Supplemental Tool: Incorporating Resilience into Critical Infrastructure Projects

Homeland Security

Incorporating Resilience Into Critical Infrastructure Projects

Purpose and Scope

The purpose of this supplement is to provide the critical infrastructure community with steps that support development decisions and investments in infrastructure that will enhance the resilience of critical infrastructure systems. This supplement was developed through research into existing strategies for infrastructure resilience, including the Hurricane Sandy Rebuilding Strategy and the updated *NIPP 2013, Partnering for Critical Infrastructure Security and Resilience*. It is intended for government decision makers at all levels who are undertaking new infrastructure projects or enhancing security and mitigation measures on existing government-owned infrastructure. It also can be used more broadly by all critical infrastructure owners and operators as decisions are made to invest in infrastructure replacements or improvements.

This supplement includes examples of steps in the infrastructure planning and investment process that can be used to prioritize projects that promote resilient infrastructure. All of the recommended steps included in this supplement may not apply directly to each sector and type of infrastructure. In that case, this supplement can help investors and others involved in decision making tailor the relevant steps that will promote resilience as well as provide a model for the types of characteristics that should be incorporated into resilient systems.

Steps for Promoting Resilient Infrastructure Investments

As defined in Presidential Policy Directive 21: *Critical Infrastructure Security and Resilience* (PPD-21), resilience is "the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents." Resilient infrastructure systems are flexible and agile and should be able to bounce back after disruptions.

Incorporating resilience is not a new concept for investors. For example, when planning new investments, it is standard practice for investors to perform cost-benefit analyses. These analyses and other tools enable investors to make well-informed decisions that lead to smart, profitable investments. Critical infrastructure investors also have an incentive to be forward-looking, since the lifespan of many types of infrastructure can be 50 to 100 years. Prior to funding a project, investors and project managers will generally try to identify the impacts of demographic and population trends so they can determine whether the critical infrastructure they develop will retain its usefulness.

Building on the positive actions investors have taken toward developing and maintaining resilient critical infrastructure, the following steps can be used as a guide to promote resilience in infrastructure development and investment. The list is not exhaustive, but equips decision makers with some of the best practices and implementable ideas for how to incorporate resilience into infrastructure design. When making investment decisions and selecting infrastructure projects, decision makers are encouraged to use these recommended steps to the fullest extent applicable and possible:

- Incorporating **projected climate change impacts** into the decision-making process.
- Measuring both the **direct and indirect costs and benefits** of developing the project to gain a holistic picture of the impact of the project (e.g., the financial and opportunity cost of losing infrastructure functions and services, the societal impacts of developing the project, environmental costs and benefits, etc.).
- Examining **demographic trends** and using the anticipated demographics to predict the future demand for infrastructure.
- Consulting with the Federal Emergency Management Agency (FEMA) on the **best available data pertaining to flood risk** (e.g., the FEMA Map Service Center to access current flood maps). [*See additional resources for more information*]
- Referring to available **science and predictive tools** on future trends and risks when selecting a location (e.g., the National Oceanic and Atmospheric Administration Sea Level Rise and Coastal Flooding Impacts Viewer tool, etc.). [*See additional resources for more information*]
- Considering applicable **standards and best practices** for incorporating resilience into asset and system design.
- Conducting **vulnerability assessments** that can identify where the infrastructure is vulnerable to known and future risks.
- Utilizing available **risk assessment and scenario planning tools** to make risk-informed decisions (e.g., the Department of Homeland Security-sponsored Owners Performance Requirements tool, which enables owners to develop several scenarios for a project to help select the optimal combination of performance levels for energy, environmental, safety, security (including blast; ballistic; and chemical, biological, and radiological protection), sustainability, durability, operational, and cost-effectiveness attributes to meet their needs). [*See additional resources for more information*]
- Identifying key **dependencies and interdependencies** and ways in which this critical infrastructure asset, system, or network could impact other components of critical infrastructure systems, whether within the same sector or across sectors.

- Mapping potential **cascading effects** from potential infrastructure disruptions.
- Working with partners to develop a picture of how this infrastructure investment will fit into the **regional landscape** of critical infrastructure.
- Developing a comprehensive **incident response plan** that includes such components as **scenario planning** for the most likely risks and clearly articulated **roles and responsibilities** for all partners.
- Building **redundancy** into an infrastructure system so it can handle a localized failure.
- Budgeting for infrastructure **mitigation** during the development of a project to ensure the resilience of the infrastructure to threats and hazards.
- Developing a **business continuity plan** to ensure rapid recovery from disasters or other disruptions.
- Planning to conduct **periodic updates** for the infrastructure asset that can **incorporate new technologies** and/or **upgrades** that could enhance mitigation.
- Determining whether **environmental buffers** (e.g., dunes or wetlands) can be incorporated into the infrastructure design to mitigate the effects of natural disasters.
- Ensuring there are **manual overrides and physical backups** built into automated systems.

Conclusion

The above list represents recommended steps that decision makers can use to promote resilience in infrastructure projects. In many cases, those responsible for design decisions are already using these steps in localized efforts to achieve resilience because they see a purpose and a value in promoting resilient design. To further these efforts, the Federal Government will continue to support access to accurate information and analysis about these risks as well as an approach for how to manage the risks. As we work together to promote the goals of secure and resilient critical infrastructure nationwide, it is important to codify and update these best practices and implement them when possible to better manage the risks. Those who use this supplement are encouraged to tailor this information to suit their needs and to provide feedback on additional recommendations that can be incorporated.

Additional Resources

Federal Emergency Management Agency, FEMA Map Service Center, **https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1**

National Oceanic and Atmospheric Administration, Sea Level Rise and Coastal Flooding Impacts Viewer tool, **http://csc.noaa.gov/digitalcoast/tools/slrviewer**

U.S. Department of Homeland Security, Office of Science and Technology, Building and Infrastructure Protection Series: Designing Buildings to Withstand Almost Anything, **http://www.dhs.gov/building-and-infrastructure-protection-series-designing-buildings-withstand-almost-anything**

U.S. Department of Homeland Security, Office of Science and Technology, Owners Performance Requirements Tool, **http://www.oprtool.org/**

U.S. Department of Housing and Urban Development, Hurricane Sandy Rebuilding Strategy, Aug. 2013, **http://portal.hud.gov/hudportal/HUD?src=/sandyrebuilding**

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