%
Commissioning	1.9	4%
Compliance Options and Procedures	1.9	4%
Prescriptive Path Functional Performance Testing	1.8	3%
Energy Modeling	1.4	3%
Existing Buildings	1.0	2%

The CCEI also conducted eight commercial in-field trainings and site tours from 2017 through 2019 totaling ten and one-half hours. Close to one-half of this time was spent touring Brown University' Watson Institute, an expansion designed to meet the University's requirements that the projects reduce energy use by at least 25% compared to current energy codes. As in the case of residential in-field work, the CCEI also spent some time demonstrating blower door use. Table 6 shows the approximate amount and percentage of time spent on each topic during these events.

Table 6: CCEI Commercial Training Focus—In-field Trainings and Site Tours

Topic	Estimated Hours	Percentage
LEED certified building expansion and adaptive reuse	5.0	48%
Commercial blower door training	4.0	38%
HVAC upgrades	1.0	9%
Lighting	3.0	5%

Section 2   Online Municipal Building Permit Review

NMR conducted a review of online residential and commercial building permits to explore the extent of measure-level energy efficiency data that is available through online databases. Residential and commercial baseline evaluations are expensive and typically require a large number of on-site visits to homes and businesses. Such visits have become more difficult due to the COVID-19 pandemic. This review assesses the current feasibility of using online permit data to streamline such evaluations by reducing the number of required on-site inspections.

In theory, thorough documentation of new construction in online permit databases could allow evaluators to estimate average measure-level efficiencies through desk reviews. A subset of on-site inspections could then assess the accuracy of permit data. Such a study would require the following:

- **Sufficient coverage** of new construction activity to avoid biasing a sample towards a few well documented buildings

- **Sufficient measure-level detail** to assess average building energy performance

This memorandum makes recommendations about data points that could be added to online permit databases to increase their usefulness in new construction baseline studies.

Key Findings

➢ Twenty-nine out of 39 municipalities, covering 74% of single-family new construction activity, have online building permit databases. This could constitute "sufficient coverage."

  o The majority of municipalities use an OpenGov portal which is easy to navigate.

➢ Currently available data does not provide sufficient measure-level detail to replace on-site visits for baseline evaluations.

  o At a statewide level, residential permits provide about 15-20% of the pertinent information for each major end use except water heating, for which almost no information is available.

  o Commercial permit documentation is far less available than residential permits.

  o Online permit databases do not currently allow for filtering based on construction date or year.

Recommendations

➢ Encourage all municipalities to implement the OpenGov online building permit database system to streamline data access and provide consistency across municipalities.

➢ Encourage all municipalities to enable record searching on their online building permit databases.

➢ Encourage all building departments to require the filing of building plans, blower door results, duct blaster results, HERS certificates, and REScheck results as attachments to residential new construction building permits.

➢ Encourage building departments to require the filing of building plans and COMcheck results as attachments to commercial new construction building permits.

➢ Encourage building departments to require detailed mechanical permits including heating cooling, and water heating equipment model numbers or equipment type, capacity, fuel, and efficiency for residential and commercial new construction.

➢ Encourage requiring filing of duct leakage to outside results in addition to total duct leakage results for residential new construction permits.

➢ If possible, create a flag for new construction in the online database and allow searching for records that are new construction rather than only allowing searching by address.

2.1 PREVALENCE OF ONLINE BUILDING PERMIT DATABASES

As shown in Table 7, 29 out of 39 municipalities in Rhode Island currently have online building permit databases. Of these municipalities, all but two use the same OpenGov online portal software which NMR found quite easy to navigate. The two that do not use the OpenGov portal use a portal powered by PermitLink which NMR found more difficult to navigate.

NMR matched the online permit databases to U.S census new construction building permit counts to estimate the share of new construction activity in Rhode Island located in towns with online building permit databases. Specifically, NMR calculated average annual building permits from 2017 through 2019 for single-family homes (including attached homes) and all residential units.[1] Overall, the online permit databases cover 74% of single-family new construction activity and 79% of all residential new construction (RNC) units in Rhode Island. Note these percentages do not account for any changes in construction activity resulting from the COVID-19 pandemic. NMR did not have data on commercial new construction activity to compare to the online databases by municipality.

