

Project-Specific Climate Hazard Risk: An Actuarial Approach

Climate Change and Credit – What Does the Future Hold?
ASFPM, Phoenix, AZ

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Overview

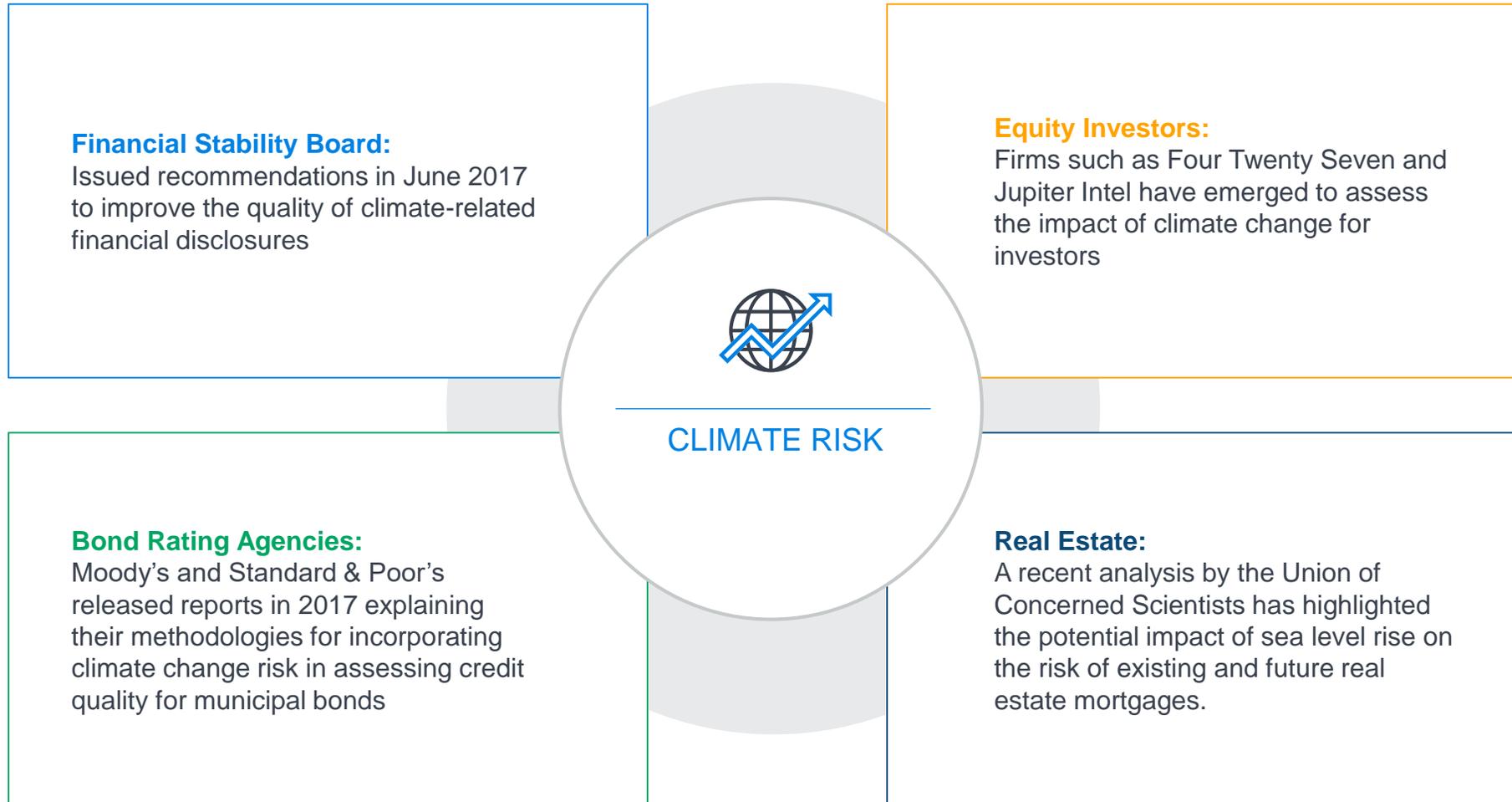
From the world stage to project-specific “climate stickers”

