

CIPI

Costing Climate Change Impacts to Public Infrastructure

TRANSPORTATION

Assessing the financial impacts of extreme rainfall, extreme heat and freeze-thaw cycles on public transportation infrastructure in Ontario



2022/23



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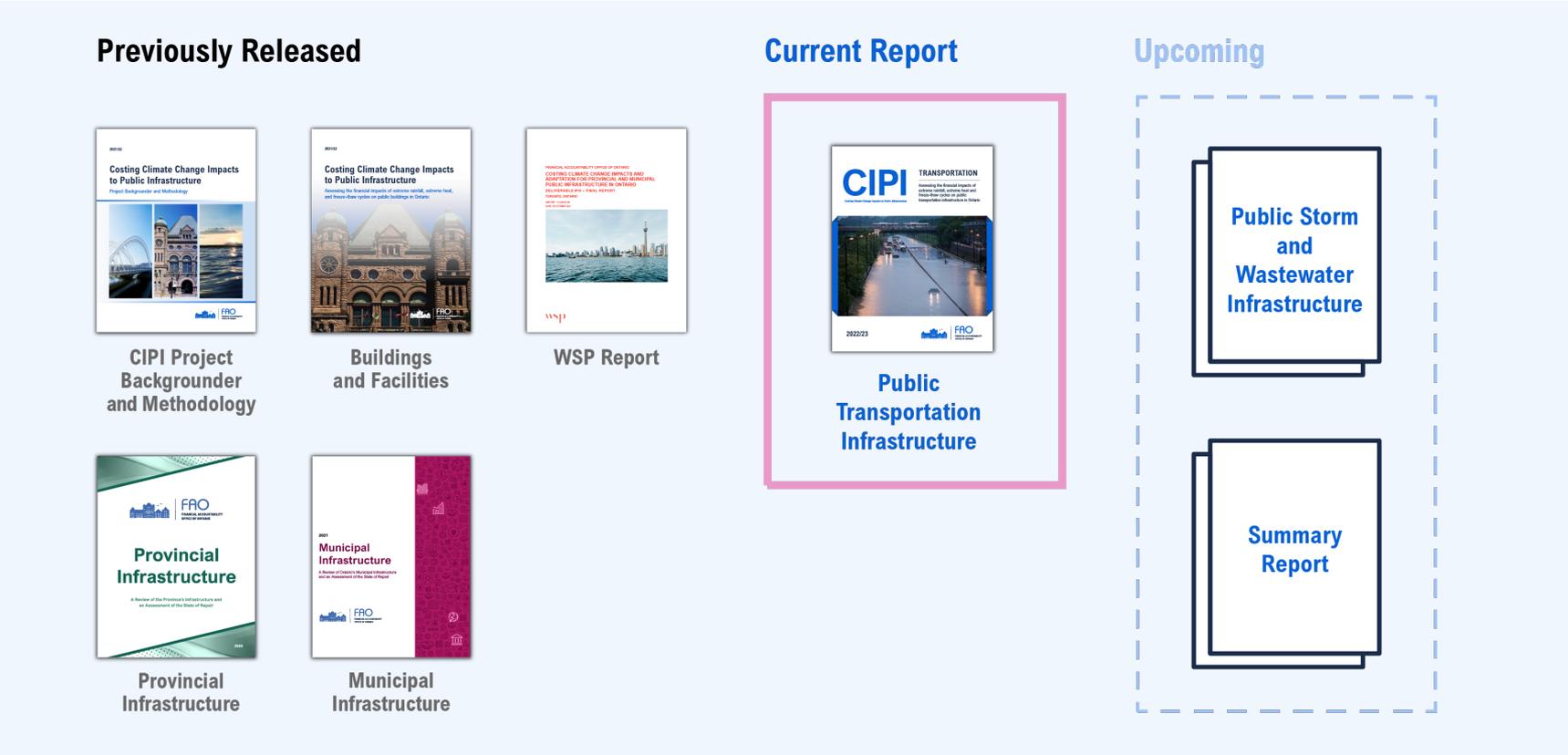
Costing Climate Change Impacts to Public Infrastructure: Transportation

Assessing the financial impacts of extreme rainfall, extreme heat, and freeze-thaw cycles on public transportation infrastructure in Ontario



