

CIPI

Costing Climate Change Impacts to Public Infrastructure

LINEAR STORM AND WASTEWATER

Assessing the financial impacts of extreme rainfall on public linear storm and wastewater infrastructure in Ontario



2022/23



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Costing Climate Change Impacts to Public Infrastructure: Linear Storm and Wastewater

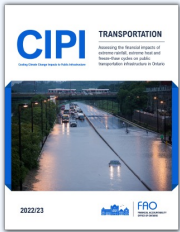
Assessing the financial impacts of extreme rainfall on linear storm and wastewater infrastructure in Ontario



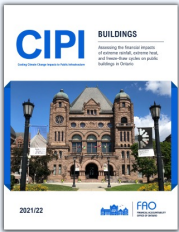
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The storm and wastewater report is part of the larger CIPI project

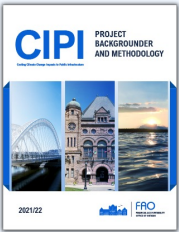
Previously Released



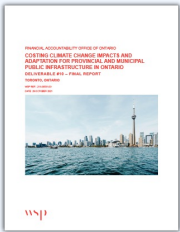
Public Transportation Infrastructure



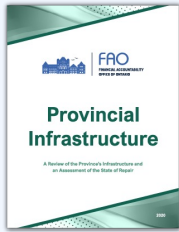
Buildings and Facilities



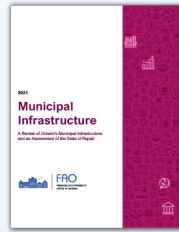
Project Background and Methodology



WSP Report

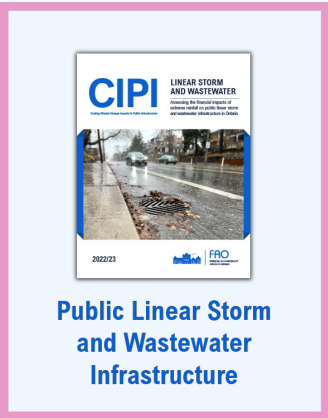


Provincial Infrastructure



Municipal Infrastructure

Current Report



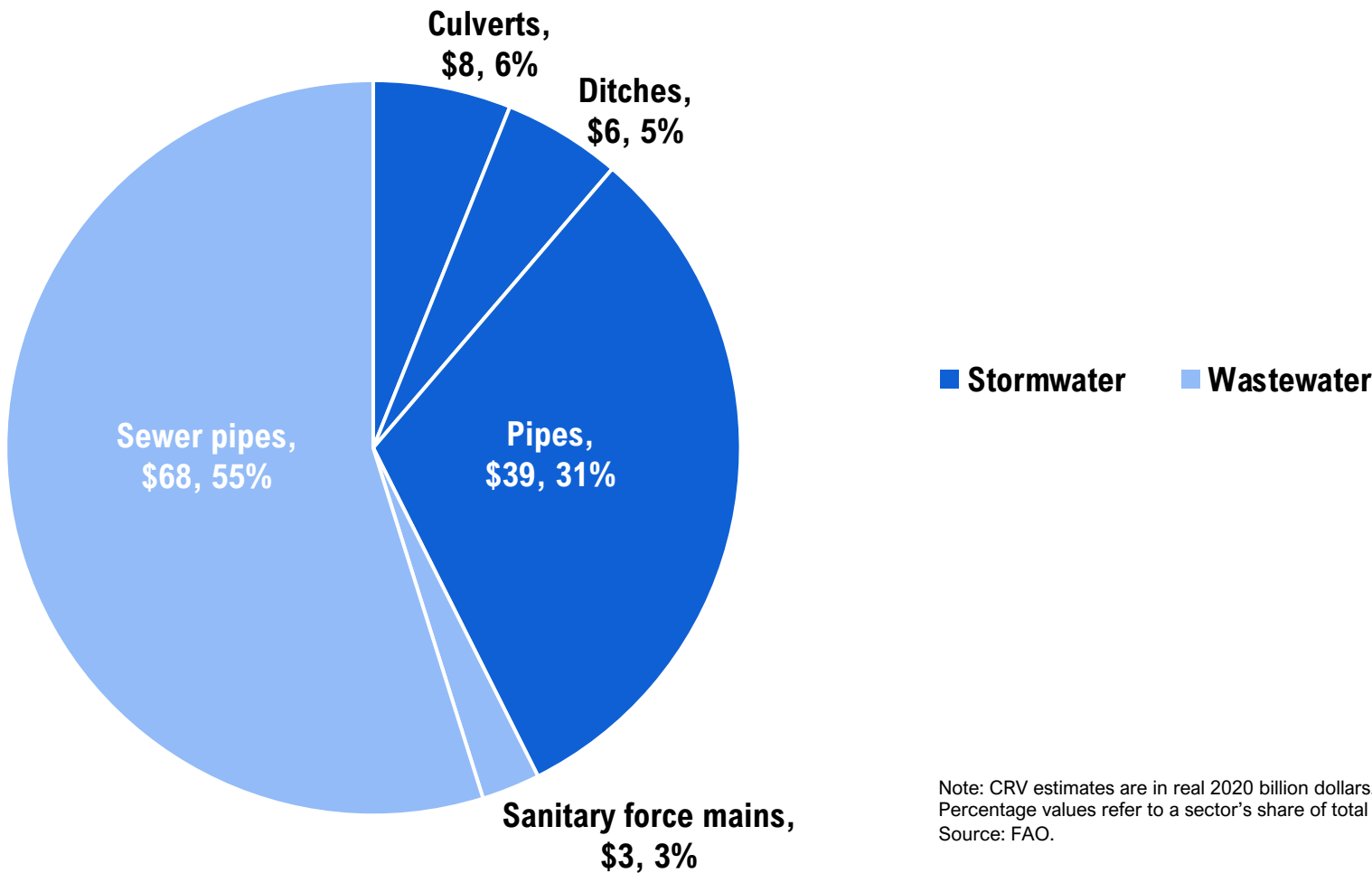
Public Linear Storm and Wastewater Infrastructure

Upcoming in 2023



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.

