Utility Wildfire Resilience Bonds

With an increasing risk of wildfires and a more frequent use of de-energization to prevent electrical ignitions, power utilities will look to minimize community impacts of power outages to further enable de-energization strategies.

OVERVIEW

Global average temperature increases coupled with prolonged drought conditions and expanding human settlement along the wildland-urban interface have given rise to unprecedented fire risks in California. One of the most common sources of wildfire ignition is faulty electrical equipment, which caused more than 2,000 fires[i] in California since 2014. Because utilities are held responsible for subsequent damages, in 2017 and 2018, shareholders, ratepayers and insurers of California's largest utility faced $30 billion in liabilities.[ii] In addition to the destruction of homes and infrastructure, wildfires incur significant carbon emissions, air pollution and most tragically, may result in loss of life. Accordingly, regulators have mandated utility interventions to protect California residents.

With authorization from the California Public Utilities Commission (CPUC), California's largest utilities have formalized "de-energization" programs to reduce risk of ignition. These programs are implemented during red flag conditions, (e.g. humidity lower than 20 percent, sustained winds of above 20mph) and appeal as relatively low-cost and immediately implementable interventions to mitigate utility wildfire risk. Advantages notwithstanding, pre-emptive de-energizing can harm communities and vulnerable populations that suffer from unexpected power loss. Nearly 60,000 households were left without power and 34 schools were shut down when Pacific Gas & Electric de-energized 41 circuits in Northern California between October 14th and 17th of 2018. [iii] Accordingly, the CPUC recently opened new rulemaking (R.18-12-005) for utilities to mitigate community impacts from power shutoffs.

OPPORTUNITY

Microgrids and residential solar-plus-storage systems are localized sources of electricity that can deliver electricity locally and autonomously without need for larger transmission infrastructure. In addition to offering year-round renewable generation, microgrids can operate as "islands" independently from the grid and, when paired with batteries, can provide backup power to critical facilities. Typically, communities of 10,000 to 60,000 homes are sufficiently large for microgrids to profitably operate.[iv,v]Rural areas, on the other hand, would benefit most from subsidized residential solar and storage systems, which utilities can withhold the right to manage during emergencies and like microgrids, are mostly unaffected by de-energization.

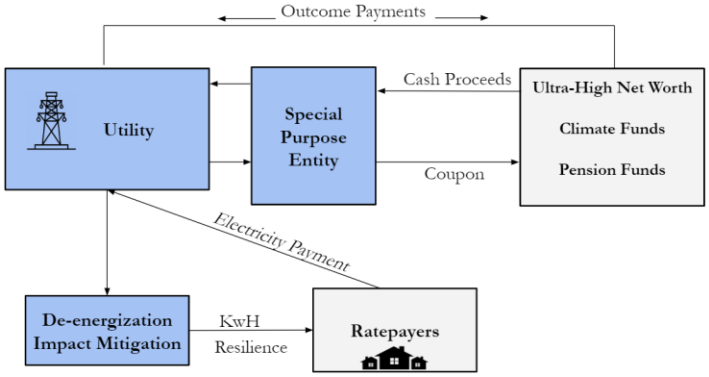
As capital-intensive projects that employ newer technologies and in the wake of mounting wildfire liabilities, utilities require alternative sources of capital that bypass state budgeting and, better yet, offer performance risk transfer to third party investors.

INSTRUMENT

A Utility Wildfire Resilience Bond (UWRB) is a revenue bond issued by a municipally-owned utility special purpose entity to 1) fund the construction of sustainable community microgrids and 2) subsidize residential solar and storage systems in rural areas. The proposed UWRB par amount is $100 million over a 15 year term featuring a 3.5% interest rate, paid semiannually.

UWRB debt obligations are backed by net revenue pledges from non-bypassable electricity charges that can be annually set and adjusted to meet debt obligations in addition to first property lien on capital assets. To further enhance credit, a prefunded reserve account will be held by the SPE and UWRBs will have state pledges to protect bondholders against possible actions to affect the value of assets until fully paid. Further, to ensure stakeholder confidence, 1% of issued notes are retained by the issuing sponsor.

Figure 1: Instrument Diagram



UWRBs also feature risk transfer to bondholders by providing a bonus payments contingent on availability of critical loads during de-energization. Impact will be measured by the proportion of de-energization events that are effectively offset by backup power availability from microgrids for a minimum operable period, over the bond's term.

Table 1: Outcome Indicators

Outcome Metric	90% power availability for critical loads throughout bond term
Outcome Payments	Postivie: + 10%
	Negative: - 10%

This outcome payment will be 10% of the principal amount at maturity. This bonus payment will ensure that bondholders are rewarded for the performance risk of microgrids, regulatory risk of expanded de-energization as well as the avoided liabilities resulting from discontinued power supply in at-risk communities. Importantly, if resilience outcomes are not achieved, bondholders will make a risk share payment of 10% to enable further capital investment by the utility to achieve intended outcomes.

