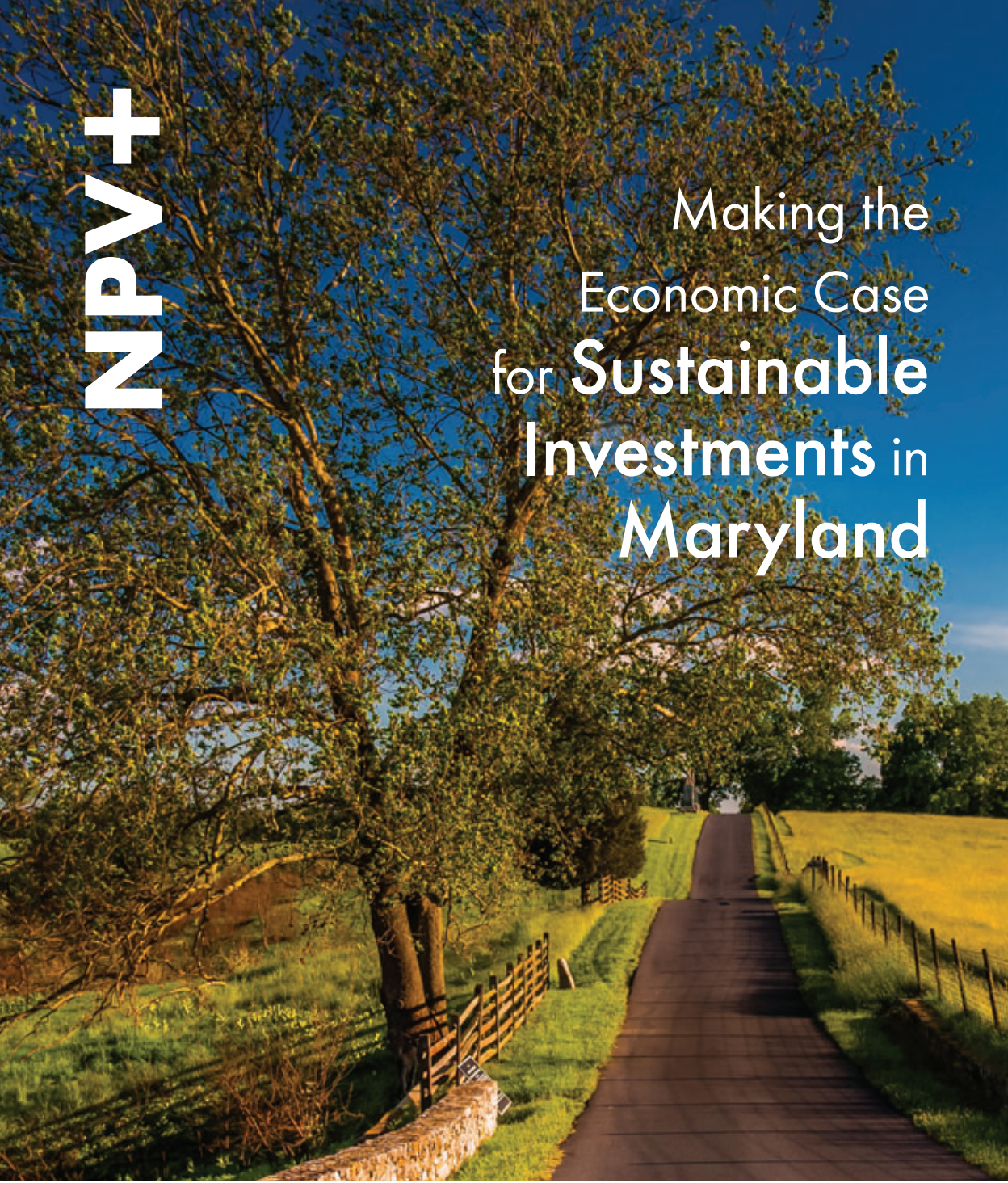


NPV+

Making the Economic Case for Sustainable Investments in Maryland

Global Footprint Network®
Advancing the Science of Sustainability

MARYLAND
Smart, Green & Growing

Supported by THE ROCKEFELLER FOUNDATION

IF YOU DRIVE BY THE REAR-VIEW MIRROR…

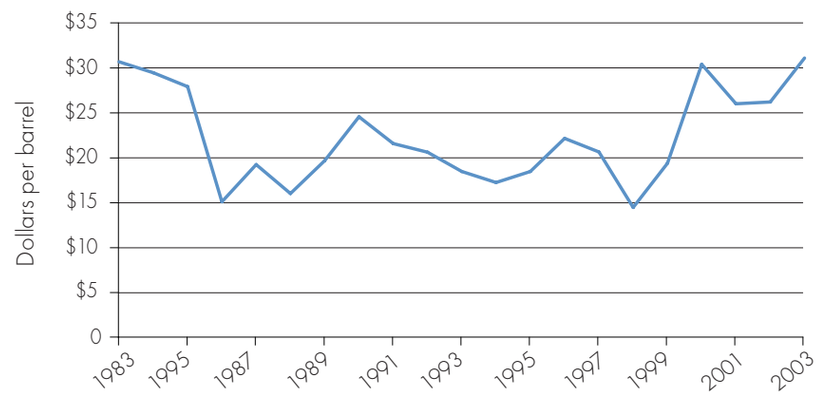
States often approach spending decisions as if the future will be just like the past, projecting that economic growth will continue at historical rates for decades to come; that resource and energy prices will remain affordable; that carbon pollution will continue to be unpriced and unregulated; and that environmental degradation will not impose burdensome costs.

Antietam National Battlefield, Maryland

It's time to re-examine these assumptions.

