Costs and benefits of climate change impacts and adaptation in Canada: the economic case for action

Richard Boyd, Director of Research, All One Sky Foundation

ADAPTATION CANADA 2020 | 19-21st February 2020 | Vancouver, B.C.

CANADA IN A CHANGING CLIMATE

NATIONAL ISSUES

- Cities and towns
- Remote and rural communities
- Water resources
- Ecosystem services
- **Costs and benefits of climate impacts and adaptation**
- Economic sector perspectives
- International dimensions
- Climate Disclosure, litigation and finance

Richard Boyd, Director of Research, All One Sky Foundation

ADAPTATION CANADA 2020 | 19-21st February 2020 | Vancouver, B.C.

About All One Sky Foundation

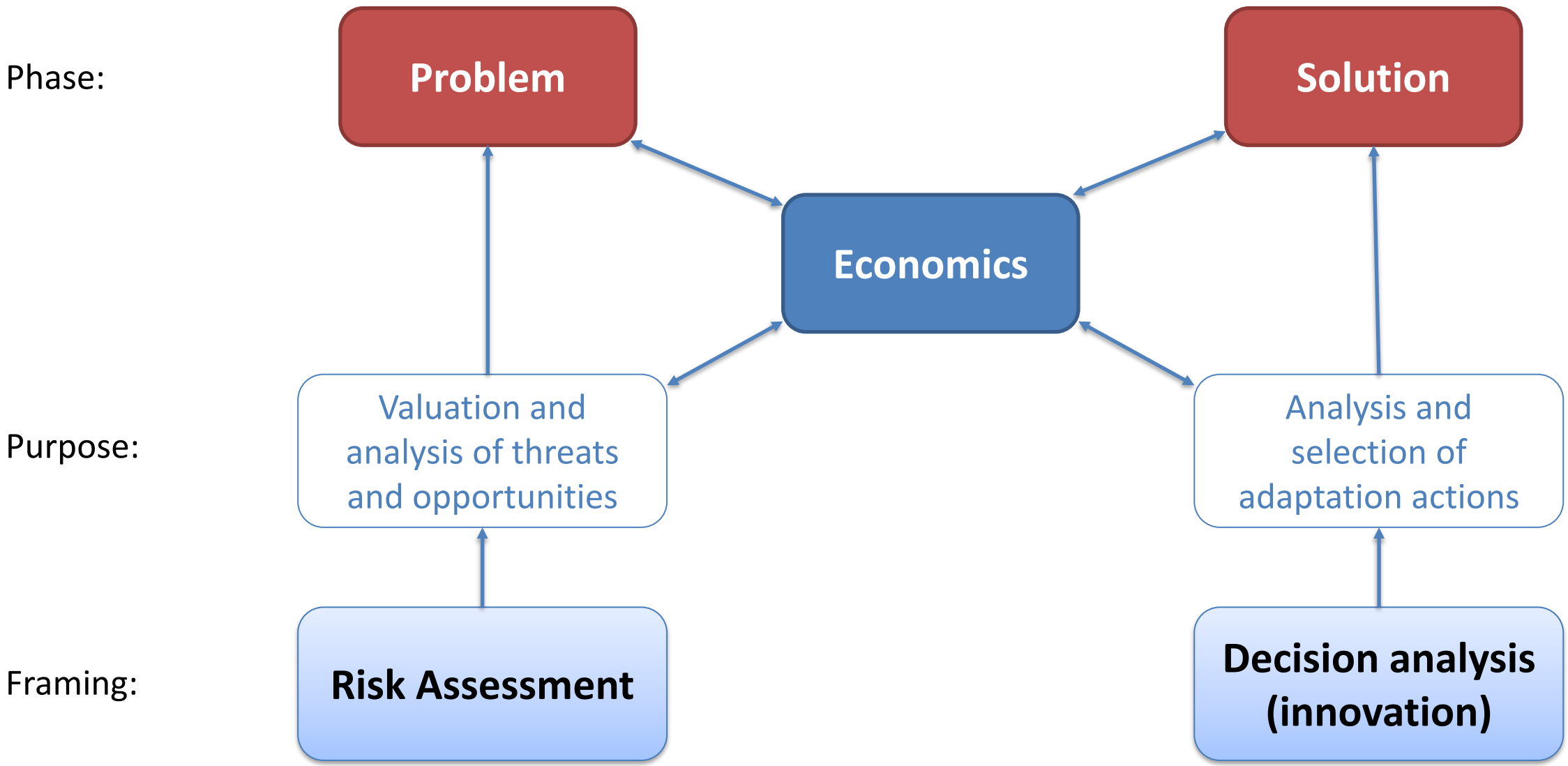
All One Sky

Agenda

1. Context for economic analysis
2. Observed costs of extreme weather
3. Projected future costs of climate change
4. Evaluation of adaptation options
5. Economic limits to adaptation
6. Key messages

