Glossary of terms

Energy efficiency and building policies in the EU and US

This glossary is a reference document to understand the terminology of the key terms and initiatives of energy efficiency in buildings in the EU and US.

BPIE

European Commission

U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

IMT INSTITUTE FOR MARKET TRANSFORMATION

US-EU ENERGY COUNCIL

European Union

Building automation and controls

Building automation and controls (BACs) refer to the software and engineering supporting the operation of technical building systems through automatic controls.

Building element

A building element means a technical building system or an element of the building envelope.

Building envelope

The building envelope means the integrated elements of a building which separate its interior from the outdoor environment.

Building Renovation Passport

A Building Renovation Passport is a tool which provides a long-term, step-by-step renovation roadmap for a specific building based on quality criteria, following an energy audit, outlining measures and renovations to improve energy performance. Building Renovation Passports are complementary to Energy Performance Certificates.

Building Stock Observatory (BSO)[1]

The EU Building Stock Observatory monitors the energy performance of buildings across Europe. The Observatory contains a database, a data mapper and factsheets assessing improvements in the energy efficiency of buildings. It covers a broad range of energy related topics and provides information on the building stock, energy consumption, building elements and technical building systems installed, energy performance certificates, nearly zero-energy buildings, and renovation rates, but also areas like energy poverty and financing aspects.

Clean Energy for All Europeans Package[2]

The Clean energy package for all Europeans is a comprehensive set of legislation that defines European climate and energy policy for beyond 2020. It is composed of eight different pieces of legislation aimed at accelerating the energy transition in Europe. It will affect many areas, from national long-term planning to reduce greenhouse gas emissions to electromobility and consumers' rights to produce renewable energy.[3]

[1] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/eu-bso_en

[2] https://ec.europa.eu/energy/topics/energy-strategy/clean-energy-all-europeans_en

[3] https://www.bpie.eu/wp-content/uploads/2020/01/Build-Upon2_Summary-of-implications-of-the-Clean-Energy-Package-on-National-Renovation-Strategies_FINAL_2020.pdf

Co-decision procedure

The co-decision procedure is the Ordinary Legislative Procedure (OLP) in the EU to adopt legislation (i.e. directives or regulations). In the OLP, the European Commission is the only institution to have the 'right of initiative', which means that only the Commission can present legislative proposals. The European Council, which is the institution gathering all Heads of State and Governments of the 27 Member States, gives indications and directions through Conclusions. Besides those, the European Commission also prepares proposals based on lengthy and in-depth consultation procedures, where stakeholders and citizens can give their opinion.

Once the European Commission has issued its proposal for a directive or a regulation, it is submitted at the same time to the European Parliament, which represents the European citizens, and to the Council, which represents the Member States (national governments). Both are called 'co-legislators' because to be adopted and deemed as 'law', a directive or a regulation must be negotiated and adopted in the same terms by both, Parliament and Council. The European Economic and Social committee and the Committee of Regions are also involved in this process.

Deep renovation[4]

Deep renovation is a process capturing, in one or a few steps, the full potential of a building to reduce its energy demand. Deep renovation ultimately leads to a very high energy and carbon performance, ensuring the building is compatible with climate neutrality by 2050 and delivering quality to its occupants (IEQ, accessibility, etc.).

Deep renovation is a process that allows a building to fully reduce its energy-demand by careful planning and execution. According to the European Commission, deep renovation typically achieves more than 60% energy savings[5]. The European Commission announced in the 2021 EPBD Inception Impact Assessment that it will consider the introduction of a 'deep renovation' standard in the context of financing and building decarbonisation objectives.[6]

Directorate-General Energy (DG ENER)

The Directorate-General Energy is the European Commission department responsible for energy policy in the EU.

Energy Efficiency Directive (EED)[7]

The Energy Efficiency Directive sets the overarching legal framework for energy efficiency policy in the EU. It came into force in 2012 establishing measures to achieve the 20% energy efficiency target by 2020. Its 2018 revision extends the lifespan of one of its core provisions, the "energy savings obligation", beyond 2020 and sets a 32.5% energy efficiency target for 2030.

