

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

[NZE Multifamily Buildings Stakeholder Meeting](#)

Wed, Oct 21, 2020

8 am – 10 am

[Agenda](#)

8:00 am – Introductions & Good News (10 min)

8:10 am – Briefing on the current state of the plan (30 min)

8:40 am – Breakout sessions (30 min):

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

9:10 am – Break (5 min)

9:15 am – Report on breakout sessions (10 min)

9:25 am – Feedback on “How it All Comes Together” (30 min)

9:55 am – Thank you & Next Steps (5 min)

[Attendance List](#)

Amber Wood, CASR

Elizabeth Gillmore,
Energetics

Nathan Kahre, Energy Logic

Taylor Roberts, Group 14

Chuck Kutscher, CU

Boulder/NREL

Emily Artale, Lotus
Engineering

Katrina Managan, CASR

Norbert Klebl, Geos
Community

Joel Champagne, CPD

Christy Collins, CPD

Jan Keleher, CASR

Jarrett Vigil, CASR

Johnny Rodgers, CASR

Keith Fox, CPD

Maria Thompson, CASR

Robby Schwarz, Build Tank

Scott Prisco, CPD

Sean Denniston, NBI

Shanti Pless, NREL

Jim Meyers, SWEEP

Julie Edwards, Oz

Architecture

Multifamily Denver NZE Breakout Room Notes

Highly Energy Efficient

Right Targets (barriers & costs)

- Are these the right targets?
 - Do we need both EUI and HERS/ERI numbers?
 - EUI includes common areas within the energy modeling
 - Is you're using RESNET HERS index, can't get to these numbers without solar 40-35 range, though this is a different metric
 - Can you get to these levels on envelope and mechanical features?
 - Yes, Boulder multifamily is requiring 32 EUI
 - This is hard but achievable
 - This is total building modeling, not unit-by-unit
 - Corridors have a lower EUI and balance out higher EUI spaces within a whole building model
 - Multifamily projects have met zero energy performance numbers
 - These feel comfortable
 - Intermixing terminology could be confusing
 - Low rise in the commercial code makes sense
 - Do we need low rise in here?
 - Ask NBI about this in more details
 - Stakeholders recommend looking into this in more detail
- Can you give us specific reasons why these targets cannot be met?
 - No, but we need to think about the difference between modeled and actual
- Are there outstanding technical barriers?
- Are there costs that are prohibitive?
 - All this is cost effective
 - Affordable housing projects are often the most innovative
 - The market is a low-cost game
 - Developer is typically about making this as cheaply as possible
- Are there cost barriers?
 - Not super far off - projects that are doing a good job that end up with an EUI in the mid-30s
 - The cost is very hard and some of the low-cost MF pushed out without supports
 - Developers can figure this out
 - Not a huge cost, other things can swing this more
 - Some of the smaller lower end stuff will be pushed out of Denver without supports
 - However, this will force developers to be more creative
 - Multifamily can reach this more easily than some other building types

Support it Takes

- What are the supports (marketing, training, education, incentives, etc) needed to meet these targets?
 - Contractor training
 - Developer training

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- Cost of hitting the EUIs is within tolerance of projects
- Training across architects and engineers
- Highlight projects, pilot projects that have used these technologies
- Promoting passive house as well for multifamily

All Electric

- Are there similar issues with central space heating systems?
- Electric-readiness
 - Could be the most expensive option since you are paying for all the infrastructure
 - But none of the cost savings from removing the gas infrastructure
 - Then you are still paying for the electric retrofit, which is cheaper but more expensive
 - Not just infrastructure, but also space requirements
 - SWEEP did a study of electrification codes
 - Electrification readiness was introduced as a response to developers saying that certain end-uses were impossible to electrify.
 - So Jim sees readiness as a political move
 - Cost of construction in Denver is already more expensive than national average
 - So this has a very real impact on affordability
 - Both up-front and operating
 - Maybe just scrap electric-readiness and incentivize as the first step
 - Maybe all-electric is in the Green Code
 - This could vary by building type
 - Maybe one of them is all-electric or all-electric-ready but the other is not
 - IRC structures by 2021, but IBC are 2024 and high-rises are 2027
- There needs to be some recognition of the impact on electric demand in all-electric
 - This could be addressed through:
 - Solar hot water
 - Point of use
 - Insulation
- Would an electric-ready requirement drive electrification?
 - Stakeholders would recommend it, but aren't sure the community would go for it because they would proof, but won't pay for the proof/analysis
 - The space requirement is a bigger issue than the capacity requirement
 - If the panel capacity is there, then they are paying for that capacity every month
- Pipe-fitters
 - Large systems and utility side of the meter
 - Plumbers do small systems on the building side of the meter
- Carbon impact
 - When will all-electric be less carbon intensive than gas?

