

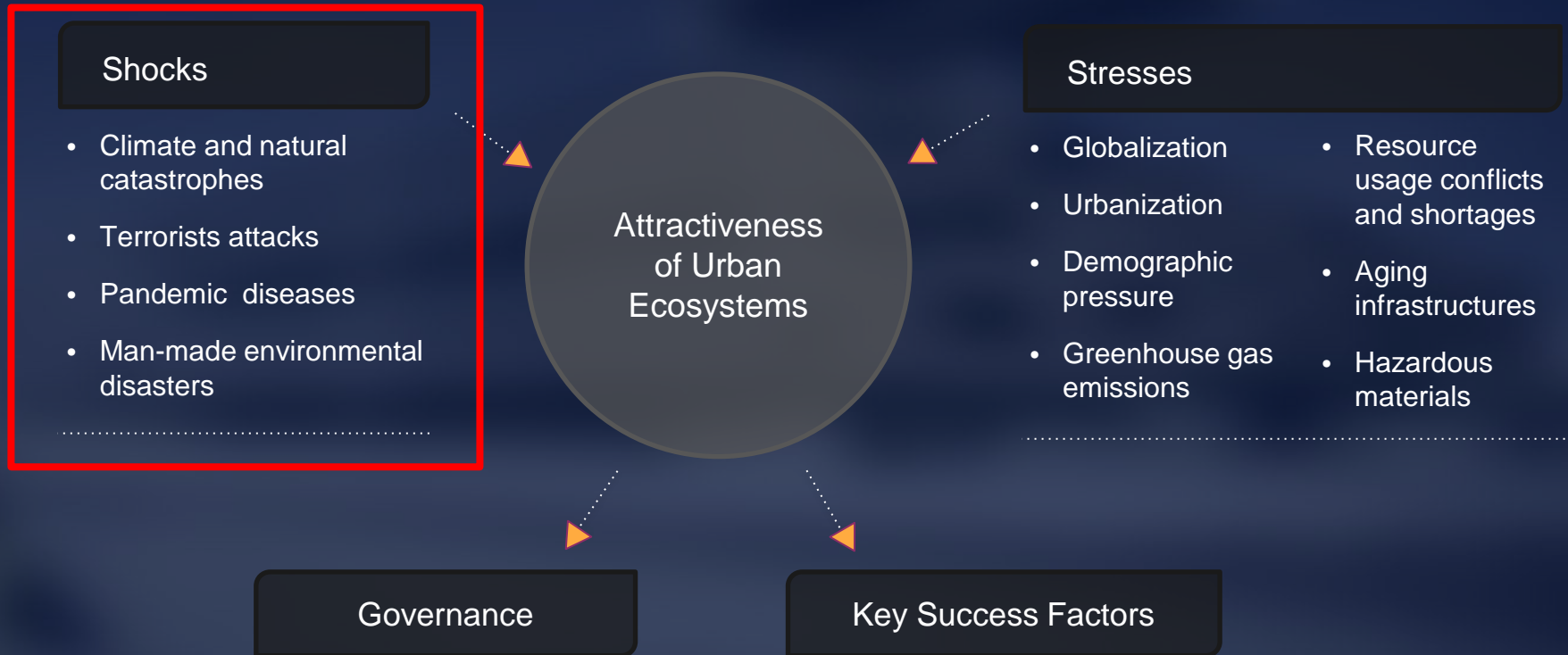


RESILIENCE BOND

Thierry Witkowicz
Senior Vice President
Smart and Resilient Solutions at Veolia

WHAT IS RESILIENCE ?

Resilience: Strategic approach to strengthen the socioeconomic attractiveness of the urban ecosystem, guaranteeing its sustainable growth.



VEOLIA AND THE 100 RESILIENT CITIES INITIATIVE

A \$100 million effort launched by the Rockefeller Foundation
2 300 Cities apply



100RC is a non-profit entity, managed by **Rockefeller Philanthropy Advisors (RPA)**.