Energy Performance of Buildings Directive (EPBD)[8]

The Energy Performance of Buildings Directive (EPBD) serves as the primary legislation guiding building construction and renovation in the EU to enhance building performance and efficiency

[4] Not part of legislative text

[5] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX%3A32019H0786&from=EN

[6] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12910-Energy-efficiency-Revision-of-the-Energy-Performance-of-Buildings-Directive_en

[7] https://ec.europa.eu/energy/topics/energy-efficiency/targets-directive-and-rules_en

[8] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en

to achieve the 2030/2050 energy targets. In addition, the Energy Efficiency Directive (EED) includes relevant provisions on annual renovation rate of central government buildings, and on energy saving obligation schemes which in practice tackle primarily energy efficiency improvements in buildings.

Adopted in 2002, the EPBD was recast in 2010 and amended in 2018 as part of the Clean Energy Package, with a focus on speeding up the renovation of existing buildings and on modernising the building stock with specific reference to smart technology, automation systems, renewable integration storage solutions, and electromobility support. The Directive will reopen for regulatory revision as part of the European Green Deal. The new text proposed by the European Commission is expected in December 2021 and will be adopted through a co-decision procedure.

European Union-Member States proper transposition and implementation of the EPBD
EU Member States must transpose the new components of the Energy Performance of Buildings Directive into national law by 10 March 2020 (20 months from the date of the entry into force- 9 July 2018) and communicate them to the European Commission.

Mobilising investment in renovation
As a core component of achieving long-term decarbonisation objectives, the Energy Performance of Buildings Directive lays out several focus areas to address and facilitate financing for building renovation. Specifically, these include project aggregation, addressing risk, leveraging public funds, investment in the public building stock, the creation of advisory tools.

Energy performance of buildings standards[9]

The Commission has established a set of standards and accompanying technical reports to support the EPBD called the energy performance of buildings standards (EPB standards). These are managed by the European Committee for Standardisation (CEN).

Energy Performance Certificate (EPC)[10]

Introduced in 2002, Energy Performance Certificates (EPCs) are now commonly used across Europe aiming at informing building owners, occupiers and property actors on (i) energy performance of buildings so that they can compare and assess different buildings and make informed decisions; and (ii) practical ways to improve the energy efficiency of buildings and their performance class (e.g. A or G).

According to the Energy Performance of Buildings Directive (EPBD), Member States must establish the necessary measures to create a system of certification of the energy performance of buildings. They must be issued by independent energy experts.

An EPC must include the energy performance of a building and reference values such as minimum energy performance requirements to make it possible for owners or tenants of the building or building unit to compare and assess energy performance. They also include information on how to improve the performance of the building. EPCs may include additional information such as the annual energy consumption and the percentage of energy from renewable sources in the total energy consumption.

[9] https://epb.center/
[10] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/certificates-and-inspections_en

Member States shall ensure that an energy performance certificate is issued for:

a. buildings or building units which are constructed, sold, or rented out to a new tenant;
b. buildings where a total useful floor area over 250 m² is occupied by a public authority and frequently visited by the public.

Energy poverty

While there isn't an established EU definition of energy poverty, energy poverty refers to a lack of adequate essential services, such as warmth, cooling, lighting, and power. This can be caused primarily by low household incomes, combined with high energy cost, and high energy use (especially caused by inefficient building components or appliances).

Member States are required to include policies and actions to alleviate energy poverty in their national Long-term Renovation Strategies and in National Energy and Climate Plans.

Energy Poverty Observatory (EPOV)

The EU Energy Poverty Observatory (EPOV) is a database designed to improve the monitoring and measuring of energy poverty throughout the EU. The EPOV includes resources for Member States (such as indicators for energy expenditure, and fuel prices) to track progress and find resources to address energy poverty. As part of the Renovation Wave, the European Commission also published Commission recommendation on energy poverty.

Energy Union

The Energy Union strategy[11] was published in early 2015. The Energy Union focuses on providing EU citizens with secure, sustainable, competitive, and affordable energy. Since the introduction of the strategy, the European Commission (EC) has released several legislation and initiatives, and policy packages to support these principles – the most important one for energy efficiency being the 'Clean Energy for All Europeans' package in November 2016.

The main list of Directives and Regulations include:

1. The Energy Performance of Buildings Directive (EPBD)
2. The Energy Efficiency Directive (EED)
3. The Renewable Energy Directive (RED)
4. Governance Regulation (GOV)

The Energy Union focuses on the following core elements:

- Energy **security and solidarity** – diversifying Europe's energy sources as well as ensuring cooperation amongst Member States.
- An **integrated internal energy market** – enabling the free flow of energy through the EU, removing technical or regulatory barriers, and establishing adequate infrastructure.
- **Energy efficiency** - improved energy efficiency in all sectors (buildings, transport, and industry).
- Climate action, **decarbonising the economy** – promoting the use of renewable energy sources (RES), aligning with the Paris agreement and supporting the EU's commitment to global targets.
- **Research, innovation, and competitiveness** – supporting breakthroughs in new technologies to support the clean energy transition.

