

Title of Paper

Sustainable Resiliency™: Financing Environmental, Homeland Security, and Other Infrastructure Systems

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Abstract

Banks and insurance companies provide capital to build and maintain urban infrastructure. Community performance benchmarks, infrastructure condition accounting, and environmental management standards are evolving tools.

Proactive managers of public and private infrastructure systems deserve to be rewarded with lower interest rates and insurance premiums for the risks reduced through their sustainable resiliency™ practices, but lenders and insurers lack ways to measure reduced risk and improved solvency from such management. The savings in interest and insurance costs could fund sustainable development and hardening of critical systems. Spatially-aware infrastructure and program accounting information are essential prerequisites.

Bottom line, sustainable resiliency™ is a new underwriting approach that could partially finance environmental stewardship, homeland security, and other domestic programs.

Paper Body

Sustainable Resiliency™: Financing Environmental, Homeland Security, and Other Infrastructure Systems¹

By Bruce B. Cahan

Modern cities are exposed to high-risk, low-probability events with greater frequency of unseen interdependencies. Threats include terrorism, earthquakes, floods, wildfires, crumbling infrastructure, chemical spills and transit accidents.

Last year, the Federal Emergency Management Agency estimated that one in five Americans were affected by or knew someone affected by disaster. Building fragile structures and communities without adequate resiliency against “all-risk” hazards doesn’t serve human, economic development or environmental priorities. And the current homeland security spending spree is largely unaccountable along these lines or as adding to regional resiliency against known threats.

Sustainable resiliency™ is a new way to reward governments and companies for reducing regional risk while making energy, environmental, infrastructure and social networks more sustainable and resilient. Businesses and citizens whose operations and choices support sustainable resiliency™ have lower recovery expense.

Borrowers and insured pay less interest and insurance premiums, and cities lose less in tax revenues when natural or man-made disaster strikes. And energy, food and other needs are conserved with local suppliers, delivering more self-sufficient capacity to offset reliance on foreign imports.

In short, sustainable resiliency™ is market driven. It supplements government financing of homeland security, but it’s more adaptive, accountable and locally self-funded.

Through objective assessments of regional resiliency gaps, sustainable resiliency™ creates a dashboard that citizens, media and employees can use to enhance homeland security and all risk preparedness with greater transparency at less cost and delay than what occurs today.

Changing the Paradigm

Governments and companies borrow to pay for operations and build infrastructure. Credit ratings are a universal performance benchmark, subsidizing higher-rated borrowers with lower interest rates. Ratings reward thrifty budget managers whose short-term revenues exceed costs. Yet long-term savings from preparedness, environmental stewardship and social justice go undervalued in credit ratings.²

Insurance against disaster is a normal expense for companies as well as governments through self-insurance, and risk models drive the insurance premiums charged. Property and earthquake insurance reflect the condition of buildings and infrastructure; geologic, weather and natural conditions affect flood and other coverage; and environmental

practices affect environmental and product liability coverage.

None of the financial or insurance ratings systems adequately reward individual governments or companies for adding to regional sustainability. Until they do, regional sustainability will be seen as a charitable rather than commercial activity.

Sustainable Resiliency™ Defined

Sustainable resiliency™ is a weighted measure of how the people, structures and natural conditions at a given place and time would survive known man-made and natural stressors (e.g., age, decay, design flaws, underinvestment in maintenance, hazards, etc.). Sustainable resiliency™ is a “performance benchmark of performance benchmarks,” and it includes several key features.

Access Communities of Practice Expertise

Communities of Practice (CoPs) offer performance benchmarking of quality or safety across thousands of institutions and application settings. Many performance benchmarks evolved to win funding of existing programs or show stalled progress deserving of new funding priorities.

Sustainable resiliency™ turns the power of CoPs into a community resource by unifying access to, and the importance of, a composite range of CoPs expertise to portray overall performance and resiliency of urban systems.

