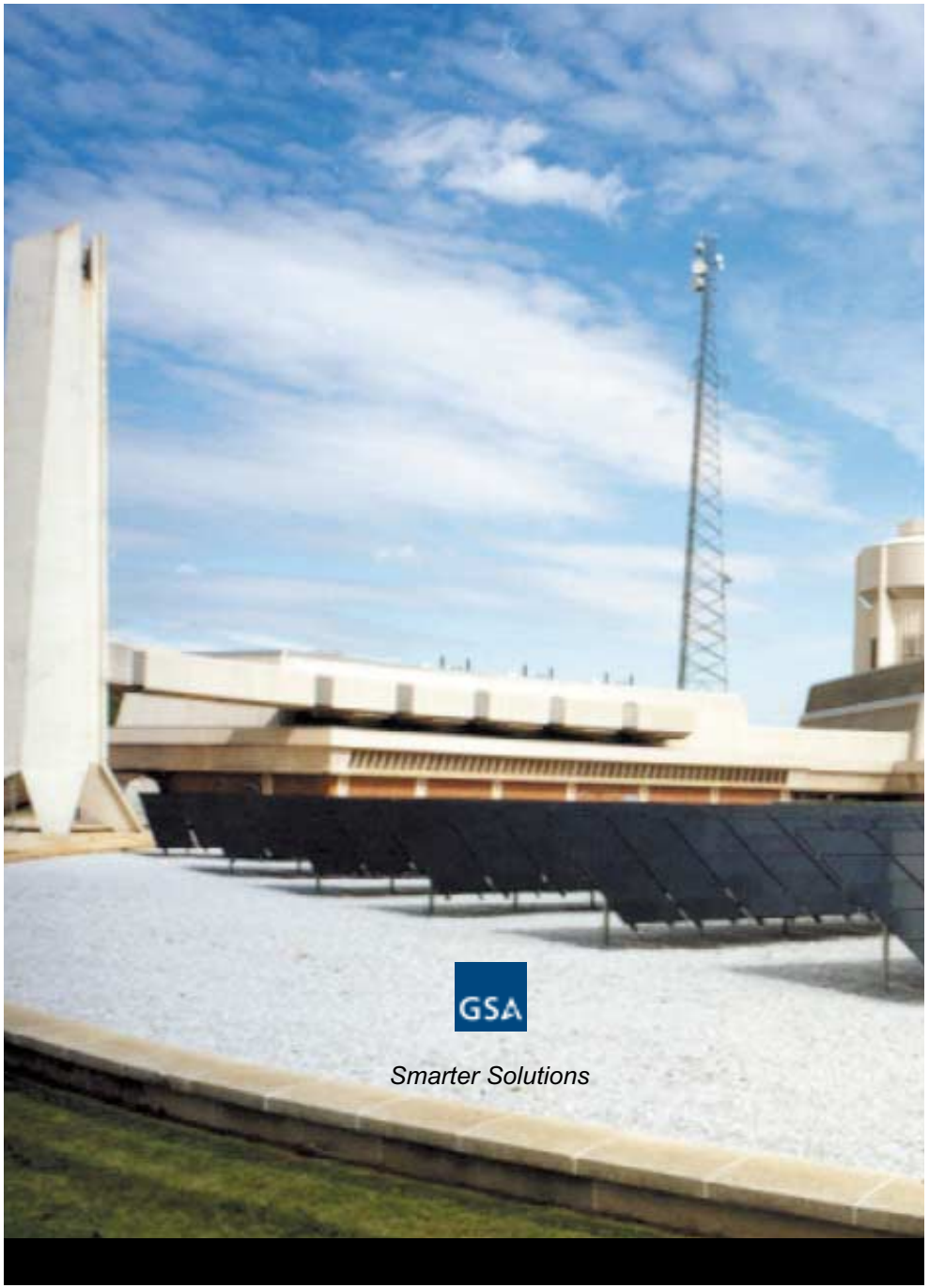