In the past decade we have seen enormously damaging and costly natural disasters; a tripling of oil prices; increasingly strained supplies of water, fuel, food, and other essential resources; political imbalances due to natural resource shortages; and lackluster economic growth despite unprecedented central bank interventions.

U.S. Oil Prices, 1983-2003



Source: WTI Oil, EIA

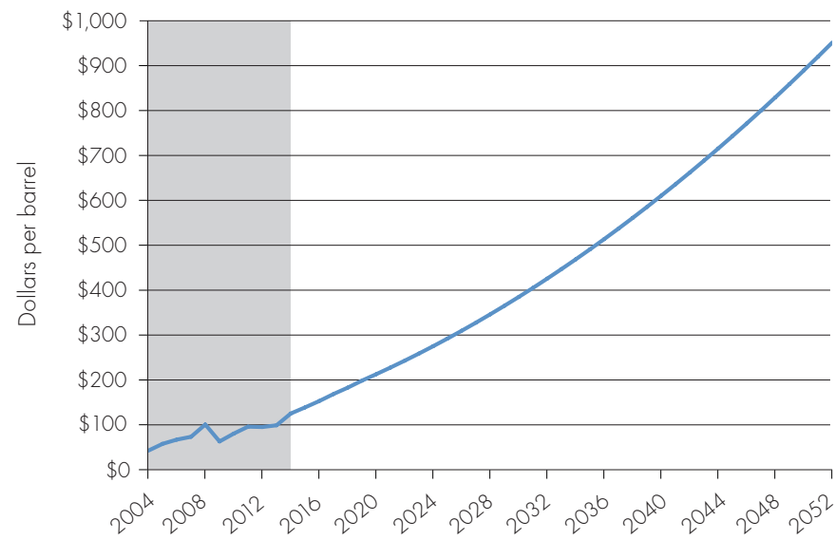
AND IGNORE THE SIDE-VIEW MIRRORS…

Part of the problem is that we do incomplete cost-benefit analyses.
We leave out factors that are very real – like the true costs of carbon pollution or the true benefits of storm water protection provided by wetlands – simply because they aren't assigned values. Oftentimes we don't do cost-benefit analyses at all and simply buy what's cheapest today, ignoring operational costs and benefits. In the process, we miss some of the best long-term investment opportunities.

YOU'LL MISS WHAT'S ABOUT TO HAPPEN TO YOU

Some believe that since no one can predict the future, we shouldn't even try. But failing to consider real possibilities can have disastrous outcomes, like painful budget cuts, stranded assets, locked-in costs, and unsustainable development. Conversely, **careful risk assessment and lifecycle accounting usually shows that sustainable choices offer better returns.**

U.S. Oil Prices, 2004-2013 and Forecast



Source: WTI Oil, EIA (historical data); Chris Nelder, Global Footprint Network (forecast)

NPV+ RESPONDS | **LOOK AHEAD**

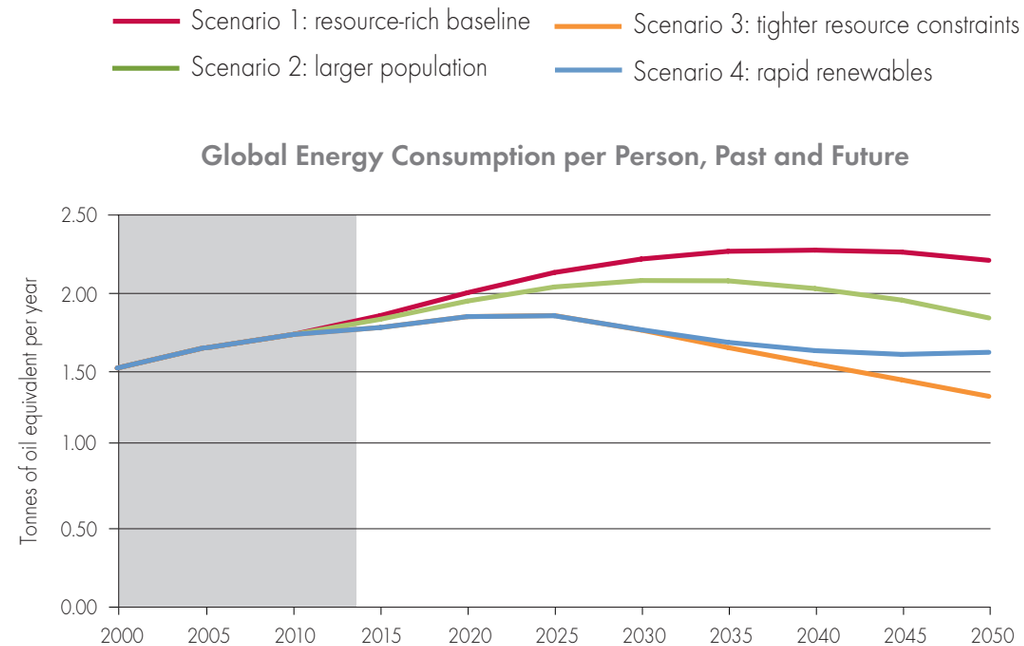
Net Present Value Plus (NPV+) uses scenarios to set a realistic context for capital decisions.

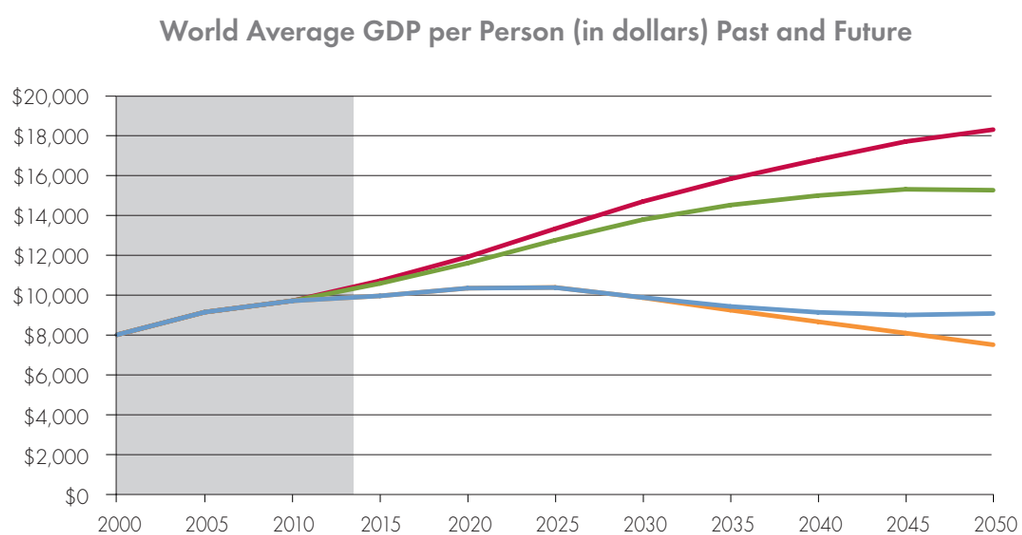
With **NPV+**, we used multiple energy price forecasts and discount rates to evaluate built capital projects and identify the ones with the lowest lifetime costs and the highest returns.