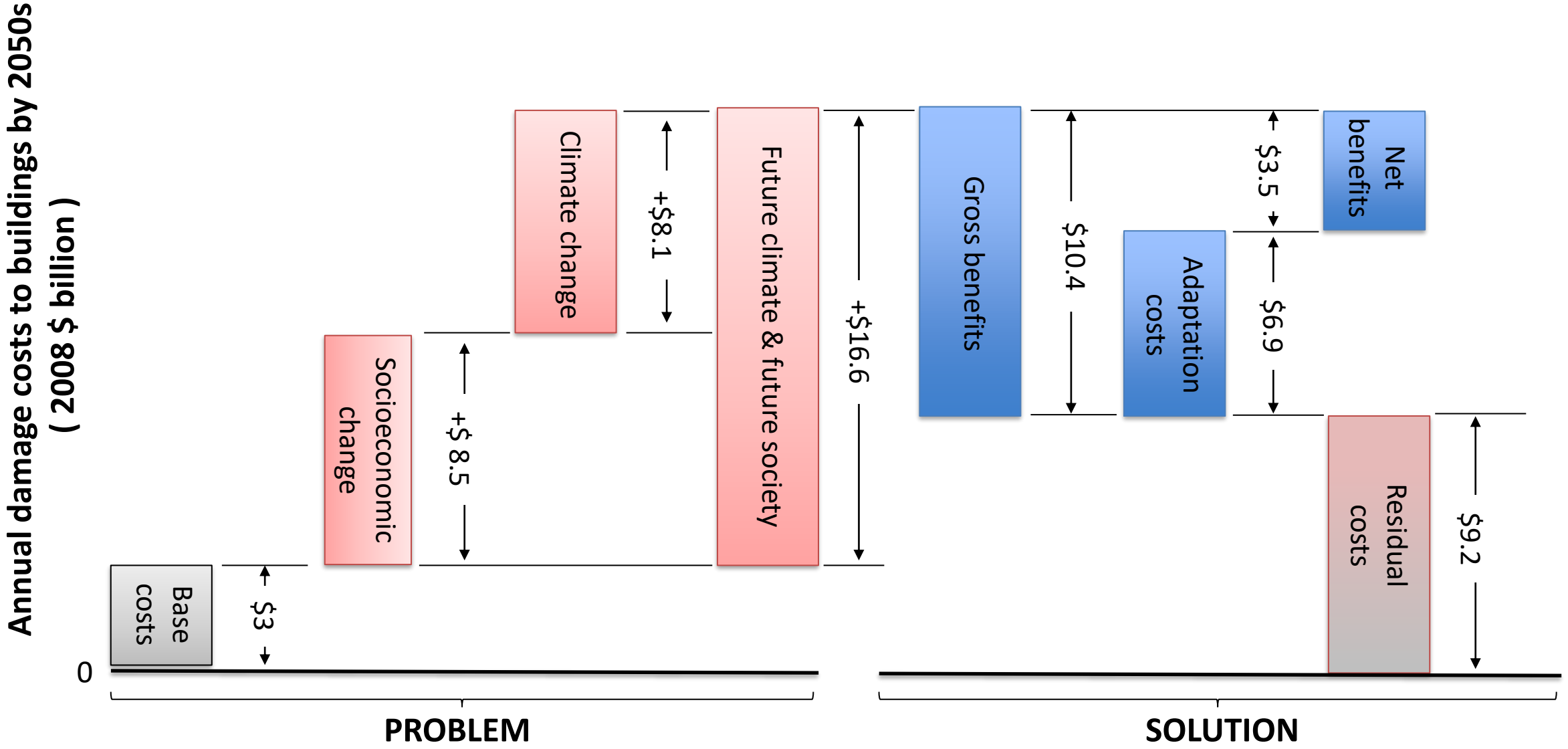
1. Context for economic analysis

Role of economics in iterative climate risk management



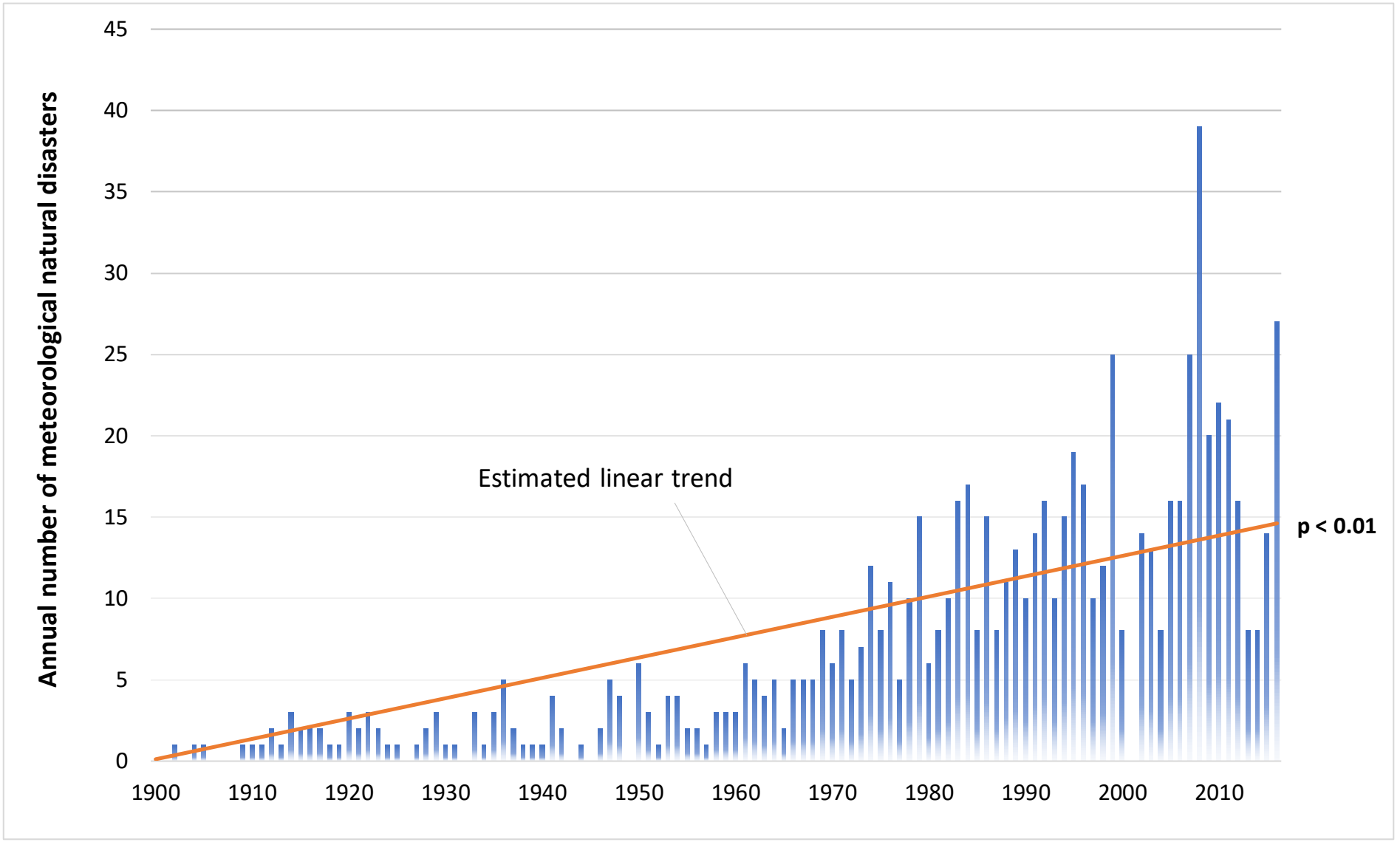
Source: Adapted from Jones et al (2013)

