

# CRAY

# CX1

CASE STUDY

## Company

Lakes Environmental  
Based in Ontario, Canada  
[www.lakesenvironmental.com](http://www.lakesenvironmental.com)



## Overview

Founded in 1995, Lakes Environmental is an IT company offering a complete line of air dispersion modeling, risk assessment, emissions inventory, and emergency release software, as well as training and custom software services

## Their customers

Industrial companies, governmental agencies, consulting companies, and academia worldwide

## Use of Cray CX1™ supercomputer

Running air dispersion modeling reports that help industrial customers reduce air pollutant emissions and enable them to demonstrate real-time compliance with governmental regulations

**“The processing power of the Cray CX1 system is light years ahead. Reports that used to take two weeks can now be run in two days.”**

—Mike Johnson  
Head of the Software Development Group

# Helping Industrial Companies Decrease Air Pollution

## Situation

Governments throughout the world set limits on the level of air pollutants that may come from industrial sources. In the United States, these limits are specified in the National Ambient Air Quality Standards (NAAQS). In a report on air pollution published in 2008, the EPA states that since 1990 emissions of the six most common pollutants from all sources have dropped by 41 percent<sup>1</sup>. This progress is credited to the joint efforts of government, industry, academia, and environmental groups.

One of the tools that industrial companies use to reduce toxins is air dispersion modeling software, which simulates the physical and chemical processes that affect air pollutants in the atmosphere. This software uses complex mathematical equations and algorithms to process data on meteorological conditions, emissions rates, and other pertinent factors. Air dispersion models enable companies to:

- Reduce toxic air emissions in order to meet regulatory limits
- Demonstrate real-time compliance with the limits
- Anticipate unexpected emissions and take proactive action to prevent their release

## Problem

Lakes Environmental develops premier air dispersion modeling software. In addition, the company supports a select group of industrial customers—including Fortune 50 petrochemical, mining, and smelting companies—by running their reports for them. The scientific code involved in these models is highly complex and may contain hundreds of thousands of simulations. With about fifty dual- and quad-core PCs scattered throughout their offices, Lakes Environmental produced reports as quickly as anyone else, which was within a couple of weeks. But they weren't satisfied. They wanted a computing solution that would enable them to deliver results in record time.

## Solution

To solve the problem of speed, Lakes Environmental deployed a single Cray CX1 deskside supercomputer running Windows® HPC Server 2008. Designed for individuals and workgroups who want to harness the power of high performance computing (HPC) without the complexity of traditional clusters, the Cray CX1 supercomputer delivers the performance, functionality, and affordable cost to revolutionize commercial and scientific applications.

<sup>1</sup> Environmental Protection Agency, "Highlights of National Air Quality—Status and Trends through 2007."

## Bringing the power of HPC to heavy industry

Until he read about it on a technical blog, Mike Johnson didn't know Cray had introduced a deskside supercomputer. As head of the software development group at Lakes Environmental, he is always in search of solutions that empower customers. If Lakes Environmental could find a way to produce air dispersion modeling reports more quickly, their customers could evaluate more options and discover even better solutions.

### