

Denver Net Zero Energy (NZE) New Buildings & Homes DRAFT Implementation Plan

[NZE Commercial Buildings Stakeholder Meeting](#)

Tue, Oct 20, 2020

10 am – 12 pm

Agenda

10:00 am – Introductions & Good News (10 min)

10:10 am – Briefing on the current state of the plan (30 min)

10:40 am – Breakout sessions (30 min):

Highly efficient, All electric, Renewable energy/electricity, Grid flexible

11:10 am – Break (5 min)

11:15 am – Report on breakout sessions (10 min)

11:25 am – Feedback on “How it All Comes Together” (30 min)

11:55 am – Thank you & Next Steps (5 min)

Attendance List

Amber Wood, CASR

Sean Denniston, NBI

Arron Esselink, Xcel

Bill Holicky, Coburn Partners

Celeste Cizik, Group 14

Cheryl Hoffman, Hensel

Phelps

Christy Collins, CPD

Elizabeth Gilmore, Energetics

Jan Keller, CASR

Jenny Willford, Sierra Club

Jarrett Vigil, CASR

Johnny Rodgers, CASR

Julie Edward, Oz Architecture

Katrina Managan, CASR

Keith Fox, CPD

Lilly Djanians, CPD

Maria Thompson, CASR

Scott Prisco, CCD

Steven Shepard, BOMA

Taylor Roberts, Group 14

Tom Hootman, Integral

Group

Tony Thornton, Stantech

Commercial Denver NZE Breakout Room Notes

Highly Energy Efficient

Right Targets (barriers & costs)

- Are these the right targets?
 - Yes, generally, but the group plans to review in more detail
 - Medium office building, why the 28 EUI?
 - Look at the analysis in detail and will get back to us with any comments
 - Regarding Class B/C Offices
 - Often want this group to over invest in energy efficiency as there is little operation expertise
 - Look at the differences of large and small buildings
 - The 100,000 sqft seems arbitrary
 - Stories may be a better breakout than area
 - It is good that Denver mirrors the Boulder approach
 - One consideration regarding modeling
 - EUI is way easier than PCI
 - Make sure the EUI and non-EUI calibration
 - Building schedules for modeling should be specified and NREL is working on this right now
 - Denver should align energy modeling guidelines, make the schedules and consistent, have updated process with other jurisdictions such as Boulder and Ft. Collins
 - Denver is currently working with Boulder on energy modeling reporting requirements
 - Denver should consider aligning in general
 - Part of the surety that's important: consistency looking at people that run and own, it's consistent within Denver and Colorado
 - Determine how to add in renewable energy
 - This will be discussed in the How it All Comes Together
 - Currently all of the foundations are separate
 - Denver needs to clarify what to model regarding PV
- Can you give us specific reasons why these targets cannot be met?
- Are there outstanding technical barriers?
- Are there costs that are prohibitive?
- Are there cost barriers?
 - Yes, but this can be addressed through incentives and supports

Support it Takes

- What are the supports (marketing, training, education, incentives, etc) needed to meet these targets?
 - Workforce development is currently happening with DEDO and IFMA, however, it's not an easy path
 - Denver is suffering from a lack of building engineers
 - Denver needs multiple types of training
 - Building Operators/Engineers to operate to targets

Denver NZE Commercial Buildings Stakeholder Meeting Notes

- Design teams to design to targets
- Are there additional supports needed beyond those previously identified?
- Are there equity considerations in addition to these supports?
 - Training/education

All Electric

- Chart in roadmap has policy targets
- Barriers
 - Any specific reasons the targets cannot be met?
 - The HVAC system type itself could be a barrier to electrification in the future
 - Boiler piping, etc,
 - Electrical distribution is also an issue
 - Timeframe
 - Could be concerning for people already into planning, even for all-electric
 - People are already in the planning process for projects that will be permitted in 2021.
 - Adoption
 - When they are submitted to building department for review, not entitlement
 - 1-6 month grace period on code going into effect
 - Projects can apply for a grace period extension
 - How is EV charging included
 - More of a transformer issue
 - Size of transformer
 - Have to fight with XCEL
 - XCEL tries to put in undersized transformers to start with
 - XCEL provides the transformer, they wanted proof of the load
 - Transformer can't be up in the garage, has to be at grade
 - Either large enough transformer now or space for a larger one in the future
 - If you do it up front, it is free. If you have to swap it out, you have to pay for it.
 - Is EV part of the EUI target?
 - Hot water
 - Central water heating is not just DHW, but also space conditioning
 - Heat recovery is a key issue
 - Space requirements for electrification is a key issue
 - Future-proofing buildings
 - There are things that can be done now to make the transition in the future
 - Bill doesn't know how to do a boiler system all-electric
 - Central systems are a challenge
 - They try to do smaller point-source electric water heaters
 - Cost
 - Electric resistance is very expensive to run
 - Heat pump performance either scavenges from the interior or takes from the exterior, and both impact total performance