Two of the 29 municipalities using the OpenGov portal have not enabled public searching of their online permit databases. This means that the public can apply, submit and check the status of their own permits, but cannot search existing records for properties by address.

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[1] https://www.census.gov/construction/bps/

Table 7: Online Building Permit Databases

Municipality	Online Building Permit Database by Town	Municipality	Online Building Permit Database by Town
Barrington	OpenGov	Newport	OpenGov
Bristol	OpenGov	New Shoreham	No
Burrillville	No	North Kingstown	OpenGov
Central Falls	OpenGov	North Providence	OpenGov
Charlestown	No	North Smithfield	OpenGov
Coventry	No	Pawtucket	OpenGov
Cranston	OpenGov	Portsmouth	PermitLink
Cumberland	OpenGov	Providence	OpenGov
East Greenwich	OpenGov	Richmond	OpenGov
East Providence	OpenGov	Scituate	No
Exeter	OpenGov	Smithfield	OpenGov
Foster	No	South Kingstown	OpenGov (Not searchable)
Glocester	No	Tiverton	OpenGov
Hopkinton	OpenGov	Warren	PermitLink
Jamestown	No	Warwick	OpenGov
Johnston	No	Westerly	OpenGov
Lincoln	OpenGov	West Greenwich	No
Little Compton	OpenGov	West Warwick	OpenGov
Middletown	OpenGov	Woonsocket	OpenGov
Narragansett	OpenGov (Not searchable)		

2.2 RESIDENTIAL PERMIT REVIEW

Assessing the energy efficiency of RNC in Rhode Island via desk reviews requires, at a minimum, access to data on the measures shown in Table 8 for a representative sample of new homes. These minimum data requirements reflect key measures used in assessing the energy performance of homes as well as the measures used to characterize the User Defined Reference Home (UDRH) for the RNC program. A study with only this minimum amount of information would still require the use of substantial assumptions if producing energy models and HERS index values.

The minimum data requirements could be satisfied if online permit databases included legible copies of complete building plans, blower door and duct blaster test results, and documentation of heating, cooling, and water heating equipment model numbers and quantities. Additionally, REScheck certificates, HERS certificates, or municipal energy certificates could expedite and

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safe-guard the desk review process. [2] Note, mechanical permits provide space to record equipment capacity, quantity, and efficiency; however this information was rarely completed.

Table 8: Minimum Data Requirements for RNC Baseline Desk Review Studies

Measure	Description	Bldg. permit	Bldg. plans	Assessor database	HERS cert.	RES check	Mech. permit	Misc. documentation
Permit date	Date permit was issued	X						
Conditioned floor area (CFA)	Square feet of floor area that is heated and/or cooled.	X	X	X	X			
Conditioned volume	Cubic feet of home that is heated and/or cooled		X		X			
Stories	Number of stories		X	X				
Air leakage	Blower door test results in units of ACH50 (or CFM50 if conditioned volume is known)				X	X		blower door test
Duct leakage	Duct blaster leakage to outside test (LTO) results in CFM25/100 sq. ft. of CFA				X	X		duct blaster test
Insulation	Insulation R-values for all portions of the building thermal envelope including ceilings, walls, floors, foundation walls, and slabs		X		X	X		generic energy certificate
Window	Window U-values and SHGC		X*			X		*window schedule
Heating	Heating equipment type, distribution, fuel, capacity, and efficiency						X	any with model #
Cooling	Cooling equipment type, capacity and efficiency						X	any with model #
Water heating	Water heating equipment type, fuel, capacity							any with model #

[2] Municipal energy certificates refer to certificates made by individual municipalities that provide space to list insulation R-values, window U-values and information about heating and cooling equipment.

Additional useful information beyond the minimum data requirements include percent of efficient lighting, appliance efficiencies, framing characteristics, skylight characteristics, presence and capacity of onsite renewable energy, and mechanical equipment details.