Economics of adaptation



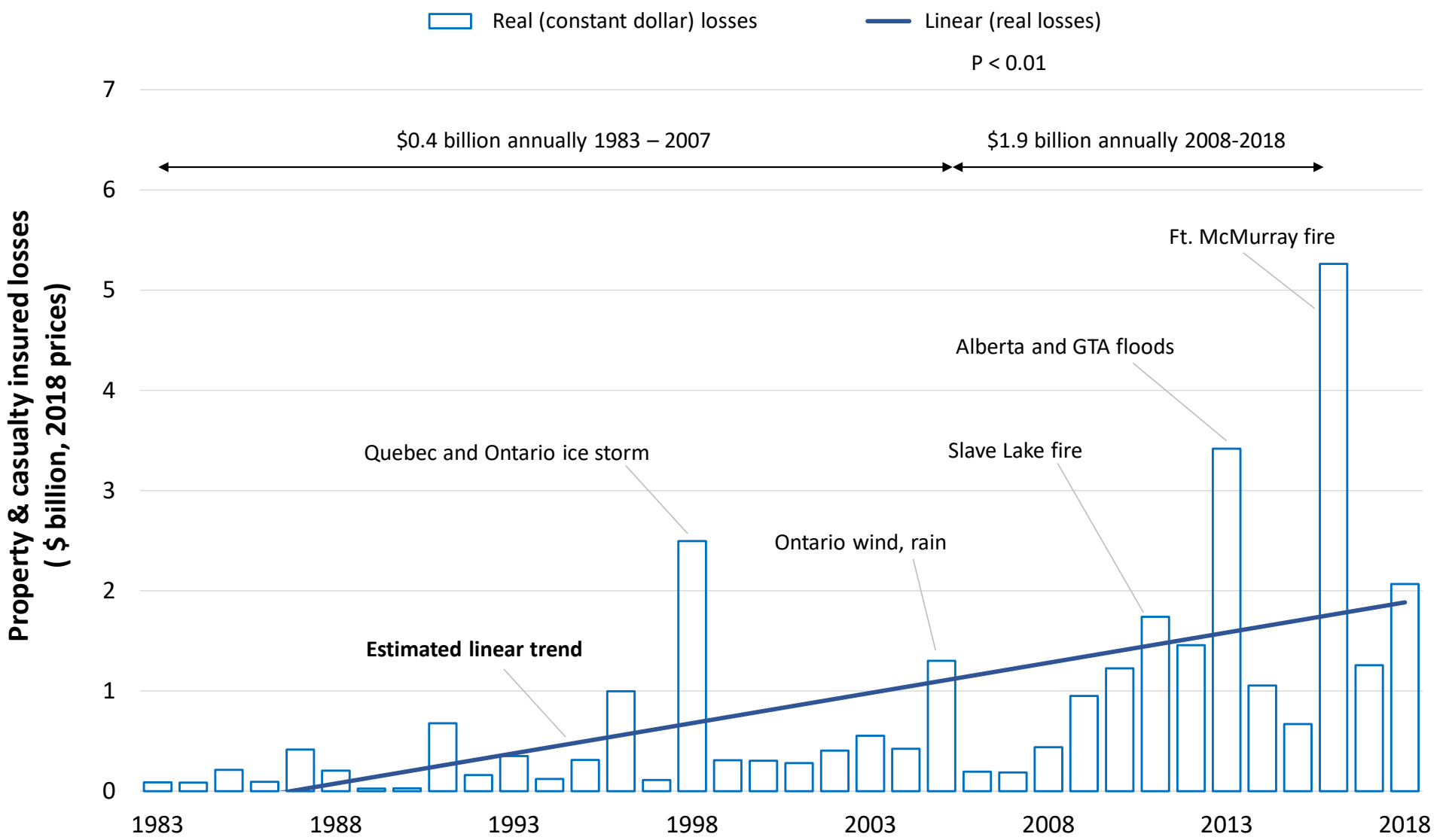
2. Observed costs of extreme weather

Trends in meteorological natural disasters in Canada



Source: Canadian Disaster Database (Public Safety Canada)

Trends in meteorological natural disasters in Canada



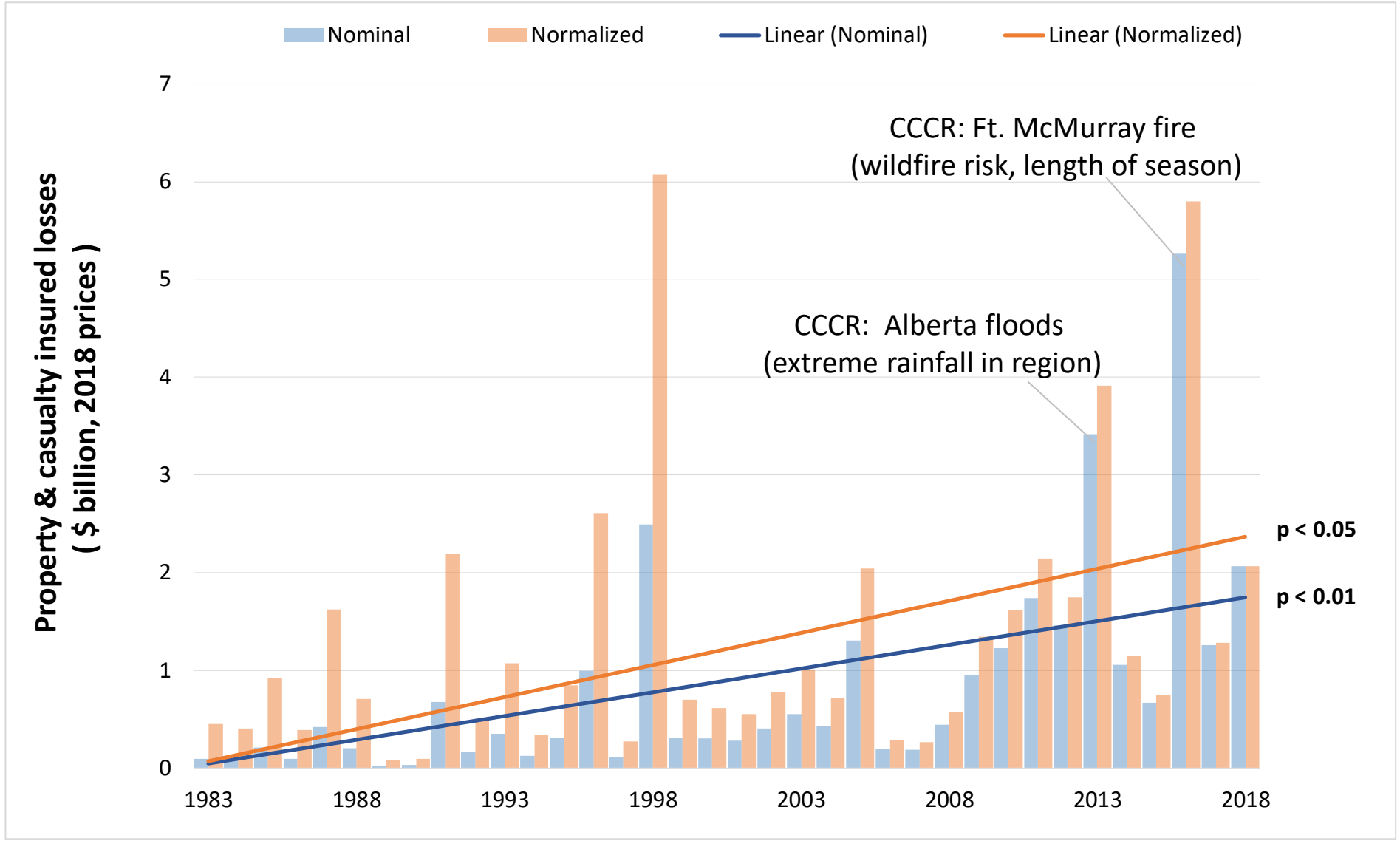
Source: Boyd and Markandya (forthcoming)

