

Power Consumption and Environmental Impact of Video Surveillance Systems

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Abstract

Unlike other powered devices, Video Surveillance systems function 24/7. As such their energy consumption, and therefore environmental impact, is surprisingly high. A company with only 10 locations may spend thousands of dollars a year on power for their Video Surveillance system while generating 10,000's of pounds of CO2. A centralized system with small foot prints at each location, and one centralized back end, enjoys economy of scale over traditional solutions.

1. Introduction

“Turn off the lights when you leave the room”, our parents used to tell us. That is good advice today as it was then. Security systems, however, need to be turned on 24/7. The energy and environmental impact of a system running day and night is much greater than something that is only on when we're in the room.

What is the energy and environmental impact of a typical video surveillance system? It depends on which one.

2. Landscape

It used to be that video system consisted of a bunch of analog cameras connected to a VCR tape deck by co-axial cable. Then the VCR's were replaced by DVR's (“Digital Video Recorders”, recorders with hard drives in them). Finally, around 2001, the cameras went digital and now live on the network and the co-axial cable has been replaced with Ethernet cable. If the system has a web-server built into it then it's typically called an NVR (“Network Video Recorder”). So, how much power does a video surveillance system consume? It depends on which one.

2.1 DVR's

DVR's: these are typically small computers with a hard drive in them and a capture card so they can be connected to old fashioned analog cameras. Analog cameras tend to have older and less expensive sensors in them, so they need more light.

A lot of Analog cameras have built in “illuminators” (invisible infra-red LED's around the lens to help light up objects in front of the camera), so these would consume more power than a newer more efficient network camera. Alternatively, more lights can be left on at night to help the analog cameras work better but this is even worse from a power stand point.

DVR's, because they store all their video locally and aren't networked, also need a dedicated monitor on which to view the videos.

2.2 NVR's

NVR's: these are usually not small, they have to capture and store all the video data and serve it up on demand, either to a local monitor or to a network client. They have to hold a lot of hard drives for data redundancy and typically have a fast (high power consumption) CPU. Some even have “dual rail” power supplies (two supplies plugged in at the same time in case one goes down).

Older ones that work with analog cameras have to have add-in cards that also have to power the cameras over the co-axial cable or, worse, each analog camera needs a separate transformer power supply. A small power supply for a typical DVR might be 250W, a big NVR might be 750 or 1000W.

2.3 Cameras

Whether analog or digital, cameras consume a relatively small amount of power. A good rule of thumb is about 5Watts per network camera, assuming no extra power consumption for illumination – it will be at least double for most analog cameras.

There is a better way to do things, however, the same way Connexed does things.

3. Centralized Approach

First, Connexed puts the smallest possible “foot print” at each customer's location. A small, but very powerful box, that typically consumes only about 50W. This box can record at as high or higher resolutions and frame rate than any DVR/NVR on the market, and it is an intelligent networking device that communicates with a central system to manage and transmit recordings.

Connexed also centralizes virtually all of the storage and play back equipment in a data center. Data centers charge a lot for power, mostly because they need power systems that are fully redundant and constantly available. Power costs at a data center are the majority of the expense for most of their customers. Connexed goes to great lengths to minimize power consumption at our data centers, not only to be environmentally conscious, but because we are financially motivated to keep our power costs down.

Note that companies who build DVR's or NVR's have no financial motivation to keep power consumption down – their customer is paying for the power, not DVR or NVR manufacturer.

7. Scenarios

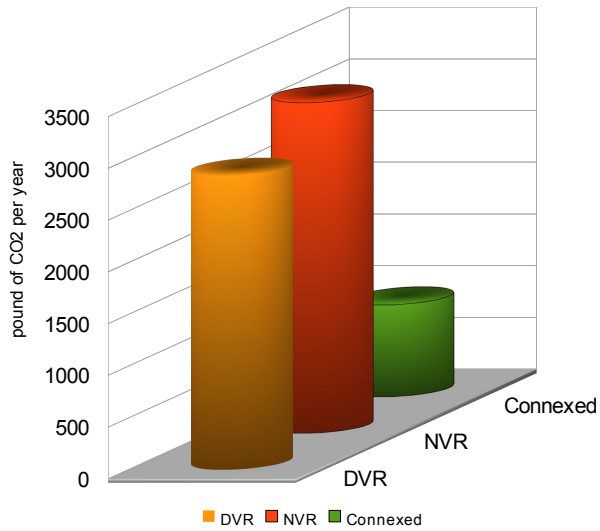
So, let's look at a customer who has 10 locations to manage, with an average of 4 cameras at each location, and compare Connexed's energy footprint with that of onsite DVR's or NVR's:

1 location	DVR Analog Cams	+	NVR NetCams	+	Connexed + NetCams
Cameras	40W		20W		20W
Onsite Equipment	100W		250W		50W
Offsite Equipment?	0W		0W		5W
Required Monitor?	100W		0W		0W
Total per location	240W		270W		75W

How does that translate to CO2 usage? In the US, averaged across all electrical power generation technologies (from coal to solar), about 1.3lbs of CO2 is generated for each kWh of electrical usage. So:

10 locations	DVR Analog Cams	+	NVR NetCams	+	Connexed + NetCams
Watts for 10 locations	2,400W		2,700W		750W
Kilo Watt hrs in a year	21,000 kWh		23,500kWh		6,500kWh
Pounds of CO2 in a year	28,000lbs CO2		32,000lbs CO2		8,900lbs CO2

Note that a mature tree can absorb about 50lbs of CO2/yr, so running a Connexed system, instead of an older competing technology, takes as much CO2 out of the atmosphere as 400 mature trees. No matter what you think of carbon emissions, using less power is a good thing for the environment, our country and your pocket. At a US average of 10 cents per kWh, a Connexed system can literally save you thousands of dollars a year on electricity.



The above graph shows pounds of CO2 per year (proportional to kWh) generated to power an average of four cameras at 10 different locations.

8. Summary

A centralized system with small foot prints at each location, and one centralized back end, enjoys economy of scale over traditional solutions. The centralized nature of the Connexed solution can save thousands of dollars per year and 10,000's of pounds of CO2, while providing higher quality video, increased reliability and business continuity functionality.

9. References

[1] Lbs CO2 per kWh:

http://www.eia.doe.gov/cneaf/electricity/page/co2_report/co2_report.html