

WORKING PAPER
JANUARY 2021
FSET PROJECT, UT ENERGY INSTITUTE



ASSESSING THE POLITICAL FEASIBILITY OF DECARBONIZING THE U.S. BUILDINGS SECTOR

Sarang Shidore and Joshua Busby



The University of Texas at Austin
Energy Institute

Sarang Shidore is a Senior Research Analyst at the Lyndon B. Johnson School of Public Affairs at the University of Texas at Austin, with expertise and multiple publications in geopolitical risk and the energy-climate nexus.

Joshua Busby is an Associate Professor at the LBJ School of Public Affairs at the University of Texas at Austin and has published widely on energy, climate, and security for both academic and policy audiences.

Assessing the Political Feasibility of Decarbonizing the U.S. Buildings Sector

Sarang Shidore and Joshua Busby
sarang@utexas.edu, busbyj@utexas.edu

Working Paper
January 2021
FSET Project
UT Energy Institute

[1] This working paper is supported by the Energy Institute and the Fueling a Sustainable Energy Transition (FSET) research initiative. These findings are based on the research of the authors and do not reflect the views of EI. The authors obtained necessary copyright permissions for the figures used in the paper from other sources.

ABSTRACT

This working paper lays out plausible policies for decarbonizing the U.S. buildings sector at the federal and state level under a Biden administration which took office in January 2021.

Most of our analysis focuses on the political feasibility of passing legislation through Congress. Our working assumption is that changes enacted through legislation are more likely to endure and survive partisan changes in the U.S. presidency. We recognize that the Biden administration will take (and already has taken) executive action to pursue its climate agenda, including in the buildings space. Our analysis could help surface which areas may be harder to pursue through Congressional action.

The buildings sector contributed 39% of net US energy-related emissions by end-use in 2019 (EIA, 2020) [2]. Thus, it is a key area for emissions reductions. Reducing the carbon footprint of buildings primarily involves increasing energy efficiency (through enhancing building and appliance codes) and total electrification of space and water heating especially in existing real estate stock. Covid recovery efforts provide an opportunity for major investments in these areas. But even more ambitious policies will be needed to get the sector to net zero levels by mid-century.

Presidential candidate and now President Joseph Biden proposed several specific policies that address this sector. Congress has also proposed and even passed legislation for the sector. Bipartisan support exists for extending tax credits for efficiency improvements, upgrading federal buildings, more spending on low-carbon weatherization programs, and stricter building standards.

[2] End-use based consumption includes both direct emissions through fossil fuel combustion at site and indirect emissions through electricity consumption. In 2019, about 30% of the total buildings energy consumption was direct and about 70% indirect.

As part of its wider Covid emergency response, Congress passed in December 2020 the Energy Act of 2020 which included a number of measures for energy conservation and efficiency in the buildings sector including weatherization assistance and tax credits for home and commercial buildings efficiency.

Extending and expanded these measures will likely be a priority for the Biden administration, made somewhat easier by the Democrats securing a narrow Senate majority by winning both Georgia run-off elections in January 2021. However, stronger measures such as mandating all-electric buildings face greater resistance from fossil fuel and homebuilder interests. Moreover, states and local government have a major role in this sector. Some states, chiefly on the two coasts, are ahead of others on buildings decarbonization.

EXISTING FEDERAL POLICIES

The following are some of the federal programs already focus on greening buildings:

- Weatherization Assistance Program (WAP) – dating from 1976, it funds states and local communities for energy efficiency upgrades to low-income single-family homes (DoE, undated). It weatherizes approximately 35,000 homes every year. This was increased to 1 million homes in the 2010-12 period during the Great Recession. A total of 7 million homes have been weatherized under this program.
- Energy Star Program – Encompasses various energy efficiency initiatives managed jointly by EPA and DOE for energy efficiency of appliances and buildings (DOE, undated-c). These include the popular Energy Star scheme for the rating, testing and verification procedures, for appliances and electronics, a similar rating system for buildings and the Energy Star Portfolio Manager, a free online software tool that enables property owners and managers to track energy and water use across their properties (EPA, undated; Energy Star, undated).
- Energy Efficient Mortgage Program – Administered by HUD, the program enables homebuyers or homeowners to finance energy efficient home improvements, including solar energy systems (HUD, undated).

FEDERAL LEGISLATIVE PROPOSALS

Several bills have been introduced in Congress on enhancing energy efficiency of buildings (figure 1). Most of them are Democrat-sponsored, though a few have Republican backers. Bipartisan convergence is likeliest in extending tax credits for energy efficiency retrofits and new builds, improving model energy codes, supporting WAP, and enhancing efficiency of federal buildings. Since many Republicans have supported a push for infrastructure spending, a major building program of new sustainable homes may also attract some conditional Republican support.