Table 9 shows the towns with online permit databases in which at least one home was found to have either building plans, blower door results, duct blaster results, or REScheck certificates in their permit files. No homes had HERS certificates or mechanical equipment model numbers.

Table 9: Required Data for RNC Baseline Desk Review Studies

Municipality	Building Plans	Blower Door Results	Duct Blaster Results	REScheck
Barrington				
Bristol				
Central Falls	X			
Cranston		X	X	X
Cumberland	X			
East Greenwich				
East Providence				
Exeter				
Hopkinton				
Lincoln				
Little Compton	X	X	X	
Middletown	X			
Narragansett				
Newport	X	X		
North Kingstown	X	X	X	
North Providence				
North Smithfield				
Pawtucket	X			X
Portsmouth		X	X	
Providence				
Richmond	X			
Smithfield				
South Kingstown				
Tiverton	X	X		
Warren				
Warwick	X	X		
Westerly	X	X	X	
West Warwick	X			
Woonsocket				

2.2.1 Reviewed Residential Permit Sample

NMR used Zillow.com to identify 896 homes built from 2017 to 2020 across the 29 municipalities that have online permit databases. NMR then did in-depth permit reviews for 70 of these homes. Homes were randomly selected with larger shares of the sample coming from municipalities that had larger construction activity as estimated by the U.S. Census building permit data.[3] At least one address was reviewed for each of the 29 municipalities. Table 10 shows the count of homes NMR reviewed in each municipality.

Table 10: Online Building Permit Databases

Municipality	Count of Reviewed Homes	Municipality	Count of Reviewed Homes
Barrington	1	North Providence	1
Bristol	1	North Smithfield	3
Central Falls	1	Pawtucket	1
Cranston	5	Portsmouth	3
Cumberland	5	Providence	1
East Greenwich	3	Richmond	10
East Providence	1	Smithfield	3
Exeter	1	South Kingstown	1
Hopkinton	1	Tiverton	3
Lincoln	3	Warren	1
Little Compton	1	Warwick	5
Middletown	3	Westerly	1
Narragansett	1	West Warwick	3
Newport	1	Woonsocket	1
North Kingstown	5		

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[3] South Kingston was an exception to this sampling scheme. It has a large share of the construction activity (11%) yet does not allow the public to search its online database for permit files. Therefore, only one address was reviewed for South Kingston which resulted in finding no files.

Table 11 summarizes the findings for the key measures examined during the residential permit reviews. The following sub-sections discuss the findings for each key measure in more detail.

Table 11: Permit Review Measure-Level Findings

Measure	Count with Data	Percent	Notes
Air leakage (ACH50)	19	27%	Typically found in pictures of blower door results attached to building permit.
Duct leakage (LTO)	0	0%	Only total leakage test results were available (found in 16% of homes) since code is based on total leakage rather than LTO. Energy modeling requires LTO. Total duct leakage results were found in images of duct blaster results attached to building or mechanical permit.
Insulation (R-value)	14	20%	Typically found in images of building plans attached to building permit or in images of REScheck compliance documents.
Windows (U-value/SHGC)	10	14%	Typically found in images of building plans attached to building permit or in images of REScheck compliance documents.
Heating equipment type	37	53%	Typically found in open-ended "descriptions" in mechanical permits. Fuel was only identified for 24% of homes, capacity for 20% and efficiency for 10%.
Cooling equipment type	35	50%	Typically found in open-ended "descriptions" in mechanical permits. Capacity was only found in 24% of homes and efficiency inf 7%.
Water heating type	1	1%	Only found in description of either mechanical or plumbing permit. Fuel identified in 9% of homes in plumbing or mechanical permits
Solar	2	3%	Confirmed presence at two homes but other homes could have had solar without available solar permits.