Align Existing Data and Measurement Efforts

Performance benchmarks measure environmental, public-health and other variables in a consistent way. Examples include forest service data on changes in natural forest stock; highway data on lifespans of critical bridges; Home Mortgage Disclosure Act lending-pattern data; Centers for Disease Control measures of incidents and conditions ripe for disease spread; and law-enforcement measures of shifting crime patterns or improved ambulance response. Sustainable resiliency™ pulls such benchmarks together into meaningful clusters of performance.

Agnostic Allegiances

CoPs passionately believe their measure of risk establishes a societal or political value or priority to address that risk, and “those who yell loudest receive funding.” Sustainable resiliency™ plays no favorites. It lets all CoPs nominate, qualify and supply their documented performance benchmarks to the overall weighting.

The framework ties together 1) latent liability, 2) the likelihood of an occurrence, and 3) how the process is managed relative to further mitigation and consequence management. Sustainable resiliency™ lets CoPs better capture and share their knowledge of consequences and mitigation. It then aligns benchmarks to create the financial and insurance incentives for moving that integrated CoP knowledge into the mainstream in a readily identifiable and digestible form.

Trusted Performance Benchmarks

Trust in performance benchmarks can be measured depending on how often a benchmark is used or cited. Slate.com® and Ebay.com® are examples of trust meters that rate the authors of information. Sustainable resiliency™ would offer CoPs the foundation for metering trust and use of their performance benchmarks as blended with others'. In essence, CoPs would come to appreciate would good their expertise meant.

“Network of Networks” Approach

Sustainable resiliency™ sees CoPs as stewards of human, built and informational networks that depend on each other (as proven in Year 2000 (Y2K) interdependency studies).

Thus, a city with improved monitoring to more quickly detect bioterror attacks scores higher due to its surveillance monitoring network of sensors and emergency-room case admissions. A city with a hospital and clinic network linked to respond to bioterror, earthquake and other emergencies merits a higher “network of networks” score than a city whose regional hospital has large capacity at a location that snarls ambulances in traffic delays or whose poorer citizens get health care from local clinics facing shortages of antibiotics or other acute care.

Spatially and Temporally Aware

Although the information flows for sustainable resiliency™ may start in different computers, they are fused to describe conditions in a given place at or during a given time of day or season. GISs, along with “spatial tagging” of routine financial information, provide important analytical capacity for sustainable resiliency, especially as spatial data housed in GISs become increasingly interoperable and “Web ready.”

Risk factors of greatest concern to coastal areas deserve greater weight when assessing coastal sustainable resiliency, rather than risk factors unique to deserts or mountainous forests. In addition, risks of heightened concern are weighted appropriately (e.g., during daytime hours in office buildings, times when vacationers flock to beaches or public sporting or cultural events, etc.).

Such weighting overcomes historic shortcomings in modeling high-loss, low-probability events. The weightings come from impact studies available in government, business and university disaster-research centers. Such spatially and temporally aware weightings can support the predictive modeling of insurance.

Free and Open Data Access

CoPs benchmarks evolved and are maintained by hosted partnerships and consortia often to assure traditional government funding and other analysis. Because the benchmarks underpin publicly-accountable business and government processes (i.e., program measurement, grant seeking, budget analysis and oversight), it’s likely they will continue to be freely available.

However, it’s difficult to get and use data in a form ready for sustainable resiliency™ analysis. Some data are in paper reports, some require “freedom of information” requests, some are unconnected spatially, some are “blurred” for security reasons to be unrelated to their original locations, some are dated, etc. When cheaper interest and insurance rates are the value proposition, sustainable resiliency™ justifies moving relevant “data anarchies” into “web services” linked through interoperable spatial registries, that let users readily publish and acquire the content, expertise and analytics necessary to apply sustainable resiliency™ across their horizontal and vertical business processes.