Chamber	Name of Bill	Key Sponsors	Key Elements	Full Text
House	GREEN Act of 2020	Thompson-48 others (Democrats)	Extends ITC to renewables technologies deployed in buildings - 30% until 2025, phased down to 22% in 2027; extends energy efficiency building tax credits 25C, 25D, 45 L, 179D till 2025.	https://www.congress.gov/bill/116th-congress/house-bill/7330
Both	HOPE for HOMES Act 2020	Van Hollen-Shaheen-Coons-Welch-McKinley (Democrats)	\$500 mn to develop retrofit contractor training, \$5 bn for rebates to homeowners up to \$4000 each to add insulation and reduce energy use by up to 40% until 2025.	https://www.congress.gov/bill/116th-congress/senate-bill/4052
Both	Energy Savings and Industrial Competitiveness Act	Shaheen-Portman-Hassan-Welch (Democrats)	Total of \$850 mn for strengthening national building codes, energy efficiency goals for federal government, homebuilder/contractor grants, and financing energy efficient commercial buildings.	https://www.congress.gov/bill/116th-congress/senate-bill/2137
House	Energy Savings and Building Efficiency Act of 2019	Schrader-Flores-Correa-Peterson-O'Halleran-Norman (Bipartisan)	Calls for strengthening DOE building code, but such initiatives must have a payback period of 10 years or less, NAHB-backed	https://www.congress.gov/bill/116th-congress/house-bill/3586/
Both	Weatherization Enhancement and Local Energy Efficiency Investment and Accountability Act of 2019	Coons-Collins-Tonko-Rush-Kaptur (Bipartisan)	\$350 mn for reauthorization of Weatherization Assistance Program through 2024, includes renewables technologies, allows re-weatherization of homes 15 years after past weatherization services	https://www.congress.gov/bill/116th-congress/senate-bill/983/
Both	Green New Deal for Public Housing Act 2019	Sanders-Ocasio-Cortez (Democrats)	\$180 bn over 10 years for energy retrofits including electrification and renewables in 1.2 million public housing units, repeals Faircloth Amendment.	https://www.congress.gov/bill/116th-congress/senate-bill/2876
Both	Home Energy Savings Act AND New Home Energy Efficiency Act	Hassan-Collins-Gomez-Kelly (Bipartisan)	Extend and enhance energy efficiency tax credits for retrofits and new homes (sections 25C and 45L). 25C credit extended to 2026 & enhanced to 15% and cap to \$1200. 45L credit extended to 2022 & enhanced to \$2500.	https://www.congress.gov/bill/116th-congress/senate-bill/2588 AND https://www.congress.gov/bill/116th-congress/senate-bill/2595
Both	Smart Building Acceleration Act	Cantwell-Welch (Democrats)	Requires DOE to implement smart building technology in federal buildings, survey smart buildings nationwide and evaluate costs/benefits, and initiate R&D on barriers to advanced building technologies integration.	https://www.congress.gov/bill/116th-congress/senate-bill/2335
Both	Smart Cities and Communities Act	Cantwell-Lujan-DelBene (Democrats)	Authorizes \$1.1 billion over five years for local smart city technology initiatives, work force training, fosters collaboration between cities.	https://www.congress.gov/bill/116th-congress/senate-bill/1398
Both	Federal Energy and Water Consumption Act	Murkowski-Welch-Kinzinger-Moulton (Bipartisan)	\$180 mn for reducing energy efficiency of federal buildings by 2.5% per year until 2030, data collection and public reporting of federal buildings efficiency progress.	https://www.congress.gov/bill/116th-congress/senate-bill/1857
House	Mechanical Insulation Installation Incentive Act of 2019	Sanchez-Suozzi-Reed (Bipartisan)	Provides a tax credit for 10% of the labor costs of installing mechanical insulation on property	https://www.congress.gov/bill/116th-congress/house-bill/5166/
Senate	All-Electric Homes Act of 2019	Markey-Whitehouse (Democrats)	Provides a tax credit for contractors that construct new all-electric homes of \$5000 per single-family home and \$1750 per unit of a multi-family property.	https://www.congress.gov/bill/116th-congress/senate-bill/1197/

Figure 1: Key bills introduced in Congress for the buildings sector

The Energy Act of 2020 included all or part of 37 Senate bills including a number of those in the table above (U.S. Senate, 2020a). In the energy efficiency space, bills incorporated into the Energy Act of 2020 included:

- S. 253, Streamlining Energy Efficiency for Schools Act
- S. 983, Weatherization Enhancement and Local Energy Efficiency Investment and Accountability Act
- S. 1857, Federal Energy and Water Management Performance Act
- S. 1706, Energy Savings Through Public-Private Partnerships Act
- S. 2425, CHP Support Act
- S. 2137, Energy Savings and Industrial Competitiveness Act
- S. 2799, NEWS Act (Nexus of Energy and Water for Sustainability)
- S. 2335, Smart Building Acceleration Act
- S. 2978, Energy and Water Research Integration Act
- Amdt. 1375, Electrochromic glass