Renewables

- Where do roof percentages come from. Need an alternative for 70% or available roof space.
 - 70% of roof area must be PV, difference not met by minimum renewable offset pay in option for city to build renewable offset

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- Roof area might not be a good measure, so have the 100% renewable offset be the primary driver, if that can be met with less than 70% of the roof area then that is ok.
 - Tall buildings have limited roof area.
- There is an intrinsic unfairness for tall building to have to get to 100% of its needs. Work something into roof area calculation that accounts for efficiency of the panel possibly.
 - Factor in something that would incorporate PV efficiency with roof percentage converge.
 - Roof percentages could be based off of building's overall capacity as opposed to mandated numbers?
- Social space on roofs is competing with solar.
 - What if someone wants a green roof instead of solar?
 - How does solar PV area requirements impact green roofs or roof top activity spaces like gardens?
- Do we envision GBO being replaced with this requirement at some point? Or absorbed into this requirement?
 - Denver will have to figure out how GBO comes together with this.
 - Better define GBO and NZE definition of requirements, is there a feasibility point for both plans?
- The emphasis needs to be on the first line of the renewable offset.
 - Renewable offset is a good option for building owners facing difficulties with roof area percentage, the only issue is that if buildings purchase offsets they still need to make their own compliance pathways and show performance.
- Make sure minimum renewable offset is a percent of energy use (not energy cost). Can create a strong incentive for electrification if the cost for offsets is right (offsetting all natural gas).
- Consider requiring percent of electricity needed to be met on-site – assuming solar windows, etc become available.
 - As opposed to requiring percent of roof space could there be an alternative option where a certain percent of renewable energy is generated on site as opposed to just the roof. This would relieve the roof to floor space issue allowing taller buildings the opportunity to meet renewable demands without increasing offset purchase.
- Or structure the cost study so that on-site is always the most economical alternative (with options for solar windows, geothermal, etc as code develops.)
 - Instead of mandating all electric or grid flexible, why not create greater incentives to make it the cheaper option that will make it seem more attractive for builders
- Developers look hard at first cost – if all electric is cheaper, it will happen every single time. If all electric need half the solar, becomes a strong incentive for all electric
- Can we change the price depending on the shape of the building? Tall skinny pay only incremental cost, larger roof, make it more expensive to pay into the fund instead of putting solar on the roof.
- Break down with buildings that has 50% of roof area dedicated to solar – here's your rate out of the fund, if you're under 50%, here's your rate into the fund. If you have more solar, you get more cost effective off-site solar. Can subtract out amenity space, or put PV over amenity space.
 - Offset fees can vary widely from building to building and costs can be very high for buildings not able to meet their own generation, offset fee requirements can be a lot to charge in some cases
- Renewables offsetting all energy use including gas.

Grid Flexible

- Add appliances like dishwashers, washers, dryers, etc. Need to go well beyond the water heater.
- Grid flexible means taking advantage of time of use rates – can lower costs for low income folks in low income housing.

How it All Comes Together

Goals for NZE

- The targets in the Implementation Plan meet the Climate Action Task Force recommendations.
- How fast can we go?
- Can we make these Targets (with supports) our goals for Denver?
- Call this plan Net Zero Emissions?
 - Emissions: is the real metric, but net zero energy is catchier and more people know this
 - Good question, what's being achieved
 - Emissions is clearer, but can be confusing in the market
 - Emissions would imply embodied carbons
 - Net zero operational emissions so emissions come down to a TOU question
 - It is net zero according to Denver's definition...
 - Using the combination of renewables, using all the tools is important, it's not just onsite
 - Net zero energy immediate benefit to the builder
 - Operational cost
 - From marketing selling the broader community seeing benefit in energy
 - Emissions is the correct term, but for building owner has more value
 - If it's clear in what it means
 - Smaller jurisdictions have done this, but not Denver

Right Targets (barriers & costs)

- Are these the right targets?
- Can you give us specific reasons why these targets cannot be met?
 - All electric requirement needs consideration
 - Make adjustments that incentivize going all electric
 - Make it easier to build electric buildings
 - Code compliance, solar requirements with building system requirements tradeoffs could make this more incentivized
 - Start education of the design industry
 - Technology for an electric central system is not readily available in the US which is the reason for the asterisk in the current electrification table
 - Heat pumps won't fit in the same way because they are larger than other equipment so the mechanical spaces will have to be designed specifically for this equipment
 - In the Geos neighborhood, they install the heat pump water heater in a pantry space for veggies and food to be kept cooler

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- The costs for heat pump water heaters are reduced because Xcel incentives
 - Costs the same when taking advantage of the incentive
 - For small apartments a HPWH might be excessive, but 1,500 and 2,200 sqft
 - Don't have to go centralized for multifamily buildings
- All-electric ready a bad first step
 - Perhaps make all electric optional in the first phase, tie that to the green code
 - Phase in all electric by building type, target buildings that would be easier first.
 - Need to better publicize that all electric is lower carbon today, perception is coal electricity is dirtier
 - Maybe start with 3 stories and less in 2021 (IRC townhome), mid-rise in 2024 (IBC mid rises), high rise in 2027.
 - On electric readiness – maybe just put in conduit or a few other minimum cost items now.
 - Stakeholders support an incentive approach
- Are there costs that are prohibitive?
 - Take ROI out of this equation
 - Most multifamily new buildings are not condos where the developers are paying the utility bills
 - Make it easier to build that all electric and hybrid electric
 - Do it cheaper to go all electric
 - Maybe go to:
 - 2021 IRC 3-story townhome
 - 2024 Mid-rise
 - 2027 High-rise
 - Remove all electric ready
 - Incentivize going all electric earlier
 - Use Denver Green Code
 - Other end uses that should be all electric ready?
 - EV charging
 - Electrification readiness
 - Issues: pools & snow melt
- Are there cost barriers?
 - Offsetting all energy use inclusive of gas
 - Make sure these support each other
 - Encourage buildings to go all electric sooner

Support it Takes

- What are the supports (marketing, training, education, incentives, etc) needed to meet these targets?
- Are there additional supports needed beyond those previously identified?
- Are there equity considerations in addition to these supports?
 - Education with trades is needed particularly