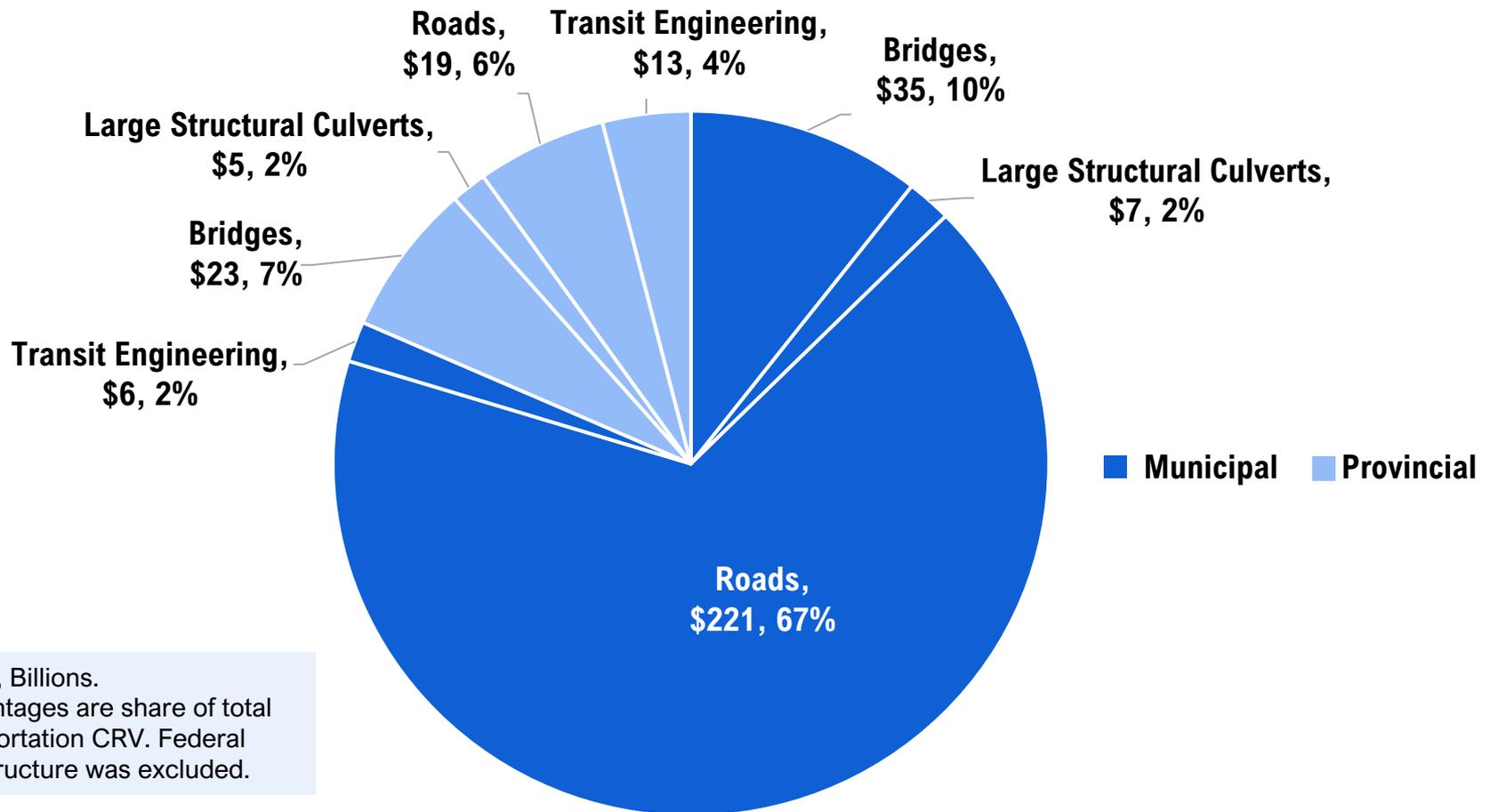
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The transportation report is part of the larger CIPI project



The FAO’s “Costing Climate Change Impacts to Public Infrastructure (CIPI)” project estimates the budget impacts of select climate hazards on provincial and municipal infrastructure.

Ontario has a very large portfolio of public transportation infrastructure, worth \$330 billion

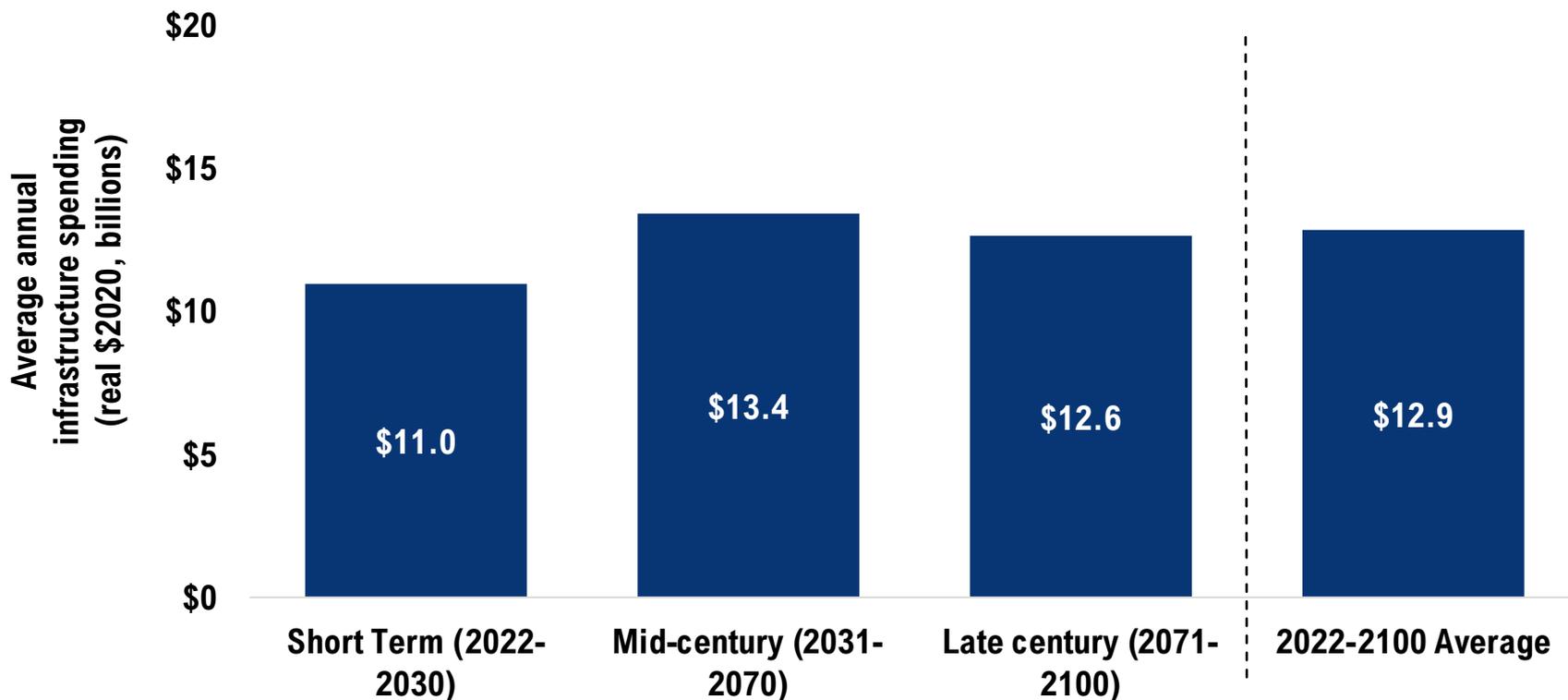


2020\$, Billions.
Percentages are share of total transportation CRV. Federal infrastructure was excluded.