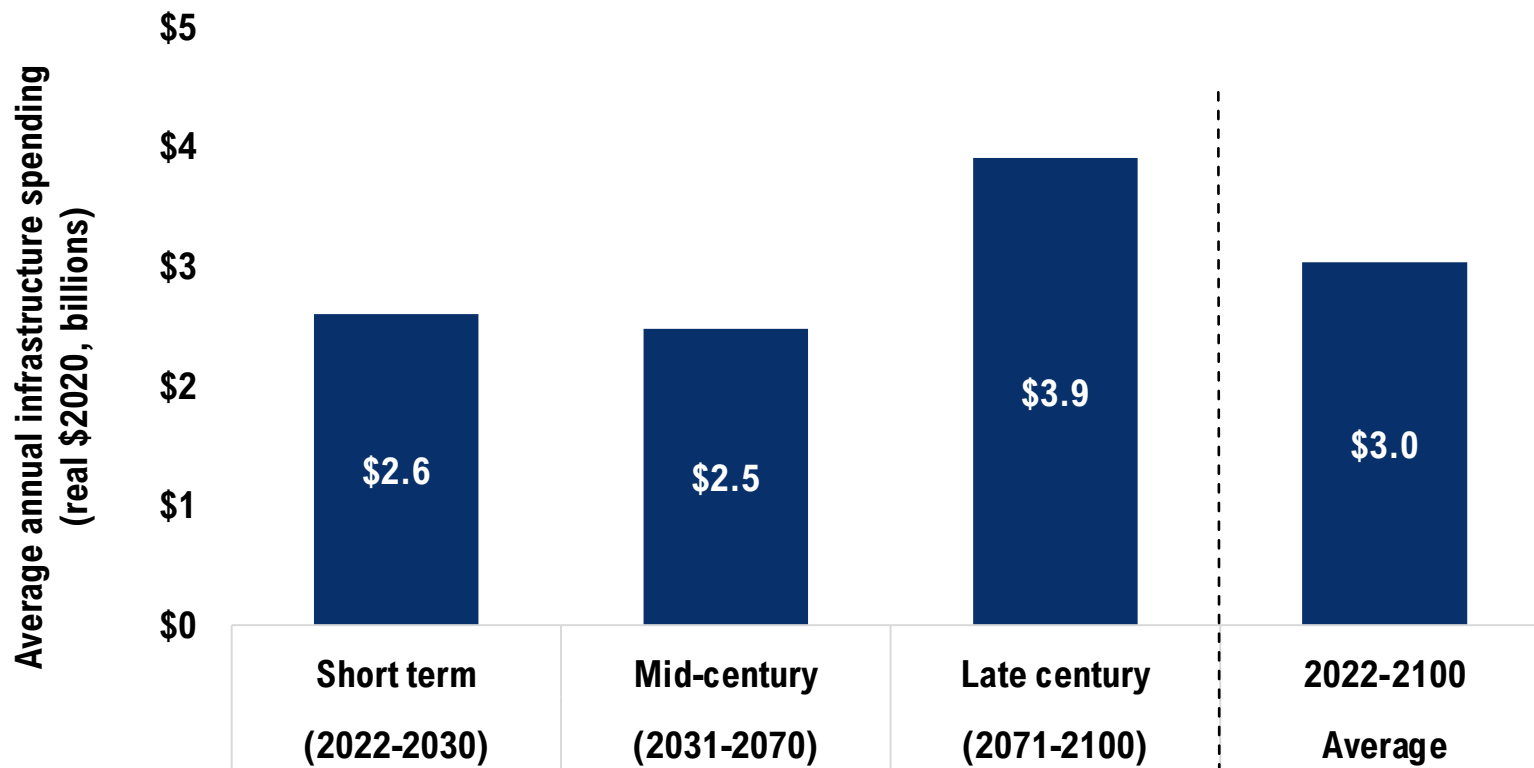
Ontario's municipalities own \$124 billion of linear storm and wastewater infrastructure



Note: CRV estimates are in real 2020 billion dollars. Percentage values refer to a sector's share of total CRV. Source: FAO.

The cost to maintain this existing infrastructure in a state of good repair is substantial

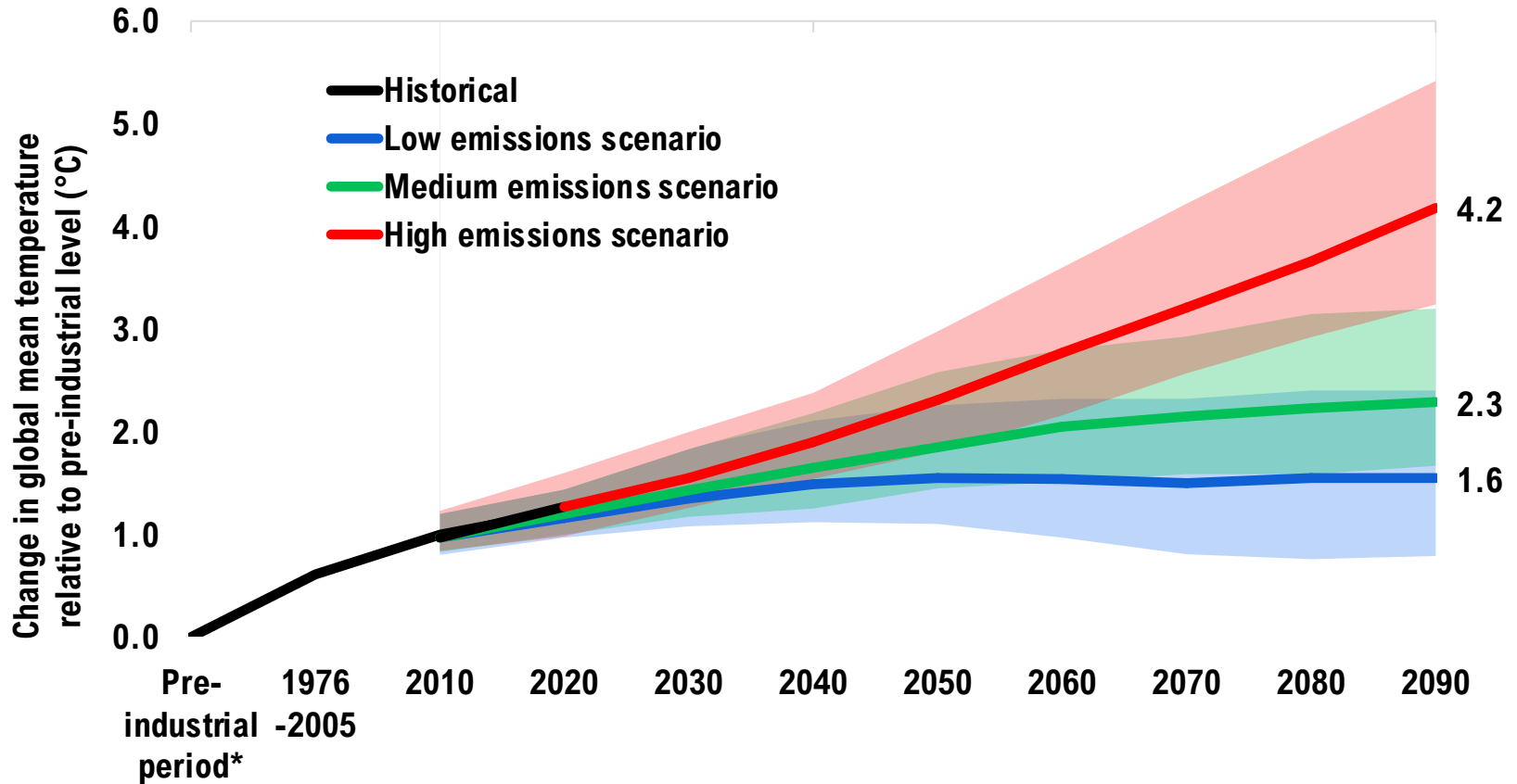
- If the climate was stable*, it would cost an average of \$3 billion per year to bring these assets into a state of good repair and maintain them.