The majority of University of Maryland faculty who reviewed the **NPV+** Scenarios chose Scenario 3 (with lower resource availability and higher population projections than the baseline scenario) as the most realistic one.

In this scenario, resource constraints slow down economic activity, restrict investment opportunities, and force governments to make do with existing assets.

SCENARIOS PROVIDING CONTEXT FOR CAPITAL DECISIONS



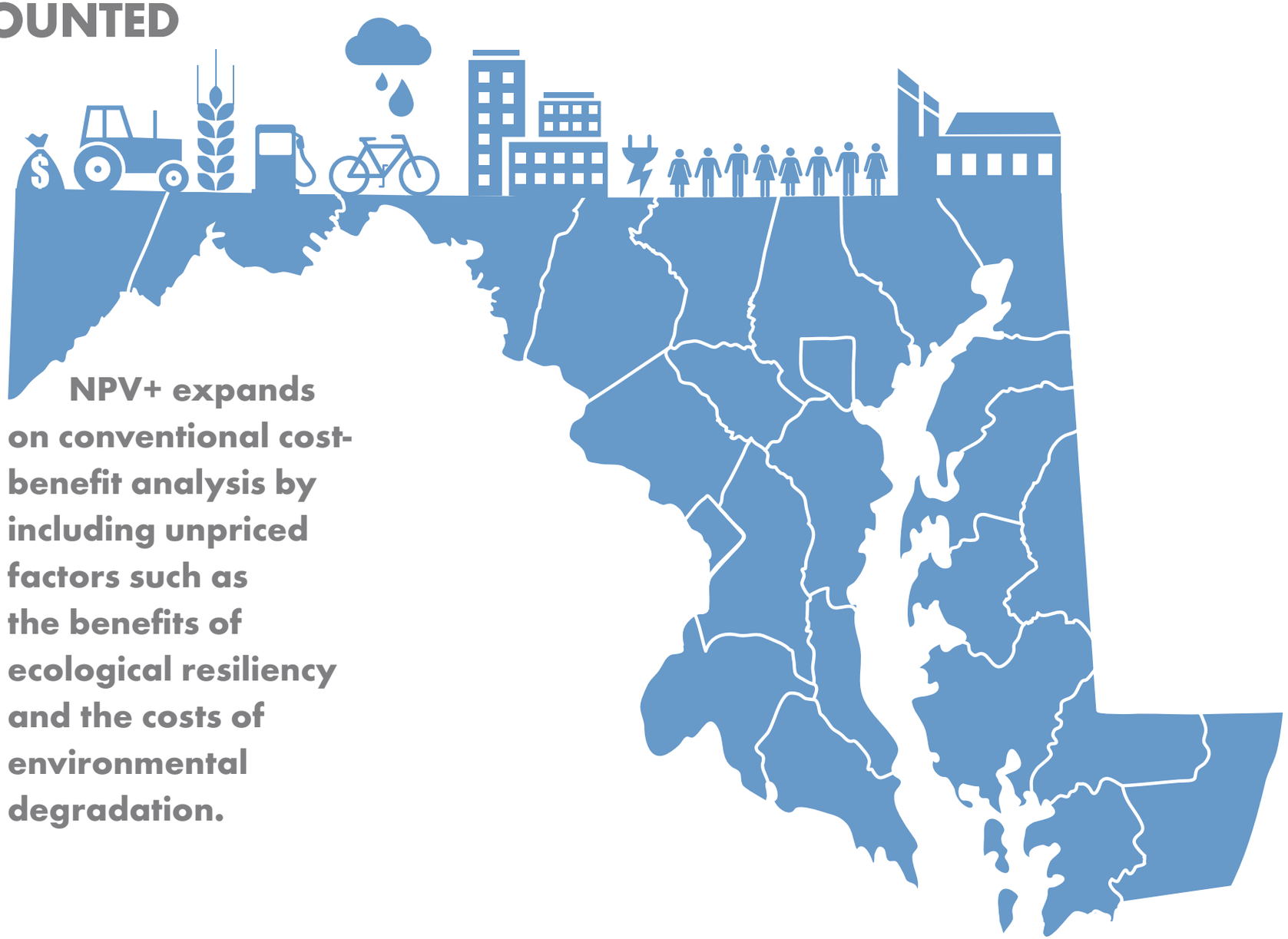


Source: Jorgen Randers, www.2052.info (baseline Scenario 1); Global Footprint Network