Sustainable Resiliency™ Users

Sustainable resiliency™ would have many users, including Wall Street, insurance companies, the federal government, citizens, non-governmental organizations (NGOs) and the media.

Wall Street and Capital Markets

Much has been written about trends in socially responsible investment (SRI) in which companies are ranked to show their financial, social and environmental performance (i.e., “triple bottom line”). SRI posits that stocks in more responsible companies will perform better over time and should be valued higher in the marketplace. But the equivalent information doesn’t readily exist for finding, pooling and trading socially responsive debt (SRD) of companies; countries; and state, county and local governments.

Wall Street pyramids the public’s private capital, government guarantees, and public and private grants to invest in cities through municipal bonds. Interest rates on bonds are set by credit-quality decisions made primarily by three rating agencies—Standard & Poor’s, Moody’s and Fitch—whose underwriting criteria largely ignores the information technology foundations for managing smarter cities.

SRD bond buyers would use sustainable resiliency™ analysis to see how the proceeds of buying bonds would affect a city’s sustainable resiliency™ as well as what the debt service to repay the bonds will take out of city budgets that might generate or lose sustainable resiliency.

An investor or municipal-bond fund manager filling a bond portfolio, for example, may have to choose between a stadium bond and a pollution-control or flood-management bond with the same credit rating, term and maturity. One reduces and the other enhances sustainable resiliency. An SRD market would require sustainable resiliency™ benchmarks to effectively gauge regional impacts and how they’re being managed positively.

Insurance Companies

Insurance markets trade in risk (the converse of *resiliency*, an insured’s capacity to absorb risk). Tsunamis, blizzards, floods, earthquakes, terrorism and other hazards have stretched the reserves and pricing of business and personal insurance. Even health care insurance, as a barometer of the cost of living in modern societies, reflects stresses.

Casualty, business interruption, liability, flood, earthquake and special-risk insurance is required for most real estate and business loans as well as for public and private projects financed by bonds. Increasing the resiliency of property and people to sustain damage without significant loss reduces an insurer’s exposure and their premiums.

Insurers who base premiums purely on historical experience may miss the point. Predictive modeling with sustainable resiliency’s alignment of data paints a much finer context of risks and mitigation. Predictive analytics inform risk management to give local communities choices as to how, where, when and to what extent they should mitigate a risk before an event occurs, and how to manage its consequences afterward. For assets where the confluence of risks are mitigated systemically mainly through large one-time investment decisions (i.e., designing a hardened office building against earthquakes and terrorists), such analytics affect its life-cycle costs for insurance and adding further mitigation. A regional framework that shows the impact of investments to prevent an

occurrence and buffer (or even leverage) its consequences, instead of dealing with its consequences randomly is a different insurance landscape.

Sustainable resiliency™ is about informed choices for how citizens, communities, companies and governments balance and leverage tradeoffs in which 1) mitigating every risk isn't feasible or desirable, 2) every risk isn't equally likely nor as harmful and, most importantly, 3) any mitigation strategy for a given building or enterprise can protect against multiple risks simultaneously.

Sustainable resiliency™ would let insurance companies safely offer a broader range of discounted insurance products that reward policyholders and their communities and utilities for proactively managing risk, resiliency and damage from risk.

City Management

Interest payments on bonds "eat up" city budgets. They produce no additional services to its citizens. The financial markets set interest rates based on perceived risk. The more predictable costs of future operations, the lower the interest rates. A city whose infrastructure is aged and breaking or insufficient to keep up with an influx of new residents presents unpredictability. Sustainable cities whose infrastructure and preparedness networks are resilient to "all-risk" hazards should be financed at cheaper interest rates and insured at cheaper premium rates.

With our wired world, e-government has put most cities on the Web. Sustainable resiliency™ would help government managers, mayors, business leaders, union members and citizens follow municipal decisions as well as use informed consensus to invest money and design programs that foster sustainable resiliency.

