Connecticut’s Model for Property Assessed Financing for Affordable Flood Resilience

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3 Questions That Can Change Your Life

Innovators often go through these three questions, repeating the cycle many times before getting a brilliant answer.

- amorebeautifulquestion.com
- rightquestion.org

**Why?** Let’s confront a problem and a present reality.

**What if?** Envision what might be. What if we borrow an idea or try some combination of X and Y?

**How?** Turn speculation into reality. How can we get this done? What are the first steps?

**If my idea isn’t working, how can I figure out what’s wrong and fix it?**
NFIP Affordability and Home Elevation Reality

2013 NFIP Annual Premiums for a post-FIRM, One- to Four-Family Residence Purchasing $250,000 Coverage

<table>
<thead>
<tr>
<th>Zone</th>
<th>3 feet below BFE</th>
<th>1 foot below BFE</th>
<th>At BFE</th>
<th>1 foot above BFE</th>
<th>4 feet above BFE</th>
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</thead>
<tbody>
<tr>
<td>A zone</td>
<td>Not rated</td>
<td>$2,199–$4,483</td>
<td>$778–$1,315</td>
<td>$429–$616</td>
<td>$296</td>
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<tr>
<td>V zone</td>
<td>$13,950–$23,150</td>
<td>$8,950–$15,925</td>
<td>$6,750–$12,050</td>
<td>$4,675–$8,725</td>
<td>$2,050–$4,150</td>
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“How might the NFIP provide insurance to residents who may require special treatment, such as low-income homeowners residing in flood-prone areas, because they cannot afford the higher risk-based premiums?”
Regular Think Tank Meetings and Communications with a Diverse Group of Stakeholders Asking **What if…**

- **What if** we **borrow** from a highly successful Commercial *Property Assessed* Clean Energy (C-PACE) Fund to set up *Property Assessed* Resiliency PAR finance?
- **What if** future savings from lowered NFIP insurance premiums and lower disaster recovery costs are invested in resiliency proactively? (in addition to lowering our electric bills and carbon footprint)
- **What if** prudent mitigation measures were subsidized with a voucher for completing mitigation before a storm instead of subsidizing a flood insurance premium that does not account for the actuarial risk?
Elevate Housing: Shore Up CT

Situation in Connecticut in 2015

- $85-90K to elevate house
  ($35-40K in PA)
- Require elevation to .02% per year probability storm event design flood elevation + 1 foot
- NFIP insurance premium reduction $2600/yr to $400/yr
  - Sometimes you can do better: recent $300K loan with NFIP reduction of $4,482/yr to $487/yr
- Challenges
  - Low and moderate income households not likely to participate
  - Home by home approach
  - Roads are not elevated
  - Determining design flood elevation
Elevate Housing: Shore Up CT

Loan Program Overview

- 15 Year Term
- 2.75% interest rate (2.895% APR*)
- 1% origination fee
- Minimum $10,000 to maximum $300,000
- No monthly principal or interest payments for the first 12 months

*APR is based on Loan Amount of $125,000 - 168 payments of $897.29

* on Loan Amount of $90,000 – 168 payments of $646.05.
HOME ELEVATION BENEFIT COST ANALYSIS

No elevation scenario
Annual NFIP Insurance premium-- $2600

Elevating house ($90K)
Annual Insurance premium-- $400
Monthly Loan cost- $646.05 over 14 years beginning in year 2
Property tax and market value increase – an incentive to be proactive or not?
Infrastructure Resiliency Innovation: Microgrids Grants and Loan Program

- $23 million in grants for microgrids
- Partner with Green Bank to provide additional financing for support and implementation
  - Generators, fuel cells, or any other type of electrical energy production source
  - Fuel tanks, piping, or fuel regulation equipment
  - Foundations, except for electrical interconnection equipment as defined above
  - Excavation, trenching, paving, etc. – except for underground electrical interconnection of the microgrid
  - Mechanical equipment or piping
  - Thermal insulation
Critical Infrastructure: Clean Water Act State Revolving Fund