NPV+ RESPONDS

COUNT THE UNCOUNTED

In the **NPV+** framework, any investment may be a "capital project;" all costs and benefits – even those where no monetary exchange occurs – are "cash flows;" and those cash flows can be evaluated using the conventional net present value (NPV) formula, which calculates the value of a long-term investment in present-day dollars.



NPV+ expands on conventional cost-benefit analysis by including unpriced factors such as the benefits of ecological resiliency and the costs of environmental degradation.

EXAMPLES | **FOUR CAPITAL PROJECTS**

We tested **NPV+** by analyzing four diverse investments the State of Maryland customarily makes, in order to answer some basic questions:

VEHICLES

- At what price would an electric vehicle (EV) become cheaper to own than a conventional gasoline vehicle for general-duty, local use?
- How does the total cost of ownership compare for law enforcement use of sedans vs. SUVs?

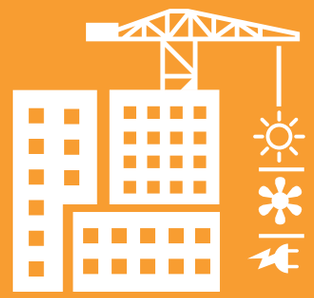
LAND CONSERVATION

- What is the long-term value to Maryland of purchasing land for conservation, including the full ecosystem benefits?

WEATHERIZATION

- What is the long-term value of the weatherization measures the EmPOWER Maryland Program has funded for low-income residences?
- Is the greatest benefit of weatherization realized when a high or low amount of energy is saved?

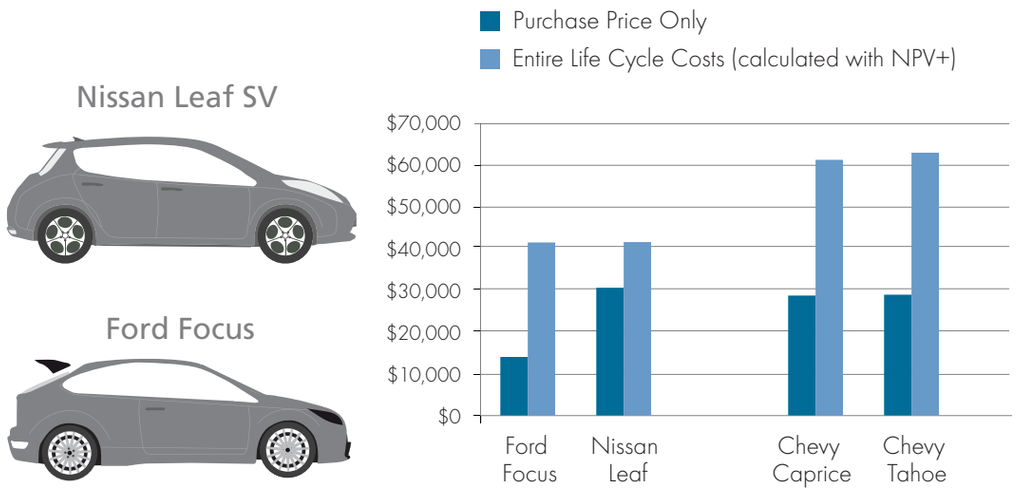
FACILITIES



- Would buying a more expensive HVAC system for a new detention center pay off in natural gas and electricity savings over the system's lifetime?