- The emerging discussion on climate risk and finance
 - G20 Task Force on Climate-Related Financial Disclosures
 - Ratings agencies
 - Venture capital for risk assessment
- Actuarial tools and climate risk
 - Scientific toolkit
 - Insurance and actuarial toolkit
- Project cost analysis framework
 - Scenario analysis
 - Types of costs
- Next steps

The emerging discussion

Private sector has increased attention on climate risk

New standards for climate risk analysis and reporting are emerging



G20 Financial Stability Board convened a Task Force

Bloomberg's group issued a final report in June 2017

“To help identify the information needed by investors, lenders, and insurance underwriters to appropriately assess and price climate-related risks and opportunities, the Financial Stability Board established an industry-led task force: the Task Force on Climate-related Financial Disclosures (Task Force). The Task Force was asked to develop voluntary, consistent climate-related financial disclosures that would be useful to investors, lenders, and insurance underwriters in understanding material risks.”

The context was primarily private corporations that issue public disclosures, but many principles are transferable to governments that finance public projects. What problem were they solving?

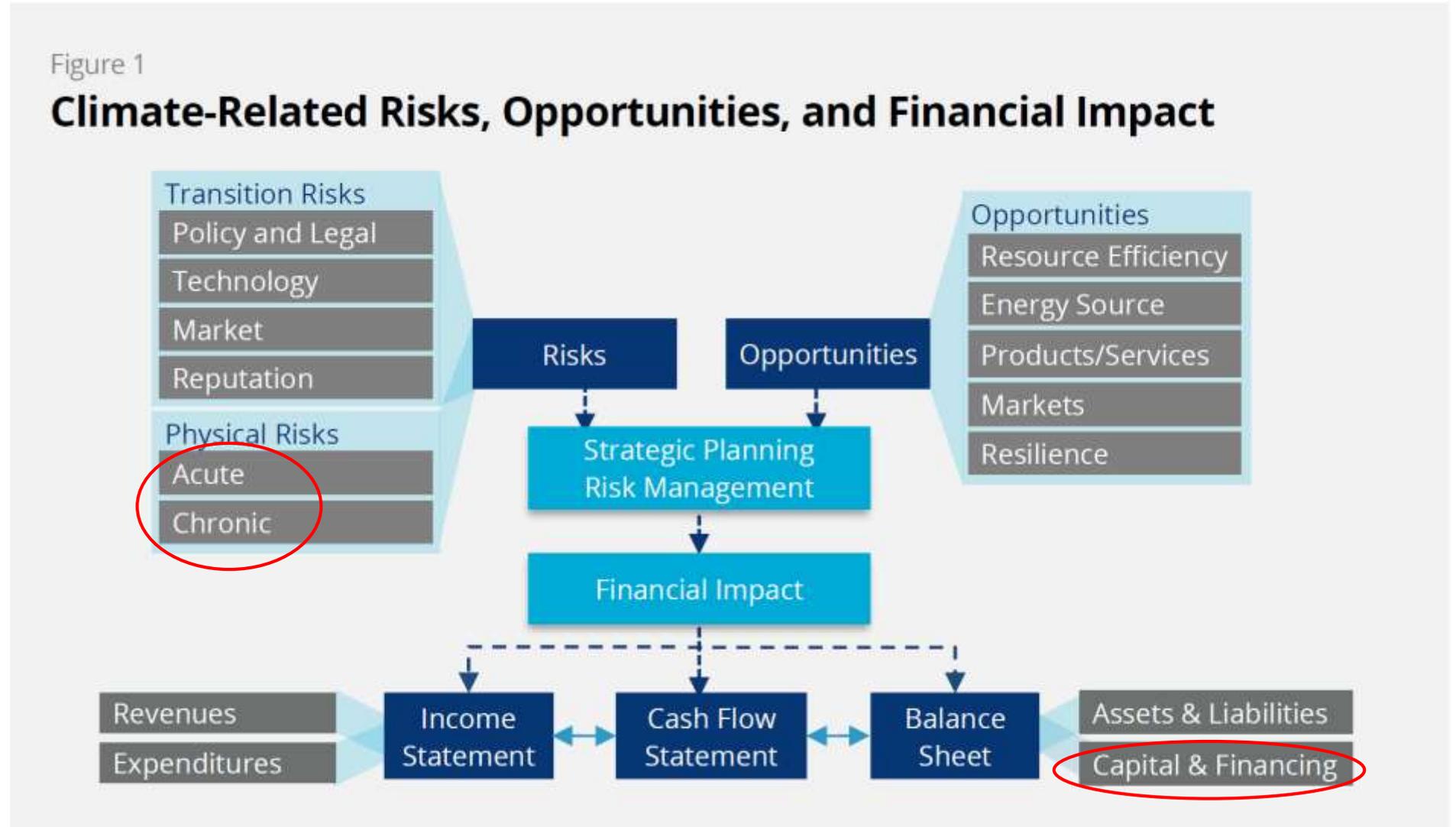
*“Users of such climate-related disclosures commonly cite the lack of information on the financial implications around the climate-related aspects of an organization's business as a key gap. Users also cite **inconsistencies** in disclosure practices, a lack of **context** for information, use of boilerplate, and **non-comparable** reporting as major obstacles to incorporating climate-related risks and opportunities (collectively referred to as climate-related issues) as considerations in their **investment, lending, and insurance underwriting decisions** over the medium and long term.”*