“Alberta has become the place where bad weather pays a visit more often”

DATE	PLACE	EVENT TYPE	LOSSES (current $ million)	LOSSES (2018 $ million)
2016	May 3–19, Fort McMurray AB	Fire	3,750	3,900
1998	Jan., southern Quebec	Ice storm	1,380	2,020
2013	June 19–24, southern Alberta	Flooding/Water	1,600	1,740
2013	July 8, Greater Toronto Area ON	Flooding/Lightning/Water	920	1,000
2005	Aug. 19, Ontario	Hail/Tornadoes/Wind	630	780
2018	May 4, Hamilton and GTA ON; Quebec	Windstorm/Water	680	680
2011	May 15–16, Slave Lake AB	Fire/Windstorm	530	590
2014	Aug. 7, central Alberta	Hail/Windstorm/Lightning/Water	550	580
2012	Aug. 12, Calgary AB	Hail/Lightning/Water	520	570
2010	July 12, Calgary AB	Hail/Flooding/Windstorm/Lightning	490	560

Source: IBC 2019 Facts

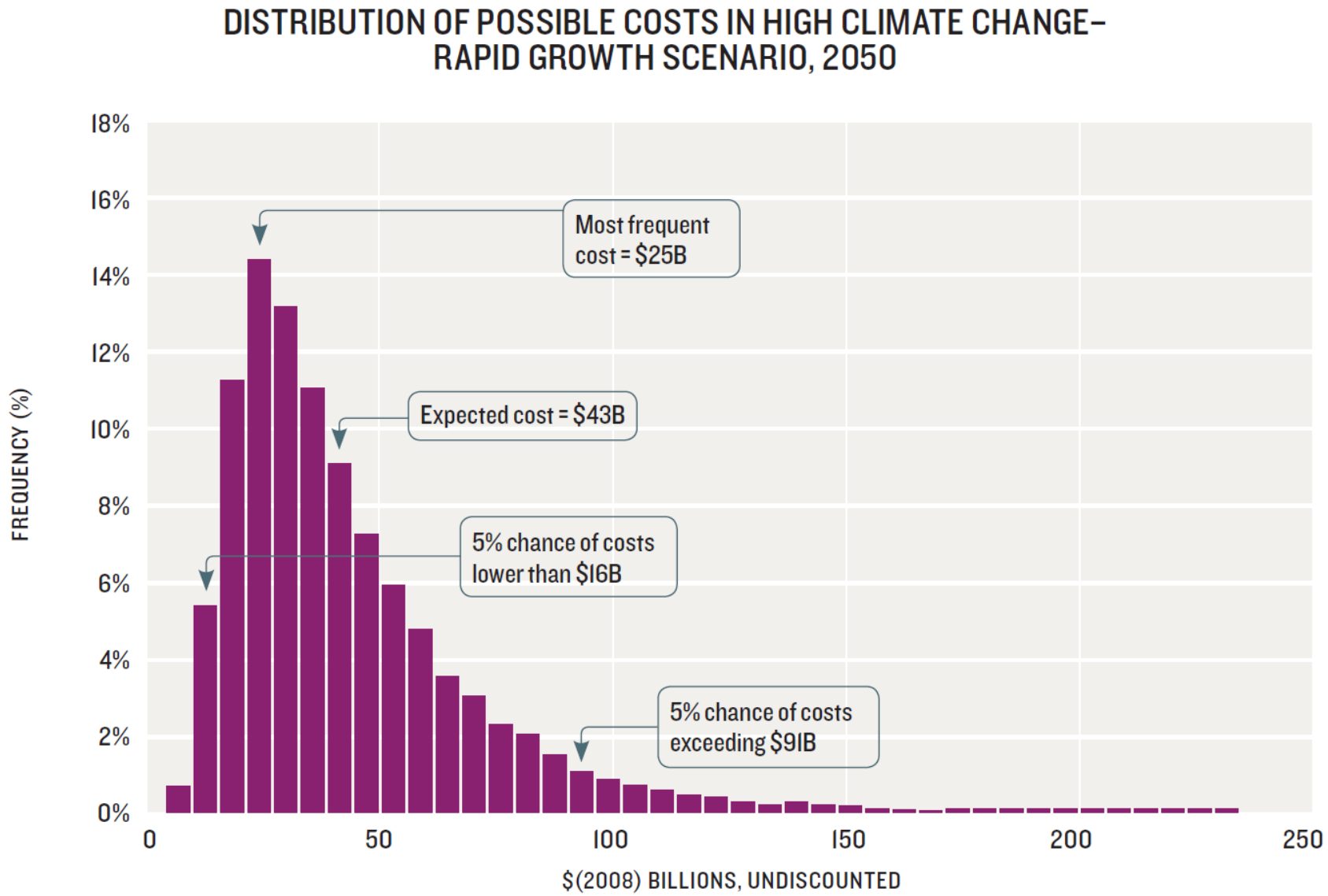
Trends in damages from (catastrophic) extreme weather events



Source: Boyd and Markandya (forthcoming)

3. Projected economic consequences of climate change

Projected future economic impacts of climate change - national



Source: NRTEE (2011)

Projected future economic impacts of climate change – regions & sectors

Coasts - national

$109-$379 Bn. PV costs

(2011-2100; DR = 3%; 2008 $)