2.2.2   Residential Air Leakage

The air leakage measure reflects the tightness of building envelope. Air leakage is measured using blower door tests conducted by specialists including HERS raters. Air leakage is measured

as "ACH50" which represents the air changes per hour when a pressure gradient of 50 pascals is created between the interior and exterior of the home. The previous RI building code required homes receive blower door tests but had no maximum requirement. RISBC-8, adopted in August of 2019, set a maximum ACH50 of 8 for the year 2019, 7 in 2020, 6 in 2021, and 5 from that point forward.

NMR found air leakage data for 19 (27%) homes. Typically, the air leakage values were found in documents of test results from the blower door contractor submitted as an attachment to the building permit.

2.2.3 Residential Duct Leakage

The duct leakage measure reflects the tightness of the home's ductwork. There are two types of duct tests: total duct leakage (TDL) tests and leakage to outside (LTO) tests. TDL refers to air leaking from ducts anywhere besides registers. Some of that leakage may just be leaking from the ductwork to inside the house, for example from unsealed duct seams in conditioned space. LTO differs from TDL by measuring only air leaking from the ducts to outside of the house, for example from ducts in attics.

NMR found duct leakage data in documents from duct testing contractors submitted as attachments to either the building permit or mechanical permit. NMR found TDL data for 11 (16%) homes and did not find any LTO data.

The lack of LTO data is due to code having a TDL requirement but not an LTO requirement. Homes can demonstrate compliance with a TDL test only. However, while code depends on TDL, energy modeling depends on LTO since LTO is the true measurement of wasted energy. Therefore, the lack LTO data reduces the usefulness of a desk review-based evaluation. In the absence of LTO data, a study could make assumptions of LTO based on TDL, size of the home or duct system, and location of the duct system.

2.2.4 Residential Insulation

Assessing the energy efficiency of buildings requires the R-values of insulation in all portions of the thermal envelope (i.e., walls, floors, ceilings, slabs, and foundation walls). NMR found insulation R-values for 14 (20%) of homes. NMR found R-values for homes in Central Falls, Cranston, Cumberland, Little Compton, Middletown, North Kingstown, Pawtucket, Richmond, Tiverton, and West Warwick. Most frequently, R-values were identified through building plan documents submitted as attachments to the building permit; however, occasionally R-value were found in REScheck compliance documents. Note that not all building plans listed the R-values of insulation and other building plan documents were illegible online.

2.2.5 Residential Windows

Window U-values and SHGC values were ascertainable for 10 (14%) homes. NMR could use window model numbers from window schedules on plans to find window U-values and SHGC. Data was also available in some REScheck files. Finally, one home had a document of full window specifications submitted as an attachment to its building permit.

2.2.6 Residential Heating Equipment

In the online building permit databases, NMR only found heating equipment data in mechanical permits. The OpenGov online permit files contain fields to enter heating equipment types, capacities, and fuel; however, these fields were seldom filled out. Instead, NMR ascertained most of the heating equipment data through open-ended "description" fields. The level of detail in the description fields varied greatly.

Note that the OpenGov portal did not include a field for efficiency. Therefore, NMR was only able to find efficiency ratings in the OpenGov portal if the permit filer happened to include it in a description for the mechanical permit. NMR was never able to ascertain model numbers, and files attached to mechanical permits never provided any useful information beyond duct blaster test results.

In contrast to the OpenGov portal, the PermitLink portal (used only by Portsmouth and Warren) allowed NMR to view full mechanical permit applications as attachments. These permit files include capacity, fuel, quantity, and efficiency, although the fields were not always filled out.

NMR identified heating equipment types for 37 (53%) homes. For an additional 7 (10%) homes, NMR found some amount of heating equipment data but was not able to identify the specific type. For example, NMR found that some homes had either a furnace or a boiler but could not determine which, or that a home had either a furnace or a central air-source heat pump. NMR identified the heating fuel for 17 (24%) homes. Fuel was only ever identified through permit description fields or finding separate mechanical permits pertaining to the installation of propane tanks. Heating system capacities were identified at 20 (29%) homes. Heating system efficiencies were identified at 7 (10%) homes with an additional 5 (7%) of heating system efficiencies identified as "90+."

