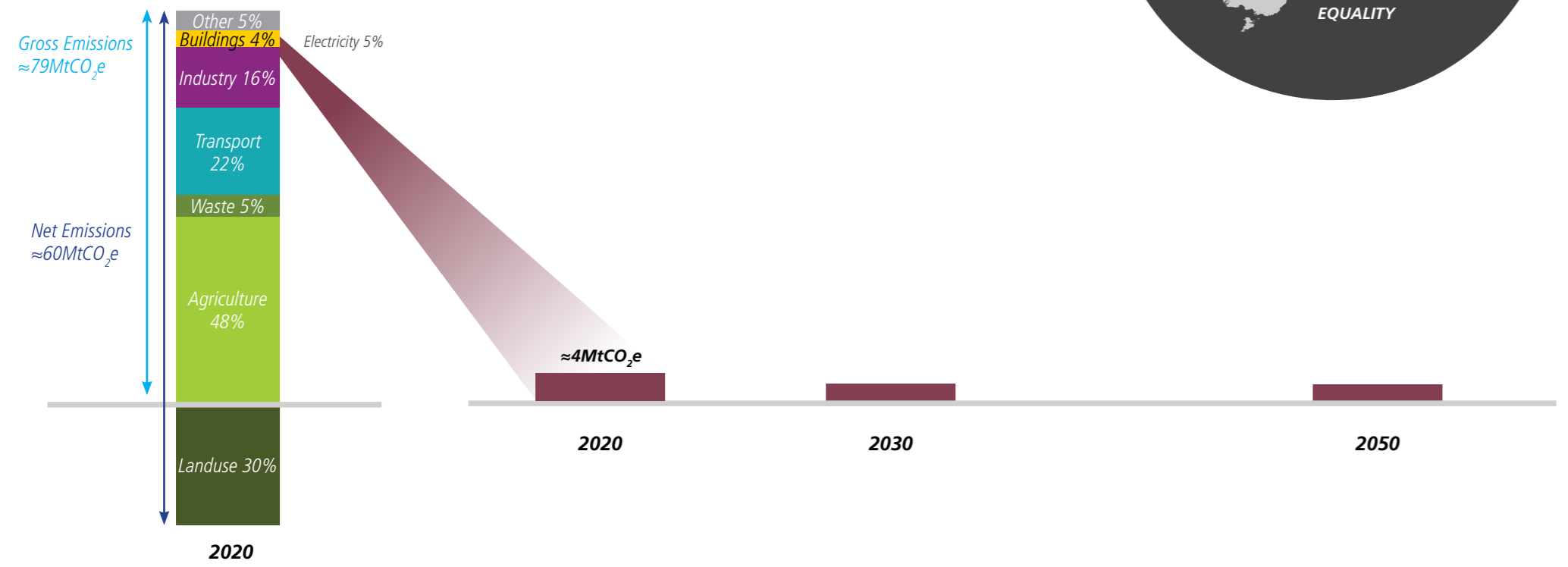


- THE CHALLENGE:**
- ▶ HIGH EMISSIONS
 - ▶ HEATING CLIMATE
 - ▶ UNEMPLOYMENT
 - ▶ HOUSING CRISIS
 - ▶ DECLINING BIODIVERSITY
 - ▶ LINEAR ECONOMY
 - ▶ ECONOMIC INSECURITY
 - ▶ POLLUTED WATERWAYS
 - ▶ DEGRADING SOIL

- TRANSITION: ELECTRICITY:**
- ▶ SUPPORTING ACCELERATED ELECTRIFICATION
 - ▶ UTILITY SCALE WIND & RENEWABLE ELECTRICITY
 - ▶ TOWARDS 100% RENEWABLE
 - ▶ REGULATORY SYSTEMS & RENEWABLES FINANCING



Transition: Electricity Systems

CHALLENGE STATEMENT

New Zealand's electricity grid has a high proportion of renewable energy (approximately 82%) and as a result, only contributes $\approx 4\text{MtCO}_2\text{e}/\text{year}$, approximately 5% of national GHG emissions. Electricity is an essential service providing household heat, light and communications, however its cost has led to "energy poverty" in some low-income households.[1] Further, in order to substitute fossil fuel energy with electricity, we will need to expand electricity infrastructure, particularly as we transition to greater use of electric vehicles. All electricity infrastructure has some environmental impacts and some, like visual impacts are often opposed by local communities.

KEY OPPORTUNITIES

Beca specialists have identified the following key opportunities for grid electricity transitions which could be progressed as part of our Wave-3 recovery:

Supporting Accelerated Electrification: The greatest opportunities for rapid decarbonisation in New Zealand include a rapid shift from fossil fuel-based energy to electricity in transport and industry. Grid capacity will need to expand to help support this and additional transmission and distribution networks and/or upgrades may be required to support high process heat users. Fast tracking this will create employment opportunities throughout the country.

Utility Scale Wind & Renewable Investment: Utility scale wind will be an essential component of both accelerating electrification and transitioning towards 100% renewable electricity. Unit costs of photovoltaic, wind and green hydrogen generation, plus energy storage including batteries are declining.[2] These can all be used to further support a renewable grid and growth in renewables aligns with the

government's target of a 100% renewable grid by 2035. Many renewable energy systems have previously been consented but not built, making these highly suitable for a preliminary focus in Wave-3. Green hydrogen generation and storage can be used to support a renewable grid and has the potential to become a future export. Accelerated development of hydrogen capability in New Zealand would create high-value jobs, and help to position New Zealand as world leaders in hydrogen.

Enhanced Management of Hydropower: Existing hydropower will continue to play a major role in New Zealand's electricity systems. It is the largest source of electricity currently and plays a key role in balancing fluctuating supply of other renewable sources. However, some of the water bodies servicing hydro generation are in poor condition.[3] Projects that prioritise the management of water bodies, considering both ecosystem health and cultural values will support management of hydropower.

Towards 100% Renewable Electricity: Fossil fuel-based electricity must be rapidly phased out to reduce emissions, and dependence on fossil fuels. Growing New Zealand's renewable capacity should be a key focus during the post-COVID-19 recovery. However, while long term goals need to include the complete phase out of fossil fuels, it would be more cost effective to focus in the first instance on increasing renewable energy generation during this post-COVID-19 transition before targeting 100% renewable energy.

Regulatory Systems & Renewables Financing: We believe that regulatory and financing changes will be needed to enable accelerated electrification and growth in renewable energy. The streamlining of consent processes for renewable energy solutions and transmission network installations and upgrades should be undertaken to enable an accelerated growth in renewable energy and access to electricity and associated job creation. It is our view that new financing models may be needed for renewable systems. Wave-3 initiatives should include modelling of future financing mechanisms and the development of clear road-maps that address challenges such as price structures, enabling and incentivising distributed energy and storage (e.g. from rooftop solar, electric vehicles and household batteries), and different roles for key stakeholders including government, electricity suppliers, transmission and distribution companies, and end users.