* 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



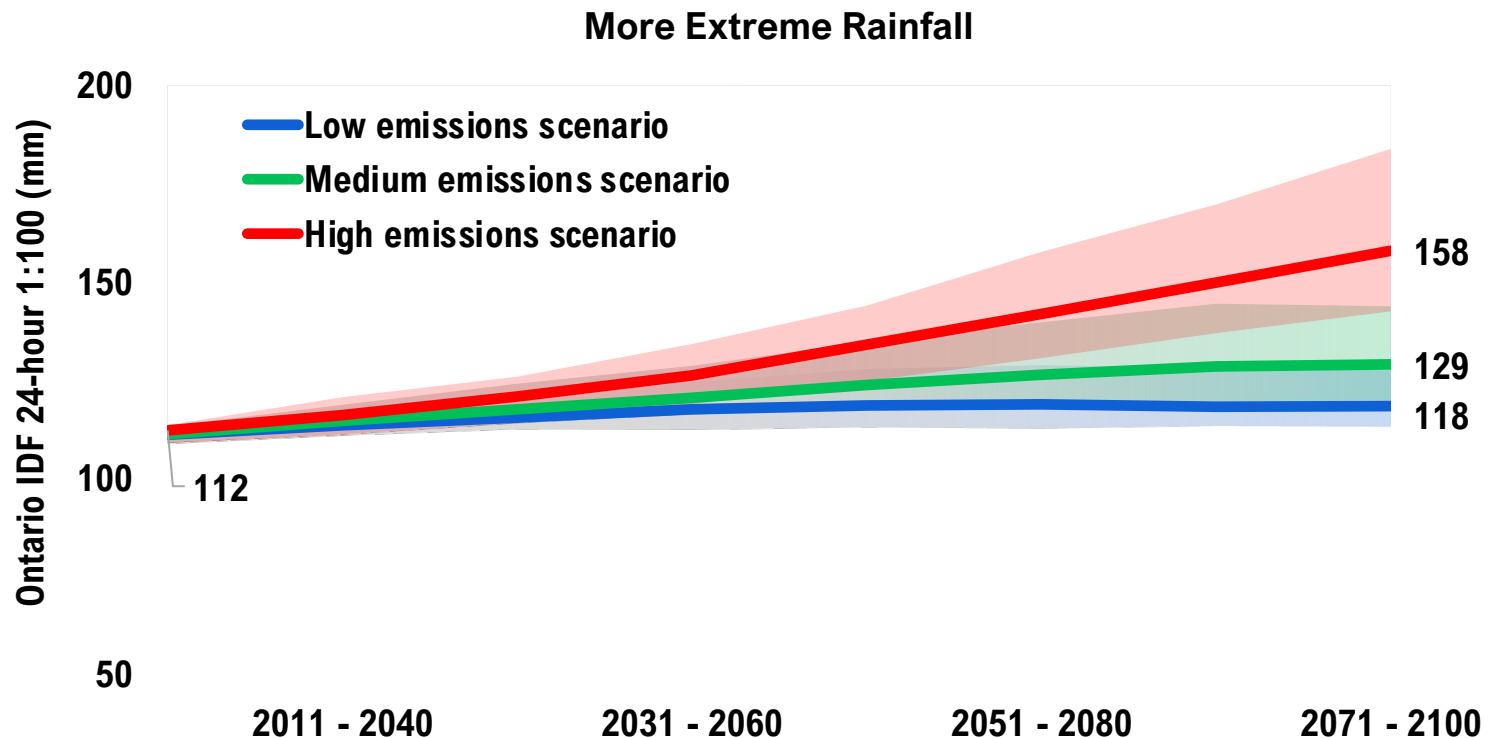
*1850-1900 base period.

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 frequent and intense extreme rainfall