CHALLENGES FACED BY CITIES WITHIN 100 RC:

Aging infrastructure and/or Infrastructure failure: 48%

Energy and environmental degradation: 28%

Flooding and water shortage: 80%

Lack of affordable housing: 40%

Technology and Data: 20%

100RC PROVIDES MEMBER CITIES 4 TYPES OF

SUPPORT TO ADDRESS THEIR CHALLENGES:

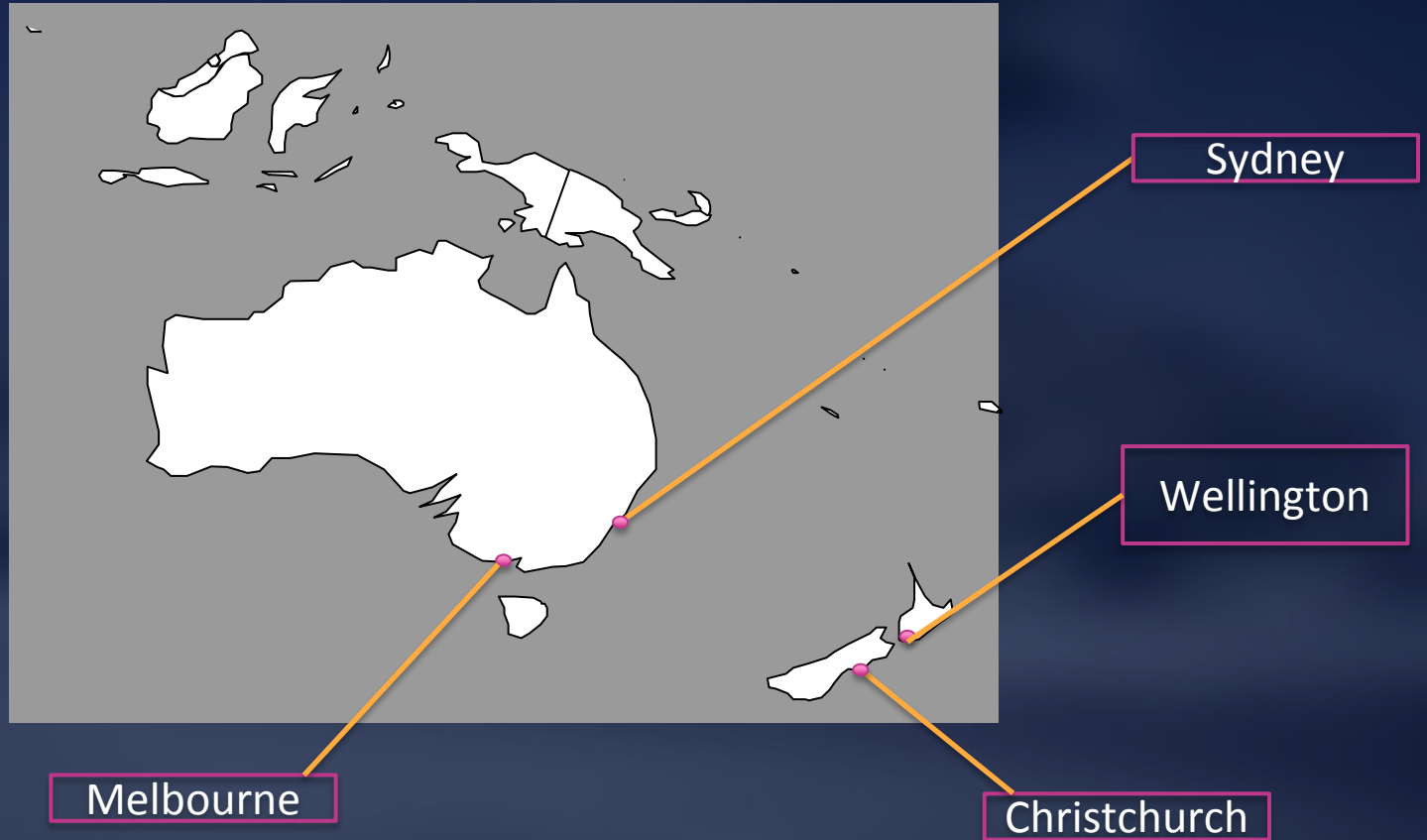
Chief Resilience Officer (CRO)

Support to Develop a City Resilience Strategy

Membership in the 100RC peer Network of cities

A Platform of Services to support strategy implementation

Resilient Cities in Australia & New Zealand



Main resilience challenges for Australia & New Zealand cities

	Christchurch	Melbourne	Sydney	Wellington City	
Aging infrastructure			X		1
Drought		X			1
Earthquake	X			X	2
Economic shifts	X			X	2
Flooding (rainfall and coastal)	X	X	X	X	4
Heat wave		X	X		2
Hurricane, Typhoon, Cyclone	X				1
Infrastructure failure			X		1
Lack of affordable housing			X		1
Poor transportation system			X		1
Rising sea level and coastal erosion	X	X		X	3
Tsunami				X	1