Denver NZE Commercial Buildings Stakeholder Meeting Notes

- Supports
 - Incentive to go all-electric before all-electric is required
 - Broader considerations for electric-ready
 - There are a limited number of firms that can do this cost-effectively
 - M&P firms are going to have to do most of it, and most of them don't know how to do it cost-effectively
 - The firms need a way to get experience
 - Cost supports are always key
 - Both upfront and operating
 - Could be done through operating taxes for building types like hotels

Renewables

- Write renewables requirement technology neutral (70% coverage of roof or equivalent of similar capacity by others)
 - Most of the code written uses renewable as an umbrella term, however the majority will most likely be solar. Combination of % of roof area plus offset for 100% of building capacity based on EUI. Excess capacity will be covered by incremental costs paid into the city renewable fund.
 - Solar will offset most but limitations may be apparent for some buildings more than others
 - Could buildings with extra roof space help to offset for buildings with limited roof space or capacity?
- Minimum renewable offset cost that will pay into renewable community generation
 - Not meeting rooftop area size for % will create a double cost
 - Important to focus on the incremental costs to get rooftop covered compared to offset costs so that they can get all the net energy savings. Continue to create commercial programs that promote energy accessibility. Find the right balance between what they are paying so that it's not just penalty.
 - Cost study is key to show how much you have to pay per kilowatt built. Useful for us to look at alternative options. If someone wants to 100% subscribe to wind source, then they would be paying a premium each year. Rather than this, they should be paying Denver that equivalent. But we don't want to structure it so that it's an ongoing fee, we want it to be an upfront cost. Potentially could be subscribing to the city and see savings.
- Do you have to offset gas and electricity prior to 2024?
 - Yes so there isn't a disincentive for all electric.
- Distributed electricity fee cost study needs to take affordable housing requirements into consideration, provide an ROI for owners.
 - If a building cannot invest in rooftop solar then it can invest into the city to offset leftover energy at an incremental cost. Incremental cost could help to cover costs for low income buildings seeking assistance for renewable upgrade or implementation
 - Overtime, the incremental costs will pay into a program that will continue to improve renewable energy access in Denver. Buildings paying in will be penalized for not meeting requirements but overtime the costs will fade. Pay into Denver funds so that the price per KWH goes to the city for offset costs, structure the fee so that income stressed aren't as troubled.

Denver NZE Commercial Buildings Stakeholder Meeting Notes

- How much should the fee be, what would be the best ROI for the offset costs?
- Who gets the benefit of the solar?
 - Every tenant usually pays their own bill directly based on their % energy use in the building
 - Affordable housing – we need to think about how we structure the fee they pay or structure our subscriptions to our community solar gardens so that an affordable subscription ensures bill savings. There is an equity concern here that we need to tackle.

Grid Flexible

- Grid Flexible equipment
 - Equipment that allows grid flexible equipment where utilities can control BAS systems during high demands
 - Increases building operation complexity
- More sophistication adds complexity, can be operated incorrectly, and end up less efficient.
 - Could end up with systems failing also because of complexity.
 - Even by not opting in, increasing building efficiency programs not being used in buildings but being there by requirement can complicate things for buildings. If one thing breaks, how can it impact another?
- Single equipment like water heaters would be fine, but longer term, adding complexity should be done carefully.
 - Inclusion of all grid flexible equipment not required. Xcel can produce incentives for new equipment. EV chargers, electric water heaters, onsite storage, onsite generation
- Requirements for % of grid flexibility for each building
 - Every building is different with limited roof space in some cases, how can this be addressed for onsite renewables while aiming to meet low offset costs
- Opt in Utility Programs
 - Program parameters where utilities have set points, may adjust temperature or energy usage but the tenants should not feel the difference.
 - Instead of buying energy in peak hours, utilities can pay consumers to reduce energy usage to meet demand at peak hours through improved energy efficiency.
 - Opt in program, open source equipment available to new buildings
 - With the inclusion of more renewables, grid flexibility is key to meet demands of peak energy use as well.