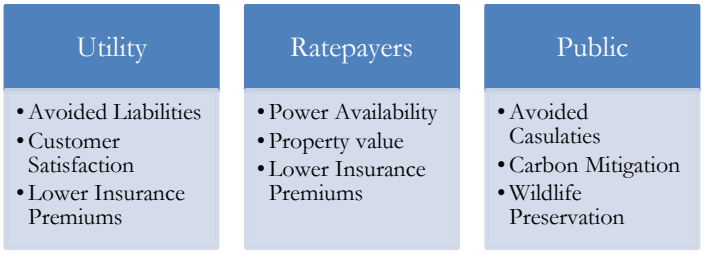
Table 2: Sources/Use of Funds

Sources of Funds	USD (millions)
Principal Amount of Funds	100
Less Fees & Underwriting Discount	-1
Total Sources	99
Uses of Funds	
Deposit microgrid development	92
Deposit distributed generation subsidy	7
Total Uses	99

IMPACT

Based on 2018 projections of over $11.4 billion in insurable losses in California[vi], a risk reduction of about 9% in wildfire outbreak, as enabled by de-energization would offset a $100 million capital investment. Direct savings from avoided outages are significant as well, with a 2016 study estimating annual costs of outages in California to be $8 billion.[vii] Extrapolating these figures on a per capita basis, the proposed instrument would enable $16 million in cost savings per year. Additional social cost benefits from fire risk reduction include avoided fire fatalities, fewer health complications from smoke and trauma, homeowner insurance premium reductions, wildlife preservation and carbon mitigation.

Figure 2: Anticipated Impacts



ADDRESSABLE MARKET AND SCALE

We consider California as a primary market for UWRBs, considering the high level of wildfire risk coupled with a regulatory landscape that supports microgrid investments. A municipal utility would perform due diligence to select highest priority areas based on wind exposure, temperature, dry fuel abundance and local terrain, in addition to considerations of equity and vulnerability (income, population size, age). We expect that UWRB financing microgrids could ultimately be expanded to capture a sizeable fraction of the estimated 4.5 million properties nationwide, and 2 million in California, at high or extreme risk of wildfires.[viii]

Table 3: Rating Comparison

LA Department of Water and Power System Revenue Series A	Moody's: **AA2**
	US $345 million
	January 2019
Burbank Water and Power Revenue Bonds	Moody's: **Aa3**
	US $82 million
	August 2017

INVESTORS

Based on recent California municipal revenue bond issuances, and as a ratepayer backed security, we expect UWRBs to achieve a Moody's rating of A1 (prime) and therefore constitute attractive fixed income investments for pensions, foundations and other institutional investors seeking stable returns, within a new class of ESG; namely, wildfire resilience. As tax exempt securities, these bonds will also be attractive to ultra-high net worth individuals and family offices, particularly residing in California who may benefit from additional state tax exemptions.

BOND REVENUE PROJECTIONS

The yield for a UWRB, assuming a successful outcome, is 4%. Municipal bond tax-free incentives can provide maximum federal tax equivalent yields of 6.3% and a maximum federal plus state tax equivalent yield of 8.0%.

Table 4: Bond Terms

Rating (Moody's)	A1
Bond Term	15 years
Note Coupons	3.5%
Maximum Potential Yield (Bonus)	4%
Minimum Potential Yield (Risk Share Payment)	2.96%
Maximum Federal Tax Equivalent Yield*	6.3%
Maximum Double Tax Equivalent Yield*	8.0%

*Federal ordinary income tax rate: 37%, CA ordinary income tax rate: 13.3%

RISKS & ASSUMPTIONS

Regulator: Whereas the public utilities commission has indicated requirements to mitigate de-energization impacts, including but not limited to generators and batteries, there is no guarantee that these policies will manifest and that utilities will be inclined or required to invest in mitigation.

Rate Approval: Electricity rate increases for municipal utilities will typically require city council approval, which may be politically unfavorable.

Geographic Risk: The location of a wildfire can be unpredictable, such that microgrid proliferation may only have a marginal impact on overall fire risk reduction. Additionally, it is possible that a constructed microgrid cannot be isolated from the main grid, and in turn, will not serve any new backup generation capacity.

Utility Bankruptcy Risk: Utilities facing mounting liabilities have elevated bankruptcy risk, which may affect utility structure, the ability to collect revenues and future bond issuances to cover principal payment at maturity.

[i] California utility equipment sparked more than 2,000 fires in over three years (LA Times, 28 January 2019)
[ii] Wildfire Liability Drives California Utility to Bankruptcy (PEW Trusts, 15 January 2019)
[iii] Utilities Cut Power To Prevent Wildfires. But Who Wins When The Lights Go Out? (New York Times, 15 October 2018)
[iv] Evaluating business models for microgrids: Interactions of technology and policy (Energy Policy, January 2017)
[v] Making Solar Smarter - How microgrids deliver resilience, energy cost optimization, and sustainability (sustainablesolarstorage.com)
[vi] 2019 Press Release, California Department of Insurance, January 28, 2019
[vii] E. O. Lawrence, K. H. Lacommare, J. H. Eto, K. H. Lacommare, J. H. Eto, "Cost of power interruptions to electricity consumers in the United States (U.S.)", 2005.
[viii] 2017 Verisk wildfire risk analysis