- Grants range from 20% to 50% of costs
- Loans are repaid 2% over 20 years
- Reserve for construction of resiliency projects for sea level rise FY15 $4M (20% grant/80% loan)
- Reserve for green infrastructure FY15 $20M (20% grant/80% loan or 50% grant/50% loan)
HUD National Disaster Resilience Competition: SAFR* Connecticut Connections

- Financing proposed in Phase I application
  - Leveraging public-private partnerships
  - Building on existing programs (Shore Up CT, Green Bank, Microgrids and CWF)
  - Targeting Low and Moderate Income households
  - Mix of grants, low interest loans, vouchers
  - Retrofitting structures: housing and critical infrastructure

* State Agencies Fostering Resilience
**WHY PROPERTY ASSESSED RESILIENCY FINANCING?**
Green Bank Attributes of C-PACE for PAR

Access to PRIVATE financing of mitigation measures with senior lien for qualified upgrades and repaid via a benefit assessment on the owner’s property tax

Requires legislative consent of municipality and existing mortgage lender

Savings from upgrades payback over loan period enforced by legal, financial and technical underwriting
Stakeholders and partners

- Governments
- Building owners
- Contractors
- Utilities/Insurers
- Banking
PACE and PAR Fundamentals

- Lien priority
- Standards
- Central administrator
- Private capital
- Municipal property assessment collection
Resilience Outcomes

- Elevation
- Mitigation
- Retreat
- Job creation

Return on Investment

- Increased property value
- Insurance savings
- Reduced losses
- Reduced risk
- Property tax stability

Benefit Cost Analysis
Return on Resiliency
Lower Risk and Insurance Costs
Standards to mitigate flood and wind risk and reduce disaster recovery costs
Increase elevation and resiliency
Increase property value
business continuity & community economic stability
R-PACE/PAR Issues and Solutions Needed

- C-PACE retrofits commercial buildings and multi-family (5 or more units) not single family residential.
- Fannie Mae and Freddie Mac has $5 trillion in federally backed mortgages (R-PACE/PAR lien needs to be senior to other debt on the property).
- R-PACE/PAR needs consumer protection for debt risks and affordability.
R-PACE/PAR Issues and Solutions Needed

• Private investors and Central Administrator need access to risk underwriting to acceptable standards for building improvements (Ex. ASCE-24-14, Fortified for Safer Living®, Resilience Home™ and Resilience STAR™).

• Benefit Cost Analysis and resilience performance standards need to be predictable to monetize long-term savings on NFIP premiums.

IBHS- Insurance Institute for Business and Home Safety provides contractor training programs on their standards.
Streamlined R-PACE/PAR Financial Underwriting Guidelines Needed

- Eligible resiliency products to be financed.
- Loan to Value Ratio (mortgage debt + financing by PACE/PAR to property value)
- Lien to Value Ratio (R-PACE/PAR to property value).
- Annual Benefit Assessment to Value Ratio (R-PACE/PAR annual charge to property value OR annual R-PACE/PAR charge + property taxes to property value.)
In Summary

• Hybrid and Innovative Financial Products for Resiliency can be developed to meet the property owners’ and lender’s needs.

• Need more P3 financing solutions.

• See Bloomberg Finance Resilience (FiRe) 2015 competition examples for other innovative ideas.
Thank You!
Any Questions?
2015 Finance for Resilience Winner

INTERVENTION 9: Pay as you save® (PAYS®) financing for distributed clean energy upgrades

SUMMARY: Open access to $10 billion in financing for all cost-effective distribute energy resources to virtually all customers of utilities that implement a voluntary tariff for both energy efficiency and renewable energy