TO BE IN THE NETWORK : VEOLIA ORGANIZE WORKSHOPS



Robust infrastructure

- Risk assessment
- Urban Consulting
- Asset management



- New Orleans
- Santiago de Chile



Resource conservation

- Water Resources Monitoring
- Network efficiency
- Wiix - Water footprint
- Alternative techniques (desalination, wastewater reuse, aquifer recharge)



- Lyon
- Milwaukee (Wiix)



Flood management

- Overflow reduction (Sewers Network Dynamic Management)
- River basin dynamic management
- Urban Green Infrastructure



- Copenhagen
- Milwaukee (Rain net)
- SIAVB (France)



Critical energy supply

- CHP (Combined Heat Power)
- Electrical flexibility VPP/micro-grid
- Energy efficiency on buildings



- NYC (CHP)
- Hubgrade (worldwide)



Heat wave mitigation

- Vulnerability Study
- Urban Monitoring
- Urban Green Infrastructure



- Lyon
- Nice



Critical event management

- Emergency response management
- Depollution (soil & aquifer)
- Recovery services



- New Orleans

Value Proposition

Boosters (example)

References (example)

D1 New Orleans Risk Assessment for the Sewerage & Water Board (SWB)

Contract description

First PPP on Resilience

Veolia and Swiss Re working together with the City to develop a Risk Assessment on the most critical assets of the city; the whole of the water systems, drinkable, wastewater and drainage, and the risks related to the energy supply of its assets in current and future climate scenarios.

Client's challenges

In the wake of Hurricane Katrina, the City of New Orleans implemented a number of reinforcement measures to protect the city, such as the Hurricane and Storm Damage Risk Reduction System.

While protecting itself against a similar event, the City has made it a priority to better understand its exposure to a broader set of future risks, to transform its systems and become more dynamic and prepared.

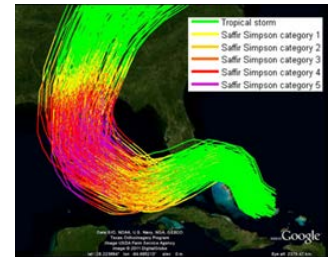
Veolia's solution

- > Analysis of risks and impacts
- > **Veolia's detailed field investigation asset per asset** (in-house risk management tool with MRO Analytics): Identification of resilience improvements to be brought to the various systems. The tool supports local decision-makers by identifying assets criticality and by modeling a threat analysis to determine priorities and build a long term adaptation strategy.
- > **Modelling the impact of improvements** on current and future climate scenarios to determine potential cost savings
- > **Development of a strategic plan to optimize investment funds** for risk and cost reduction for taxpayers.

Client's benefits

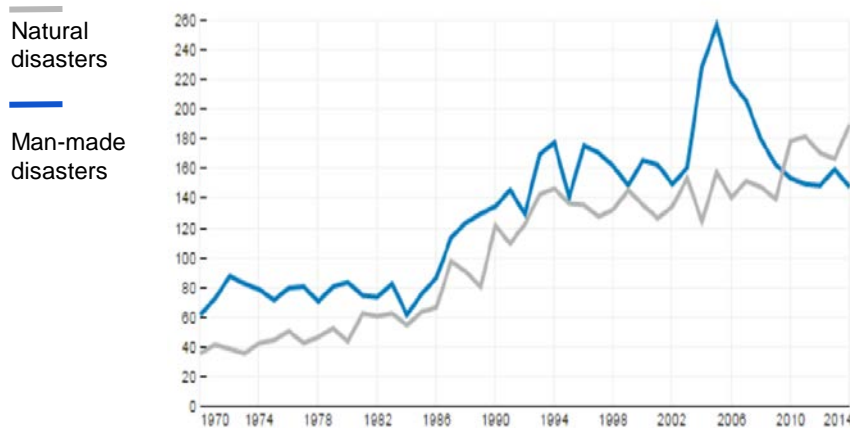
Main recommendations from the Risk Assessment report highlight Veolia competencies, services, and products to implement either as a service provider or as a coordinator:

- **“Must have”** (46% of total asset value), **power supply reliability**
- **“Quick wins”** (with the highest reduction for the least investment) **operational excellence and staffing strategy & change management**
- **“Good to have”** (51% of total asset value) **hardening measures** to improve resilience of the SWB (expected >10 M\$)

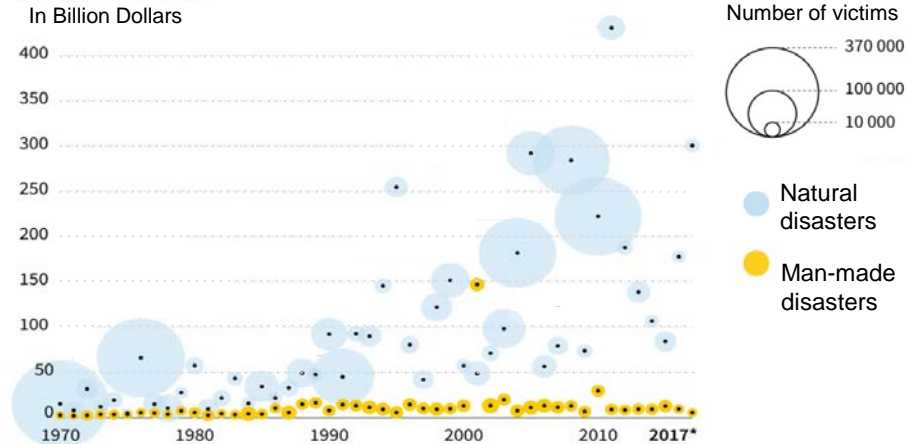


More violent, frequent and intense shocks: a growing economic exposure of cities

Increased number of natural disasters and man-made disasters (1970-2014)



Increased cost and frequency of natural and man-made disasters (1970-2017)



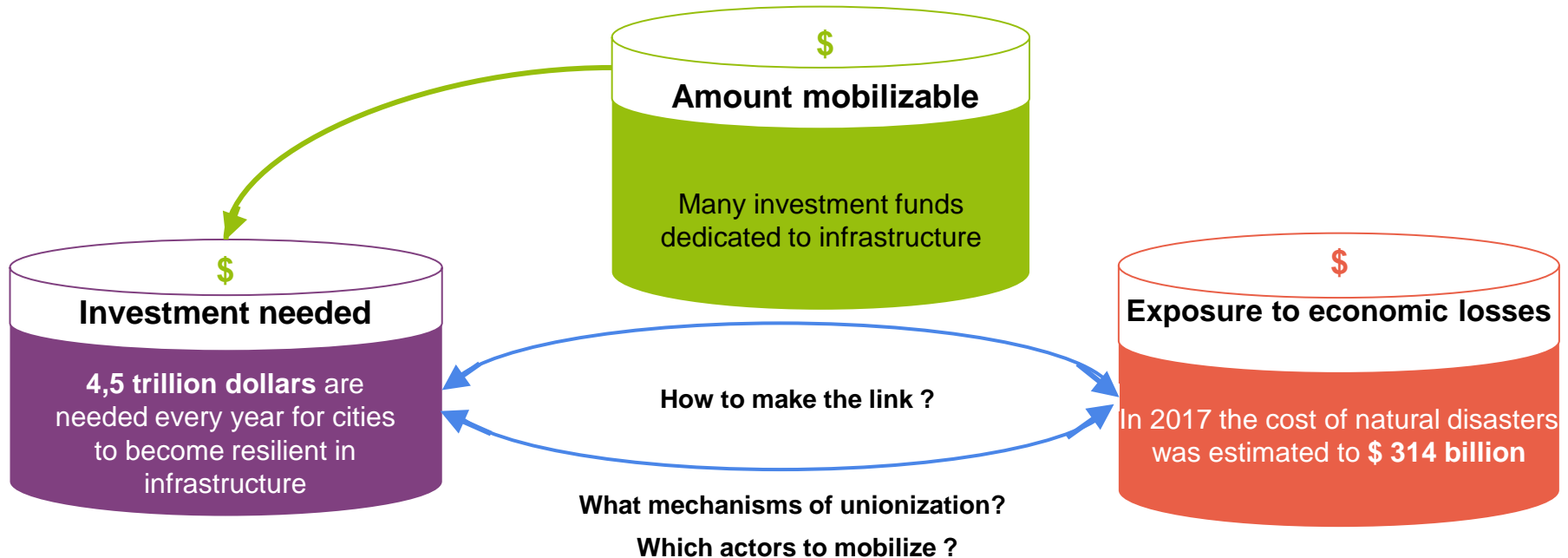
Natural disasters intensify in billions:
More than 220 million people affected and about 100 billion US dollars of losses per year

Number of shocks increased by 60% in 4 years.

Evolution of the cost due to disasters:

- 2016 = 188 billion
- 2017 = 314 billion (x1,7)

A major issue: how to capture the “de-risked” economic value to finance technical solutions



How the Insurance Industry Can Push Us to Prepare for Climate Change

by **Matthew E. Kahn**, **Brian Casey**, and **Nolan Jones**

AUGUST 28, 2017

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'Resilience bonds': A secret weapon
against catastrophe

<https://www.bloomberg.com/news/articles/2018-08-30/houston-eyes-designer-bonds-in-quest-for-15-billion-storm-wall>

Economics

Houston Eyes Designer Bonds to Pay for \$15 Billion Ike Dike

By [Jack Kaskey](#)

30 août 2018 à 11:00 UTC+2 Updated on 30 août 2018 à 15:59 UTC+2

- ▶ Twist on catastrophe insurance partners with private industry
- ▶ 'Resilience bonds' would help fund 60-mile levee system



[...] Texas would put its own twist on the concept, pioneering a new instrument called “[resilience bonds](#)” that would both insure against flood damage and help fund construction of the Ike Dike, said Marvin Odum, Houston’s chief recovery officer [...]

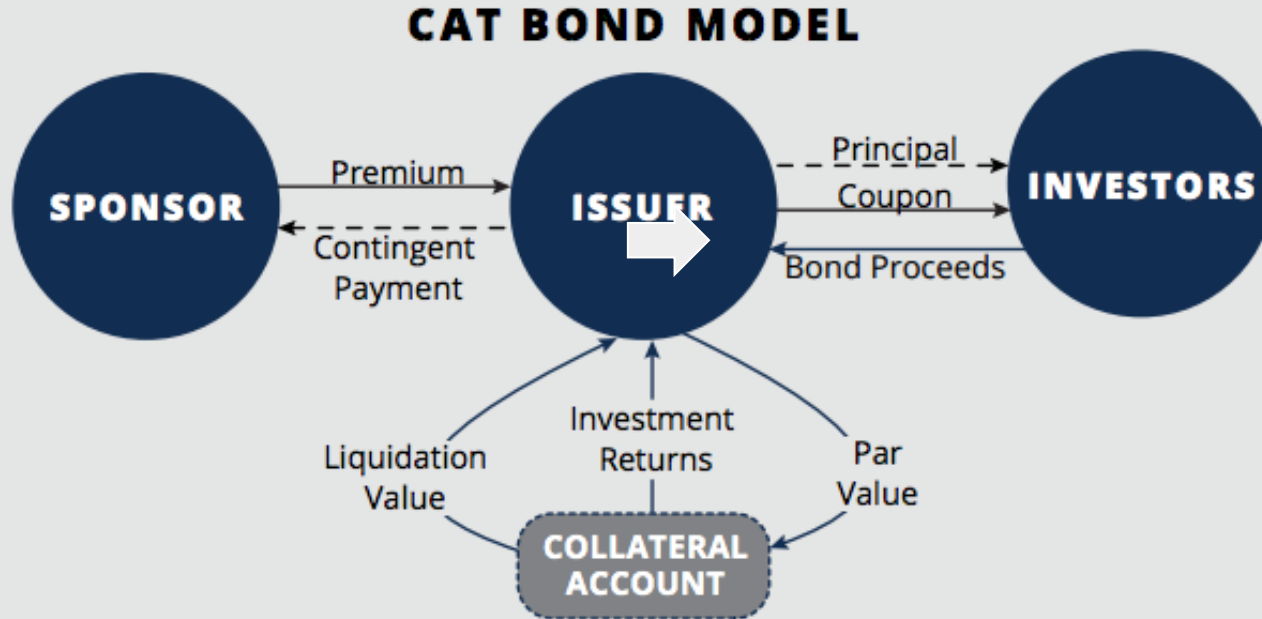


Figure 14. Generalized catastrophe bond structure.