Title I on efficiency in the Act is the most relevant to buildings and included coordination of federal energy efficiency efforts for schools (section 1001), reporting and performance contracts for energy and water efficiency in federal buildings (section 1002), metrics for energy efficient data centers (section 1003), measures for more energy efficient information technologies (section 1004), rebate systems for energy efficient motors and transformers (sections 1005 and 1006), a smart buildings program for federal buildings (section 1007), enhanced ceiling fan efficiency standards (section 1008), exploration of the benefits of electrochromic glass (section 1009), integrated water and energy conservation programs (sections 1010 and 1014), reauthorize Weatherization Assistance Program through 2025 (section 1011), establish the Federal Energy Management Program (FEMP) in law (section 1012), and an amended program on Combined Heat and Power (section 1013) (U.S. Senate, 2020b).

Among the other important buildings-related measures in the Act were authorization of \$1.7 billion for the Weatherization Assistance Program, making permanent a tax deduction for commercial energy efficiency under section 179D of the Internal Revenue Code (Shearman & Sterling LLP, 2020), and providing tax extensions for noncommercial energy efficiency under section 25C (for one year) and energy efficient homes under section 45L (for one year) (Wilson Sonsini Goodrich & Rosati, 2020). In addition, the investment tax credit for solar under section 25D, which had been scheduled to drop from 26% to 22% in 2021, will remain at 26% for another two years (Pickerel, 2020).

Despite passage of the Act, there is much unfinished business in the buildings space. In addition to pursuing measures that were not included in the Act, the Biden administration will have to seek appropriation of the funds that were authorized for weatherization and it might seek to extend some of the tax credits that will expire in a year or two.

PRESIDENT BIDEN'S PROPOSALS

During his candidacy for president, Joseph Biden promised to “reducing the carbon footprint of the U.S. building stock 50% by 2035, creating incentives for deep retrofits that combine appliance electrification, efficiency, and on-site clean power generation (and) to identify barriers to help offset the upfront cost of building upgrades and put in place a national program to target a package of affordable energy efficiency retrofits in American homes.” He also committed to “redouble efforts to accelerate new efficiency standards for household appliances and equipment...repair and accelerate the building code process and create a new funding mechanism for states and cities to adopt strict building codes and train builders and inspectors” with a \$10 billion fund for energy efficiency retrofits in housing (Biden, 2020a, 2020c).

As a candidate, Biden promised to “upgrade 4 million buildings and weatherize 2 million homes over 4 years...spur the building retrofit and efficient-appliance manufacturing supply chain by funding direct cash rebates and low-cost financing to upgrade and electrify home appliances and install more efficient windows” as a part of his \$2 trillion infrastructure plan. He also promised to “spur the construction of 1.5 million sustainable homes and housing units,” back technological innovation for “the next generation of building materials” through a new federal research agency focused on the environment similar to ARPA and issue building performance standards to halve the sector’s carbon footprint by 2035 (Biden, 2020b).

ASSESSING POLITICAL FEASIBILITY

We consider federal measures in this section. Rather than consider legislative or campaign proposals individually, we break out key policy elements that emerge from these ideas and assess them for political feasibility. Such policy elements can be classified into three categories at the federal level – mandates & standards, investments, and taxes &

subsidies. These are listed below, with specific policy elements that fall under each category.

1. Mandates & Standards
 - a. Model building performance standards
 - b. Enhanced appliance standards
 - c. Faircloth Amendment repeal
2. Investments
 - a. Sustainable home construction programs
 - b. Smart city investments
 - c. Enhancing efficiency of federal buildings
 - d. Training investments
3. Taxes & Subsidies
 - a. 25C, 45L revival/enhancement
 - b. Solar ITC extension
 - c. Tax credits for building electrification

The logic for the assessments is detailed below, including for two Senate scenarios (namely High-, Medium-, Alignment) with a summary in figure 2 and Appendix A [3]. The outcome of the Georgia run-offs suggests we are in a Medium Alignment scenario. We have also included a column for measures that were included in the Energy Act of 2020.

While we mostly focus on political feasibility of passing legislation, we recognize that the Biden administration will pursue its climate agenda through executive actions, including in the buildings space.

[3] Three scenarios are laid out in detail in a companion working paper in this project focused on clean electricity see (Shidore & Busby, 2020). High Alignment corresponds to a Democratic majority with filibuster removed for legislation. Medium Alignment keeps the filibuster and Low Alignment assumes a Republican-controlled Senate. The High Alignment scenario has been excluded from this document in light of the November 3 election results due to its now low likelihood. Even though Democrats won both Senate seats in Georgia and now have fifty Senators with the vice president able to break the tie, West Virginia Democratic Senator Joe Manchin has ruled out backing the elimination of the filibuster (Broadwater, 2020).