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</tr>
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<td>Rahul Chopra, Corporate Development, Lawrence Berkeley National Laboratory, <a href="mailto:rchopra@lbl.gov">rchopra@lbl.gov</a></td>
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<tr>
<td>Champion 2 + contact</td>
<td>Nancy Wallace, University of California Haas School of Business, <a href="mailto:newallace@berkeley.edu">newallace@berkeley.edu</a></td>
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<tr>
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</tr>
<tr>
<td>Working group member 1</td>
<td>Paul Mathew, Staff Scientist, Lawrence Berkeley National Laboratory, <a href="mailto:pamathew@lbl.gov">pamathew@lbl.gov</a></td>
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<tr>
<td>Working group member 2</td>
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</tr>
<tr>
<td>Working group member 3</td>
<td>John Wilson, Director of Energy and Buildings Practice, Energy Foundation, <a href="mailto:john@ef.org">john@ef.org</a></td>
</tr>
</tbody>
</table>

BNEF mentor + contact |  |
**PAYS®**

**Long description relevant literature**

**Challenge:** Many people who want the benefits of distributed renewable generation and energy efficiency lack access to financing via traditional instruments, especially in rural America and emerging economies around the world.

**Solution:** Pay As You Save® (PAYS®) is a market-based system that enables utility customers to purchase and install cost-effective energy efficiency upgrades or distributed renewable energy assets through a voluntary tariff that assures immediate net savings to customers. No up-front payment. No new debt obligation. Full transferability to successive customers. Full cost recovery for utilities.

**Action Plan:** First, expand the use of Efficiency PAYS® in rural America, then launch the first ever Solar PAYS® financing product. The top priority is developing at template business plan that streamlines applications for up to $5B/year in unsubsidized Treasury rate financing available to 500+ utilities that serve 40 million rural Americans. Investor owned utilities can follow suit quickly with private capital markets. Next, introduce the PAYS® solutions to countries with high load growth or conditions of poverty that require debt-free micro-financing solutions.

**Potential:** It is possible to grow investment in distributed clean energy solutions in rural America from $10M in 2014 to $3B/year, with similar growth at the global scale, reaching >$10B/year in financing for customers seeking clean energy.

**History**

Our project champion played a key role in crafting a new U.S. federal policy for utilities that serve 40 million people in rural America. For the 500+ utilities that have access to $5 billion in unsubsidized Treasury rate financing each year, this policy levelled the playing field for demand-side solutions, for which financing had been practically prohibited. **To date, only $10 million of the $40 billion in unsubsidized financing sought by those utilities is for distributed renewable energy and energy efficiency.** This project was initiated to rapidly replicate the use of an innovative financing mechanism (PAYS®) where other instruments have failed to serve customers with limited access to capital.

**Scale & scope**

**Industry:** All cost-effective energy solutions on the customer’s side of the meter, including energy efficiency, distributed renewable energy, and smart grid solutions.

**Geography:** Customers of U.S. rural utilities initially, moving to utilities globally.

**Scale:** In 2014, PAYS® accounted for more than half of all unsubsidized U.S. federal financing for distributed energy solutions, but the scale was still small at $10M. PAYS can be rapidly replicated to exceed $3 billion/year within this segment. Engaging utilities in countries with rapid load growth can expand PAYS financing to >$10B/year.

**Barriers to implementation**

**Incumbent domination** by utilities that depend on increasing volumetric sales is a major barrier to deployment for all distributed energy solutions, so PAYS® leverages the existing tariff-based business model for utility monopolies. **Small deal size** is another barrier, which PAYS addresses by motivating larger investments at each site and offering standardized investment terms that aid aggregation. **Underwriting requirements** for debt-based financing instruments categorically discourage important customer segments, such as renters and commercial tenants, so introducing a turn-key package for debt-free, on-bill financing via PAYS is a game-changer for catalyzing voluntary investment.