Source: FAO.

The cost to maintain the existing portfolio in a state of good repair is substantial

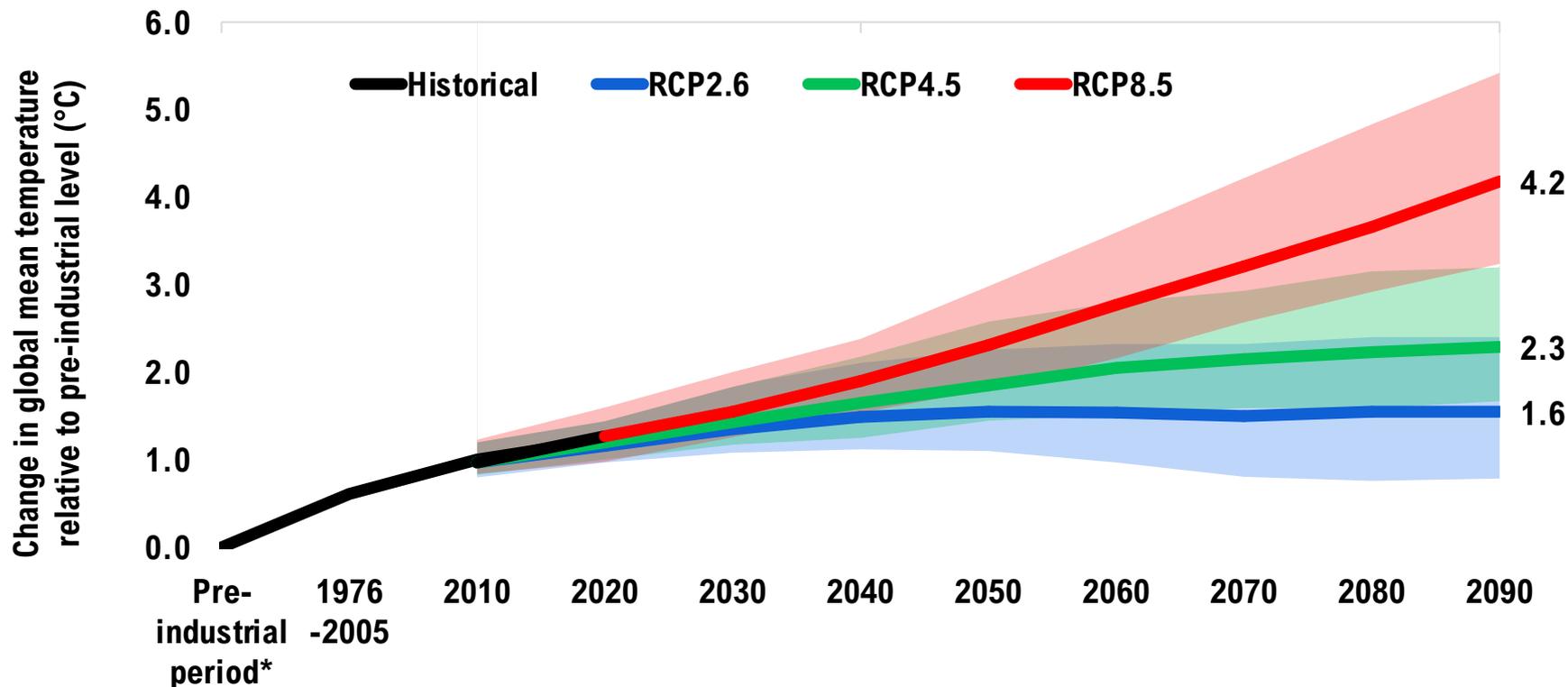
- If the climate was stable*, it would cost an average of \$12.9 billion per year to bring these assets into a state of good repair and maintain them.



* A “stable climate” means that all climate indicators remain unchanged from their 1975-2005 average levels over the projection to 2100.
Source: FAO.

Global temperatures are increasing

Increase in global mean temperature relative to 1850-1900



*1850-1900 base period.

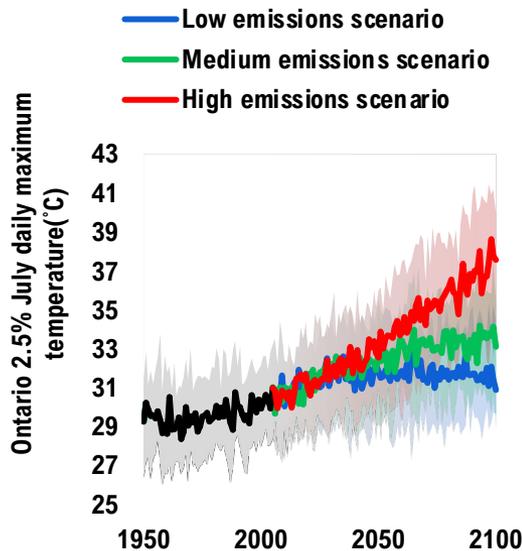
Note: Lines indicate the median estimate and the shaded areas show the range of 5th and 95th percentile projections.