2.2.7 Residential Cooling Equipment

Similar to heating equipment, cooling equipment data was only found in mechanical permits but cooling equipment data was almost entirely identified only through entries in the open-ended "description" field. Often cooling equipment was identified through a description mentioning an installation of a "compressor." NMR made an assumption based on other available information to determine what type of cooling system a compressor represented. For example, if permits also indicated the installation of fossil-fuel heating equipment such as a furnace, NMR assumed a compressor referred to a conventional central-air split system as opposed to a heat pump. There was no way for NMR to know if the absence of cooling equipment information indicated that the home did not have installed cooling or if the information was simply not available.

NMR identified the cooling equipment type for 35 (50%) homes with an additional 4 (6%) where some cooling equipment data was found but a type not determined. NMR identified cooling capacity at 17 (24%) homes and cooling efficiencies at 5 (7%) homes.

2.2.8 Residential Water Heating Equipment

Water heater information was very inconsistent. NMR found water heater data in plumbing permits that mentioned installing plumbing for a water heater or included a water heater in a list of fixtures. NMR also found water heater data in mechanical permits that mentioned water heaters in the

"description" field. While mechanical permits in the OpenGov portal included specific fields for water heater details, those fields were always empty. It appears that common practice does not require filing permits for water heaters.

NMR was only able to identify the fuel for water heaters at 6 (9%) homes. One could assume the water heating fuel matches that of the heating system, however, it is possible to have fossil fuel heating and electric water heating. NMR only identified the type of water heater at one home since the mechanical permit "description" specified a "NAVIEN combination boiler." In all other cases, NMR could not identify whether the water heater had a tank or was tankless. NMR never found water heater model numbers and was not able to identify water heater efficiencies.

2.2.9 Residential Solar

NMR found solar permits for on-site photovoltaic systems at two homes. It is possible that other homes had on-site photovoltaic systems but did not have permits in the online permit database. The two permits provided detailed information including module model numbers, inverter model numbers, array area, framing structure dimensions and more.

2.2.10 Residential Assessor Databases

In addition to online permit databases, municipal tax assessor offices typically maintain online property assessment databases with details about buildings. While examining assessor databases was outside of the scope described in the workplan, NMR reviewed assessor database files for a small sample of addresses that had limited available information in the online permit databases. Overall, NMR reviewed assessor database files for 27 homes in 18 towns.

In cases where the online building permit databases lacked data on building area and mechanical equipment, assessor databases were able to fill some gaps. Twenty-three homes had a picture of the front of the home, another 21 had sketches of home dimensions. Seventeen homes listed the heating equipment type and fuel and 18 homes listed the cooling equipment type. Water heating equipment type and fuel was never found in assessor databases.

Assessor databases also included information on roofing, wall, and flooring material, number of stories, and number of bathrooms.

2.3 COMMERCIAL PERMIT REVIEW

Assessing the energy efficiency of commercial new construction in Rhode Island via desk reviews requires, at a minimum, basic data about the building shell, and detailed information about any HVAC or other equipment. Most of this information could be ascertained through plans and equipment schedules. Studies have found that information in commercial building plans effectively reflect the actual construction of the building. Therefore, if enough documentation was readily available online, it could be possible to conduct commercial baseline studies without the need for on-site visits. While NMR was only able to review documents for a sample of commercial buildings, online permit databases never included commercial building plans or thorough equipment schedules.

2.3.1 Reviewed Commercial Permit Sample

The online building permit databases allow users to search by address or permit number, but do not allow users to search for new construction. For the residential review, NMR used Zillow.com to identify addresses of newly constructed buildings. Unfortunately, there is no alternative to Zillow.com that allows the public to easily identify newly constructed commercial addresses. Commercial real estate websites, such as LoopNet.com, do not provide a comprehensive list of new construction properties.[4] The government of Providence hosts an online map of development projects that list major new construction commercial projects, but no other municipality in Rhode Island maintains a similar resource.[5] Other commercial addresses can be identified through municipal development planning committee meeting minutes or through google searches for news articles about commercial development, but such processes are time consuming and often inaccurate. NMR identified files for 20 newly constructed commercial properties in Rhode Island using all the above methods as shown in Table 12 and Table 13.

