



# Cooling Contingency Planning: Five Steps to Minimizing Downtime

*By Joe Blackett*

In today's critical facilities, there are certain services whose importance simply cannot be understated:

1. Power
2. Cooling
3. Compressed air

A loss of any of these can result in lost revenue, customer defections, lost product, and in some extreme cases, death. This paper will focus on critical cooling and the means to ensure that a facility has cooling even under the most adverse conditions. It will list the steps to developing a cooling contingency plan, and how best to implement that plan to achieve minimum downtime.

## Introduction

### CONTINGENCY PLANNING: WHAT IS IT?

There are dozens of different definitions for the term contingency planning, but the best one for our purposes is: “an organized and coordinated set of steps to be taken if an emergency or disaster strikes.”

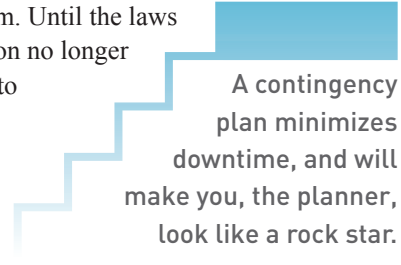
By that definition, one doesn't start developing a cooling contingency plan when a data center or other critical facility loses cooling. One does it BEFORE the disaster strikes. Loss of cooling in a critical facility can mean millions of dollars in lost revenue, interruptions of critical services to customers and a nightmare for anyone responsible for the critical cooling system's reliability.

It doesn't matter whether you're a chief engineer, mechanical contractor, facility manager, lab director, or hospital administrator. If a lack of adequate planning results in significant and costly downtime, you're going to have some very difficult questions to answer and will likely be ill-equipped to answer them. As this paper will demonstrate, there is no reason not to have a cooling contingency plan in place and every reason to put one in place. A contingency plan minimizes downtime, and will make you, the planner, look like a rock star.

### WHO CAN BENEFIT FROM A CONTINGENCY PLAN?

- **Mechanical contractors:** Having a contingency plan in place for your clients with mission-critical systems makes you a valued and trusted ally.
- **Property managers of critical facilities:** Your tenants expect uninterrupted service from critical systems. While we all know that mechanical systems fail from time to time, an ounce of prevention is worth a pound of cure. A contingency plan in place will save you irate tenants, give-backs and increased vacancy rates.
- **Facility managers:** Harry Truman said, “The buck stops here”. Nowhere is this truer than for a facility manager. Emergencies, disasters and critical system downtime are the events where a facility manager is tested. In every case, it is the facility manager who will be held to account for the outcomes.

No amount of equipment maintenance and redundancy can ensure 100% equipment reliability. Having developed a contingency plan shows foresight, initiative and professionalism. Until the laws of physics change and friction no longer exists, it will be impossible to eliminate equipment failure. By working with their contingency planning partners and contractors, property managers and facility managers can minimize the impact of equipment failure on their businesses by minimizing downtime in an emergency. There is no better tool to do that than a well thought-out contingency plan.



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### WHAT KINDS OF SITES CAN BENEFIT FROM CONTINGENCY PLANNING?

- Data centers
- Hospitals
- Manufacturing facilities
- Biopharmaceutical plants
- Universities
- Cold storage facilities
- Entertainment facilities
- Any site with a critical need for cooling, power, or compressed air

# COOLING CONTINGENCY PLANNING: FIVE STEPS TO MINIMIZING DOWNTIME

## STEP ONE: DETERMINE YOUR FACILITY'S NEEDS

The elements of a good contingency plan read like a mystery novel: The answers to the same questions posed in the mystery novel provide the basis of the plan.

1. When? (establishes lead time for the equipment and the time until critical services are resumed)
2. What? (establishes the equipment required in the plan)
3. Where? (establishes staging areas and locations for the equipment)
4. How? (establishes how the system will tie into the facility)
5. Who? (establishes who performs the installation)
6. Cost? (establishes a budget for the contingency plan)

The contingency plan solves the mystery and locks up the bad guy who, for our purposes, is equipment downtime.

“How,” you may ask, “do I put one of these plans in place?” The answer is partnering with a qualified

provider. This provider can help with the development of the contingency plan; he'll set up a meeting and conduct a survey of your facility. Expect the survey to take one to four hours depending on the size, number, and complexity of your systems. Large campuses will likely require multiple visits.

A partner who has a dedicated local fleet is far more likely to have the equipment you need close, when you need it.

As the facility manager, you should plan to accompany the provider during this visit(s). Development of an effective plan requires someone with a high level view of the facility and its needs. A detailed walk-through with a partner will provide invaluable insights into the critical requirements of your facility and in all likelihood flesh out many of the details of the plan.