Source: Intergovernmental Panel on Climate Change.

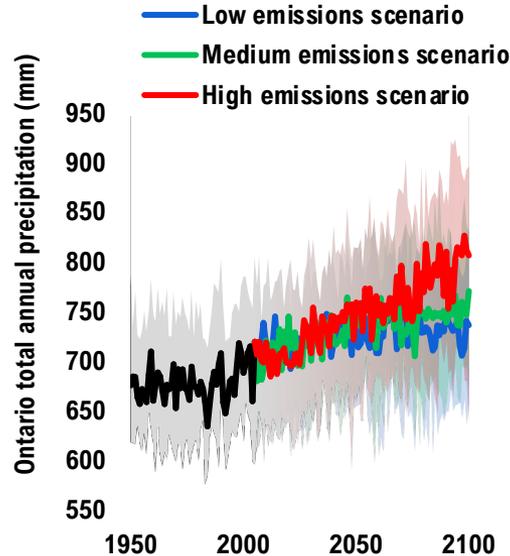
Climate change will bring more extreme heat and extreme rainfall, but less freeze-thaw cycles in Ontario

- To ensure safety and reliability, public infrastructure is designed, built and maintained to withstand a specific range of climate conditions typically based on historic climate data. But these variables are changing.

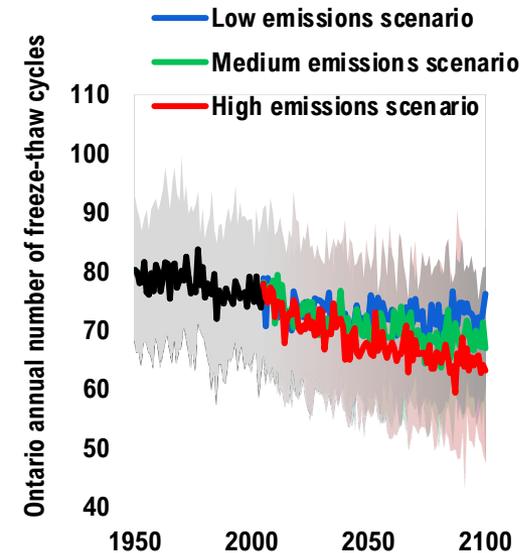
More Extreme Heat



More Extreme Rainfall



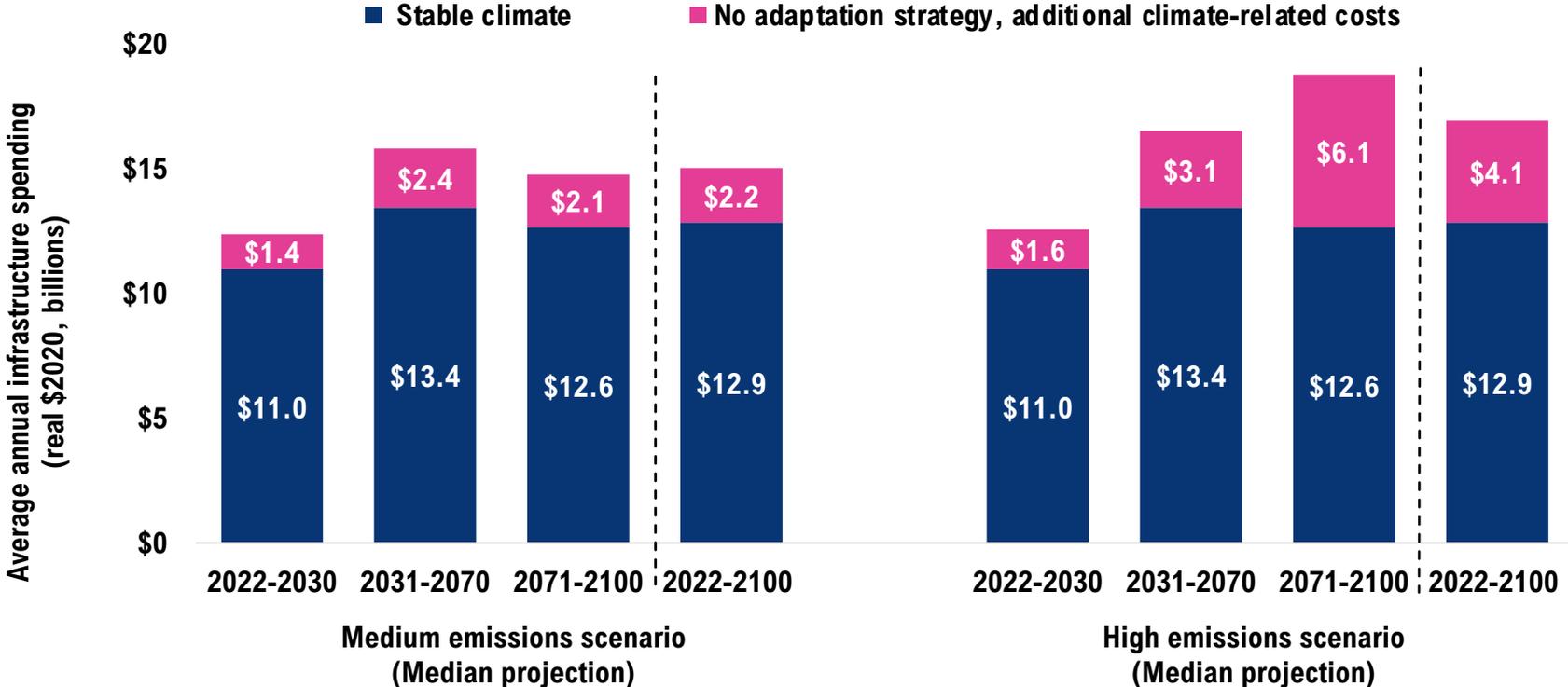
Less Freeze-Thaw Cycles



Source: Environment Canada, Canadian Centre for Climate Services.