[11] https://eur-lex.europa.eu/resource.html?uri=cellar:1bd46c90-bdd4-11e4-bbe1-01aa75ed71a1.0001.03/DOC_1&format=PDF

European Green Deal[12]

The European Green Deal, introduced in 2019 by the European Commission, is a roadmap to drive the European Union to a sustainable, climate-neutral economy by 2050. The EU Green Deal essentially is the next step of the Energy Union. The overall target of the European Green Deal is to reduce emissions across all sectors by 55% by 2030. The Green Deal covers many sectors, affecting almost all aspects of European life. However, specific emphasis is put on "a just transition to a zero-carbon building stock," which includes the Renovation Wave and associated initiatives.

European Union competence on energy and building policy

Article 194 of the Treaty on the Functioning of the European Union (TFEU)[13] states that energy is a shared competence between EU Member States and the EU. However, each EU Member State maintains its right to "determine the conditions for exploiting its energy resources, its choice between different energy sources and the general structure of its energy supply".

The main aims of EU energy policy are to:

- ensure the functioning of the energy market
- ensure security of energy supply
- promote energy efficiency and energy saving and the development of new and renewable forms of energy
- promote the interconnection of energy networks

Eurostat

Eurostat is the statistical office of the European Union. Eurostat consolidates and publishes comparable statistical information at the EU level (across Member States) but does not collect the data. Its main function is to harmonise and inform on data across the EU on a wide range of sectors from employment data to agricultural and tourism data.

Fit for 55[14]

The "Fit for 55" package is an EU communication, released in July 2021, accompanied by a set of policy proposals outlining how the EU will deliver its targeted 55% reduction in GHG emissions by 2030. Specific to efficiency in the buildings sector, the Fit for 55 package includes a revision of the EED, proposing to increase the level of ambition, as well as making targets binding. It also includes a widened scope for the provision relating to the renovation of public buildings, which should apply to all governance levels beyond central governments. The proposed EPBD revision expected at the end of 2021 would constitute the second part of the Fit for 55 Package.

Additionally, the Fit for 55 package includes a revision of the EU emissions trading scheme (EU ETS). The revision includes the extension of the EU ETS to cover an expanded set of measures, including shipping, update on aviation, and a separate programme for transport and buildings, and will include a revision of the Renewables Energy Directive.

[12] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
[13] https://eur-lex.europa.eu/summary/glossary/energy.html
[14] https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3541

Governance regulation

The Regulation on Governance entered into force in December 2018 as part of the Clean Energy for all Europeans package. The regulation emphasises the importance of meeting the EU's 2030 energy and climate targets and sets out how EU Member States and the Commission should work together, and how individual Member States should cooperate, to achieve the Energy Union's goals.
The governance mechanism is based on integrated national energy and climate plans (NECPs) covering ten-year periods starting from 2021 to 2030, EU and national long-term strategies, as well as integrated reporting, monitoring and data publication.

InvestEU[15]

InvestEU is the key programme under the MFF 2021-2027 for investment through financial instruments. InvestEU is also additionally supported by NextGenerationEU, thereby doubling the programmes capacity[16]. The main objective of InvestEU is to support financing and investment operations related to sustainable infrastructure, operations related to research, innovation/digitisation, increasing access and availability of finance for SMEs, to name some of the main ones.[17]

Law-making in the EU

There are three primary institutions in making EU legislation:

1. The European Parliament – comprised of elected officials
2. The Council of the European Union – represents individual Member States
3. The European Commission – proposes and enforces legislation

Additionally, there is the involvement of the Committee of Regions and the European Economic and Social Committee.

Long-term renovation strategies (LTRS)[18]

According to Article 2a of the EPBD, each Member State is required to establish a national long-term renovation strategy (LTRS) to support the renovation of the national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised stock by 2050. The plans must facilitate a cost-effective transformation of existing buildings into nearly zero-energy buildings. LTRSs' are required to have a solid finance component and indicate mechanisms for mobilising the necessary investments. The Strategies must include a roadmap including nationally determined measurable progress indicators, and indicative milestones for 2030, 2040 and 2050.

To support the development of its long-term renovation strategy, each Member State shall carry out a public consultation on its long-term renovation strategy prior to submitting it to the Commission. Each Member State shall also establish the modalities for consultation in an inclusive way during the implementation of its long-term renovation strategy.