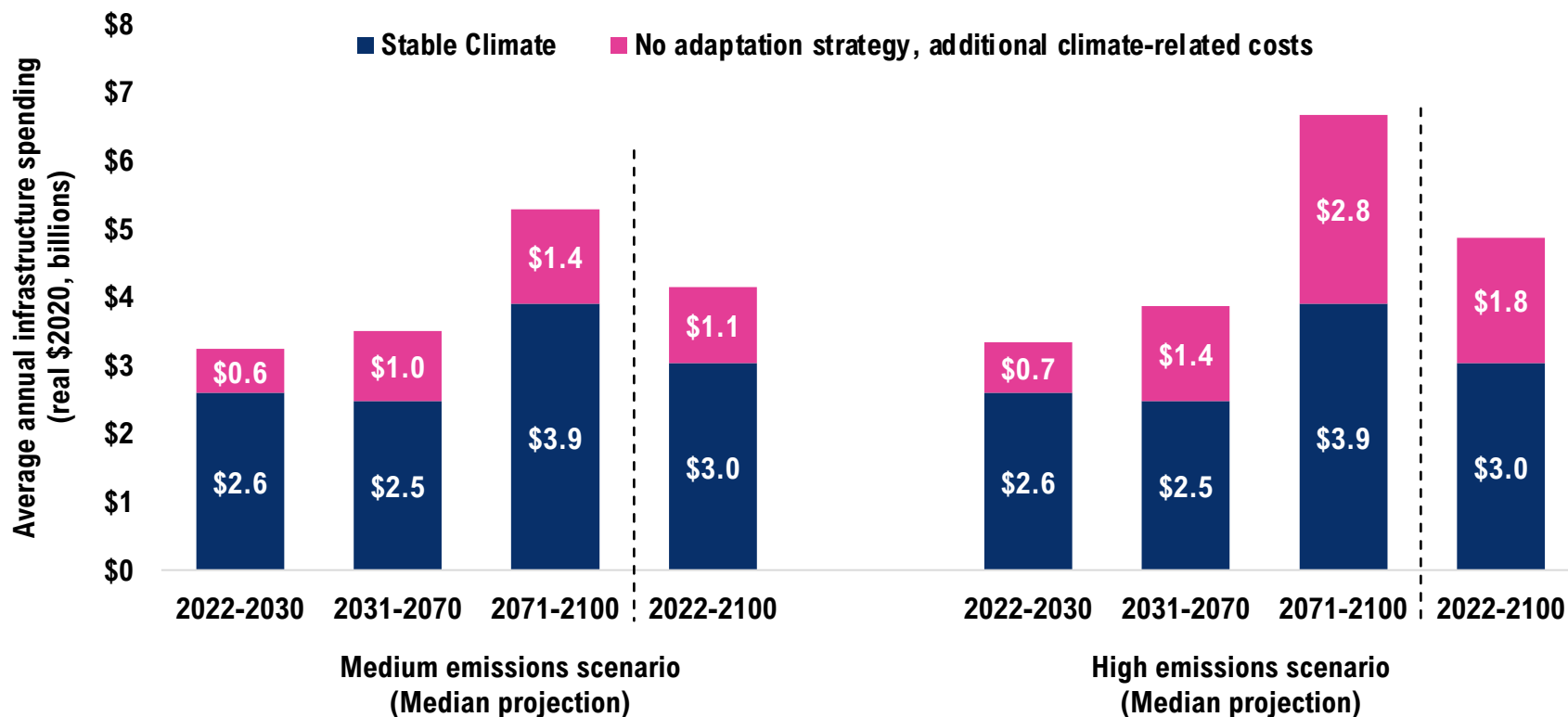
- To ensure safety and reliability, public infrastructure is designed, built and maintained to withstand a specific range of climate conditions typically based on historic climate data. But these variables are changing.



Source: Environment Canada, Canadian Centre for Climate Services.

Without adaptation, maintaining public storm and wastewater infrastructure is becoming more expensive

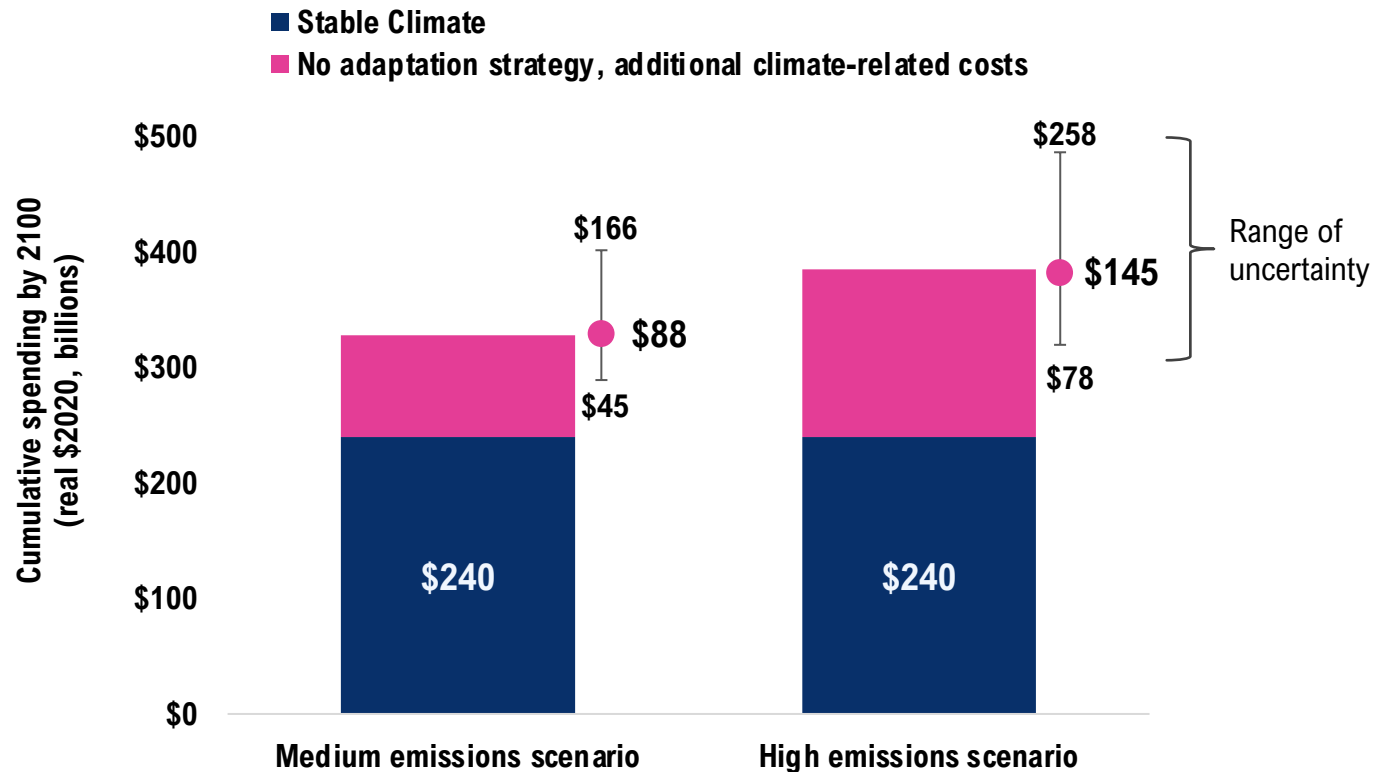
- Over the rest of the century, additional climate-related costs will average \$1.1 billion in the medium emissions scenario and \$1.8 billion in the high emissions scenario per year.



