



Tips for Selecting and Implementing Adaptation Measures

INTRODUCTION

There's no hard-and-fast formula for determining which adaptation measures should be prioritized and implemented to mitigate climate change risks. Those decisions are generally based on factors such as the costs of implementing the adaptation measures relative to funds available, the political or technical feasibility of the measures, the anticipated relative effectiveness of the measures, and other factors. Furthermore, an adaptation measure that is optimal for one agency may not be optimal for another, due to agency-specific situations.

When selecting and implementing the right adaptation measures for your agency, consider the following:¹

- There are different types of costs of adaptation measures
- There are different ways to achieve “resilience”
- Some investments may be needed now, and some can wait (but shouldn't be forgotten!)
- There are ways to manage uncertainty about the future climate
- It's ok to start small
- Effective communication can make the difference when seeking support for your resiliency efforts

THERE ARE DIFFERENT TYPES OF COSTS OF ADAPTATION MEASURES

There are a lot of different costs to consider when deciding whether to implement an adaptation measure. There are immediate upfront costs, and ongoing costs over the lifetime of the adaptation measure. Increases/decreases in revenue may factor into costing of some measures. Moreover, there are the *avoided* costs of avoiding future damage or loss of revenue due to having a more resilient system. It's helpful to consider all of these costs when making investment decisions.

For example, some adaptation measures might require more money to implement, but save money in the long term through reduced maintenance and repair costs. Considering long-term costs and savings facilitates more cost-effective decisions.

¹ Source: These tips were developed based on professional experience of the project team, as well as tips suggested in the California Natural Resources Agency 2013 document called *Planning for Adaptive Communities in California Adaptation Planning Guide* (http://resources.ca.gov/docs/climate/01APG_Planning_for_Adaptive_Communities.pdf)

That said, cash-flow issues can be a barrier for adaptation measures that require large, upfront investments, no matter how much money they save in the long-run. Some adaptation measures may require seeking additional sources of funding, or may simply not be feasible if the upfront costs are too great.

Also remember that inaction can be costly. Not taking action to build resiliency could bring on costs like lost fare collection due to service disruptions, medical costs if worker safety is not maintained, or repeated repair costs to vehicles or equipment.

THERE ARE DIFFERENT WAYS TO ACHIEVE “RESILIENCE”

Sometimes people think that resilience means completely preventing any impact from happening in the first place. In many cases, however, complete avoidance of impacts is simply not feasible from a technological or cost perspective. In such situations, it may make more sense to focus on how to minimize (not avoid) disruptions or damage, and/or how to recover faster and communicate service issues to customers. In fact, a suite of adaptation measures that simultaneously tackle minimizing the incidence of service disruptions, reducing the impacts of those disruptions when they occur, and more quickly bringing service back to normal, may help achieve an acceptable level of resilience in a more cost-effective manner than relying on any single measure. For more information on types of adaptation measures, see the resource titled “Adaptation Measures.”

SOME INVESTMENTS MAY BE NEEDED NOW, AND SOME CAN WAIT (BUT SHOULDN'T BE FORGOTTEN)

Climate vulnerabilities don't always require immediate adaptation actions. However, it can be helpful to begin identifying what situations would trigger action, when key decisions need to be made, and what the process is for implementing appropriate actions.

Consider the following stages of adaptation investment decision-making:

- **Establishing Needs.** If you determine you need improved air conditioning in your buses to address projected increasing temperatures, it is not necessary to replace your entire fleet tomorrow. Rather, it is possible to wait until buses are due for replacement anyway. However, taking appropriate actions today can ensure that when it becomes time to purchase new buses, the people making the purchase are aware that additional air conditioning capacity is needed.
- **Identifying Immediate Steps.** If you need to build more bus stop shelters to help shield customers from more extreme weather, you likely don't need to (or would even be able to), build them all in the next year or two. However, it is possible to start assessing where additional shelters are needed so that you can begin lining up funding, making sure appropriate right-of-way and other land-use issues are addressed, and other processes are put in place. It may be easier to make these adjustments if they are done gradually, rather than attempting to do them all at once.
- **Establishing Thresholds for Action.** To enhance the climate resilience of a coastal bus route, the route doesn't necessarily need to be changed today. Rather, it can be rerouted once it begins to experience coastal flood impacts. However, it would be helpful to identify today the threshold at which point re-routing occurs. For example, since temporary flooding would likely occur far before permanent inundation, it may be helpful to determine

what frequency or severity of temporary flooding is acceptable before action is needed. That way, your agency can act before it becomes a serious problem, and thus take a proactive, rather than reactive, approach.

- **Deciding to Invest.** If you're planning a major infrastructure project that is expected to be around for a long time (such as a new rail line or a new building), it is prudent to make sure that decisions on siting and design are appropriate given projected changes in climate.

THERE ARE WAYS TO MANAGE UNCERTAINTY ABOUT THE FUTURE CLIMATE

Sometimes, agencies can be reluctant to implement adaptation measures because there is uncertainty around exactly how the climate will change in the future. However, enhancing resilience may still be justified even in the face of an uncertain future. Keep in mind:

- **Uncertainty isn't new.** Planning decisions are routinely made based on uncertain assumptions about the future, including assumptions on where and by how much population grows, how and to what extent the population will use the transit system, and changes in land use and vehicle use. These assumptions may, or may not, hold true in the future. Climate change adds a different type of uncertainty, but is by no means the only source of uncertainty in planning and making investment decisions.
- **Co-benefits.** Many investments to increase climate resiliency will have other benefits, known as co-benefits. For example: increasing resiliency to today's extreme weather events, improving service reliability today, increasing customer and worker comfort, or reducing long-term maintenance and repair costs. These co-benefits can help mitigate the downside of uncertainty.
- **Direction of change is more certain.** In many cases, the exact magnitude of change is uncertain, but the nature of the change is more certain. For example, different models and climate scenarios may show different magnitudes of temperature increases, but they all generally show that temperature will increase in the SCAG region. The exact values may not matter as much as understanding the general trends when deciding if, and how, to adapt.
- **Flexible decision-making.** Identifying actions that need to happen today, and which ones can happen in the future at pre-determined times or thresholds (see previous discussion), can help reduce the risk of making "wrong" investments.

IT'S OK TO START SMALL

Sometimes the hardest part is just getting started. The concept of a full-fledged vulnerability assessment or adaptation plan might be daunting—but you don't need to do everything at the beginning. Getting a general sense of how a changing climate might affect your agency's services and financial health can be a less intimidating first step, as is putting in place initial processes that will facilitate bigger decisions in the future. You might consider reviewing a Capability Maturity Model (CMM), to help you match your current institutional capabilities with an appropriate level of action, and identify ways to increase your capabilities over time. For example, see the Adaptation Capability Advancement Toolkit (Adapt-CA) at <http://arccacalifornia.org/adapt-ca/>.

EFFECTIVE COMMUNICATION WHEN SEEKING SUPPORT FOR ACTION EFFECTIVE COMMUNICATION CAN MAKE THE DIFFERENCE WHEN SEEKING SUPPORT FOR YOUR RESILIENCY EFFORTS

The way you communicate climate risks and the need for action can make all the difference when seeking support within your agency. Consider these tips:²

Explain the risks of inaction and the solutions, rather than focusing on the science.

Sometimes the science can be hard to communicate, and can even cause debate. Climate risks are often more relatable when first discussed in terms of recent extreme weather events and their consequences on the agency; then the discussion can be expanded to making sure the agency stays resilient through similar events *and* more extreme or more frequent versions of those events in the future.

Tie resilience to agency-wide priorities. Your leadership may be more likely to approve adaptation measures if they also help achieve other, non-climate resilience related, goals or priorities of your transit agency. For instance, health and safety of passengers and employees is often a key priority of organizations. Therefore, it may be helpful to look for adaptation measures that will help maintain or improve your agency's safety record. Adaptation measures that provide more shade to customers (e.g. shelters) or create better working environments to employees (e.g. improved air conditioning on buses) are examples of adaptation measures for dealing with increased heat that are focused on the health and safety of customers and employees.

Keep the message positive. Being too negative or scary about the future can cause people to feel overwhelm and shut down. The good news is that most climate risks *can* be managed—you just need to take action to do so. Phrase communications so that you're focusing on not only the risks your agency is facing, but also what your agency is able to do to mitigate those risks.

REMEMBER THAT BENEFITS ARE NOT ALWAYS EVENLY DISTRIBUTED

When selecting adaptation measures, it can be useful to consider who will benefit from the measures. By enhancing the resilience of transit lines that serve the most vulnerable riders, such as transit-dependent riders and disadvantaged communities, transit agencies can build resilience in a more equitable manner.

In general, California is encouraging greater consideration of impacts on disadvantaged communities when crafting and implementing policy. Taking into account equity concerns when selecting your resilience measures may be consistent with larger equity goals.

[CalEnviroScreen](#) has information and spatial data on communities particularly affected by pollution, and some of this information may provide insights into the relative vulnerabilities of communities in your area.

² These tips are adapted from the upcoming ACRP 02-74 project handbook *Using Existing Airport Management Systems to Manage Climate Risk*.