## STEP TWO: CHOOSE A QUALIFIED PARTNER

Choosing a contingency partner is an important decision. Here are some things to look for in a partner:

### Local Equipment

The first item to look for in a partner is substantial resources and equipment in your area. In an emergency or disaster in a critical facility, your worst enemy is time. A partner who has a dedicated local fleet is far more likely to have the equipment you need close, when you need it.

Remember: The purpose of contingency planning is to absolutely minimize downtime in an outage. Partnering with a global firm is great, but if all of your partner's equipment is in the Midwest and you're on the coast, you can expect long delays. A global or nationwide firm's equipment goes anywhere the need is, and in the case of cooling equipment, the equipment will be needed where it's hottest.

For example, the San Francisco Bay Area has experienced record cool summers for the last three or four summers in a row. The rest of the country has experienced record-shattering heatwaves in that same time period. The equipment of the nationwide and global firms is all moved to Texas, Oklahoma, New York, Florida and Arizona where 100+ degree temperatures are a daily occurrence and the need for cooling is acute. There is little equipment left in the San Francisco Bay Area where summer has seemed more like an extended spring for the last few years. If recent history is any indicator, the nationwide and global firms will have the least amount of equipment available at precisely the time when you need it the most. By contrast, a local firm's equipment is always there in the local area, ready for quick deployment to your site.

## Breadth and Volume of Equipment

Your partner should have enough equipment and a sufficient range of sizes of equipment to provide strong assurance that the equipment you would need during an outage is available. Your partner should also have the types of equipment you'll need in an emergency: chillers, generators, AC units, and air compressors.

Few partners will provide guarantees of availability because in the event of a large natural disaster, FEMA or Homeland Security may commandeer your partner's entire fleet for distribution at their discretion. The only truly foolproof way to ensure you get the equipment you need is to have it at your facility on long-term lease at the time of the disaster. This is, of course a costly option, but as Pascal's Paradox states, "Implementing the solution may be expensive, but what is the cost of doing nothing?"

One data center Peterson Power Systems recently served with cooling stated that they lose \$6 million per minute of downtime. It is a safe bet that the temporary equipment for that job was less expensive than that possibility. A long-term lease of the temporary equipment you need will ensure that it is always available under any circumstance.

## Skilled Staff

This is the attribute that separates the mediocre partners from the great. It will often mean the difference between an eight-hour temporary installation and a 24-hour installation. You should always inquire as to the training of the on-site personnel installing and maintaining the equipment.

## Capabilities

You'll want to know in advance what your prospective partner's capabilities are. While they may have a tremendous amount of equipment, if they haven't got the ability to install it or the proper certifications required at your facility, you'll need to have a second partner to execute the plan, which will invariably involve more downtime. Always inquire about your prospective partner's capabilities.

## STEP THREE: PREPARE YOUR INTERCONNECTION POINTS

In most cases, developing a contingency plan doesn't cost anything. However, your facility may require the installation of temporary interconnection points for the critical services you require. These will take the form of an exterior electrical box or "Tap Can" to tie into your electrical system or piping for chilled water or compressed air run to the outside of the building. Forward-thinking architects and design firms (such as Syska Hennessy and United Mechanical) are beginning to make these standard features on new critical facilities because the cost to add them during new construction or retrofits is generally small, and the insurance value great.

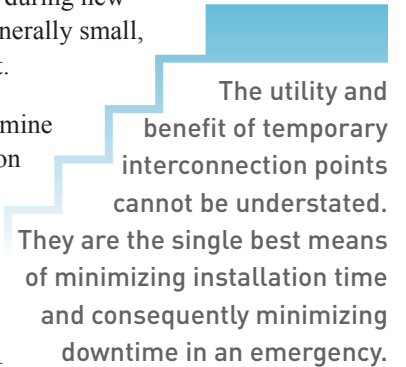
If you and your partner determine that temporary interconnection points are necessary, or will significantly reduce the installation time of the temporary system, you will find them a worthwhile investment. An added benefit

of having these interconnection points installed at the exterior of the facility is security. There will be no need to prop doors open or take makeshift security measures to accommodate the passage of temporary hose or cable into the facility. The utility and benefit of temporary interconnection points cannot be understated. They are the single best means of minimizing installation time and consequently minimizing downtime in an emergency.

Here are some things to consider when installing temporary equipment interconnection points:

### Size

When planning temporary equipment interconnection points, size them for the largest equipment you think you'll need and always round up. There is a small incremental cost difference between installing 8" diameter pipe versus 4" diameter, but the larger pipe will accommodate a chiller of four times the capacity. Your partner will be able to give you all the data required to accurately size all interconnection points to meet the demands of your facility. In most cases, he should be able to provide you with a proposal for the modifications.