THE RESULTS | **FLEET VEHICLES**

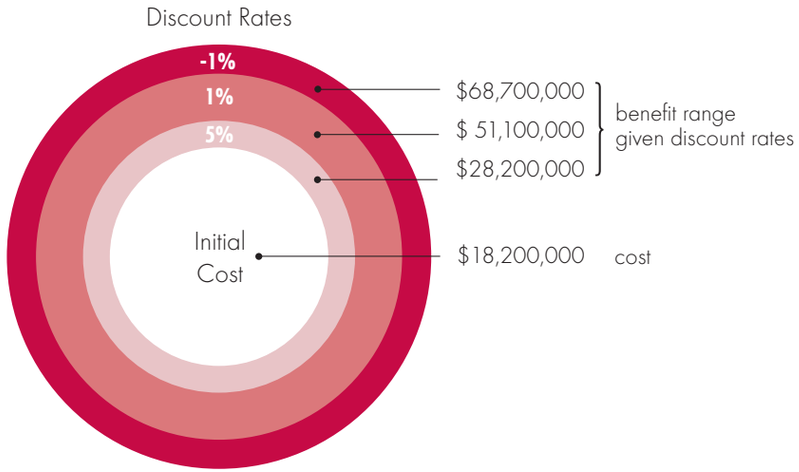
The total cost of vehicle ownership largely depends on the future cost of fuel. Taking an historic outlook on fuel prices could lead the state to buy vehicles that will be more expensive to own.



- **For general duty use, the current upward trend in gasoline prices will make the State of Maryland's cost of owning an all-electric Nissan Leaf over a typical 10-year vehicle life roughly the same as that of a conventional gasoline Ford Focus, even though the Leaf is more than twice as expensive to buy as the Focus. Under a variety of other fuel price forecasts, the Leaf will become a better investment within two to three years.**
- **For law enforcement use, the Chevrolet Caprice sedan was found to be cheaper to own over a typical four-year vehicle life than the Chevrolet Tahoe SUV, due to the higher fuel economy of the Caprice.**

THE RESULTS | **WEATHERIZATION**

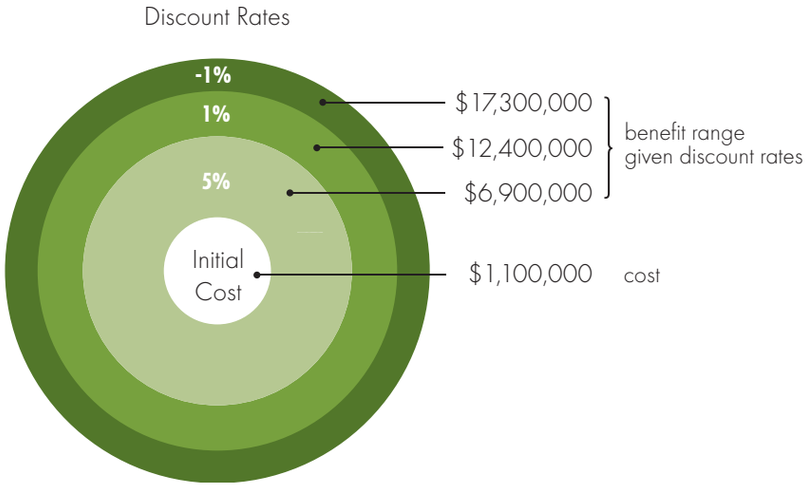
Investments in weatherization are an excellent value for the state of Maryland in purely monetary terms. They also help build long-term resiliency against energy price shocks, especially for the state's most vulnerable residents.



- **Over 20 years, the $18 million invested in this group of weatherization measures will save a net $28 million to $69 million in avoided natural gas, electricity, and carbon emission costs, depending on the discount rate. The NPV+ scenario exercise suggests that the most realistic valuation for this group of weatherization measures is $51 million.**
- **The energy savings from weatherization measures will significantly reduce what regional utilities would have to invest in new power generation capacity, and what residents would have to spend on natural gas and electricity.**