Table 12: Count of Reviewed Commercial Buildings by Municipality

Municipality	Count of Reviewed Buildings
Providence	10
Central Falls	2
East Providence	2
North Kingstown	2
Portsmouth	1
West Warwick	1
Smithfield	1
Newport	1

Table 13: Count of Reviewed Commercial Buildings by Type

Municipality	Count of Reviewed Buildings
Multifamily	7
Athletic/Arena	2
Mixed Use	2
Bank	1
Education	1
Retail	1
Science	1
Unknown	5

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[4] Filtering LoopNet.com records for commercial buildings constructed in 2017 or later yielded only 4 results as 6/25/2020 and the search by construction date is only available on properties that are for sale.
[5] https://www.providenceri.gov/providence-development-projects/

2.3.2 Commercial Permit Review Findings

NMR found it difficult to ascertain measure-level efficiency data associated with commercial new construction. Online permits contained sparse information and lacked useful attachments such as building plans or mechanical details. Only one address had full building plans available online. No other addresses had even partial building plans.

The large scale of commercial complexes made the online permit review more challenging. A single address may have multiple building and mechanical permits associated with it. Individual addresses sometimes had separate building permits for new construction, construction of small structures, renovations, additions, exterior sign changes, façade changes, and temporary tents. Those same addresses had multiple mechanical permits ranging from gas piping, sprinkler systems, ductwork, and equipment installation. It was often impossible to match specific mechanical permits to individual buildings, units, or additions at an address. Therefore, it was hard to identify if a described piece of mechanical equipment was in the relevant building or another building in the complex.

NMR found insulation values for only one address. Heating and cooling equipment type, capacity and efficiency was also found for only one home. NMR found information on heating equipment type for four other addresses at which no efficiency or capacity information was available. For the most part, heating and cooling equipment data was ascertained through the "description" fields of mechanical permits. The level of detail in the description field of mechanical permits varied greatly.

NMR found the water heating type at only one address. The information was ascertained through a description on a plumbing permit for a multifamily building. No other water heating data was available.

One address had a detailed solar permit that provided array size, module model number, and inverter model number. Another address did not have a solar permit but had a building permit with a description stating "solar array."

2.4 ONLINE BUILDING PERMIT DATABASES IN NEIGHBORING STATES

NMR conducted a high-level review of online building permit databases in neighboring states and California to identify other potential online permitting systems that could be used for evaluation purposes. Given the difficulty in identifying addresses for commercial new construction, NMR looked only at residential properties. NMR found no alternative online building permit systems that could provide a streamlined evaluation of residential measure-level baseline efficiencies. The presence of online building permit databases was inconsistent, and the available data did not provide enough detail.

Connecticut has implemented a similar system to Rhode Island based on the OpenGov tool and appears to have a similar level of information as found in Rhode Island.[6]

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[6] https://www.viewmypermitct.org/

New York City has its own online building permit database that is searchable by address. The records potentially include building permits and applications, electrical permits, "boiler permits," and more. However, the information in the permits online will not provide the minimum level of data required to conduct an evaluation. Elsewhere in New York State, building permit records seem rarely accessible online. A brief review of Albany and two other randomly selected municipalities found no online building permit databases.

Online building permit databases are inconsistent across municipalities in Massachusetts. Some use OpenGov while others use systems such as "Permit Eyes" and require users to register before searching for records.[7] Boston has its own system.[8]

Los Angeles, California has its own system that does not include measure-level inputs. Pictures of permits can provide more detail than available in the online portal but are inconsistently available.[9]

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[7] https://permiteyes.com/Ipswich/ipsbldg/loginpages.asp
[8] https://data.boston.gov/dataset/approved-building-permits/resource/6ddcd912-32a0-43df-9908-63574f8c7e77
[9] http://ladbsdoc.lacity.org/idispublic/