“Creditors and investors are increasingly demanding access to risk information that is **consistent, comparable, reliable, and clear.**”

Task Force considers broad array of risks and opportunities

Our key question:

What are the physical climate risks that affect public planners and managers, and how do we develop a broadly accepted methodology for assessing their impact on project financing?



Public planners, physical risks, and effective disclosures

Task Force recommends **scenario analysis** as a key tool

Acute Risk: *Acute physical risks refer to those that are event-driven, including increased severity of extreme weather events, such as cyclones, hurricanes, or floods.*

Chronic Risk: *Chronic physical risks refer to longer-term shifts in climate patterns (e.g., sustained higher temperatures) that may cause sea level rise or chronic heat waves.”*

A wide range of organizations are exposed to climate-related physical risks. Physical climate-related scenarios are particularly relevant for organizations exposed to acute or chronic climate change, such as those with:

- **long-lived, fixed assets;**
- **locations or operations in climate-sensitive regions** (e.g., coastal and flood zones)

Figure 6

Principles for Effective Disclosures

- 1 Disclosures should represent relevant information
- 2 Disclosures should be specific and complete
- 3 Disclosures should be clear, balanced, and understandable
- 4 Disclosures should be consistent over time
- 5 Disclosures should be comparable among companies within a sector, industry, or portfolio
- 6 Disclosures should be reliable, verifiable, and objective
- 7 Disclosures should be provided on a timely basis

Task Force charts aspirations for disclosure system

Within a few short years:

Expects climate risk analysis to “go mainstream”

Expects better scenario analysis methods and smarter use by investors

Key question: **Is this happening yet?** Yes

Figure 9

Key Areas for Further Work

Relationship to Other Reporting Initiatives Encourage standard setting organizations and others to actively work toward greater alignment of frameworks and to support adoption

Scenario Analysis Further develop applicable 2°C or lower transition scenarios and supporting outputs, tools, and user interfaces
 Develop broadly accepted methodologies, datasets, and tools for scenario-based evaluation of physical risk by organizations
 Make datasets and tools publicly available and provide commonly available platforms for scenario analysis

Figure 12

Implementation Path (Illustrative)



Stakeholders and capital are already responding

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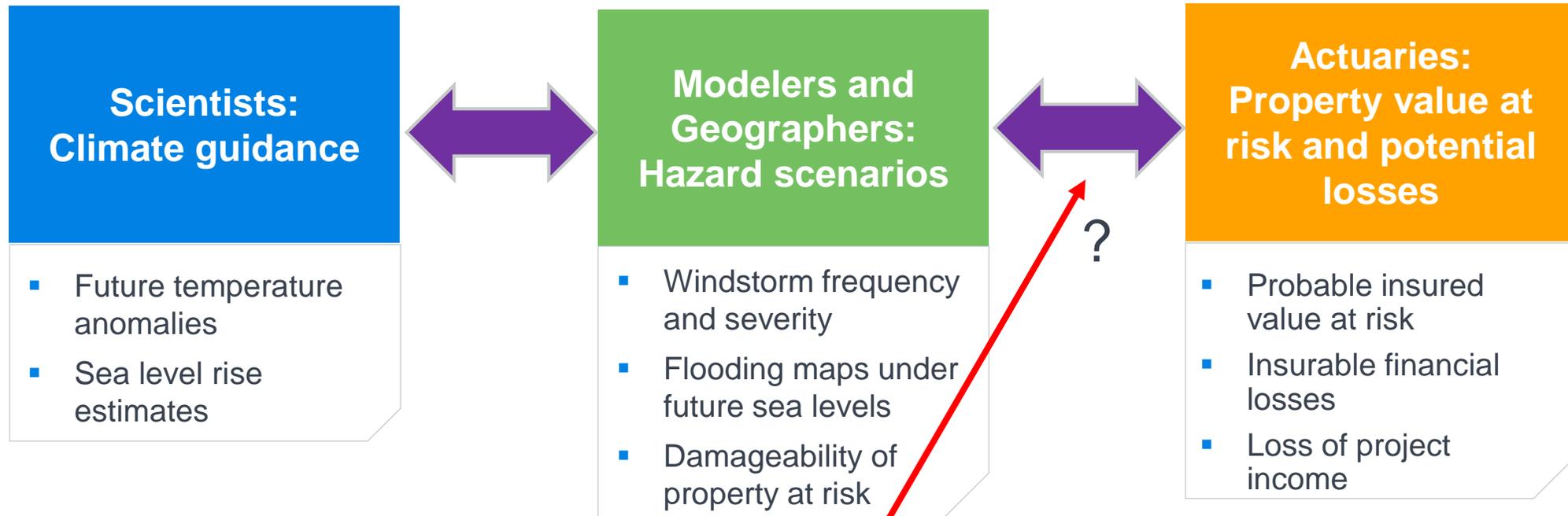
INTRODUCTION

Credit rating agencies are increasingly incorporating physical climate risk into their municipal rating criteria. Following Hurricane Harvey, Moody's downgraded Port Arthur, from A1 to A2 due to its "weak liquidity position that is exposed to additional financial obligations from the recent hurricane damage, that are above and beyond the city's regular scope of operations."¹ Likewise, after Hurricane Katrina, S&P Global Ratings (S&P) downgraded New Orleans from BBB+ to B after considerable emigration and decline in taxable assessed value by 22%.²

- Moody's has made selective rating changes to regions at physical climate risk, and issued several reports on sector credit risk stemming from climate risks
- Venture capital-backed firms such as Four Twenty Seven and Jupiter Intel have sprung up to develop bespoke reports on physical climate risk for specific projects and regions