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## Standard Sizes

Most partners standardize on the way their equipment is connected. With few exceptions, contingency planning partners provide equipment with the following types of connections:

Chilled Water	
25—150 tons	4" Camlock connections
200—350 tons	6" Victaulic connections
400—600 tons	8" Victaulic connections

Electrical	
0—400 amps	Series 16 pin and sleeve connections, one 4/0 cable per phase
400—800 amps	Series 16 pin and sleeve connections, two 4/0 cables per phase
800—1200 amps	Series 16 pin and sleeve connections, three 4/0 cables per phase

Compressed Air	
Up to 900 CFM	2" female pipe thread
Above 900 CFM	3" female pipe thread

## Location

Temporary equipment interconnection points should be located a few feet above ground level, where they can be easily accessed from the outside of the building at any time, day or night. Electrical and mechanical codes will dictate minimum height of the points, but easy access without the need for a ladder will speed the installation process. In addition, the location of the temporary equipment interconnection points should provide a good balance between project cost and rapidity of temporary equipment installation.

For example, if you have to permanently run 8" piping in a complex and disruptive path hundreds of feet through the facility to the temporary equipment staging area, you may want to look for another location for the temporary equipment interconnection points. Renting longer runs of hose and cable for the time that the temporary equipment is on your site will likely be less expensive and less intrusive than this.

Your partner should work with you to ensure optimum location and best value for the interconnection points.

## STEP FOUR: REVIEW AND FINALIZE THE PLAN

At this point, you should have a good idea of what you need to quickly re-establish services during an emergency utility interruption, as well as a qualified partner waiting to provide the equipment and services you need to execute the plan. If you have been working closely with your partner throughout this process, reviewing the plan should be a relatively painless exercise—the goal is to make sure that everyone involved is 100% onboard with the plan. This is a great time to negotiate any final details of pricing with your provider.

## STEP FIVE: COMMUNICATE THE PLAN TO KEY STAKE- HOLDERS AT YOUR FACILITY

With the important details arranged, now is the time to communicate them to key stakeholders at your facility; this includes anyone who may be affected by an outage. In addition to making you look great, sharing this information with select colleagues will give them assurance that:

- a. There is a plan.
- b. Critical services will resume according to a predetermined, known schedule.

This kind of certainty can be invaluable, as it provides decision-makers the information they need in planning their response to an outage. Knowing, for example, that chilled water will resume flowing after a thirty-minute interruption is far more reassuring than having no idea of the same event's likely duration.

If you are the person who will call your provider during an emergency outage, make sure that you have all relevant phone numbers close at hand, with multiple copies in case you misplace them or are off-site during the emergency. It's a great idea to keep a copy at home in case an emergency happens in the middle of the night or on a weekend.

Make sure that you've designated a backup at your facility who can make these important calls if you are not able to. If you're on vacation or sick during an emergency, it is vital that your replacement knows who to call if the utilities go out!

## EXAMPLE:

*Here's an example where having temporary equipment interconnection points really saved installation time, and probably some people's jobs.*

*Peterson Power Systems had recently developed a plan with a large internet infrastructure manufacturer in Silicon Valley for a critical data center on their campus. Temporary equipment interconnection points were installed as part of the plan, because the building's chillers were on the roof, a long way from the temporary equipment. Installation would have been much more time-intensive without them. About a week after the installation of the temporary interconnection points was complete, all the chillers on the roof of the building failed. The facility manager called for temporary cooling and power at 6:30 a.m. on a Friday; because we had the plan in place, we had chilled water flow reestablished by 12:30 p.m. the same day. Without the advance planning and piping modifications, downtime might easily have been double or triple that.*

*In another instance, a large software manufacturer in Silicon Valley had a complete loss of cooling to a critical data center at 10:00 p.m. The site was surveyed and because they had temporary chilled water connections, the installation was simple. Installation of 1000 tons of cooling and 2.5 megawatts of temporary power started at 7:00 a.m. and chilled water flow was reestablished by 5:00 p.m. Had there not been interconnection points already installed, a system containing thousands of gallons of water would have required draining and refilling, which would have added hours of downtime.*

*These are just two examples of how an organized and coordinated set of steps (the definition of a contingency plan) saved two companies millions of dollars in lost revenue. The mechanical contractors on the jobs looked like heroes to the end users because in a very real sense, a crisis was averted, or at least had its negative impact minimized.*

## CONCLUSION

Let's review the process:

Step One: Determine your facility's needs

Step Two: Choose a qualified partner

Step Three: Prepare your interconnection points

Step Four: Review and finalize the plan

Step Five: Communicate the plan to key stakeholders at your facility

You may never have the occasion to use the plan. It may sit in your MOP binders and never see the light of day until you review it with your partner a year later. But with this plan in place, anyone in your organization can call at anytime day or night and your partner will deliver and install the equipment per the plan.

Confucius said, the journey of a thousand miles begins with a single step. A single phone call to a partner will begin your contingency planning process. Just make the call.

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