**• Financing Energy Improvements on Utility Bills, Lawrence Berkeley National Lab report 2014.**

**• Energy Efficiency & Conservation Loan Program, Federal Register Notice of Final Rule, December 2013.**

**• New USDA Program for Financing Energy Efficiency Awards $6 Million to Roanoke Electric Cooperative., October 2014.**

**• Rural Utilities Service, Box Score, September 2014.**

**• World Energy Council, Global Electricity Initiative, 2014**
### Analysis

<table>
<thead>
<tr>
<th>Current market size:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Relevant geography and industry:</td>
</tr>
<tr>
<td>US (global potential)</td>
</tr>
<tr>
<td>Rural electric utilities</td>
</tr>
<tr>
<td>1. Market size of industry:</td>
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<tr>
<td>$40 billion in annual sales</td>
</tr>
<tr>
<td>1. Annual investment in industry:</td>
</tr>
<tr>
<td>&lt;$100M/year in energy efficiency and distributed renewables (RUS, 2014)</td>
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</table>

<table>
<thead>
<tr>
<th>Market growth opportunity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Future potential market size:</td>
</tr>
<tr>
<td>600 MW for rural U.S.</td>
</tr>
<tr>
<td>600 GW worldwide</td>
</tr>
<tr>
<td>1. Future potential annual investment in industry:</td>
</tr>
<tr>
<td>$3B/year with rural U.S.</td>
</tr>
<tr>
<td>$50B/year global</td>
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</table>

<table>
<thead>
<tr>
<th>FiRe metrics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Expected annual new finance raised through FiRe intervention:</td>
</tr>
<tr>
<td>$1 billion / year building pipeline to $10B/year</td>
</tr>
<tr>
<td>1. Expected implementation time:</td>
</tr>
<tr>
<td>3 years</td>
</tr>
<tr>
<td>1. Current stage of development:</td>
</tr>
<tr>
<td>Efficiency PAYS® is existing;</td>
</tr>
<tr>
<td>Solar PAYS® and other variations is an idea pilot, based on Efficiency PAYS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other benefits of the intervention:</th>
</tr>
</thead>
</table>

Average energy savings in existing Efficiency PAYS® programs have exceeded 20%, with commensurate savings in CO2 emissions. Most importantly, PAYS® reaches segments of the market marked by poverty that are systematically shut out of financing products that include underwriting requirements. PAYS® also harnesses the large capacity for investment through existing utilities while supporting the transformation of traditional utility business models.

### Alternative approaches

- Other approaches have largely depended on standardizing debt products for unsecured consumer lending. Renters, people with poor credit, and businesses and public agencies with limited capacity for debt are typically shut out of these channels, stranding the people who could value investments in energy efficiency and on-site clean energy resources the most. **PACE and state-backed WHEEL programs are an example of these alternatives.**

### Justification for scale metrics

#### Market size

Initial target market is segment of U.S. utility industry that is eligible for federal financing through the Rural Utilities Service. **All utilities around the world that sell power to retail customers serve addressable markets for PAYS® financing.**

#### Market growth opportunity

**Unsubsidized** federal financing available to rural electric utilities (6 GW) through the U.S. EECLP already exceeds $3 billion / year. At least 10% of that demand (600 MW) could be met with efficiency and distributed renewable energy. Private capital can back similar PAYS® financing through public and private utilities around the world (6000 GW). Globally, EE & DG could meet 10% of demand with annual investment on the order of $50B over 15 years.

<table>
<thead>
<tr>
<th>FiRe metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact of FiRe intervention would add to momentum already building from $10M/year toward $1B/year in new clean energy investment via PAYS® financing. Additional visibility and broader engagement with more utilities in U.S. and globally would amplify the opportunity to reach $10B/year.</td>
</tr>
</tbody>
</table>

### Other benefits of the intervention:

Savings noted here have been documented by **similar market-based PAYS programs in Kansas and Kentucky**, where other mechanisms have failed to reach those with the best opportunities to benefit.
Municipal Adaptation Bonds

INTERVENTION 11: MUNICIPAL ADAPTATION BONDS

SUMMARY: Develop and apply a framework that monetizes future avoided losses from extreme weather events for the implementation of infrastructure investments in climate adaptation strategies today.