Without adaptation, maintaining public transportation infrastructure is becoming more expensive

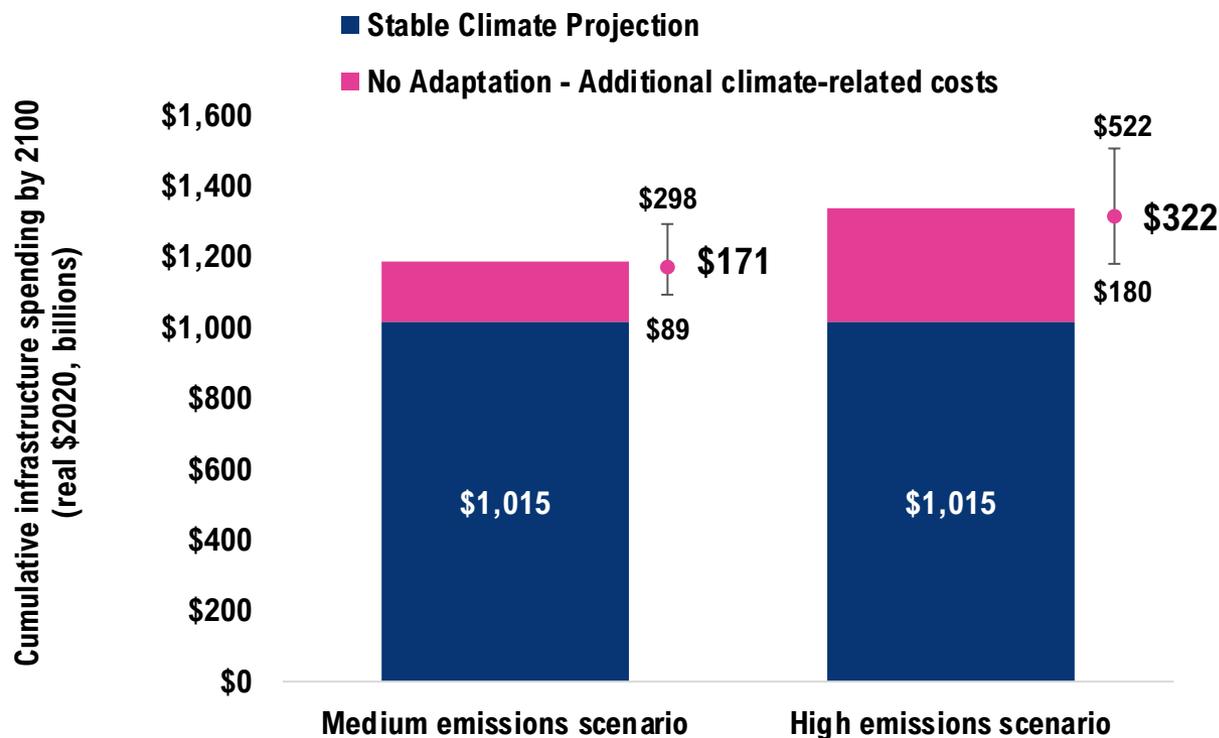
- Over the current century, additional climate-related costs will average \$2.2 billion in the medium emissions scenario and \$4.1 billion in the high emissions scenario per year.



Note: Uncertainty ranges are omitted from this chart for clarity.
 Source: FAO.

Climate-related costs will significantly raise the costs of maintaining infrastructure over the century

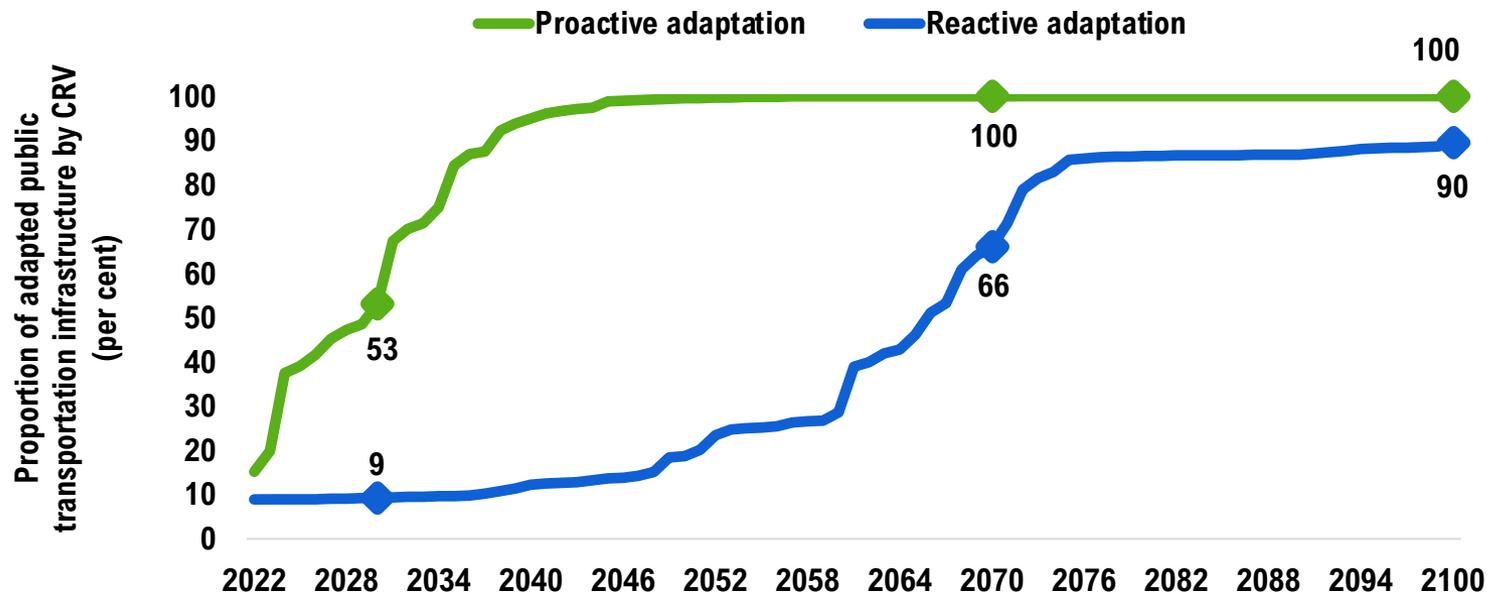
- By 2100, additional climate-related costs total \$171 billion (+17%) in the medium emissions scenario and \$322 billion (+32%) in the high emissions scenario.