[15] https://europa.eu/investeu/home_en
[16] https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/659364/EPRS_BRI(2020)659364_EN.pdf
[17] https://eur-lex.europa.eu/resource.html?uri=cellar:191b4df3-a18a-11ea-9d2d-01aa75ed71a1.0001.02/DOC_1&format=PDF also https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0403&qid=1611674340772
[18] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/long-term-renovation-strategies_en

The current long-term renovation strategy had to be submitted by Member States to the European Commission by March 10, 2020. The next iteration of the LTRS will be part of the NECP process, i.e., Member States will have to submit it by January 2029. The current LTRS can be updated in 2024. See here for more information on a review of the current LTRS in terms of their decarbonisation ambition and here in terms of overall compliance.

Major renovation

According to Article 2 of the EPBD, major renovation of a building is where: (a) the total cost of the renovation relating to the building envelope or the technical building systems is higher than 25 % of the value of the building, excluding the value of the land upon which the building is situated; or (b) more than 25 % of the surface of the building envelope undergoes renovation. Member States can choose to apply option (a) or (b).

Minimum energy performance standards based on a cost-optimal methodology

The 2010 EPBD required, for the first time, that the Commission establish a comparative methodological framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements[19]. Minimum energy performance requirements must apply to all new buildings and buildings undergoing major renovation.

It is the responsibility of Member States to set minimum energy performance requirements for buildings and building elements, which must be set with a view to achieving cost-optimal levels in line with the methodological calculation methodology. National minimum energy performance requirements should not be more than 15 % lower than the outcome of the cost-optimal results of the calculation taken as the national benchmark. The cost-optimal level shall lie within the range of performance levels where the cost-benefit analysis over the lifecycle is positive.

Multi-Annual Financial Framework (MMF)

The Multi-Annual Financial Framework MFF is the framework outlining the 7-year budget for the European Union. The current MFF runs from 2021-2017 and includes provisions for a short-term economic recovery, while supporting a green and digital future for the EU. The budget of €1.074 trillion is combined with €750 billion from the temporary recovery instrument, NextGenerationEU, for a total of €1,824.3 billion.[20]

Nearly Zero-Energy Buildings (NZEBs)[21]

According to Article 2 of the EPBD, a Nearly Zero-Energy Building (NZEB) is a building that has a very high energy performance, as determined in accordance with Annex I of the Energy Performance of Buildings Directive (which outlines a common general framework for the calculation of energy performance of buildings). The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced not only on-building but also off-site.

[19] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32012R0244

[20] https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027/whats-new_en

[21] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/nearly-zero-energy-buildings_en

Implementation: The Energy Performance of Buildings Directive requires that Member States shall ensure that:

a. All new buildings must be nearly zero- energy buildings from **31 December 2020**;
b. After **31 December 2018**, new buildings occupied and owned by public authorities are nearly zero-energy buildings.

Acknowledging the variety in building types and climate throughout the EU, the EPBD does not prescribe a detailed EU wide definition of NZEB, setting the EU main requirements that national definitions must respect. The EPBD requires Member States to draw up specifically designed national plans for increasing the number of NZEB reflecting national, regional, or local conditions. The national plans include practical and applicable measures to steadily increase the number of NZEBs. See here for more information about the national implementation of NZEB definitions.

NextGenerationEU (NGEU)

NextGenerationEU (NGEU) is a temporary European recovery instrument with a budget of €750 billion, intended to combat the economic toll incurred from the coronavirus pandemic. NGEU is meant to reinforce the EU's MFF 2021-2027, with a focus on 2021-2023. NGEU will be distributed to Member States across several programmes through grants and loans.[22] The primary programme of NGEU is the Recovery and Resilience Facility, with a budget of €673.3 billion (about 90% of the total budget).

Principle of Subsidiarity, considering national conditions

In the EU, the principle of subsidiarity[23] regulates the exercise of the European Union's non-exclusive competences (such as energy) and rules out European Union intervention when an issue can be dealt with effectively by Member States at the central, regional, or local level. In this framework, the European Union can exercise its powers only when Member States are unable to achieve the objectives of a proposed action satisfactorily and added value can be provided if the action is carried out at the European Union level (like adopting GHG emissions reduction targets to tackle a global issue like climate change or tackling energy security across the EU).

The purpose of including a reference to the principle in the EU Treaties is also to ensure that powers are exercised as close to the citizen as possible, in accordance with the proximity principle referred to in Article 10(3) of the TEU.