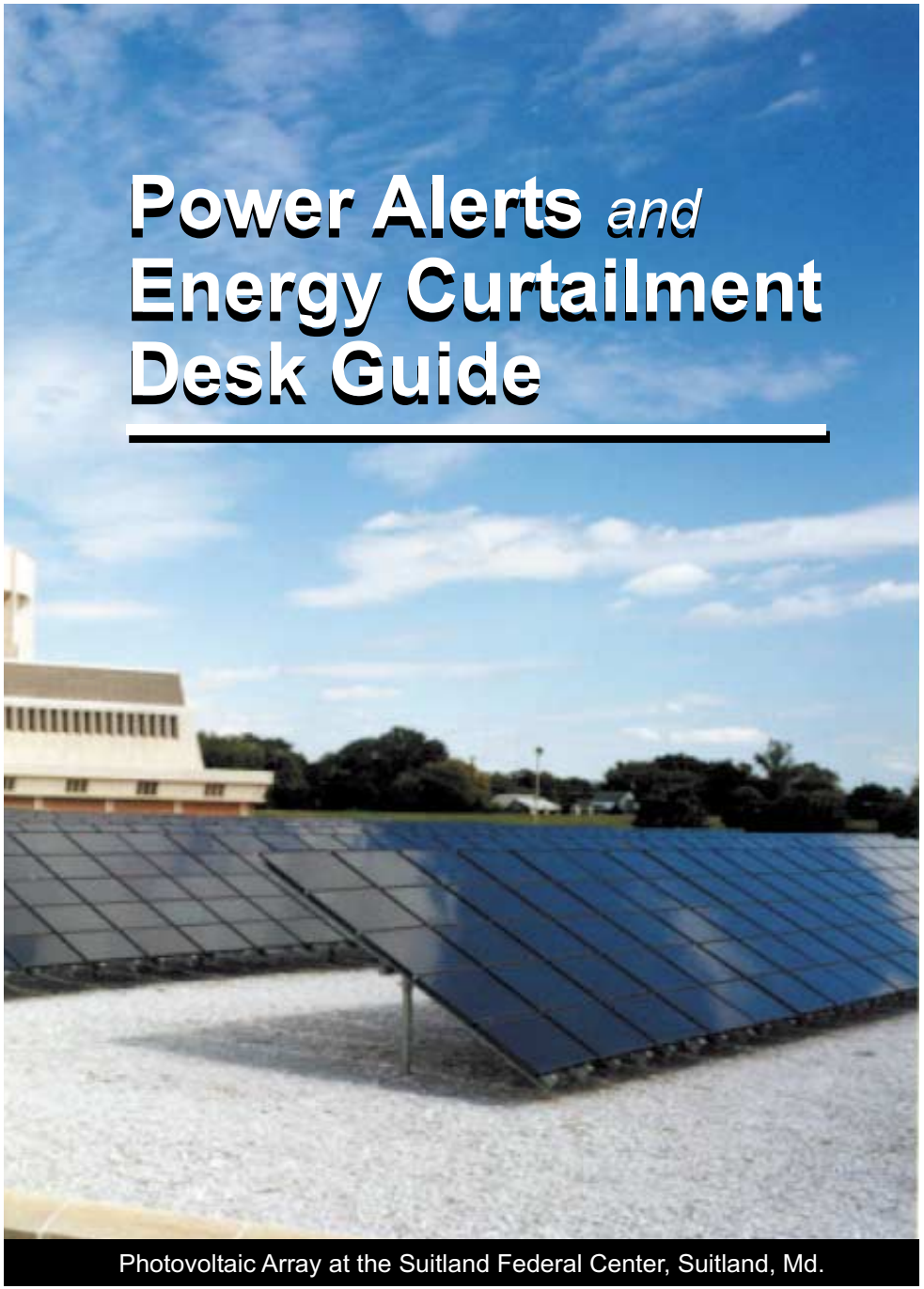