Actuarial tools and climate risk

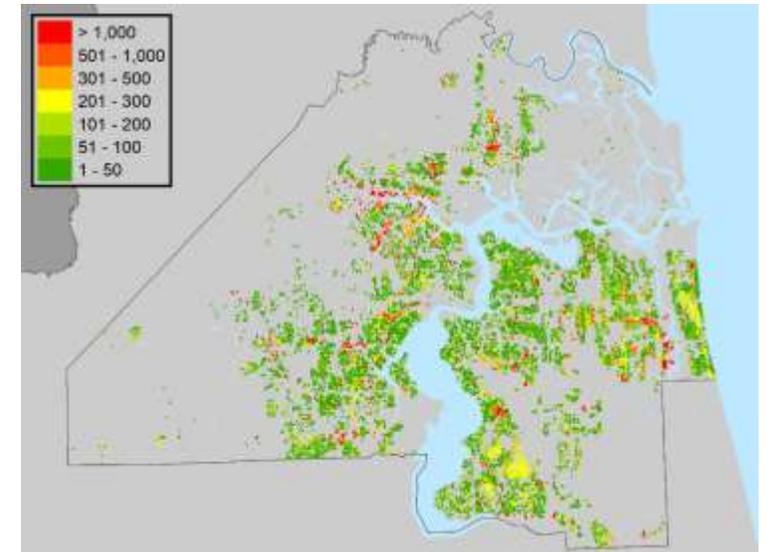
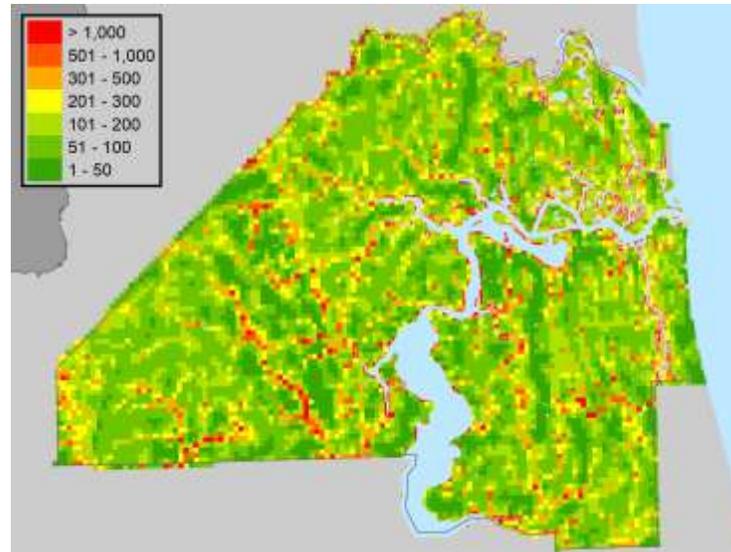
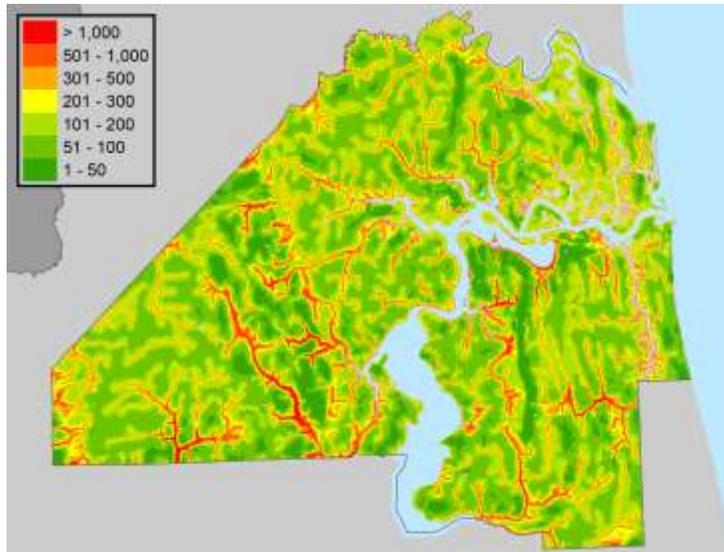
From climate scenarios to specific project risk



- Catastrophe modeling methodology provides part of the framework for physical project risk assessment
 - Input project/exposure data, hazard footprints, property attributes, and financial/insurance terms
 - Output “loss curve” relating insurable losses to probability levels (higher for more remote events)
- But we need tweaks for climate-related hazard methodology
 - Much longer time horizon – catastrophe models simulate “next year” only, not **project life** (decades)
 - Alternative scenarios on same time path – **now, baseline future, climate-stressed future, adaptive**

Actuaries use hazard maps and risk-sharing terms to quantify costs embedded in insurance premiums

Why should you care? Insurance costs reflect a real-world wager on project risk levels