Managing cities with sustainable resiliency™ has the potential to reduce insurance premiums, reduce local taxes, attract businesses and residents, and encourage a more vibrant informed civic dialog to see and seize options for renewal and resiliency.

Federal Budgets and Congress

Federal programs devolve spending authority to local, state and tribal governments who, in turn, rely on CoPs for recommending, making or reviewing investment decisions. CoPs that operate on government funding evolve the scientific benchmarks for making better decisions.

Tax dollars (earned largely locally) cascade from Washington, D.C., through state capitols to county and city governments. Visualizing federal spending as investments in more localized sustainable resiliency™ can align the diverse authorities who are spending those monies.³

The momentum, frameworks and reasons exist to map how and whether federal and state functions are funded to respond to local priorities. Sustainable resiliency™ would unify and simplify data integration and analysis.

Sustainable Resiliency™ Supplements Homeland Security Goals & Funding

Homeland security was born out of panic, fear and anger. Sustainable resiliency™ offers a more comprehensive, balanced, proactive approach to reducing threat exposure.

Homeland security has meant that someone from the federal government knows the

threats and is taking steps to protect you and your community from harm. Sustainable resiliency™ suggests a self-aware, community-based approach to minimize vulnerabilities exploited by terrorists and thereby reducing harm from any terrorist act that might occur.

Where homeland security is authoritarian, sustainable resiliency™ is consensus and market-driven. Where homeland security aims at threats from outside a region, sustainable resiliency™ looks to enhance regional self-sufficiency and resiliency no matter whether the threat is terrorism or a hurricane.

Where homeland security is a series of hierarchical information flows from CoPs to the U.S. Department of Homeland Security and back out to state and local officials, sustainable resiliency™ is largely a granular exchange of measures among CoPs and out to the diverse interdependent groups whose efforts extend and balance risks.

Where homeland security is a spending “free for all,” largely unaccountable in benefit, sustainable resiliency™ maps “all-risk” exposures and queries how government funding addresses objective priorities and removes gaps in preparedness.

Where homeland security limps along depending on Congressional funding and Presidential budget commitment to make it real regionally, sustainable resiliency™ unleashes financial and insurance market forces to fund ongoing reinvestments in America’s cities and landscape. Markets provide far more municipal capital dollars each year than federal appropriations ever could or should, especially in our deficit budget times.

Linking to International Sustainability Programs

European countries and their eco-banks are ripe for adopting sustainable resiliency™ as part of their underwriting and SRD reporting processes. The European Community (EC) actively pursues environmental accounting, which helps level the playing field so industries face similar environmental goals and regulatory regimes no matter where they operate if they choose to sell goods and services into EC countries.

But perhaps it’s in developing countries and countries ravaged by natural disasters and war that sustainable resiliency™ could be of greatest effect. For rebuilding tsunami-devastated Thai and Indonesian coastal villages, for example, the billions in foreign aid contributions intended to stabilize and rebuild will be wasted without a strong model to assure donor nations and NGOs that the risks of flooding, food shortages, medical care and other effects will be contained and that the villages themselves are being built in areas less prone to upheaval.

Sustainable resiliency™ offers an architecture for cleaving together the CoPs now operating in tsunami-hit areas and leaving their informational expertise as a permanent resource for future governance, land use, economic development and human rights. If sacrificing human rights or the environment turns a greater profit, the supply and demand chains for the product come into play, and can effectively apply pressure on manufacturers and host governments to restore human rights and environmental values. Human rights and environmentalism flourish when (i) the information - unknown in the developed world - gets out about unsafe conditions in the developing world, and (ii) that information relates to the economic profit extracted unfairly by a specific leader, company or government. To the extent that sustainable resiliency™ more clearly

quantifies and locates known harms and causes, the information assures greater human and environmental rights. When facts and their global significance are readily known or knowable, unhealthy conditions (and the power of those persisting in keeping them persistently unhealthy) must change to respond to the accountability of modern free market, fair trade-assuring forces (i.e., Web-responsive media, international accounting and banking principles, etc.)