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

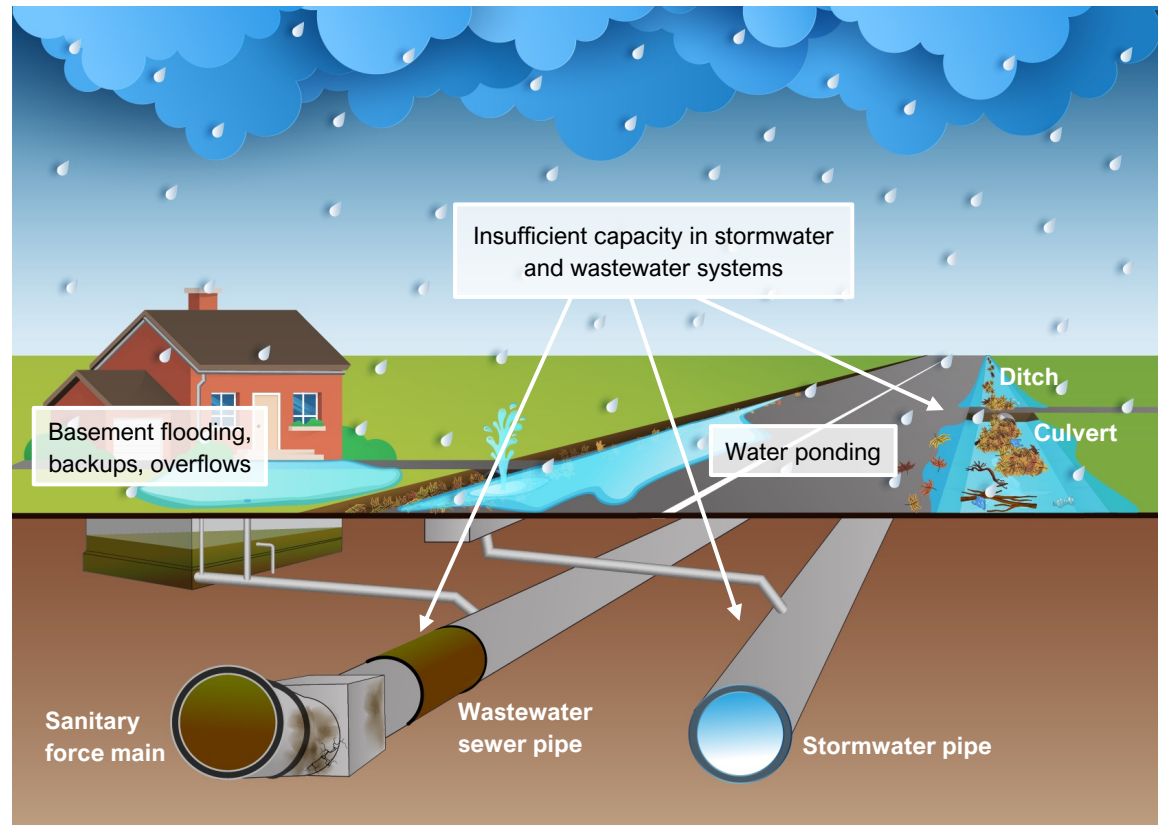
- By 2100, additional climate-related costs total \$88 billion (+37%) in the medium emissions scenario and \$145 billion (+61%) in the high emissions scenario.



Source: FAO.

The costs of a no adaptation strategy does not include the cost of flooding to households and businesses

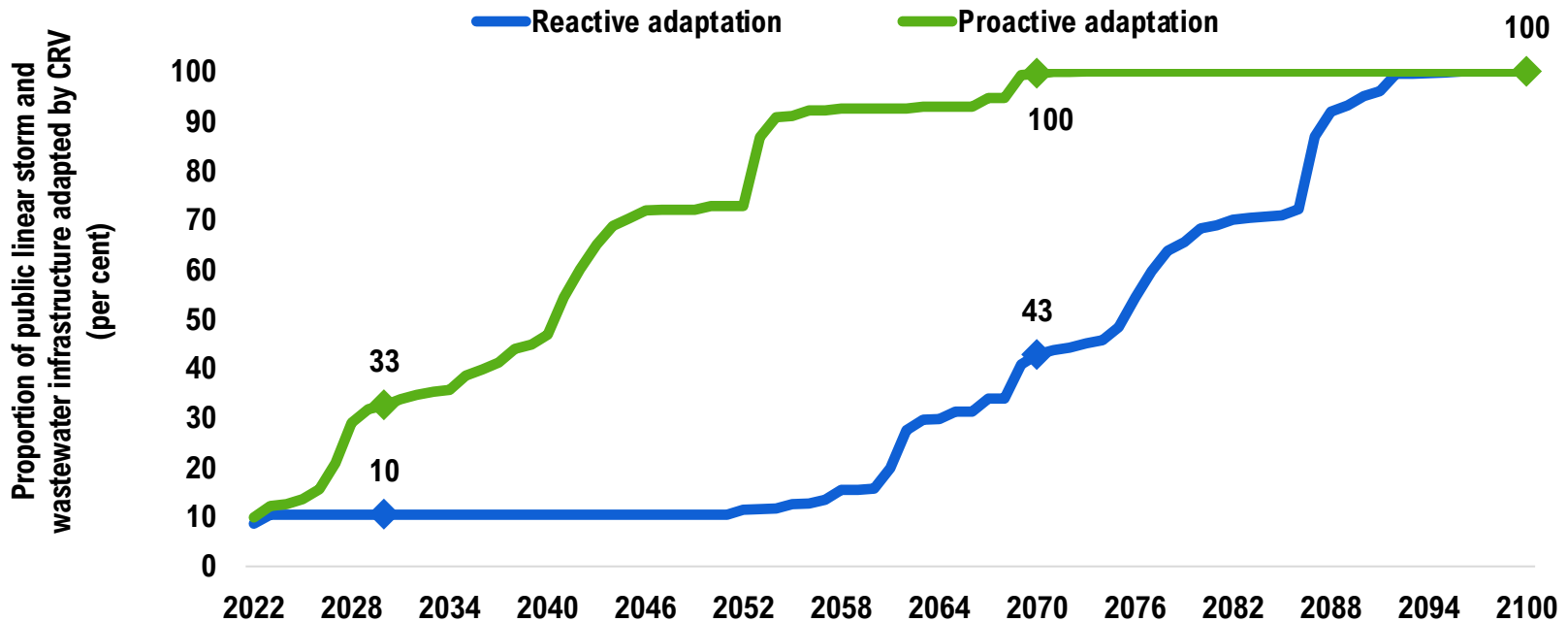
As extreme rainfall becomes more frequent and intense, unadapted assets will increasingly face capacity constraints, raising the flood risk to surrounding areas, even if these assets are maintained in a state of good repair. These potentially large costs are not included in the FAO's results.



Source: FAO.

