

Green Building Energy Sustainability (GBES)

The 2024 project – Designed Energy Efficiency

The soon-to-be-adopted changes in the new 2021 International Energy Conservation Code (IECC) will bring fundamental changes to the planning, design, permitting, and construction of residential housing in the United States. The 2021 IECC is being adopted by municipalities in Texas and other states in the US to improve the energy efficiency of new construction projects (Residential and Commercial). The utilization of those changes should improve the energy efficiency of housing by 10 – 15% and lay the groundwork for Net Zero housing. The North Central Texas Council of Governments (NCTCOG) has adopted a modified version of the 2021 IECC which makes compliance easier. Not all cities will adopt the NCTCOG amendments, so make sure you are adequately prepared.

Net Zero housing is where 100% of the planned energy use of the house is generated and used onsite. The 2021 Energy Code is the structure of the change mechanism and 45L. \$2,000 Tax Credit will help be the inducement to invest in improvements in the design and construction of the new housing. There are also potential tax credits coming down the road that may help with EnergyStar and Net Zero tax credits will also help. Most people do not fully understand the scope and scale of the changes so the implementation may be piecemeal and the potential for savings may not be realized. **The 2024 Project** is designed to incorporate the needed changes throughout the design and construction process so the maximum potential can be achieved.

Initial Planning changes

- Educate stakeholders about the advantages of implementing the 2021 IECC for short-term and long-term benefits to stakeholders and other parties.
- Decide early in the plan where this house will be built to maximize energy efficiency, meet so specific energy conservation goals (such as EnergyStar), or built to barely meet energy code requirements
- Generate an HVAC system Manual J, S, and D to meet the 2021 code requirements
- Utilize Energy Efficient mortgages to get lower interest rates and lower down payment cost
- Utilize 45L Tax Credit, EnergyStar tax credit, and potential Net Zero Tax Credit to help fund energy improvements
- Incorporate an ERI Energy Report to maximize energy savings, show 2021 IECC code compliance and estimate energy use.

Construction Crew training and orientation

- Train project superintendents about the needed changes in construction materials, construction schedules, and inspection/testing protocols
- Modify Subcontractor contracts and bidding to orient them toward the goal of full implementation
- Establish inspection schedules and criteria to assure passage with the 2021 IECC

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Architectural Plan changes

- Supplement Plan submittals to the Municipalities with a 2021 Energy Plan that completely covers all construction specifications and details necessary to build the project and utilize economies of scale and design
 - Chose a wall insulation scheme to minimize cost and labor inputs
 - Use Raised heel truss design to allow for higher attic insulation values (R-49)
 - Use more efficient window designs
 - Plan to use hand sealed junction boxes
 - Utilize 10 HSPF HVAC Heat Pump systems to get the highest efficiencies and use an electrical power source that can be generated onsite. This qualifies as an Additional Efficiency Package
 - Consider moving all air handlers and ducts into the building envelope. This qualifies as an Additional Efficiency Package
 - Perform all duct pressure tests at rough-in
 - Consider using efficient (and quieter) ERV bathroom vent fans for outside air as required in the energy report. These fans will be pressure tested under the 2021. This qualifies as an Additional Efficiency Package

Net Zero Considerations

- Modify subdivision design and planning to optimize true south exposure of roof space in the housing to maximize solar array orientation.
- Orient house on the lot to maximize solar array orientation
- Use the Manual J, Water Heater energy input, Appliance plan, and lighting inputs to estimate the total energy use needed for the Solar Array.
- Plan for Solar Array maximum energy generation is during the period of highest energy use (Summer for southern climates)
- Maximize south-facing roof area with roof slope designed to optimize solar array electrical production. (If the latitude is between 25° and 50°, use the latitude, times 0.76, plus 3.1 degrees for fixed panel array). Plan ground area for the possible supplemental adjustable solar array.
- Move all roof penetrations to the roof face other than the south face to maximize solar panel placement.
- Include Net Zero-ready components into the construction design so the structure will be ready for a solar array in the future. Plan for future Electric vehicle use.