Policy Element	Low Alignment	Medium Alignment	Political Feasibility	Energy Act of 2020
Model building performance standards	✓	✓	High	
Enhanced appliance standards	?	✓	Medium	✓
Faircloth Amendment repeal		?	Low	
Sustainable home construction and retrofits	?	✓	Medium	
Weatherization Assistance Program enhancement	✓	✓	High	✓
Enhancing efficiency of federal buildings	✓	✓	High	✓
Smart city investments	?	✓	Medium	
Training investments	✓	✓	High	✓
25C, 45L revival/enhancement, extension of 179D deduction	✓	✓	High	✓
Solar ITC extension	✓	✓	High	✓
Tax credits for home electrification	?	?	Low	

Figure 2: Political feasibility of buildings policy elements, including likelihoods of actualization in Low- and Medium- Alignment Senate scenarios.

Among one of the first executive orders President Biden issued was one which asks the Department of Energy to review ten rules associated with appliance and buildings efficiency that were promulgated by the Trump Administration. The order also asks the Department of Energy to update standards for four of those rules, including two buildings standards by May 2021 and two appliance standards by June 2021 (White House 2021, National Association of Plan Advisors 2021).

MANDATES AND STANDARDS

Model building performance standards – In the US federal system, building codes (including their energy components) are responsibilities of states [4]. Thus federal government sets model codes, but cannot impose them on US cities and states. However, most states adopt or take their cues from the model codes.

[4] However, Alaska, Hawaii, Kansas, Missouri, Mississippi, North Dakota, and South Dakota do not have state building codes. Arizona, Colorado, and Wyoming have cities driving building codes.

The national model code for residential buildings is the International Energy Conservation Code (IECC), whose latest (2021) version breaks new ground in electrification and efficiency (Urbanek, 2020). The equivalent for commercial buildings is the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1. The DOE's "Building Energy Codes" program helps develop the model code, working with standards bodies such as ASHRAE (DOE, undated). Even though some states are slow to adopt model code updates, aiming for an ambitious and greener model building code has real impacts on energy efficiency and carbon emissions in this sector (DOE, 2016).

House and Senate Democrats have supported tougher building standards and the Biden plan includes them. Republicans and interest groups such as the National Association of Home Builders (NAHB) have supported these goals to an extent with an eye on costs, and the bipartisan proposed "Energy Savings and Building Efficiency Act of 2019" supports this goal as well. Model electrification standards have been proposed by House Democrats (House Democrats, 2020).

Deep electrification moves by some local governments however have run up against natural gas interests and pro-fossil politics (Roth, 2020). For example, the increasing trend of cities in California enacting bans on natural gas use in homes and pushing all-electric building codes (such as the 2021 IECC) has led to a backlash with some states such as Arizona, Louisiana, Oklahoma, and Tennessee acting to forbid such bans in recent legislation (Sierra Club, 2020; Roth, 2020b).

Building performance standards would focus on the carbon footprint of buildings and encourage electrification. Under Section 410 of the American Recovery and Reinvestment Act of 2009, the federal government offered financial incentives (specifically, federal funding of \$3.1 billion leveraged up to a factor of 10 through additional state and

private resources) to states that adopted the most recent building energy codes (U.S. Congress, 2009; EESI, 2010). This precedent can be built upon and extended to ambitious performance standards and greater electrification with an implied net-zero target in a Covid-19 recovery act that is expected to pass in Congress in early 2021. However, the commitments states made while accepting ARRA funding under Section 410 faced major delays in compliance in many states, with spending also lagging (Facility Executive, 2009; NASEO, 2011; EESI, 2010) A future such disbursement under a Covid-19 recovery bill should have tougher monitoring and compliance components built into it. ***Political Feasibility - High***

Enhanced appliance standards – This is an area where the federal government has most of the power and influence compared to state and local actors. Federal action has been led jointly by the DOE and EPA through their Energy Star program (DOE, undated-c). The first step would be reversing Trump relaxation on rules governing light bulb standards and changes to the “process rule” governing the establishment of standards more generally. Appliance companies have opposed Trump’s relaxation of standards for dishwashers, for example, so industry will likely be supportive of Biden’s reversal (New York Times, 2019). Funding for Energy Star has shrunk from \$54 mn in 2010 to \$38 mn in 2020, a trend which Congress and the White House can reverse and increase funding substantially (Building Performance Association, 2020; ASHRAE, 2020). House Democrats have passed increases, but Republican support on this relatively low-cost budget item is unclear. Industry too may not be fully on board for tightening standards beyond the Obama-era levels. The Energy Act of 2020 included enhanced standards for motors, transformers, and ceiling fans, which we coded above as consistent with enhanced appliance standards, but there are likely a raft of other appliance-specific measures that could be pursued, included enhanced efficiency of household appliances but also measures to encourage electrification of ovens and dryers, which are often powered by natural gas. ***Political Feasibility - Medium***