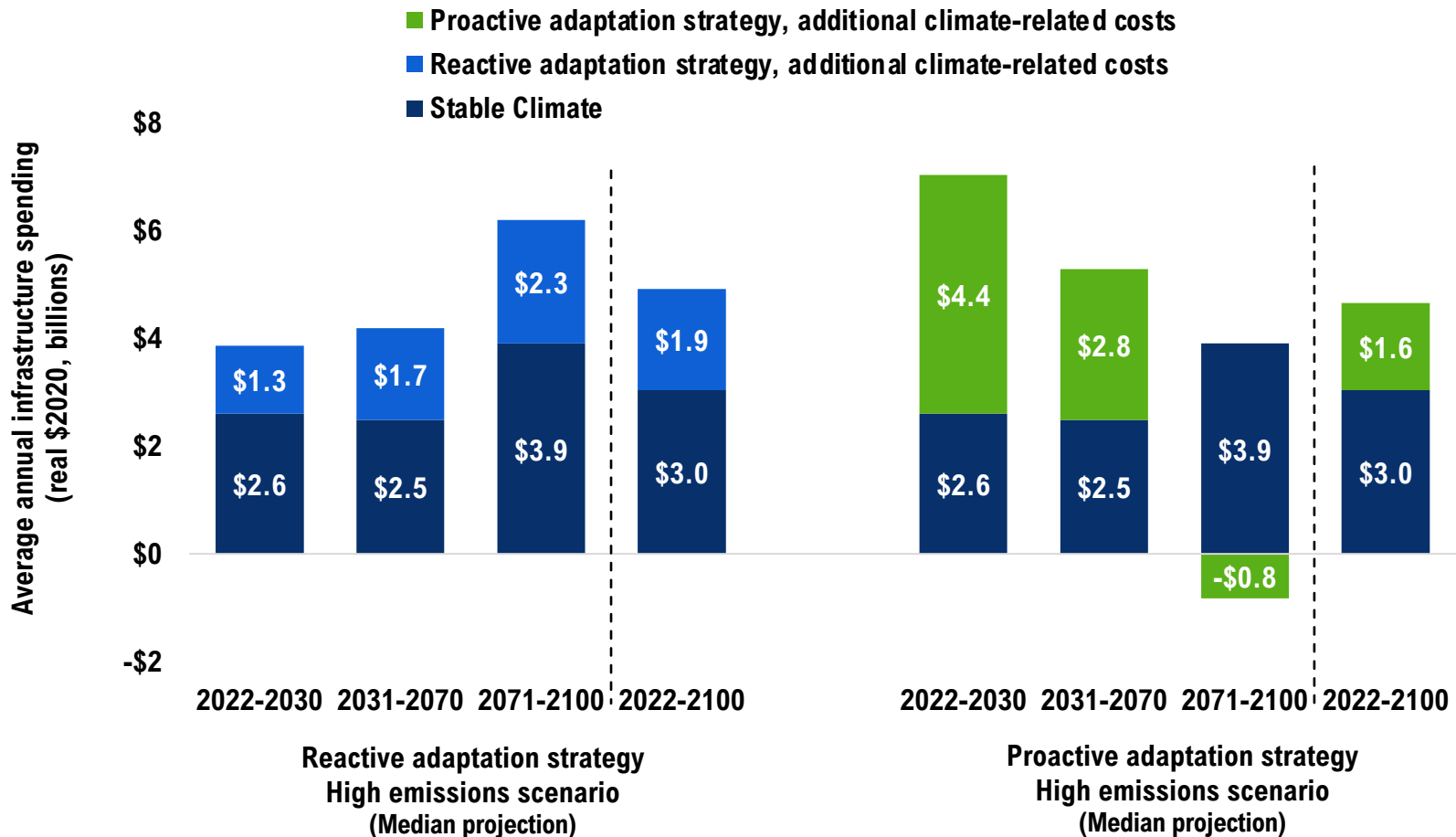
Assets can also be adapted to withstand the impacts of climate hazards

- The FAO costed two adaptation approaches: **Reactive adaptation** – assets are adapted at renewal; and **Proactive adaptation** – assets are adapted at the first available opportunity (next rehabilitation or renewal, whichever comes first)
- Adaptation ensures an asset no longer faces additional O&M and capital expenses due to more extreme rainfall and that assets will have adequate capacity to manage more extreme rainfall, reducing flood risk in surrounding areas.



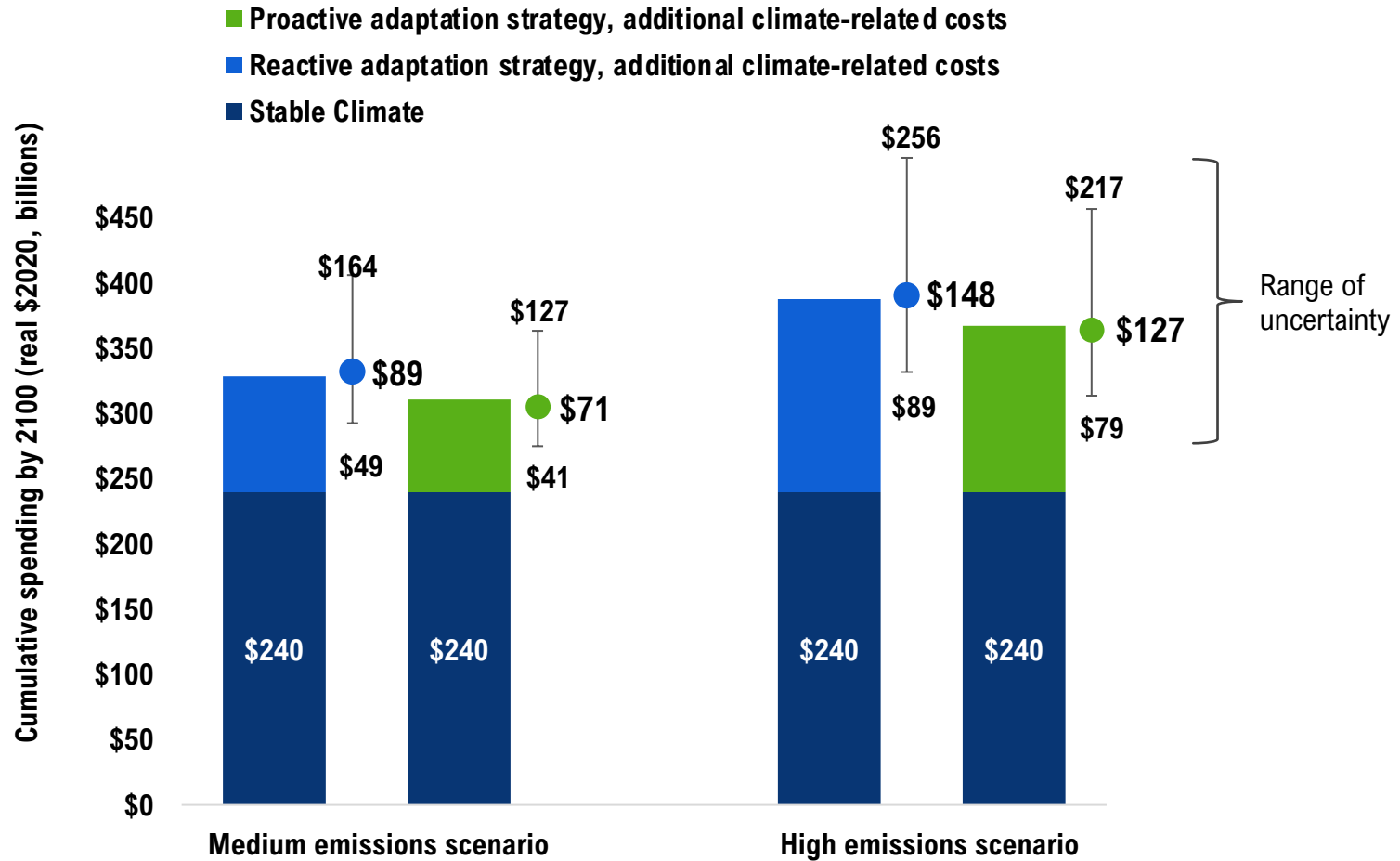
Source: FAO.