Damages to dwellings from SLR and storm surge

Forestry - national

$1,070 Bn. PV GDP costs

(2010-2080; DR = 3%; 2008 $)

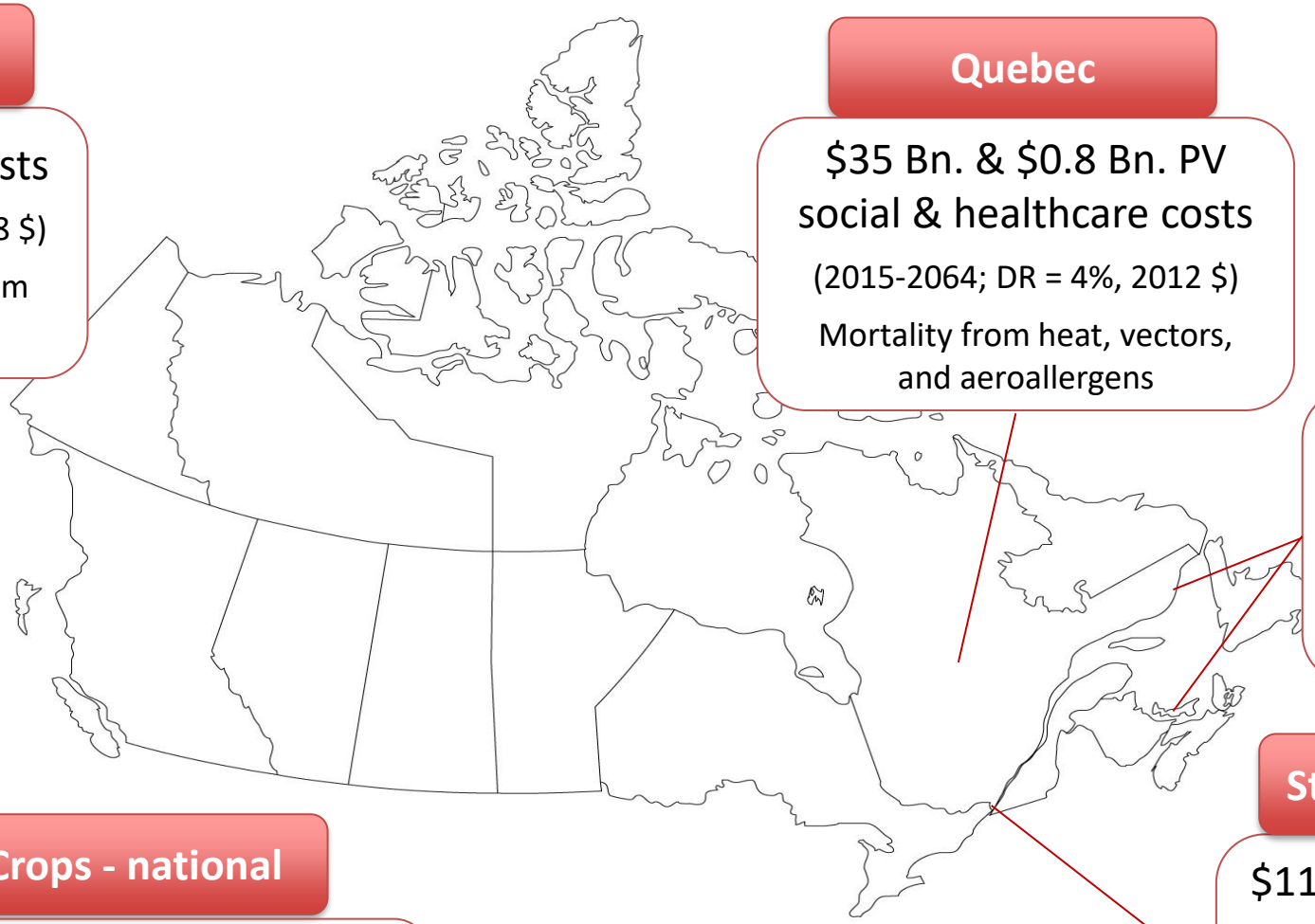
Impacts on timber supply from fire, pests and disease, and changes in productivity

Crops - national

1.7% increase in PV of GDP

(2006-2051; DR = 4%)

Improvements in crop yields



Quebec

$35 Bn. & $0.8 Bn. PV social & healthcare costs

(2015-2064; DR = 4%, 2012 $)

Mortality from heat, vectors, and aeroallergens

Eastern coast

$1.2 Bn. PV costs

(2015-2064; DR = 4%; 2012 $)