THE RESULTS | **LAND CONSERVATION**

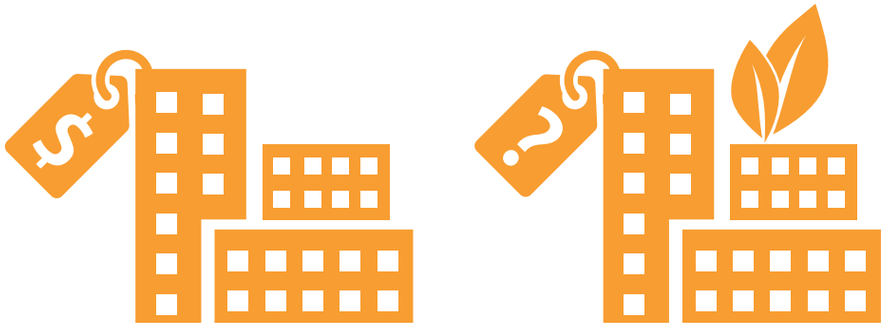
Can an investment that doesn't pay out any cash returns be considered a good one? Yes, when the state invests in land that delivers benefits it would have to pay for otherwise. For example, a natural wetland can protect property from surging storm water, instead of the state having to construct expensive storm surge protection infrastructure.



- **A $1 million property purchased by the state of Maryland to preserve a natural wetland, which is home to numerous rare and protected species, was evaluated using very conservative valuations of its natural benefits.**
- **The NPV+ analysis found that the purchase delivered between $6 and $16 in benefits for every dollar spent, depending on the discount rate.**

THE RESULTS | **FACILITIES**

Because Maryland's budget-making process grants little flexibility to explore energy efficient alternatives for facilities, the state tends to select less efficient facilities that have lower initial costs, but higher long-term energy costs.



- **Facility budgets are currently estimated from previous facility costs, without giving staff sufficient latitude to explore more energy-efficient buildings. It is currently not possible to model the long-term savings of owning a very efficient building design if it is significantly more expensive to build.**
- **A lack of coordination between State agencies can lead to lost opportunity and higher long-term costs.**

INSIGHTS GAINED

These examples illustrate how **NPV+** can help officials save money and insulate the state against future risks.

VEHICLES

We recommend that the state add more electric vehicles to the general-duty fleet, as well as charging stations, and select sedans preferentially to SUVs for law enforcement use. We urge the state to collect detailed information on maintenance and refueling costs for all vehicles to improve the accuracy of future analyses.

LAND CONSERVATION

Investments made in land conservation are an excellent value for the state of Maryland. Using conservative assumptions, the **NPV+** analysis found that purchasing a property to conserve natural resources returned benefits valued at many times over the cost of the land. We recommend that the state use a similar analytical approach to guide future land purchases.

WEATHERIZATION

Since the **NPV+** analysis shows that the financial savings are greatest where a low percentage of energy is saved, and that the return on weatherization investments is excellent, we recommend that the state broaden the weatherization program to make it available to more state residents, and/or promote other existing utility and state incentives for energy efficiency improvements.