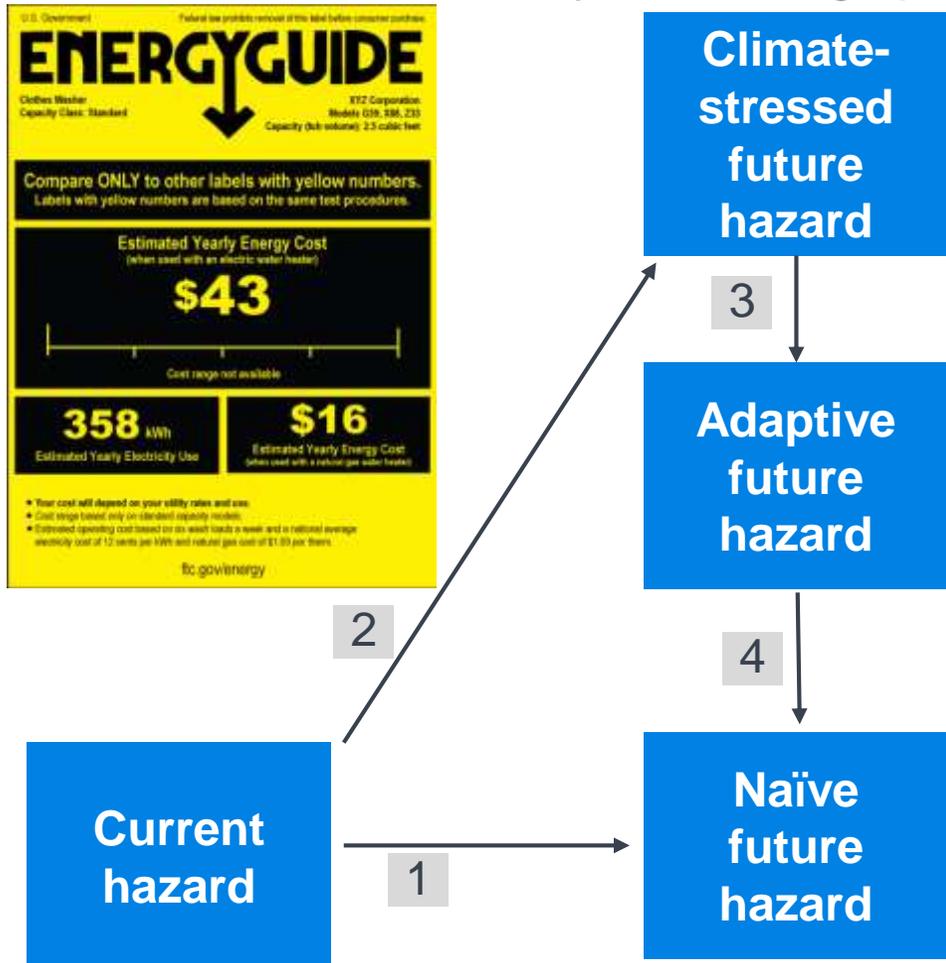


- Our rating plans can look at hazard in **many ways**, and relate it to **many physical variables**
 - *Our methodology is adaptable to the scenario analysis approach recommended by Task Force*
- The new breed of research firms can **provide the hazard maps and data** for alternative future scenarios
 - *We can translate their output into insured value at risk, hazard insurance costs, bond insurance costs*
- We need to extend our thinking to **longer horizons and project life-cycles**, not one-year insurance policies

Project cost analysis framework

Where is the return on investment in scenario analysis?

Standardized, accepted “climate stickers” attached to project financing can lower costs and smooth transactions by answering specific questions in an easy-to-consume format



1. If the naïve forecasts that fail to incorporate climate change are correct, how will the costs evolve given our development and housing preferences?
2. If a predicted climate change scenario is correct and we ignore it, how will costs evolve?
3. If the same predicted scenario is correct and we take defined adaptive strategies when designing the project, what is our return on investment?
4. Can we achieve a full or only partial mitigation of predicted additional climate risk through adaptation?

What costs should be considered in a climate sticker?

A full ROI includes financing, insurance, and funding challenges

1. Direct financing costs based on bond ratings
2. Indirect financing costs based on bond insurance premiums
3. Hazard insurance costs based on actuarial evaluation of risk and risk-sharing terms
4. Upstream project funding assistance based on state and federal government allocations
5. Project funding assistance based on contributions/grants from NGOs as shown below



Next steps in development of project climate risk culture

Many stakeholders will advance in their pursuits as outlined by G20 Task Force

- World leaders will continue to develop preferred disclosures and workgroups will make more prescriptive
- Financiers and their standard-setters will tune risk assessment methods to climate scenarios and eventually require documentation
- Insurers will face both increased disclosure of their own climate risks and demands from policyholders to add value in long-term project risk assessment
- Governments may redirect funding to well-documented projects with mitigation in design
- NGOs will allocate capital to projects that are designed to address their priorities

Thank you

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