Faircloth Amendment – The Faircloth Amendment of 1998 forbids federal funding for public housing beyond a cap. Biden has generally favored private-sector leadership in housing and supported a voucher program rather than direct public housing. Progressive Democrats however succeeded in getting the House to pass legislation to abolish the Faircloth Amendment, envisioning a direct federal role for affordable home construction, and therefore the control needed for such homes to conform to the highest efficiency standards. Republicans would strongly oppose any such move and it is unclear if Biden would shift his position on public housing. *Political Feasibility – Low*

INVESTMENTS

Sustainable Home Construction and Retrofits - The Biden plan calls for the construction of 1.5 million sustainable homes, though this will be through market-oriented approaches with “Section 8” vouchers for low-income dwellers. Biden proposes to make such vouchers an entitlement, which will speed up building of such lower-carbon homes. This will be a part of any infrastructure spending authorized by Congress, and several Republicans have backed such spending. Putting conditions of sustainability for such funding may gather Republican support, given support for some of them for WAP reauthorization (see below); however, upgrading this benefit to an entitlement is likely to spark Congressional opposition, perhaps even from centrist Democrats. *Political Feasibility – Medium*

WAP enhancement – This popular program for weatherization of low-income homes only covers 35,000 homes annually, but its enhancement is the focus of a bipartisan bill in Congress (figure 1). Biden has committed to weatherizing 2 million homes in the next four years (as well as upgrade 4 million commercial buildings), and this policy element aligns both with infrastructure and job creation goals that could draw sufficient Republican support. \$1.7 billion for this program was authorized in the Energy Act of

of 2020 what additional measures might be pursued, though appropriating funds for this purpose under an infrastructure spending bill is likely.

Political Feasibility – High

Smart City investments – Smart Cities are conceptualized as next-generation urban planning designs that use technology and sustainability at their heart. Urban planning is a key part of greener buildings, though this area is largely under state and local control. Democrats have proposed smart city legislation with significant federal funding (figure 1) but considering the political reality of the Republican base living in exurbs and rural America, Republican support for substantial funding for urban renewal is up in the air. This too might be folded in a wider infrastructure spending proposal. ***Political Feasibility – Medium***

Training investments – Training for contractors and other participants in greening of buildings finds a mention in more than one Congressional bill and is a part of the Biden plan. The investments involved are modest and given the push for a jobs bill in the new Congress, this has a high chance of realization. ***Political Feasibility - High***

TAXES & REBATES

25C, 45L, 179D revival/enhancement – A number of measures in the tax code encourage energy conservation. Sections 25C and 45L respectively provide tax credits for energy retrofits (10% of installed cost up to a maximum of \$500) and new construction (\$2000 per unit). These tax credits expired in 2011, and their revival and enhancement is the focus of two bipartisan bills. It is also a core part of the Biden plan. Section 179D allows a taxpayer to deduce the cost of energy efficient commercial property, not to exceed \$1.80 per square foot. Until the Energy Act of 2020 made this deduction permanent, the 179D deduction was only for property in service prior to December 31, 2020 (Shearman & Sterling LLP, 2020). The chances of these proposals being implemented were assessed as high even before the Energy Act of 2020 was passed to include them.

Given the short extension of these tax credits, one possibility is their extension for longer duration. ***Political Feasibility – High***

Solar ITC extension – This policy element has been considered in a companion working paper in this series (Shidore & Busby, 2020a). It applies as much to homeowners for distributed solar system as to large-scale solar farms. A question for the Biden administration is whether a further extension beyond the two year extension provided by the Energy Act of 2020 is desirable. ***Political Feasibility – Medium***

Tax credits for home electrification – Deep electrification of homes, specifically in space and water heating, is a key requirement for achieving Biden’s goal of a 50% reduction of buildings emissions by 2035. It is also the most cost-effective way to do so (Dyson et al., 2020). Electrification technologies such as heat pumps are highly competitive in many U.S. geographies (Rocky Mountain Institute, 2018). Their high efficiencies will reduce carbon emissions as compared to natural gas for 99% of U.S. users (Rocky Mountain Institute, 2020). Considering the political pushback against bans on gas use in new homes with even some pro-climate Democrats among the opponents (Roth, 2020a, 2020b), tax credits may have a better chance of making it in any final legislation. Depending on how they are structured, tax credits can help greatly in scaling up electrification.. Prominent Democrats have proposed legislation for tax credits to contractors who build new all-electric homes (figure 1), but Republican support is still doubtful due to anxieties over impacts on natural gas demand. Homebuilder interests also often resist quicker energy efficiency adoption (Urbanek, 2019). ***Political Feasibility – Low***

STATE AND LOCAL ACTION

The buildings sector is particularly suited to state and local government action, since adoption of building codes and their enforcement primarily falls upon these levels of government. In addition, states and cities can and do offer their own programs on incentivizing decarbonization.