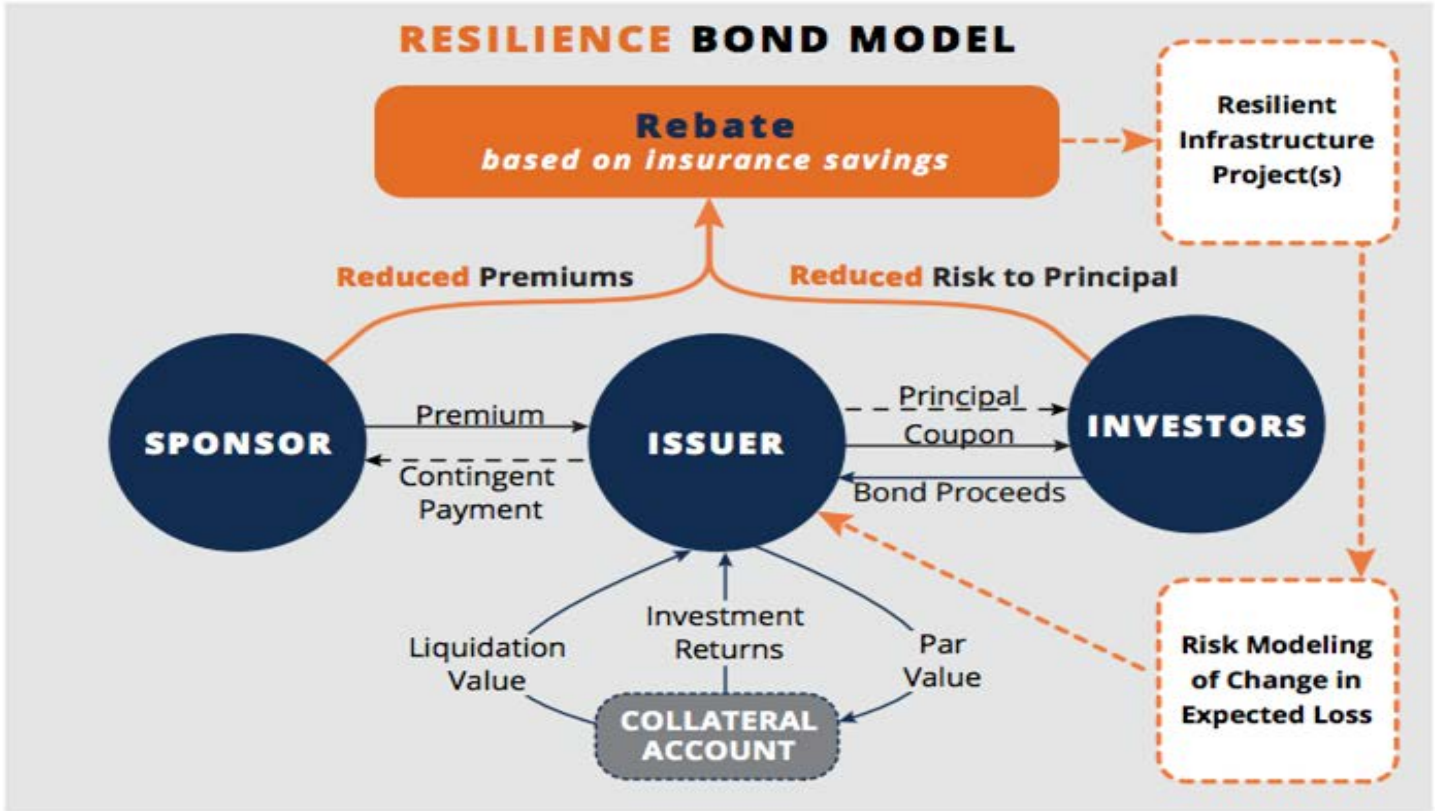


Figure 15. Proposed resilience bond structure.

By Analogy

Cat bond = life insurance

you pay your insurance and Insurance company + Investors cross fingers that your health will remain excellent (to keep their return)

Resilience bond = Progressive health insurance

you pay your insurance and Insurance company + Investors will help you to keep you in very good health with incentive, advice, health club...

Thank you

Why not to issue the first resilience bond in New Zealand ?