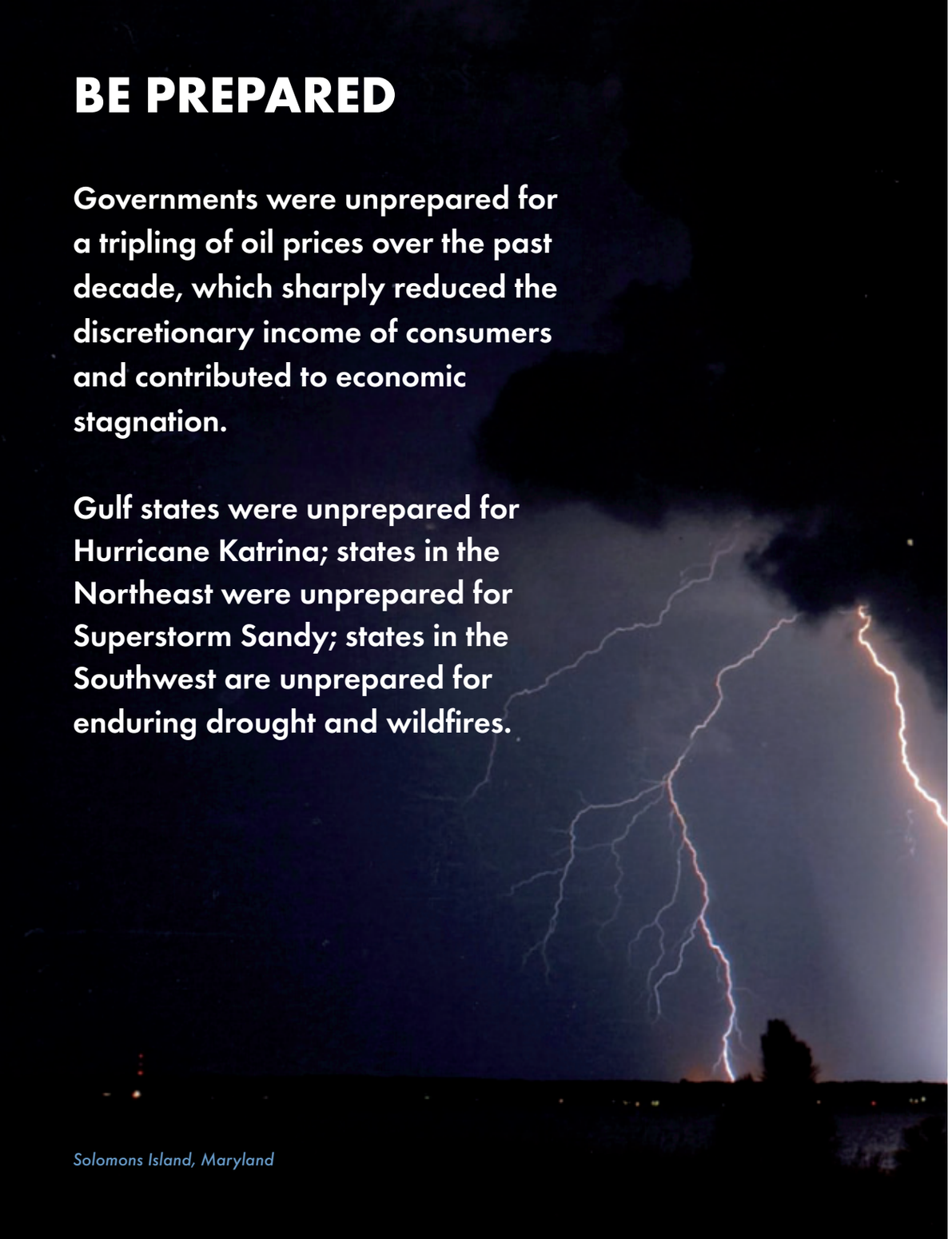
FACILITIES

We recommend that the state increase its investment in detailed energy modeling for new facilities; allow sufficient budget to evaluate high-efficiency combined heat and power (CHP) systems where appropriate; and grant agency staff the flexibility to exceed a facility's original project budget if a building design option would save the State a significant amount of money over the life of the investment.

BE PREPARED

Governments were unprepared for a tripling of oil prices over the past decade, which sharply reduced the discretionary income of consumers and contributed to economic stagnation.

Gulf states were unprepared for Hurricane Katrina; states in the Northeast were unprepared for Superstorm Sandy; states in the Southwest are unprepared for enduring drought and wildfires.



Solomons Island, Maryland

By recognizing **new trends**, good forecasting, and including unpriced factors, **NPV+** can help governments **build resilience.**

INVEST FOR PROSPERITY

APPLY NPV+ IN DECISION-MAKING

NPV+ can help governments focus on capital expenditures that deliver long-term wealth; avoid investments in assets that will be stranded in a very different world from today's; insulate against rising energy prices; prepare for major transitions in energy, transportation, and infrastructure; and leave a better legacy for present and future generations.

Use **NPV+** to identify the capital projects that will build the greatest long-term wealth and resilience for the State of Maryland.

For more information, visit:
www.footprintnetwork.org/npvPLUS

or contact:
npvPLUS@footprintnetwork.org

Chesapeake and Delaware Canal in Chesapeake City, Maryland

ACKNOWLEDGMENTS

The **NPV+** project was developed with the generous financial support of the Rockefeller Foundation, and the assistance of faculty from the University of Maryland.

Supported by THE ROCKEFELLER FOUNDATION

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Global Footprint Network gratefully acknowledges the personal support and cooperation of the State of Maryland government, without which the project would not have been possible.

MARYLAND Smart, Green & Growing

Governor Martin O'Malley and staff

The Department of Natural Resources

The Department of Budget and Management

The Department of Housing and Community Development

The Department of General Services

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