The state of California is by far the leader on pushing decarbonization in buildings. Its latest and ambitious building energy code requires all new residential construction from 2020 to be net-zero by mandating rooftop solar panels for new construction from 2020 (California DGS, undated) and higher-efficiency insulation. There are also provisions for retrofits of existing commercial and state buildings. Nebraska, Illinois, Massachusetts, Maryland, Nevada, and Ohio are the other states adopting strong building energy codes (ACEEE, 2019, 73)

Other state legislatures and governors are specifically targeting heat pump scale-up. Maine passed a law in 2019 aiming for 100,000 heat pump installations in the state by 2025, expected to reduce heating bills between \$300 and \$600 a year per home (State of Maine, 2019; Gerdes, 2019). The program offers rebates of \$500-\$750 for up to two heat pumps per home. Massachusetts recently recommended a target of converting 40% of its homes (one million in number) to heat pumps by 2030 (State of Massachusetts, 2020). Colorado's recent GHG Pollution Reduction Roadmap targets 200,000 homes (i.e., 12% of the total in the state) for such conversion (State of Colorado, 2020). Washington, Colorado, Hawaii, and Nevada passed tougher state appliance standards (ACEEE, 2019).

Cities in California, Washington, New York, and Massachusetts are the leading edge of electrification by passing laws incentivizing or requiring all-electric new buildings in the past two years, despite opposition from homebuilder and natural gas interests (McKenna et al., 2020).

The American Council for and Energy Efficient Economy releases an annual scorecard for states, which includes scores (rated between 1 and 8) on building energy efficiency. The latest (2019) score lists California, Connecticut, Massachusetts, Pennsylvania, Texas, New York, and Washington as the top eight states in that order, with a score of 6.5 or higher (ACEEE, 2019, 80).

CONCLUSION

The Covid recovery spending legislation and budgeting processes provide an opportunity to greatly increase federal support for decarbonizing the buildings sector. However, even if all or most proposed Congressional measures are enacted, President Biden’s promise of cutting the carbon footprint of the buildings sector by half by 2035 will still be an uphill climb. A major reason is so much of action in this sector depends on states and local communities. Three key technologies can be most gainfully targeted – compressors (mainly in refrigerators), lighting (especially commercial) and addition of low-emissivity glazing for windows [5]. Thus appliances are key and could use more focus. Lighting standards currently may encourage excessive lighting, due to the strong influence of the lighting industry.

The other major area of enhanced action is greatly accelerating the adoption of heat pumps. Heat pumps are now economically competitive even in states with very cold climates. Scale-up will require overcoming policy barriers and countering fossil interests.

The big take-away is that total electrification of new, but especially existing, buildings and upgrading to the most efficient energy codes are critical actions for decarbonization in this sector – with states and local communities in the driver’s seat on adoption and enforcement. These steps are still work-in-progress.

However, ambition can be raised even beyond these approaches. The next step in technological evolution is positioning a group of all-electric buildings as a “virtual power plant” – i.e., “a network of self-optimizing energy resources that unbundles the centralized utility and distributes it

[5] Interview with leading buildings sector academic, Nov. 6, 2020.

across the grid” (Oberhaus, 2020). This approach is being tried out at small scales in the U.S., but is still far from scale-up. Another area for improvement is embodied energy, i.e. the energy that goes into manufacturing construction materials and constructing a building. It has been estimated that at least 30% of emissions from a building come from embodied energy [6]. This can be mitigated with low-carbon construction materials.

Technology-heavy measures are important but will need to be complemented by other actions to achieve truly deep decarbonization in buildings. A challenge is that even as emissions per unit area is going down, the average size of buildings has gone up, substantially negating the gains from efficiency. Major improvements in carbon footprint can be achieved by focusing more on the human body than the building – for example, implementing localized heating and cooling directed at individual occupants rather than trying to uniformly cool the entire enclosed space [7]. All this calls for designing new building standards on a per capita rather than per area basis, which would be a paradigm shift. The focus could also be more on reforming energy codes than building codes; the former are promulgated by states and are easier to change, being less subject to veto powers of unions [8].

To conclude, a sector that makes up about 40% of net U.S. energy demand requires far greater attention than it has received thus far. Electricity and transport hog most media headlines in decarbonization, but the United States will not achieve net zero by the middle of this century unless the buildings sector gets much more federal, and especially local, attention.

[6] Ibid.

[7] Ibid.

[8] Ibid.