Recovery and Resilience Facility (RFF)

With €672.5 billion in loans and grants available to support reforms and investments undertaken in EU countries, the Recovery and Resilience Facility (RFF) is the centrepiece of NextGenerationEU.[24] This facility aims to support climate targets, while ultimately promoting economic recovery. The aim is to mitigate the economic and social impact of the coronavirus pandemic and make European economies and societies more sustainable, resilient, and better prepared for the challenges and opportunities of the green and digital transitions. Renovation is one of the eight flagships of the RRF, where the Commission highlights that it leads to job creation, savings on energy bills, and ultimately indispensable as a tool to support the economic recovery.

[22] https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027/whats-new_en#nextgenerationeu-750-billion-for-europes-recovery
[23] https://www.europarl.europa.eu/factsheets/en/sheet/7/the-principle-of-subsidiarity
[24] Source: https://ec.europa.eu/info/strategy/recovery-plan-europe_en

Recovery and Resilience Plans (RRP)

To receive funding from the RRF, MSs need to submit their national reform programmes and their Recovery and Resilience Plans (RRP), which will provide an overview of the reforms and investments that the Member State plan to undertake in the coming years, in line with the objectives of the Facility. Additionally, RRPs are required to allocate 37% of their expenditure to climate investment and policy.

Renovation Wave[25]

The Renovation Wave, introduced as part of the Green Deal, is a strategic communication of the European Commission highlighting the key areas of intervention to boost the renovation of buildings in 2021-2024.

Of specific importance, the Renovation Wave calls for an increased annual renovation rate of 2% by 2030, up from the current rate of 1%. Additionally, the Renovation Wave[26] suggests more effective use of energy performance certificates via the development of a digital building logbook and smart readiness indicator. The Renovation Wave also highlights the importance of reducing total carbon impact in the buildings sector, calling to develop a 2050 roadmap for reducing whole lifecycle carbon in buildings. Other important parts from the Renovation Wave Action Plan[27] are the introduction of Minimum Energy Performance Standards and extending the requirements on renovating public buildings to all governance levels beyond central governments. It also includes a document presenting support from the EU budget to unlock investment into building renovation.[28]

Smart readiness indicator scheme (SRI)[29]

The smart readiness indicator (SRI) is a tool introduced by the European Commission with the aim to facilitate and support the smart transformation of Europe's building stock. Two provisions of the Energy Performance of Buildings Directive relate to the smart readiness indicator: Article 8 and the corresponding Annex IA. The SRI is voluntary and it is up to the Member States to decide whether to introduce it or not on their territory and make it available.

The SRI aims at indicating the potential smartness of a property by evaluating the "functionality level" of various services present in a building. These services are grouped into 10 domains: (i) heating, (ii) domestic hot water, (iii) cooling, (iv) mechanical ventilation, (v) lighting, (vi) dynamic building envelope, (vii) energy generation, (viii) demand side management, (ix) electric vehicle charging, and (x) monitoring and control.

Technical building systems (TBS)

Technical building systems (TBS) refer to the equipment for space heating, space cooling, ventilation, domestic hot water, built-in lighting, building automation and control, on-site electricity generation of a building or a combination thereof, including those systems using energy from renewable sources.

[25] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en
[26] https://eur-lex.europa.eu/resource.html?uri=cellar:0638aa1d-0f02-11eb-bc07-01aa75ed71a1.0003.02/DOC_1&format=PDF
[27] https://ec.europa.eu/energy/sites/ener/files/renovation_wave_strategy_-_annex.pdf
[28] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020SC0550&from=EN
[29] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/smart-readiness-indicator_en

The Transposition of EU law

Transposition of EU law is the process under which EU Member States make EU directives national law.

Trigger point

A trigger point is a key juncture in the life of a building (for example sale, change of use, maintenance work, or rental), in which renovations or a building intervention is typically happening regardless of energy efficiency considerations, therefore making it an ideal time to execute energy performance upgrades as well.

The Energy Performance of Buildings Directive provision linked to the Long-Term Renovation Strategy, states that Member States must identify cost-effective approaches to renovation considering potentially relevant trigger points in the life cycle of a building. The directive also addresses fire safety and risks related to intense seismic activity that affect energy efficiency renovations and the lifetime of the buildings, indicating another way how non-energy related renovation can be combined with energy efficiency upgrades.