GSA

Energy Center Of Expertise

# Power Alerts *and* Energy Curtailment Desk Guide



Photovoltaic Array at the Suitland Federal Center, Suitland, Md.

# Introduction

This guide is intended to explain the National Capital Region's alerts and necessary actions when the regional power transmission system (the Pennsylvania – Jersey – Maryland or PJM Interconnection) is subjected to a condition that could affect system reliability and warrants the implementation of emergency measures. Such conditions could include equipment failure, extreme weather conditions, fuel shortages, or terrorist activities.

As representatives of the Federal Government and building owner/operators, we need to insure that we consider the implications of potential problems with power delivery, and mitigate the impact that we have on the transmission system and our tenants.

The information contained in this guide will assist you in understanding what each alert means, and how it could or will affect your building(s). It will also assist you in requesting assistance and understanding from your tenants.

The GSA's Energy Center of Expertise (ECOE) prepared this guide. If you have any questions, comments, or require further explanation, please contact the ECOE at:

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Energy Center of Expertise (WPE)
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" I recognize the right and the duty of this generation to develop and use the natural resources of our land; but I do not recognize the right to waste them, or to rob, by wasteful use, the generations that come after us."

-- Theodore Roosevelt





The GSA's Energy Center of Expertise (ECOE) prepared this guide. It can also be found on **www.gsa.gov/energy**. If you have any questions, comments, or require further explanation, please contact the ECOE at:

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# References

1 PJM “The Power of Connecting”

2 GSA NCR PBS Transition Briefing Book 2002

3 PJM Emergency Operations Manual M-13

**Level 4 – "Demand Curtailment"**

When a "Demand Curtailment" alert is sent, you should begin building system load reductions as outlined in the BOP. You should also notify tenant(s) and ask for cooperation with plug load and lighting reductions. Maximize use of daylight, task lights, and minimize general overhead lighting. Also allow temperatures to increase (2 or more degrees F) in the afternoons (coordinate this with tenants in advance – recommend agencies adopt an appropriate "casual dress" policy for extended periods).

**Level 5 – "Maximum Effort"**

"Maximum Effort" means that YOU AND YOUR TENANT should be doing everything possible to reduce electric load, particularly in the afternoon.





# Background Information

### What is the PJM Interconnection, and how does it relate to me?

The Pennsylvania – Jersey – Maryland (PJM) Interconnection is a company that operates the regional transmission system, or "power grid." The system physically connects power lines from one utility to another, and is responsible for insuring the stability of power, power quality, and that adequate power supply is available for all customers.

PJM complishes this by coordinating generation efforts among all potential generators, with system requirements (i.e., customer demand). In effect, the large territory that PJM controls is beneficial, because it is easier to predict demand over a larger cross section of customers.

To get an idea of PJM's scale, they are responsible for (1):

- 25.1 million people in the control area
- 614 generation sources of diverse fuel types (over 67,000 megawatts)
- 13,100 miles of transmission lines

The PJM operators forecast demand and communicate system-wide requirements to generators in the region. Once this is done, it just becomes a matter of making sure the electricity can be delivered to local utility companies such as PEPCo, Dominion VA Power, Baltimore Gas & Electric, etc. The local utility company is ultimately responsible for getting the power to the consumer.

PJM communicates directly with the generators and the local utilities to meet the demands placed on the system. From time to time, a problem will arise in the system that requires action on the part of utilities. When this happens, a message is broadcast to entities that need to know. The GSA Energy Center of Expertise (ECOE) receives status routinely from the PJM through the Internet.

As information is received by the ECOE, we determine if the alert would potentially impact GSA, and if so, we broadcast the information internally via email to GSA PBS offices in NCR and Region 3 that could be affected. Ultimately it is up to you to implement necessary changes in your building operation to help stabilize the grid when the condition warrants.