Market & non-market damages from SLR, storm surge and erosion

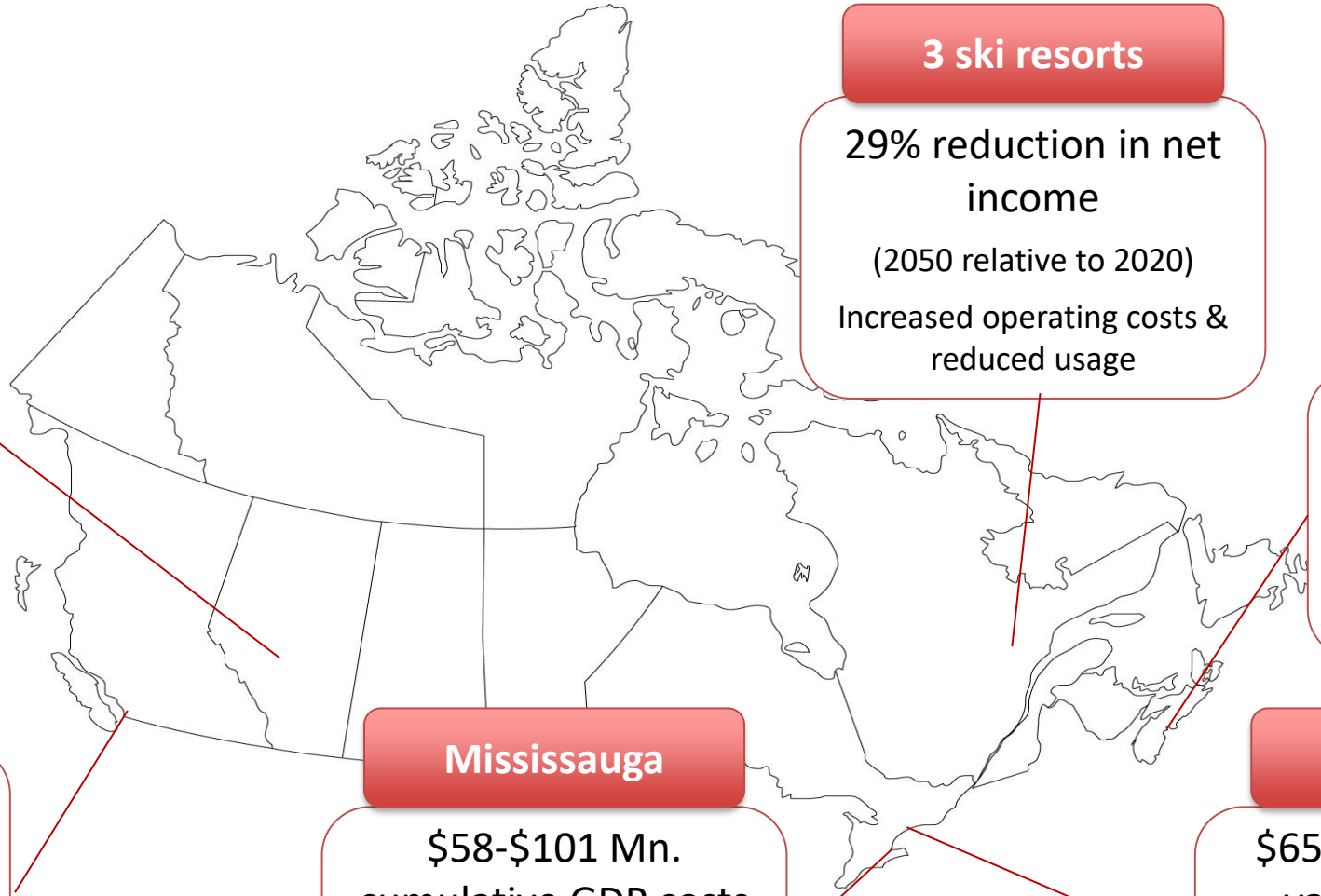
St. Lawrence & lakes

$11.4-$11.7 Bn. PV costs

(2015-2064; DR = 4%; 2012 $)

Low flow impacts to hydro, recreation, waterfront property, shipping

Projected future economic impacts of climate change - municipalities



Edmonton

$10.5 Bn. social costs pa

(2080s relative to 1980s)

Damage to heath, built and natural environment from 17 climate hazards (2018 $)

3 ski resorts

29% reduction in net income

(2050 relative to 2020)

Increased operating costs & reduced usage

Halifax

$90-$175 Mn. cumulative GDP costs

(2040 relative to 2015)

Damages from storm surge and high winds (2013 $)

Vancouver

$36-$48 Bn. present value social costs

(2010-2100; DR = 4%; 2008 $)

Mortality from heat and poor air quality

Mississauga

$58-$101 Mn. cumulative GDP costs

(2040 relative to 2015)

Damages from stormwater and freezing rain (2013 $)