Wider Benefits

The concept of wider benefits (sometimes also referred to as multiple benefits), in relation to energy efficiency, means that energy efficiency has other/additional benefits to energy savings. Benefits include environmental, social, and economic benefits (such as improved health, safety, and air quality).

This approach seeks to expand the perspective of energy efficiency beyond traditional measures of reduced energy demand and lower greenhouse gas emissions by identifying and measuring its impacts across different spheres. The Energy Performance of Buildings Directive provision linked to the Long-Term Renovation Strategy, states that Member States must identify wider benefits from renovation.

United States

American Rescue Plan Act of 2021 (ARPA)

ARPA is a $1.9 trillion recovery package signed into law by President Biden in March 2021 with the aim to accelerate the economic recovery from the impacts of the Covid-19 pandemic and associate recession. The package will deliver $350 billion to state, local and tribal governments and may be used to assist hard hit small businesses, industries and for investments in infrastructure.

ASHRAE

The American Society of Heating, Refrigerating and Air-Conditioning Engineers is a private sector professional association that has developed a number of model codes and procedures that have become standard in the U.S. In particular the ASHRAE model codes for indoor air quality and ventilation are standards in many jurisdictions and the ASHRAE Procedures for Commercial Building Energy Audits is the typical reference point for regulations requiring energy audits.

Biden Infrastructure Bill of 2021

The infrastructure bill is a $1 trillion package that aims to rebuild aging transportation infrastructure as well as fund new climate resilience and broadband internet initiatives. The Bill still must pass through the House of Representatives before it is formally enacted. In terms of energy and sustainability policy, the bill includes:

- Billions of dollars are allocated for investing in protecting homes from extreme weather
- $73 billion is allocated to update the electricity grid to support increased renewable energy supply
- $66 billion investment in railroad infrastructure
- $7.5 billion for electric vehicle charging stations
- $17.5 billion for clean buses and ferries
- $15 billion to remove lead water pipes

Building Performance Standards (BPS)

Building Performance Standards, also called Building Energy or Emissions Performance Standards, are the newest type of building performance policy and have been passed in 6 U.S. jurisdictions to date. These standards require that buildings meet specific energy or emissions performance levels that increase over time, on a prescribed reporting schedule.

These ordinances set specific energy or emissions targets using a range of metrics including energy utilization intensity (EUI), greenhouse gas emissions intensity, or third party scoring such as ENERGY STAR for existing buildings over a certain size. Owners are required to implement whatever measures necessary to meet those targets or face fines. More information about building performance standards can be found at imt.org/bps.

Green Building Certifications

In the U.S. voluntary green building certifications have had a large impact on promoting best practices in sustainable new construction and renovations. These green building certification systems are developed and run by private organizations, usually non-profit NGOs, but are often referenced in green building laws, particularly around new construction, at the municipal level. Key certifications include the Leadership in Energy and Environmental Design (LEED), Passive House, Living Building Challenge, and ASHRAE.

Leadership in Energy and Environmental Design (LEED)

LEED is the most prominent voluntary private sector green building rating system. Developed by the non-profit the U.S. Green Building Council (USGBC) LEED offers four levels of certification (Certified, Silver, Gold, Platinum) across a number of different project types (new construction, renovation, core and shell, tenant fit out, operations and maintenance, and master plans). Projects are scored based off of a range of green building attributes including energy efficiency, connectivity to transit and urban density, site conservation, building waste management, and indoor air quality. While LEED is extremely popular and widely adopted in the US it is not strictly an energy performance or emissions reduction program, and criticism has been raised in the past that it doesn't go far enough in these areas.

Passive House

There are two main passive house certifications operating in the U.S. the Passive House Institute (Passivhaus-Institut) which is aligned with the parent organization in Germany and the Passive House Institute U.S. (PHIUS). Both rely on similar design principles and approaches to performance-based building codes. The main difference is PHIUS is calibrated to the differing U.S. climate zones (depending on the measure there are about 8 climate zones in the U.S. ranging from subarctic to subtropical, compared to far less climate diversity in Europe) while the Passive House Institute does not. It's difficult to say which is more widely used in the U.S. though there is reason to believe PHIUS is beginning to be adopted more regularly.

Living Building Challenge

Sometimes described as "the next generation of LEED" the Living Building Challenge is designed to be just that, a challenge. The Challenge sets several difficult to achieve sustainability goals for building (onsite net zero energy, onsite net zero water, onsite zero waste) and pushes projects to achieve as many as possible. No project has to date achieved all goals, but the challenge has assisted in pushing the bounds of best practices in the U.S. sustainability market.