Source: FAO.

Assets can also be adapted to withstand the impacts of climate hazards

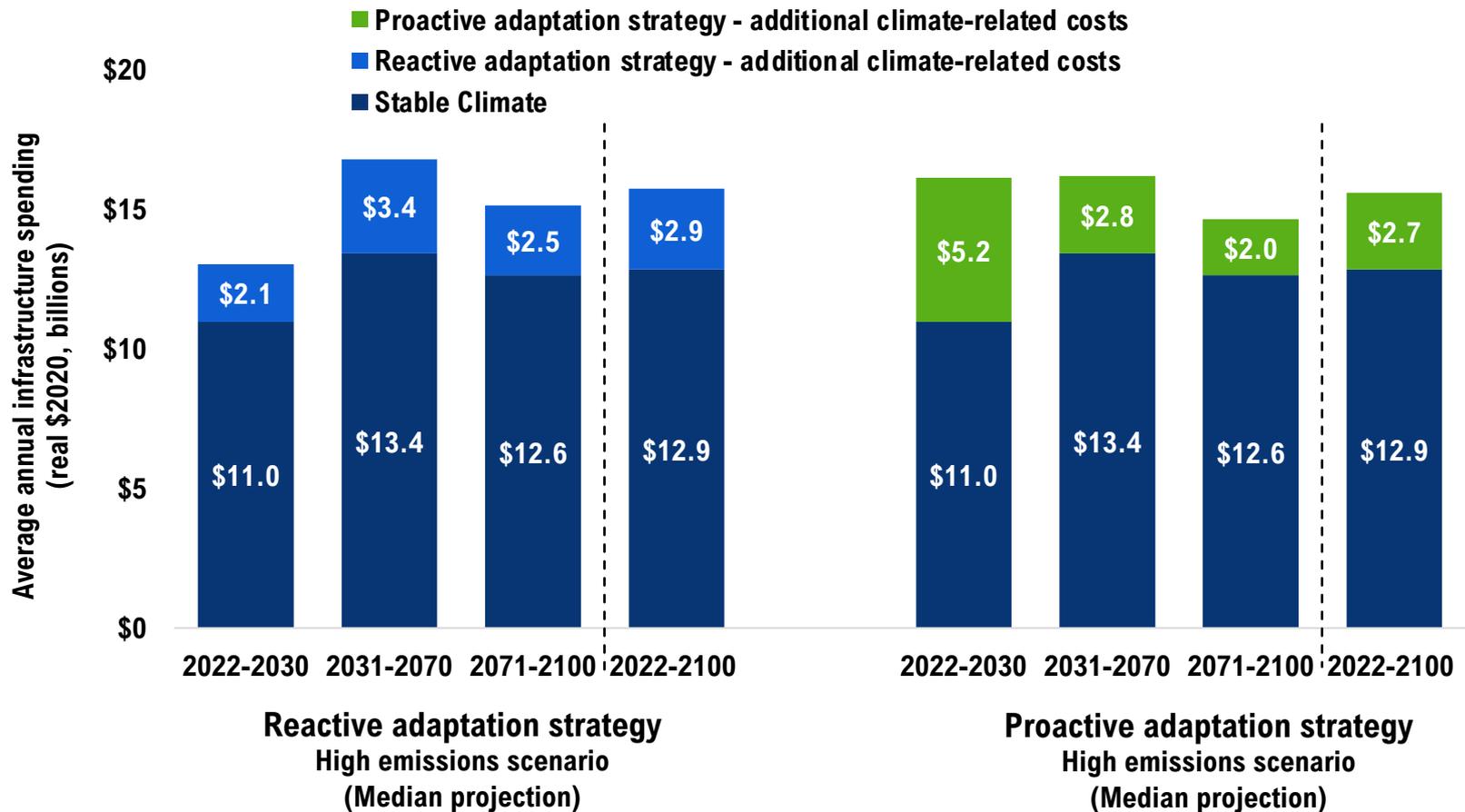
- The FAO costed two adaptation approaches
 - Reactive adaptation – assets are adapted at renewal
 - Proactive adaptation – assets are adapted at first available opportunity (next rehabilitation or renewal, whichever comes first)



Source: FAO.