REFERENCES

ASHRAE (2020), “Energy Star Letter,” <https://www.ashrae.org/file%20library/about/government%20affairs/public%20policy%20resources/fy2021-energy-star-letter---final.pdf>

ACEEE (2019), “The 2019 State Energy Efficiency Scorecard,” American Council for Energy Efficient Economy, <https://aceee.org/research-report/u1908>

Biden, Joseph (2020a), “The Biden Plan for a Clean Energy Revolution and Environmental Justice,” <https://joebiden.com/climate-plan/>

Biden, Joseph (2020b), “Climate Change: The Biden-Harris plan to create union jobs by tackling the climate crisis,” <https://buildbackbetter.com/priorities/climate-change/>

Biden, Joseph (2020c), “The Biden Plan for Investing in Communities Through Housing,” <https://joebiden.com/housing/>

Broadwater, Luke (2020), “‘We’ve Harmed the Senate Enough’: Why Joe Manchin Won’t Budge on the Filibuster,” The New York Times, <https://www.nytimes.com/2020/11/30/us/politics/joe-manchin-interview.html>

Building Performance Association (2020), “Appropriations Watch: Fiscal Year 2021 & Key EE Programs,” <https://www.building-performance.org/news-and-resources/blog/appropriations-watch-fiscal-year-2021-key-ee-programs>

California DGS (undated), “California Building Standards Code,” <https://www.dgs.ca.gov/BSC/Codes>

DOE (undated-a), “Weatherization Assistance Program,” <https://www.energy.gov/eere/wap/weatherization-assistance-program>

DOE (undated-b), “Building Energy Codes Program,” <https://www.energycodes.gov/>

DOE (undated-c), “Energy Star,” <https://www.energy.gov/eere/buildings/energy-star>

DOE (2016), “Impacts of Model Building Energy Codes,” https://www.energycodes.gov/sites/default/files/documents/Impacts_Of_Model_Energy_Codes.pdf

Dyson, Mark et al. (2020), “Building Electrification: A Key to a Safe Climate Future,” Rocky Mountain Institute, <https://rmi.org/building-electrification-a-key-to-a-safe-climate-future/>

EESI (2010), “Economic Impacts of Recovery Act Funding for the State Energy Program,” Environmental and Energy Study Institute, <https://www.eesi.org/briefings/view/economic-impacts-of-recovery-act-funding-for-the-state-energy-program>

EIA (2020), “Energy Consumption by Sector,” https://www.eia.gov/totalenergy/data/monthly/pdf/sec2_3.pdf

Energy Star (undated), “The simple choice for saving energy”
energystar.gov

EPA (undated), “Energy Star Portfolio Manager,”
<https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>

Facility Executive (2009), “ARRA Funds For State And Local Governments,”
<https://facilityexecutive.com/2009/12/arra-funds-for-state-and-local-governments/>

Gerdes, Justin (2019), “Maine Decides to Go Big on Heat Pumps,”
<https://www.greentechmedia.com/articles/read/maine-wants-to-install-100000-heat-pumps-by-2025>

House Democrats (2020), “Solving the Climate Crisis,”
<https://climatecrisis.house.gov/report>

HUD (undated), “Energy Efficient Mortgage Program,”
<https://www.energy.gov/eere/solarpoweringamerica/energy-efficient-mortgage>

McKenna, Claire et al. (2020), “The New Economics of Electrifying Buildings: An Analysis of Seven Cities,” Rocky Mountain Institute, <https://rmi.org/insight/the-new-economics-of-electrifying-buildings>

NASEO (2011), “State Compliance Requirements & Resources for ARRA Building Energy Code Provisions,” National Association of State Energy Officials, Washington DC, http://mojo.naseo.org/data/sites/1/documents/codes/documents/NASEO-ARRA_Codes_Compliance_Handout.pdf

National Association of Plan Advisors (2021), “Fact Sheet: List of Agency Actions for Review,” https://www.napa-net.org/sites/napa-net.org/files/Fact_Sheet__List_of_Agency_Actions_for_Review.pdf

New York Times (2019), “Inside Conservative Groups’ Effort to ‘Make Dishwashers Great Again’,” <https://www.nytimes.com/2019/09/17/climate/trump-dishwasher-regulatory-rollback.html>

Oberhaus, Daniel (2020), “The Power Plant of the Future Is Right in Your Home,” Wired, <https://www.wired.com/story/the-power-plant-of-the-future-is-right-in-your-home/>

Pickerel, Kelly (2020). “Solar investment tax credit extended at 26% for two additional years,” Solar Power World, <https://www.solarpowerworldonline.com/2020/12/solar-investment-tax-credit-extended-at-26-for-two-additional-years/#:~:text=Extended%20renewable%20energy%20tax%20credits,26%25%20for%20two%20more%20years>

Rocky Mountain Institute (2018), “Economics of Electrifying Buildings,” <https://rmi.org/insight/the-economics-of-electrifying-buildings/>

Rocky Mountain Institute (2020), “It’s Time to Incentivize Residential Heat Pumps,” <https://rmi.org/its-time-to-incentivize-residential-heat-pumps/>