### Why Should I Care?

The GSA NCR Portfolio is composed of more than 84 million rentable square feet in more than 650 owned and leased buildings (2). Based on this, the GSA is responsible for a sizable portion of the load on the grid.

As the area develops further and more electric load is placed on the transmission system, it becomes closer to its maximum capacity. During the summer of 2002, we saw more record-setting peak days than had been predicted. This could indicate that the need for electricity is growing faster than the ability to produce it and move it to the customers.

Sometimes the "need" for electricity is artificially inflated because of an event in the system. A hot weather spell, for example, will cause an extreme demand on the system because of the energy intensive nature of air conditioning. During extended heat waves, the situation can get worse. For example, this summer the extreme heat and electric demand caused transmission equipment to fail, further stressing the system. Some areas were warned of potential rolling blackouts, similar to what was seen in California in recent years.

The Federal Government has a responsibility to act quickly and decisively to assist in making the electric energy infrastructure reliable. We are not alone in this. Commercial and industrial entities are also interested in insuring the stability of the power system. GSA participates with commercial and industrial customers in utility "roundtable" discussions periodically to discuss curtailment plans and what does and does not work. The notifications that the ECOE now receives from the PJM interconnection are a result of those roundtables.





# Alert Definitions *a.k.a. What does it mean when?*

**Level 1 – "Normal Operations"**

"Normal Operations" is just that. Run the building as you normally would.

**Level 2 – "High Demand Possible"**

"High Demand Possible" means that the regional power grid is expecting a higher than normal load. This should be a signal to you that a "Level 3" alert could be issued, and to begin preparations. When a "Level 2" alert has been issued, you should be reviewing the Building Operation Plan (BOP) to identify potential demand reductions.

**Level 3 – "High Demand Warning"**

When you receive a "High Demand Warning" alert, you should begin low-impact curtailments (those that you and your tenant(s) have identified as having little or no effect on the tenants). Such curtailments might include reduced accent lighting; minimal reduction in elevator/escalator service; slightly increased (1 degree Fahrenheit) temperatures in the afternoons; etc.

At this point you should notify your tenant(s). Advise them of the alert you have received and keep them informed.

You should also prepare to curtail building system load, if a "Level 4" alert is issued.

# How Will I Be Notified?

In a word: email. The Energy Center of Expertise will monitor the PJM status throughout the summer and will notify customers of potential conditions that could disrupt electric power in the region. Service Delivery Centers are responsible for updating contact lists with the Energy Center as necessary. We suggest having multiple contacts on the list in the event someone is unavailable.

Alerts will be forwarded as soon as we know about them, and will be categorized by five levels:

Level 1 – "Normal Operations"
Level 2 – "High Demand Possible"
Level 3 – "High Demand Warning"
Level 4 – "Demand Curtailment"
Level 5 – "Maximum Effort"

The "subject" of the email will indicate the level, and the body will include specific information regarding the notice. **You should assume that the regional status is at Level 1 unless you are notified otherwise**.

The GSA's regional power alerts are different than the "curtailable load" programs offered by some local utilities. The Energy Center recommends participation in these programs, which in some cases offer financial incentive to the customer for "shedding" load. When enrolled in such programs, you should pay close attention to the utility's notification system. They could conceivably issue a curtailment before the GSA's criteria to issue an alert is reached.

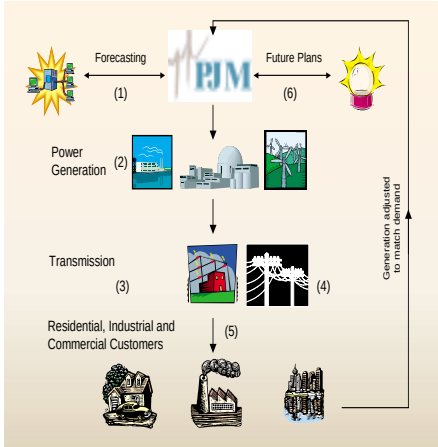
You should also be aware that alerts could happen any time of the year. While we typically associate power delivery problems with hot weather, other transmission equipment problems could cause an alert.