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.

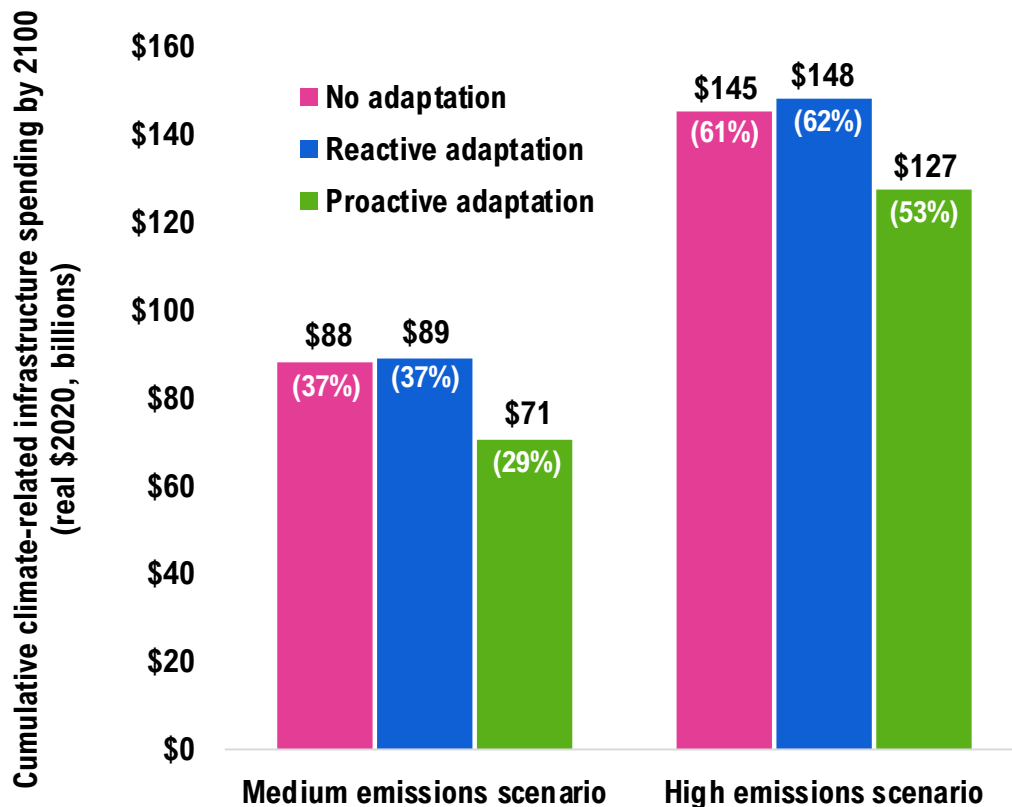
Adapting public storm and wastewater infrastructure to withstand extreme rainfall will be expensive



Source: FAO.

Proactively adapting will cost less than not adapting over the long term

Flooding costs to households and businesses are not included. Flood risk is highest in *no adaptation* and lowest in *proactive adaptation*.

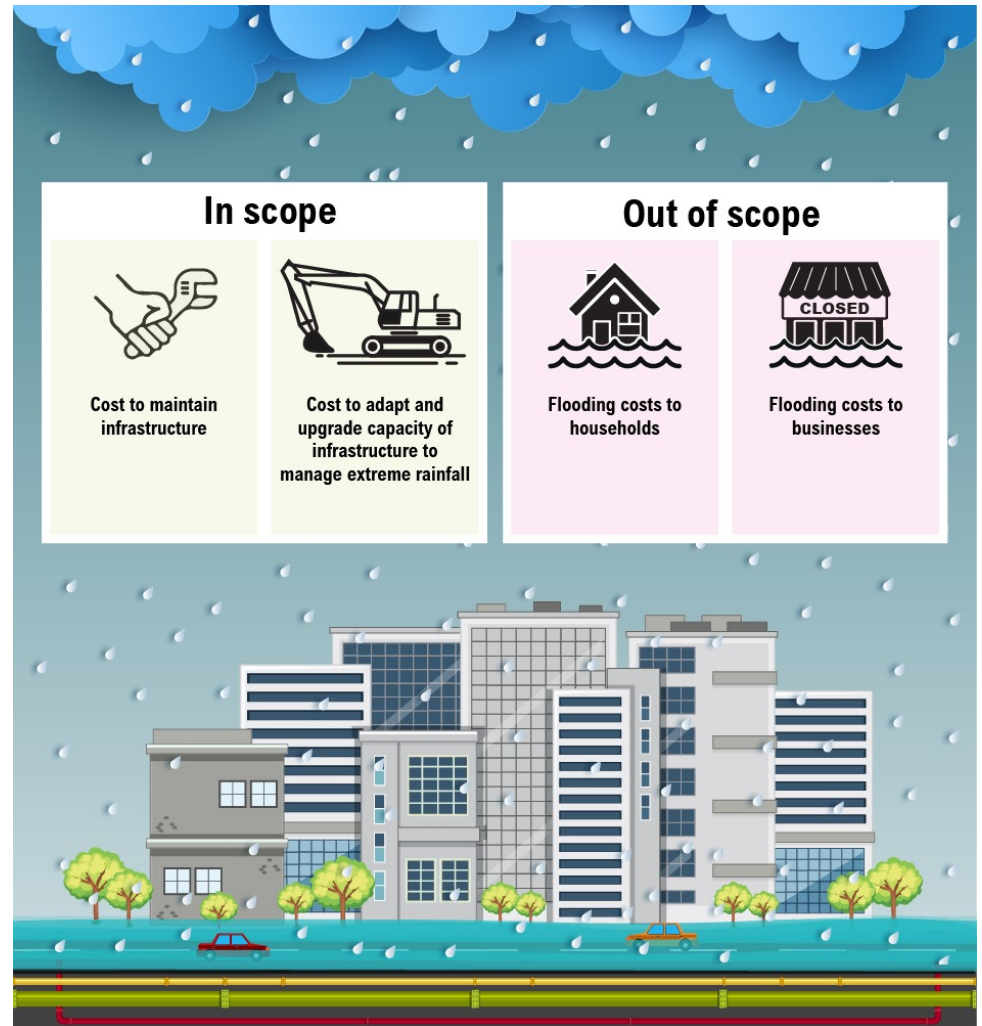


- While **proactive** adaptation will be expensive, it is less costly for municipal governments than not adapting over the long term.
- However, adaptation carries significant, but un-costed benefits, such as minimizing flood risk to surrounding areas.

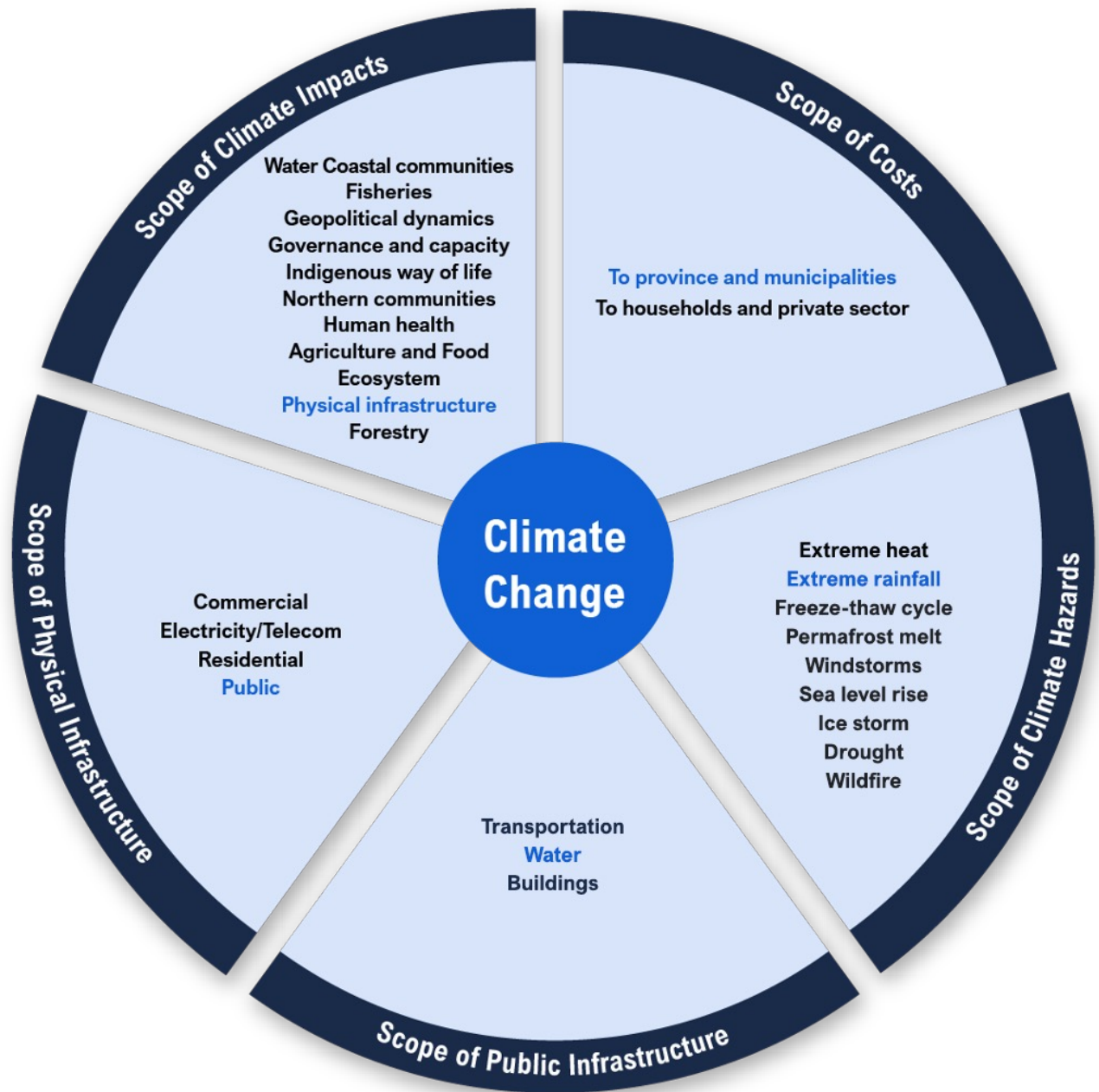
Note: The costs in this chart are based on the median (or 50th percentile) projection under each emissions scenario and are in addition to the baseline costs over the same period. For clarity, the uncertainty bands are not presented in this figure.
Source: FAO.

Proactive adaptation most rapidly reduces the risk of flooding and is the least costly strategy

Adaptation costs to increase capacity are included in the FAO's adaptation costs, but the costs of flooding to household and business are NOT included in the FAO's no adaptation strategy. Even with the omission of the broader societal costs of flooding, proactive adaptation is still less costly than a no adaptation strategy.



The FAO costed a small part of all climate change impacts



Source: Council of Canadian Academies and FAO.

Thank you!



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FINANCIAL ACCOUNTABILITY
OFFICE OF ONTARIO

2 Bloor Street West, Suite 900, Toronto, Ontario, M4W 3E2

416.644.0702

info@fao-on.org

fao-on.org