Climate Action Plans (CAPs)

CAPs are a common feature of U.S. municipal climate policy. These are documents developed between city staff, elected officials, and community stakeholders that aim to detail the steps the municipality will take to reduce greenhouse gas emissions and otherwise adapt to climate change as needed. Caps are not mandatory.

Department of Energy (DOE)

The DOE is a cabinet level department, the head of which is appointed by the President. The DOE is responsible for energy conservation, energy research, energy production, as well as the nation's nuclear programs. The agency was formed in 1977 following the OPEC oil crisis.

Disinvested Communities

Disinvested Communities is a term used to describe lower income, working class, oppressed racial minority, and other communities subject to historic disinvestment in the United States. These often overlap with Frontline Communities.

Energy Burden

Energy burden describes the higher share of income that low-income households spend a larger portion of their income on home energy costs (e.g., electricity, natural gas, and other home heating fuels) than other households spend." One recent study found that low-income households face an energy burden three times higher than other households.

High energy burdens can threaten a household's ability to pay for energy, and force tough choices between paying energy bills and buying food, medicine, or other essentials.[30]

Energy codes and standards

Energy codes typically refer to a certain version of the **International Energy Conservation Code (IECC)** with or without specific amendments, for residential and commercial buildings are adopted at the state level. Codes are typically enforced at the local or municipal level but adopted at the state level. Types of Local Building Performance Policies:

Benchmarking Policies have been adopted in the U.S. by over three dozen cities and other jurisdictions. These policies at minimum require private sector buildings of certain sizes and typologies to report whole building energy data to the local government annually. The local government can then publicly disclose that data if a transparency component is part of the benchmarking law. The intent behind these ordinances is that by reporting and disclosing this data building owners become more aware of their overall energy performance, how their performance stacks up next to the competition, and other actors in the market gain valuable data as well. Many benchmarking requirements include additional features such as;

Energy Audit Requirements mandate that building owners must perform energy audits or other forms of professional energy performance assessments periodically, such as every 5 to 10 years depending on jurisdiction. Energy Audits typically identify both low cost and capital intensive upgrade opportunities and analyze energy savings against payback metrics. These requirements do not mandate that action is taken, but again the intent is to provide building owners with detailed information about how to improve building performance.

Retro-Commissioning or Retuning Requirements mandate that building owners must perform a building system re-tuning or retro-commissioning process periodically, such as every 5 to 10 years. These processes are intended to identify operational improvements and other low cost building upgrades.

[30] https://www.energy.gov/sites/default/files/2019/01/f59/WIP-Energy-Burden_finalv2.pdf

Labeling Requirements mandate that building owners must display in a publically visible location on the property, an energy score or ranking based on benchmarked data.

Energy Services Companies (ESCOs)

ESCOs are a common type of energy retrofitting contractors that finance the cost of retrofits through the energy cost savings of the completed efficiency measures. There are various means by which ESCOs can capture these energy cost savings from clients.

Energy Star

Energy Star is a programme run by the EPA and DOE to promote energy efficiency. The Energy Star label is used to distinguish high performing products, such as appliances, as well as buildings, homes, and industrial facilities. The Energy Star platform and performance rating is a free, online tool that allows building owners and managers to benchmark energy performance against buildings with similar characteristics and had served as a critical platform for implementing benchmarking and BPS policies nationally.

Environmental Protection Agency (EPA)

The EPA is an independent executive agency, formed in 1970, with a mandate to conduct environmental research, education and maintaining standards including the Clean Air Act and Clean Water Act. The head of the EPA is appointed by the President.

Frontline Communities

Frontline Communities are those that are likely to suffer the most severe impacts of climate change and other environmental harms. These can include communities in low-lying areas that face an increased risk related to sea level rise, those in areas particularly subject to extreme urban heat island effects, and those communities near any number of environmental health hazards such as near waste incinerators. In the U.S. these communities often correlate with lower income, working class, and oppressed racial minority populations.

Green Leasing

is a best practice where language and requirements that improve the environmental performance of a leased space are formally written into commercial lease agreements. Green Leasing can include requirements to cost share on energy efficiency retrofits or otherwise have the tenant take on certain responsibilities to improve the energy usage of their operations. The intention is to overcome the 'split-incentive' problem, where building owners are responsible for paying for energy saving upgrades but the benefits go to tenants, or vice versa. More information about green leasing best practices can be found at the Green Lease Leaders Green Lease Library.