Human rights and environmental health are likely to grow symmetrically when a common benchmark such as sustainable resiliency™ exists to inform the most local and multinational decisions regarding economic development, disaster aid, public health, environmental and other choices.

Long-Term Opportunities

Today's cities are a collective inheritance. They accrued in naturally conducive settings from millions of investments made by dozens of institutions during decades of budget cycles, carrying replacement costs valued in trillions of today's dollars.

Yet as heirs managing successive generations of wealth building, are we prudently watching the urban portfolio? Environmental assets are squandered, public health risks are rising, emergency preparedness is spotty, and infrastructure—critical, natural and everyday—is failing.

Not long ago, governments, businesses, NGOs and other institutions engaged in Y2K interdependency studies that inventoried services essential to civic and business life inside multiple providers' computer systems that might black out at the instant of Y2K. Then came the World Trade Center attacks on September 11, 2001, and interdisciplinary regional groups drafted detailed emergency plans.

The December 2004 Asian tsunami renewed interest in natural-hazards mitigation. President Bush's continued "War on Terror" also raises concerns about the adequacy of regional preparedness and over-reliance on federal hegemony of homeland security.

The information required to determine sustainable resiliency, its gaps and over-supply should be organized. The obvious questions are in front of us: Given the billions spent by government, banks, utilities and other businesses and NGOs, what set of market mechanisms could be aligned to cause such a diverse set of information to come together as sustainable resiliency™ performance measures? Because of the interdependencies of multiple programs could be expressed as enhanced sustainable resiliency™ or marked for poor performance, would people embrace or fear such clarity?

Sustainable resiliency™ translates performance benchmarks in ways that let cities fund innovative programs. Sustainable resiliency™ also may unleash a more positive, locally self-directed future than homeland security alone by empowering and financing daily choices that improve the regional safety and resiliency of urban and rural interdependencies.

Government operating budgets at all levels are riddled with deficits and can't alone pay to build regional sustainable resiliency. Funding such positive changes now, when they're needed, can't languish while politicians find a cure for deficit finance. Sustainable resiliency™ lets financial and insurance markets justify making new, smarter investments and loans in larger amounts than has government-based funding of

homeland security or any other federal program alone.

Acknowledgments

This paper, and the presentation of concepts related herein, benefited from ongoing dialogue with many people including Louis Hecht, Stephanie Race, Richard Bernknopf, Dr. Harvey Rubin, Karl Bortnick and Jan Hauser. I appreciate their insights, suggestions and challenges that served to crystallize and strengthen the material you read here.

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¹ Sustainable resiliency™ is a trademark of Urban Logic, Inc., and is used with permission herein. "Socially-responsive debt" and this paper are Copyright 2005 by Bruce Cahan. All rights reserved.

² Discussions with leaders in ethical commerce (such as Paul Hawken, Hunter Lovins, Rupert Ayton, Bernard Lietaer, Greg Steltenpohl and others) confirm the need for and viability of new credit ratings approaches. See, http://www.dragonflymedia.com/portal/featured_stories/200502/hawken_ayton.html.]

³ Lessons learned in the geospatial community pave the way for funding certain governmental alignments suggested by sustainable resiliency.™ Last year, Urban Logic prepared its *Value Proposition Report on GeoSpatial One-Stop* for the FGDC and the GeoSpatial One-Stop management. In that report, Urban Logic demonstrated a method to recognize patterns of procurement by agency, vendor, technology and competitiveness across the Federal Enterprise Architecture's Business Reference Model and federal agency unclassified procurements. Sustainable resiliency™ would take advantage of this "pattern recognition" to call into question whether, for example, federal geospatial readiness investments truly align with regional data partnerships, and how funding for agency stand-alone GIS could better be used to co-invest in local cooperative efforts.