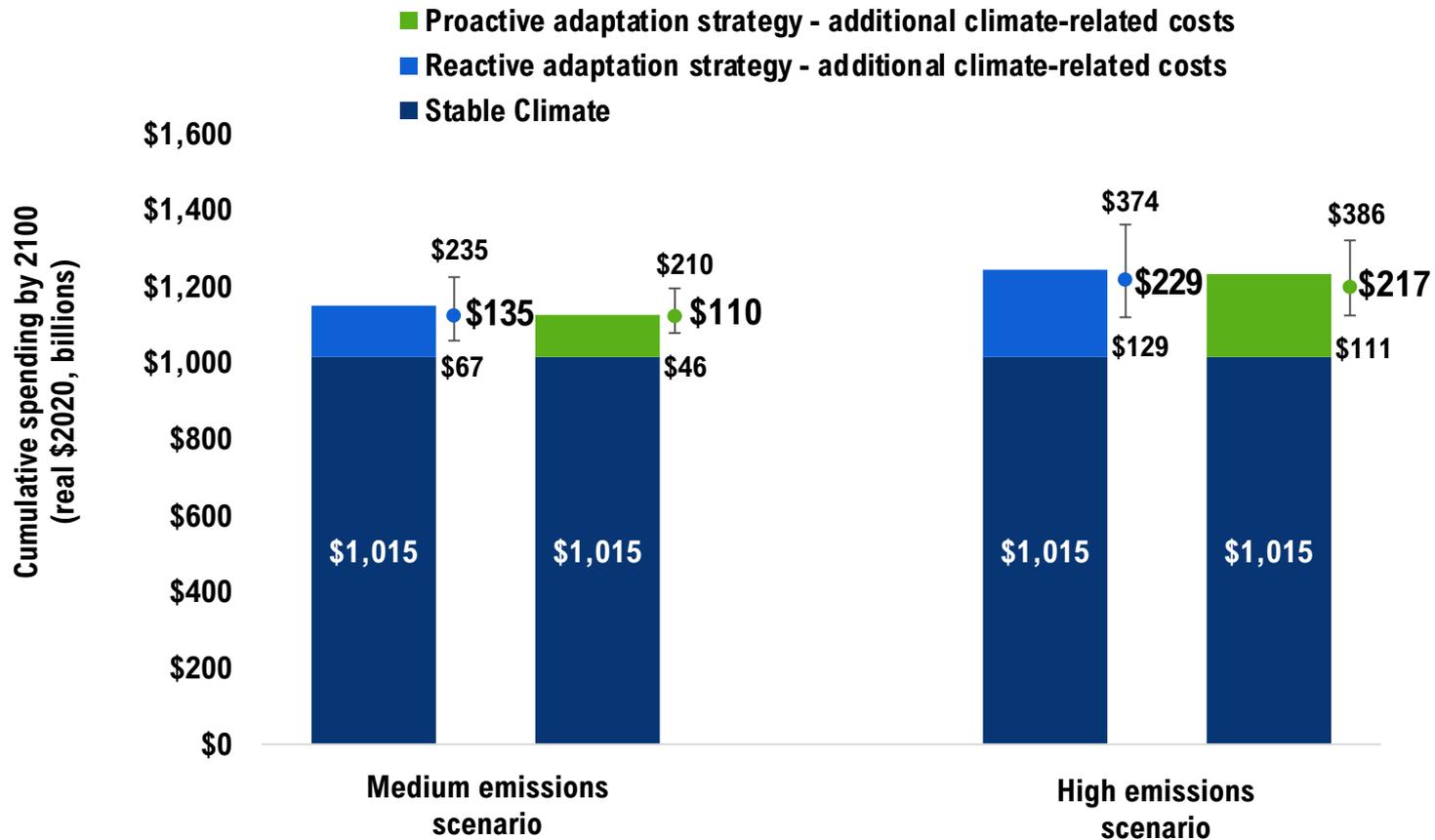
Proactively adapting infrastructure will require more upfront spending than the reactive strategy



Note: Uncertainty ranges and medium emissions scenario results are omitted from this chart for clarity.

Source: FAO.

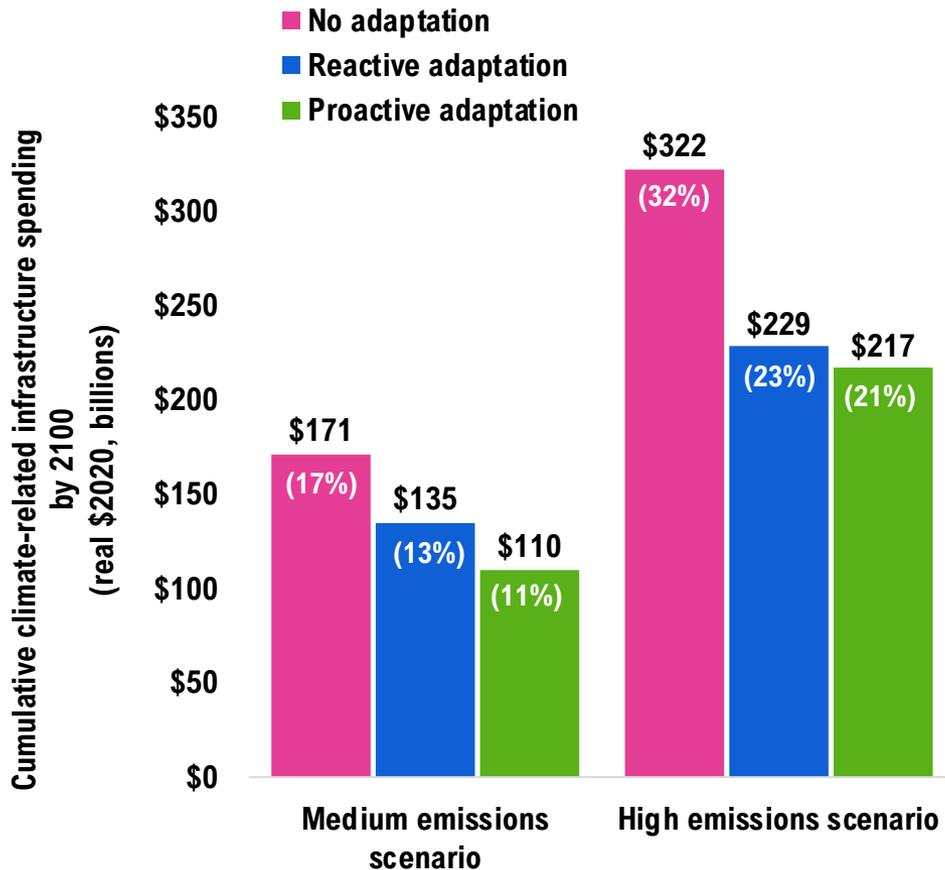
Adapting public transportation infrastructure to withstand these climate hazards will be expensive