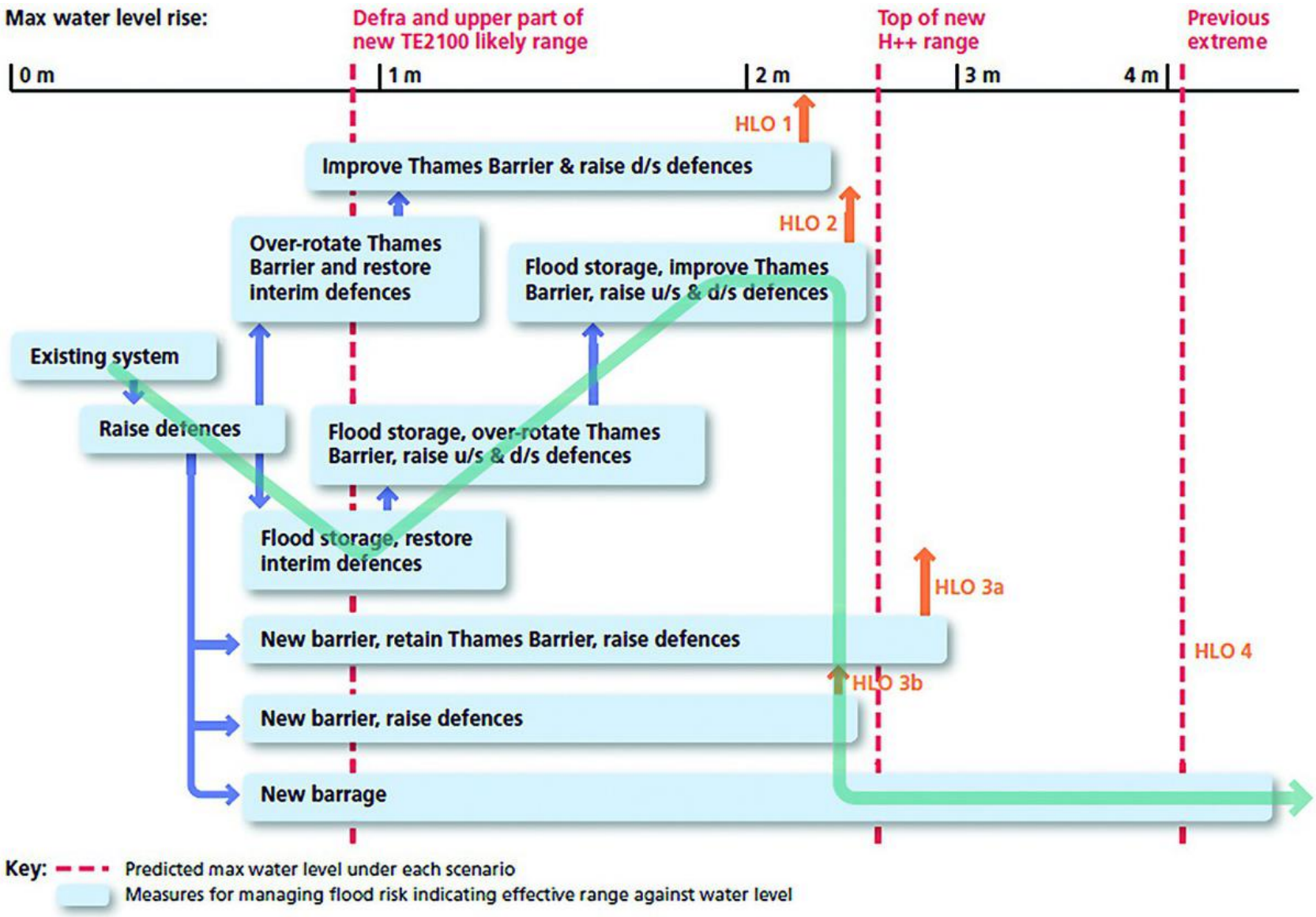
Toronto

$65-$96 Bn. present value social costs

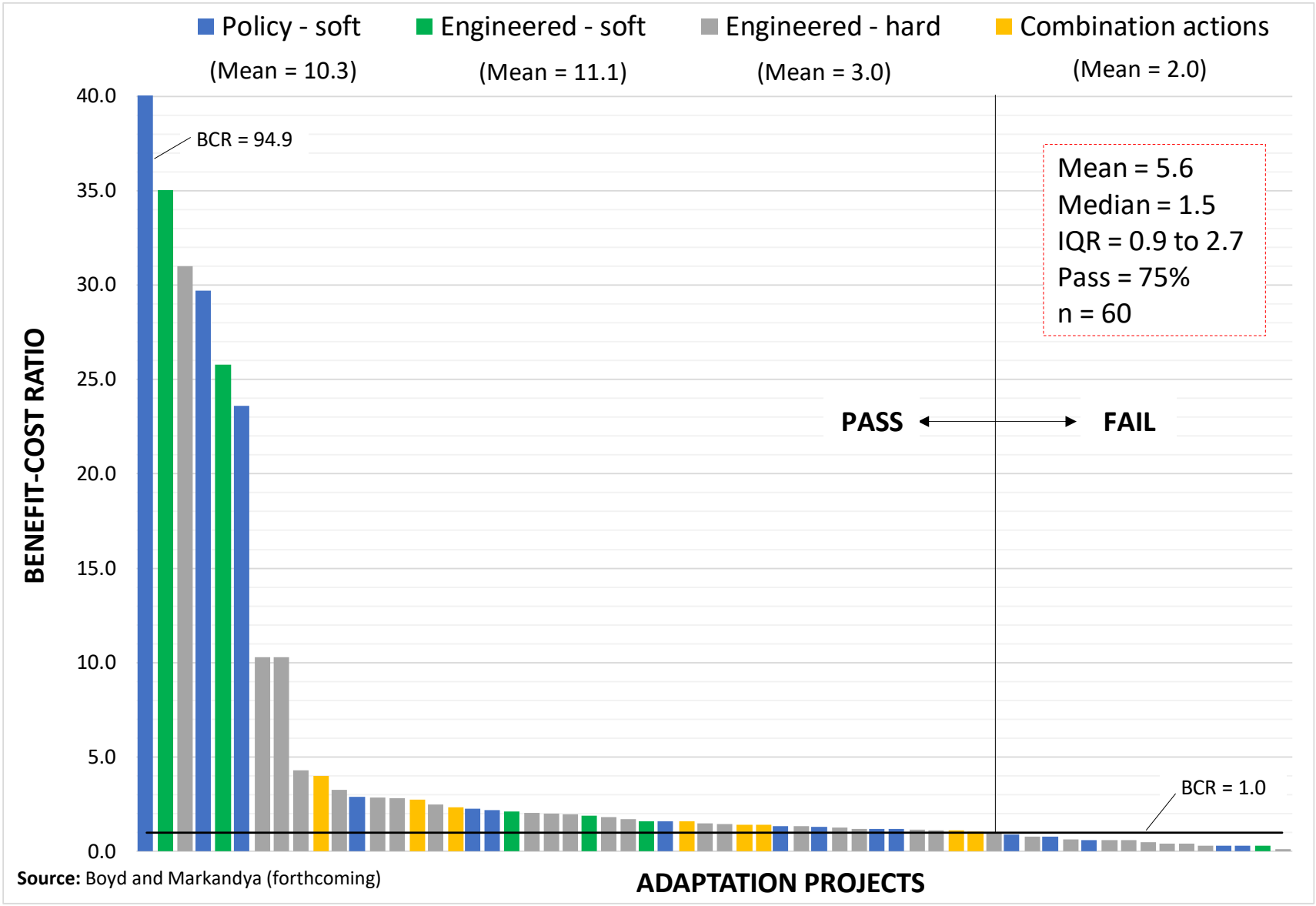
(2010-2100; DR = 4%; 2008 $)

Mortality from heat and poor air quality

Illustration of adaption pathways to manage uncertainties



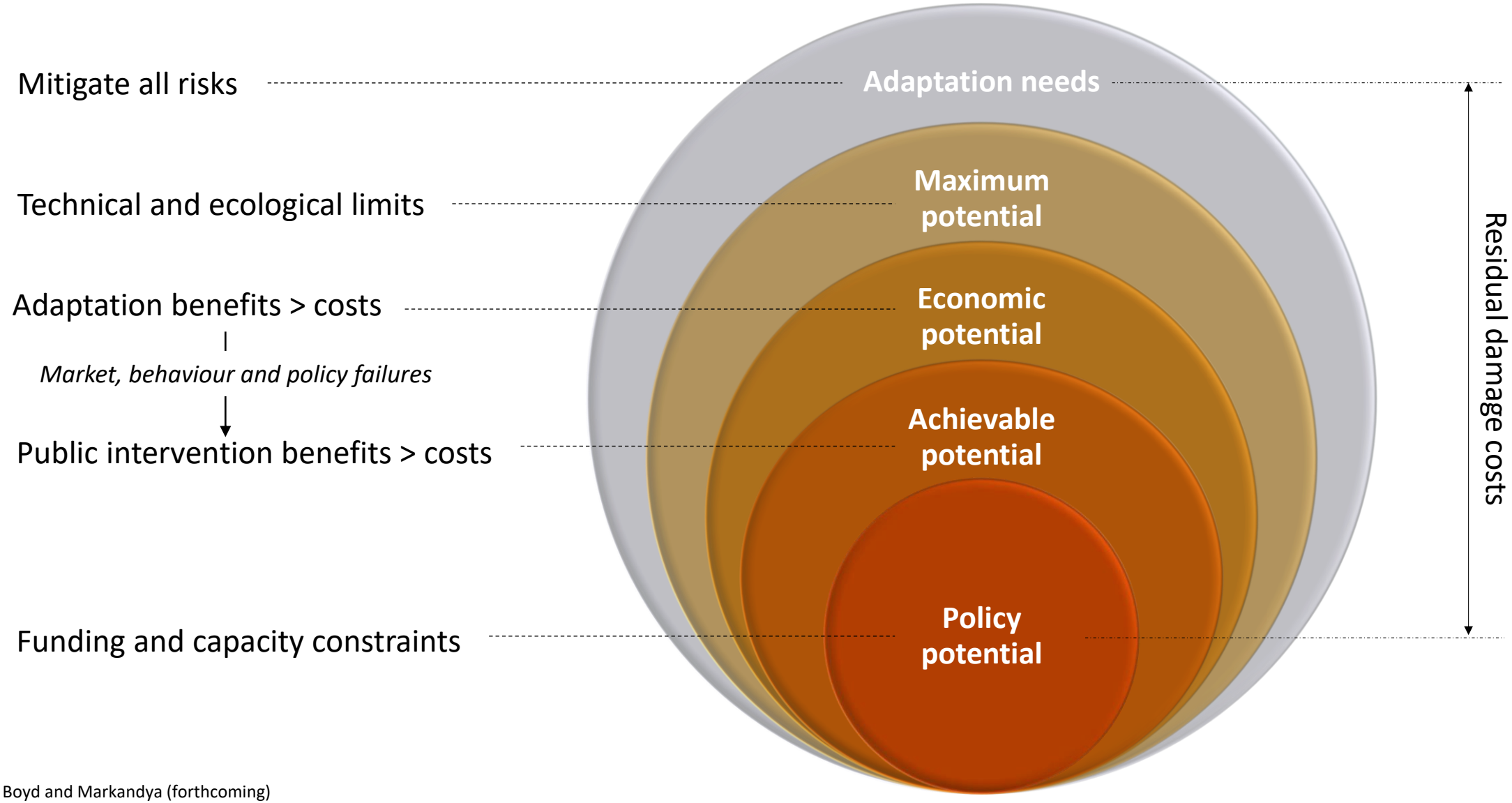
CBA of sample of adaptation options in Canada