How it All Comes Together

Right Targets (barriers & costs)

- Are these the right targets in the table within the plan for each foundation?
 - Heat pumps vs electric resistance heat
 - Cost differences are significant
 - Saying all electric, you must have heat pumps
 - Denver isn't planning to have a requirement to not allow electric resistance, but efficiency requirements
- Can you give us specific reasons why these targets cannot be met?
 - These need support including training and incentives

Denver NZE Commercial Buildings Stakeholder Meeting Notes

- Are there cost barriers?
 - Big picture
 - Looking at mid-rise & high rise
 - COVID made projects on pause
 - Starting to see them come back
 - Private developers are working to get everyone on board
 - Getting tight on the money and ROI so they can get everyone on board
 - Denver is going in the right direction
 - Consider if Denver is pushing that way, but others aren't
 - What incentives do developers need to build in Denver?
 - Net zero commercial buildings spec
 - Has to compete in the market with spec office buildings
 - There's a limited benefit on the bottom line
 - 100,000 sqft office building: 10 story vs 4 story have a different design
 - Run the requirements along with zoning
 - Could consider a different standard for highrise vs 3-4 stories and they have
 - Could address cost implications
 - GBO is also a cost consideration
 - More they do the projects the same and use the same contractor they are less expensive
 - Consider premium for unfamiliarity
- Need to design space for transformers and all electric boilers – affects design.
- What are other ways to get to all electric buildings?
- Can we align the electric requirements so that efficiency aligns with electrification so operating costs are not going up by the time we electrify?
 - Must take demand charges in to account because of peaks with electric resistance.
- Heat pumps vs electric resistance heat. Can you meet EUI's with electric resistance?
 - It would be extremely hard to meet design targets with electric resistance heat.
 - Did two zero energy buildings with electric resistance, had near passive house envelope. EUI still under 20 on both commercial projects.
 - You can do heat recovery so are only warming outside air.
- It's hard to do this in high rise buildings and hospitals and complicated industrial manufacturing facilities. Concerned about increased operating costs also in affordable housing also. Need to specifically talk to someone who develops high rises, are you going to build that building in Denver?
 - Heating is scalable with buildings like skyscrapers
 - Mid and high-rise projects on hold now but looking at how to get to NZE.
 - Need to advocate for changes in areas around Denver too to keep buildings in Denver.
 - NZ has to meet spec in the market after it's built. 4 story building with lots of solar options very different than 10 story building. Run requirements along with the zoning – core of Denver could have different requirements
 - How does GBO play into all of this? That is a large cost too.
 - The more we've done these projects, hire the same contractor, and price of the building goes down because some folks are more or less familiar.
- Questioning if all electric ready even makes sense?
 - Early architectural is needed
 - Is that a viable step?

Denver NZE Commercial Buildings Stakeholder Meeting Notes

- Aspen require heating but not water heating to be electric as stepping stone
- Solar ready & EV charging ready
- Incentivize all-electric ready instead of a requirement
 - Make it easier
- Why not go to all electric without all electric ready?
- Some loads are easier than others to electrify
 - Individual water heater is manageable
 - More targeted HPWH
 - Interesting to look at targeted electric buildout
- Require electrification in phases by end use
 - 1. All but water heating & heating
 - 2. Then require heating
 - 3. Then require hot water
- Plug & play isn't as easy as we want it to be... that's the biggest challenge
- For hospitals: encourage campus plan or central plants
 - Percent space heating with heat pumps
 - Have backup or duplication with gas
 - Could encourage heat pumps where it makes sense
- Central business district: are solar hot water allowed?
 - Yes, we believe it's allowed
 - Incentivized approach on a commercial level
- Electrify all but heating
 - Eliminate all electric ready
 - Consider other ways to start incentivizing
- Electrification readiness
 - Why not go all-electric?
 - The electrification readiness can incentivize going all-electric early
 - Easier adoption
- Could space heating be done with live loads from renewables so that energy is not lost from transmission down from rooftop generation, Create a hybrid mix?
- All electric ready is not setting a building up to convert, requiring all electric heat by 2021 would have a greater ease of implementation
- Larger buildings over 5 to 10 million get a 6-month grace period for code adoption.

Support it Takes

- What are the supports (marketing, training, education, incentives, etc) needed to meet these targets?
 - One of the more effective supports is case studies
 - This has been done
 - Taking away fear and giving ideas
 - Developer training
 - Architects: have to train new staff from scratch
 - Need training for designers & architects
 - Need to design space for transformers and all electric boilers

Goals for NZE

- The targets in the Implementation Plan meet the Climate Action Task Force recommendations.
 - These can work with supports
- How fast can we go?
 - NZE 2030 isn't as scary when considering that the code is not adopted right away and large projects can request to follow a previous version of code if they are in the middle of design
- Can we make these Targets (with supports) our goals for Denver?
 - Yes
- Call this plan Net Zero Emissions?
 - No, this should remain net zero energy
 - However, be in support of reaching net zero emissions