Source: FAO.



Adapting transportation infrastructure will cost less than not adapting over the long term

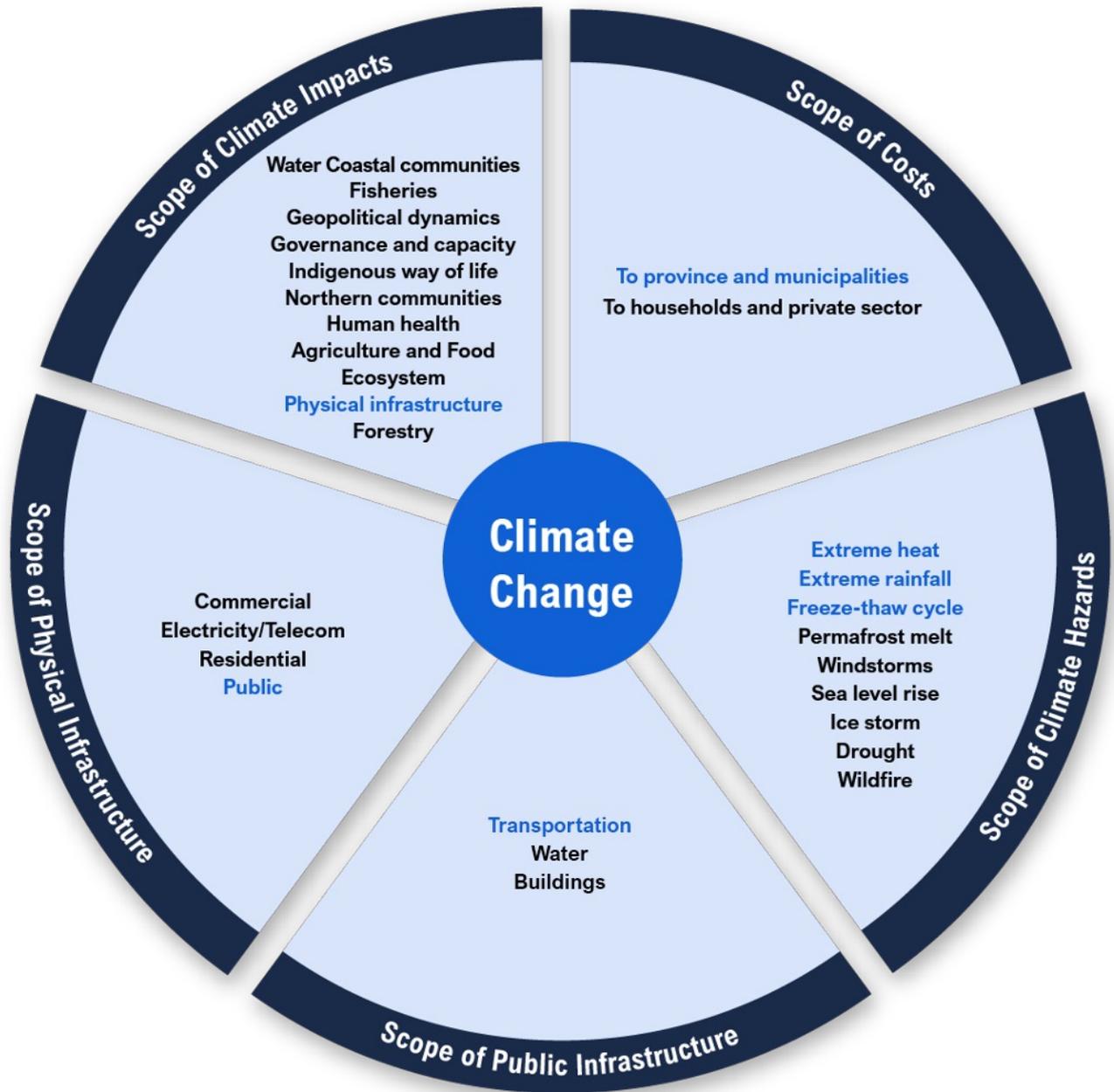


Note: The costs in this chart are based on the median (or 50th percentile) projection under each emissions scenario and are in addition to the baseline costs over the same period. For clarity, the uncertainty bands are not presented in this figure.

Source: FAO.

- While adaptation will be expensive, it is less costly for provincial and municipal governments than not adapting over the long term – same result as FAO’s building report.
- However, adaptation carries significant, but un-costed benefits, such as minimizing the disruption of transportation networks.

The FAO costed a small part of all climate change impacts



Source: Council of Canadian Academies and FAO.

Thank you!



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