Source: Boyd and Markandya (forthcoming)

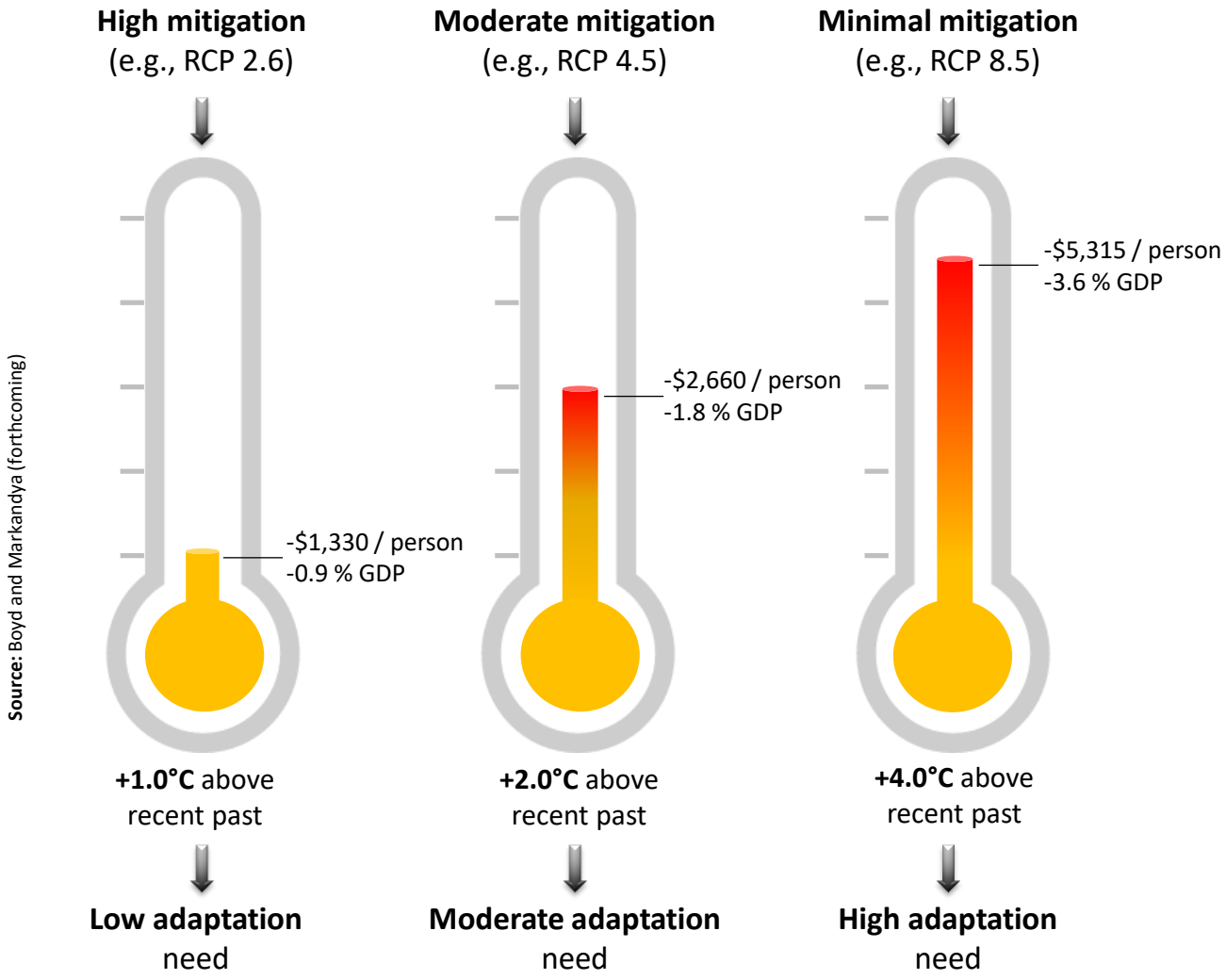
5. Economic barriers and limits to adaptation

Economic barriers and limits to meeting all adaptation needs



Source: Boyd and Markandya (forthcoming)

Climate mitigation, adaptation needs and limits



Source: Boyd and Markandya (forthcoming)

5. Key messages

Key messages

1. Insured losses significant and rising (+$60 million per year)
2. Climate link? Adaptation deficit (potential for no-regret options)?
4. Significant projected future costs for regions, sensitive sectors (except crops) and cities
5. Many gaps in coverage
6. Much more to know about cost of adaptation
7. Strong economic case for adaptation, though returns variable and context specific
8. Uncertainty not reason for delay
9. Economic limits to adaptation, expect residual costs

Contact:

Richard Boyd | richard@allonesky.ca | +1.403.612.4470

All One Sky
FOUNDATION