Roth, Sammy (2020a), “In the West, opposing natural gas is tricky — even for a Democrat with climate cred,” Los Angeles Times, <https://www.latimes.com/environment/newsletter/2020-11-26/in-the-west-opposing-natural-gas-is-tricky-even-for-a-democrat-with-climate-cred-boiling-point>

Roth, Sammy (2020b), “Should California ban gas in new homes? A climate battle heats up,” Los Angeles Times, <https://www.latimes.com/business/story/2020-12-07/should-california-ban-gas-in-new-homes-a-climate-battle-heats-up>

Senate Democrats (2020), “The Case for Climate Action: Building a Clean Economy for the American People,” <https://www.democrats.senate.gov/climate-report>

Shearman & Sterling LLP (2020), “Highly anticipated covid relief legislation contains numerous tax provisions,” Lexology, <https://www.lexology.com/library/detail.aspx?g=66fb284a-86de-4b02-a4df-7c1059d94736>

Shidore, Sarang & Busby, Joshua (2020a), “Assessing the Political Feasibility of Decarbonizing the US Electricity Sector,” Working Paper, The Energy Institute, University of Texas at Austin, <https://energy.utexas.edu/sites/default/files/Polit-Feasibility-Decarb-US-Electricity.pdf>

Shidore, Sarang & Busby, Joshua (2020b), “Assessing the Political Feasibility of Decarbonizing the US Transport Sector,” Working Paper, The Energy Institute, University of Texas at Austin, <https://energy.utexas.edu/sites/default/files/Polit-Feasibility-Decarb-US-Transport.pdf>

Sierra Club (2020), “California's Cities Lead the Way to a Gas-Free Future,” <https://www.sierraclub.org/articles/2020/12/californias-cities-lead-way-gas-free-future>

State of Colorado (2020), “GHG Pollution Reduction Roadmap,” <https://energyoffice.colorado.gov/climate-energy/ghg-pollution-reduction-roadmap>

State of Maine (2019), “Governor Mills Signs Bill Promoting Energy Efficient Heat Pumps in Maine,” <https://www.maine.gov/governor/mills/news/governor-mills-signs-bill-promoting-energy-efficient-heat-pumps-maine-2019-06-14>

State of Massachusetts (2020), “GWSA Implementation Advisory Committee Meeting,” <https://www.mass.gov/doc/presentation-slide-deck/download>

Urbanek, Lauren (2019), “A Better Energy Code Is a Holiday Gift for the Planet,” Natural Resources Defense Council, <https://www.nrdc.org/experts/lauren-urbanek/better-energy-code-holiday-gift-planet>

Urbanek, Lauren (2020), “The 2021 Energy Code Is Final—and More Efficient than Ever,” Natural Resources Defense Council, <https://www.nrdc.org/experts/lauren-urbanek/2021-energy-code-final-and-more-efficient-ever>

U.S. Congress (2009), “Public Law 111–5—Feb. 17, 2009,” <https://www.congress.gov/111/plaws/publ5/PLAW-111publ5.pdf>

U.S. Senate (2020a), “Senate Legislation in the Energy Act of 2020,” <https://www.energy.senate.gov/services/files/886A44E2-2366-4373-AD47-38AAD6E33016>

U.S. Senate (2020b), “Energy Act of 2020 Section-by-Section,” <https://www.energy.senate.gov/services/files/32B4E9F4-F13A-44F6-A0CA-E10B3392D47A>

White House (2021), "Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis," <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-protecting-public-health-and-environment-and-restoring-science-to-tackle-climate-crisis/>

Wilson Sonsini Goodrich & Rosati (2020), "COVID Relief Bill Contains Energy Tax Extenders," JD Supra, <https://www.jdsupra.com/legalnews/covid-relief-bill-contains-energy-tax-57004/>

APPENDIX A

Summary of political feasibility of policies and the logic behind the assessments are presented in figure A1.

Policy Type	Policy Element	Political Feasibility	Assessment Logic
Mandates & Standards	Model building performance standards	High	Present in bipartisan bill and Biden plan
	Enhanced appliance standards	High	In regulatory domain (DoE) and Biden plan
	Faircloth Amendment repeal	Low	Passed House in July 2020, but Republicans opposed, Biden support uncertain
Investments	Sustainable home construction	Medium	Biden backs market-based affordable housing and funding for retrofits
	WAP enhancement	High	Included in two bipartisan bills and Biden plan
	Enhancing efficiency of federal buildings	High	Regulatory action possible in Biden administration
	Smart city investments	Medium	Included in Democratic bill
	Training investments	High	Democratic bill, but may attract Republican support due to jobs component
Taxes & Subsidies	25C, 45L revival/enhancement	High	Included in two bipartisan bills
	Solar ITC extension	High	Strong Democratic and some Republican support In Democratic bill, but likely opposition from Republicans & conservative Democrats
	Tax credits for home electrification	Low	

Figure A1: Political feasibility of building policies with summary of assessment logic