Governance

Energy policy in the United States is determined by the interaction of laws from the federal, state, and local levels.

Federal Government

At the Federal level, energy policy is set through the Executive (Office of the President) and Legislative (Senate and House) branches and implemented by one of several departments, including: the Department of Energy, the Department of Housing and Urban Development and the Environmental Protection Agency.

Local Government

The role of municipal or local government fills the gaps that aren't fulfilled by the state or federal governments. Local governments can include counties and within them the major cities, towns, and other municipalities. There are often varying and overlapping jurisdictions of power between the different levels of government, but typically if a particular area or service isn't pre-empted by the federal, state, or county governments, it's the responsibility of the municipalities. Usually these include standard services of police, fire, waste management, planning, and school districts. Municipal level environmental regulations tend to be limited, but can have impact on issues such waste management, building codes, and transit infrastructure.

The structure of local government varies considerably. Traditionally there are two main elected bodies, the city council that acts as the legislative and the mayor the executive. The powers for either body vary considerably between municipalities, with some cities being "strong mayoral" or "weak mayoral" depending. Environmental departments are often under the auspices of whatever is the executive administration for the city which often has considerable overlap with other departments including transportation, public health, parks, and planning.

State Government

State governments are structured to mirror the structure of the Federal government, and include legislative, executive, and judicial branches. However, the structure follows individual sub-structures as laid out in the states' constitution. The chief executive at the state level is the governor.

Typically, most state governments include departments, authorities or agencies that lead implementation in the following areas related to energy and sustainability policy: Energy, Environment, Housing, Economic Development, and Emergency Management.

Home rule states are those which allow cities and municipalities to pass laws as desired, if those laws align with the state constitution and existing state laws.

Dilllon's rule states that on the other hand, are when cities and municipalities have limited authority to pass laws and must obtain permission from the state legislature to pass laws that are not specifically permitted. This is particularly important in thinking about a municipality's ability to pass ambitious building performance policy.

Housing and Urban Development (HUD)

HUD is a cabinet level department, the head of which is appointed by the President. HUD's mission is to implement national policies and programs around housing, improve communities and enforce fair housing laws. HUD's programs include major government housing financing entities Fannie Mae and Freddie Mac. HUD also oversees subsidies for affordable housing programs including Section 8. HUD was established in 1955.

International Energy Conservation Code (IECC)

The International Energy Conservation Code (IECC) is a building code authored by the International Code Council. It has been adopted by many states and municipal governments in the United States in order to establish minimum design and construction requirements for energy efficiency.

Law-making in the US

In the US laws are made at either the federal or state level. Congress is the legislative body at the federal level and new laws can be proposed and voted on by both legislative branches - the House of Representatives and the Senate. State legislatures make state laws in line with state constitutions.

Living Building Challenge

Sometimes described as "the next generation of LEED" the Living Building Challenge is designed to be just that, a challenge. The Challenge sets several difficult to achieve sustainability goals for building (onsite net zero energy, onsite net zero water, onsite zero waste) and pushes projects to achieve as many as possible. No project has to date achieved all goals, but the challenge has assisted in pushing the bounds of best practices in the U.S. sustainability market.

New Green Deal

In the U.S. the Green New Deal is a Congressional proposal that calls on the federal government to reduce and eventually eliminate its dependence on fossil fuels and curb planet-warming greenhouse gas emissions across the economy. It also aims to guarantee new high-paying jobs in clean energy industries. Its main goal is to bring U.S. greenhouse gas emissions down to net-zero and meet 100% of power demand in the country through clean, renewable, and zero-emission energy sources by 2030.

Property Assessed Clean Energy (PACE)

PACE is a financing model for energy efficiency and renewable energy retrofits that uses the property value of a building as the collateral for the retrofits. PACE financed retrofits are paid back through liens on a property's taxes. While popular in some states at assisting in opening up new avenues for financial cash flows, concerns about this model have been raised in recent years. There have been cases of private sector PACE providers using predatory lending practices in promoting their services, leading to home foreclosures.

Public Utility Commissions (PUCs) or Public Service Commissions (PSCs)

PUCs/PSCs are the state level governing bodies that regulate the rates and services provided by public utilities, including natural gas and electric utilities. The commissions are typically appointed by the state's governor, while some are appointed by the state legislature and others are elected.

Zero Energy Buildings (ZEB) or Net Zero Energy Building (NZE)

A building characterized by zero net energy consumption and zero carbon emissions calculated over a period of time.

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