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<tr>
<td>Champion 1 + contact</td>
<td>Michael Baer, Senior Advisor, Governor’s Office of Storm Recovery, <a href="mailto:michael.baer@stormrecovery.ny.gov">michael.baer@stormrecovery.ny.gov</a></td>
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<tr>
<td>Champion 2 + contact</td>
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<tr>
<td>Coach 1 + contact</td>
<td>Julian Richardson, CEO, Parhelion, <a href="mailto:jhr@parhelion.co.uk">jhr@parhelion.co.uk</a></td>
</tr>
<tr>
<td>Coach 2 + contact</td>
<td></td>
</tr>
<tr>
<td>Working group member 1</td>
<td></td>
</tr>
<tr>
<td>Working group member 2</td>
<td></td>
</tr>
<tr>
<td>Working group member 3</td>
<td></td>
</tr>
<tr>
<td>BNEF mentor + contact</td>
<td>Lela Jgerenaia, Finance for Resilience Fellow, BNEF, <a href="mailto:lgerenaia@bloomberg.net">lgerenaia@bloomberg.net</a>, +44-203-525-9591 (preliminary)</td>
</tr>
</tbody>
</table>
Municipal Adaptation Bonds

Long description & Relevant literature

The public sector has traditionally responded to disasters by funding post-disaster relief and recovery services rather than pre-disaster adaptation activities. Investing in pre-disaster adaptation can provide significant financial and societal benefits: studies have shown that when $1 is invested in adaptation activities, $4 in post-disaster recovery spending is saved (FEMA 2010).

The goal is to create a framework for governments to leverage the capital markets to make investments in climate adaptation that reduce the financial impact of future extreme weather events. This framework will be the basis for an investment opportunity whereby the avoided costs and the benefits of resiliency are monetized to accelerate investment in pre-disaster adaptation. The framework will quantify the costs and benefits of resilient infrastructure, leading to new revenue streams while insuring against the impact of catastrophic events.

This intervention will change the paradigm for how governments invest in climate resilience while also providing for a new asset class for investors. Investment opportunities in climate adaptation infrastructure will attract capital from debt markets, the infrastructure investment market, and the impact investor market as the resilient investments will lead to more resilient communities.

History

Research has shown that many adaptation options in climate-sensitive sectors will provide benefits in excess of their costs to implement. The barrier to acting on this research is a lack of data on the costs and benefits of adaptation (Stern 2007). The NYS 2100 Commission recognized this fact, and recommended developing innovative sources of finance that capture cost savings and avoided losses to support investment in adaptation. The New York State Governor’s Office of Storm Recovery and its partners are developing opportunities to support these findings.


Scale & scope

- This intervention has the ability to be replicated globally in areas that are at risk from the impacts of extreme weather while also attracting capital from a wide range of investors. **We will pilot the intervention in New York, where the Governor’s Office of Storm Recovery has identified over $17bn in unmet recovery needs as a result of extreme weather impacts** (APA 8 2015). We can bring our unique perspective and data gathered through our intensive work in recovery and adaptation to build a model that is globally valuable.

Barriers to implementation

- Lack of understanding by governments and investors of the potential impact that infrastructure investment can have to reduce extreme weather impacts
- Pilot project may draw limited investor interest until investment opportunity is proven
- Infrastructure development process and permitting may inhibit the length of time to scale this intervention
- Robust benefit-cost analysis may take significant investment.
- Lack of consensus on climate change data and future impacts of extreme weather events
- Lack of political will to enter into debt obligations without dedicated revenue
## QUANTITATIVE ANALYSIS

### Analysis

<table>
<thead>
<tr>
<th>Current market size:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Relevant geography and industry:</td>
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<tr>
<td>1. Market size of industry:</td>
</tr>
<tr>
<td>1. Annual investment in industry:</td>
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</table>

### Market growth opportunity:

<table>
<thead>
<tr>
<th>1. Future potential market size:</th>
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<tbody>
<tr>
<td>N/A</td>
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<tr>
<td>1. Future potential annual investment in industry:</td>
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<tr>
<td>$70-100bn</td>
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### FiRe metrics:

<table>
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<th>1. Expected annual new finance raised through FiRe intervention:</th>
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<td>~$1bn/year</td>
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<td>1. Expected implementation time:</td>
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<tr>
<td>1. Current stage of development:</td>
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<td>developing / Other (describe):</td>
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### Other benefits of the intervention:

- Reduced public expenditures associated with emergency response and long term recovery
- Reductions in property and flood insurance premiums
- Increases in property values and local economic activity
- Positive health and water quality impacts
- Increasing sustainable development practices and changes to local building codes

### Alternative approaches

- Municipalities could issue municipal debt or enter into a public-private partnership for the implementation of their infrastructure projects; however, issuing new municipal debt is potentially a politically unfavorable approach.

- Alternatively, a municipality could design a special taxing district that charges a fee to the people and business who would be protected by an investment in the area designated for the resiliency improvement.

### Justification for scale metrics

**Market size:** Actual expenditures for global adaptation in 2011 were estimated at $244m and $395m for 2012 (Chambwera et al, 2014).

**Market growth opportunity:** The most recent estimate of future global adaptation costs range from $70-100bn annually through 2050 (World Bank 2010).

**FiRe metrics:** The Climate Policy Initiative estimates about $360bn in public and private climate investments annually with local governments providing $10-20bn per year. Global spending on infrastructure is $2 trillion (WEF 2014). When considering these figures, $1bn investment for adaptation is only a small piece of the marketplace.

**Other metrics:** Sustainable infrastructure projects that decrease the risk of extreme weather impacts should result in lower insurance premiums. The reduction in risk should also increase property values and drive local economic activity in areas that have previously been impacted by extreme weather. Green infrastructure investments will also provide improved health and water quality outcomes.
Objectives through FiRe

Your approach

• Expand the amount of capital available for investment in pre-disaster adaptation in many different fields to identify different inputs into finance of investments in adaptation. This framework will educate the public about the importance of also providing a certification that the investment will enable the capital markets and implement New York upon completion of a robust benefit-cost projects that will create resilient and sustainable model, we will develop the investable opportunity, communities fund structure, and term sheets for investors. Local stakeholder and potential investor outreach will be incorporated into each step of this process.

Action plan + timeline for implementation

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Relevant actor</th>
<th>Date</th>
</tr>
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<tbody>
<tr>
<td>Create consortium of experts in disaster risk management, infrastructure investment, sustainable development.</td>
<td>Champion + team</td>
<td>April 2015</td>
</tr>
<tr>
<td>Define specific risk attributes to be included in the benefit-cost / risk framework. Identify impacts of extreme weather events to be monetized.</td>
<td>Champion + team</td>
<td>June 2015</td>
</tr>
<tr>
<td>Identification of adaptation investment focus areas. Develop pilot project in cooperation with local stakeholders.</td>
<td>Champion</td>
<td>June / July 2015</td>
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<tr>
<td>Engage in investor and stakeholder outreach.</td>
<td>Champion + team</td>
<td>February 2016</td>
</tr>
<tr>
<td>Development of investment opportunity and outline term sheets for investors and borrowers.</td>
<td>Champion + team</td>
<td>April 2016</td>
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</tbody>
</table>

Key individuals & organizations

- Reinsurance and insurance firms (Munich Re, Swiss Re)
- New York State and local governments
- Infrastructure Investment Firms (Investment banks and private funds)
- Non-profits such as the World Resources Institute, The Nature Conservancy, Natural Resources Defense Council
- Academic and Research Institutions
- Local Stakeholder Groups
- Philanthropy (Rockefeller)
- New York State Resiliency Institute for Storms & Emergencies

Input from FiRe

- We would benefit from convening experts in the field
- We would like FiRe contribution with the analysis on economic impacts from extreme weather events
- We would benefit from help in creating outreach strategies and technical assistance materials to educate local stakeholders on the importance of investing in climate resilience
- This would provide us with an opportunity to publicize a new approach to climate investment and sustainable development
References


References (continued)