## Doesn't my power come from PEPCo (or DomVA, or BG&E, or…)?

Yes it does … sort of. As described in the previous section, the local utility is responsible for moving electricity from "distribution substations" to the consumer. In effect, your local utility company owns the "wires" and equipment that gets electricity to your building. A third party usually generates the electricity that you use.




The PJM interconnection makes certain that all of these parties communicate to insure the stability of the grid as a whole.

The picture at the right graphically depicts how PJM interacts with power generators and local utilities, and how electricity is delivered to the consumer.

**Figure 1.** The PJM Interconnection Relationship to Local Utility Companies. Adapted from reference (1).

(1) To run the electric system, PJM acts as a clearinghouse and decision maker. PJM forecasts how much electricity will be needed and receives offers to supply electricity from producers and other suppliers of electricity.

(2) PJM decides what offers to accept by selecting which plants will make electricity over the next period.

(3) PJM bases its decisions on the overall least cost for the whole region, considering the pattern of demand and the availability of supply. PJM directs the operation of the generation plants by agreements with their owners.

(4) The electricity actually flows through transmission lines high tower, high voltage lines to local utilities' distribution station.

(5) from there is sent on local electric lines to homes, factories and businesses.

(6) PJM also anticipates electricity needs years ahead and makes plans to ensure that enough electricity will be available as the region grows.

## How does this work with Electricity Deregulation?

Good question. Actually, deregulation affects "who" produces the electricity that is consumed in your building. PJM works with the generators and the local utilities to make sure that the power they generate "matches" the power on the grid. This makes it possible for electric generation to occur.

PEPCo has gotten out of the business of generation and is now purely a transmission provider. PEPCo purchases wholesale power from generators to provide to customers who still purchase electricity (the commodity) directly from PEPCo.

In a "deregulated" electricity market, however, customers are potentially exposed to more risk of power price spikes. This is particularly true in industrial and commercial installations, where high peak demands will translate to higher prices.

## Wait a minute; what is electric demand, anyway?

Electric demand refers to the amount of electricity that "flows" to a consumer at a point in time. Consider a water spigot – the amount of water that flows out is increased as you open the valve. Varying the valve opening varies the water "demand;" you could measure the amount of water that flows in "gallons per minute." The maximum water you can "demand" from the spigot is limited by the size of the pipe that feeds it.

Electric demand works much the same way, only instead of a valve to change the amount, we use switches. For example, when you enter your workspace every day, you probably switch on the lights, the computer and maybe a printer and a radio.

> Electric demand is measured in kilowatts, abbreviated kW. A kilowatt is equal to 1000 watts, so a 100-watt light bulb places a demand on the electric system of 0.1 kW. Our 1000-horsepower chiller motor would "demand" about 750kW.





This action increases the flow of electricity, or demand.

The examples used here are very low demand items; consider, however, an electric chiller that uses a 1,000 horsepower motor – that's no small demand. Pumps, air handlers, building exhaust and other building equipment, hallway and general office lights and equipment, elevators and escalators, and even individual workplace loads combine to make up the building's demand.

As you might have already guessed, this demand is typically not a constant amount throughout the day. A typical building will reach a peak demand in the summertime in the afternoon, usually about 2:00 p.m. This occurs because the building is highly active, and the air conditioning load will increase dramatically as a result of this activity combined with the afternoon high temperatures.

> During the summer of 2002, the PJM grid experienced the highest-ever demand for electricity.

The PJM power grid is a network of wires that is analogous to a network of pipes. The amount of electricity that can be carried on the wires similar to the way the pipe size limits the amount of water that can flow.

This is important because we, as representatives of the Federal Government, must realize that electrical power is a finite resource. No matter how much we buy from a generation company, we have to rely on the transportation system to get it to us. If the transportation system is at or near it's maximum capacity, we will not be able to take delivery of our electricity.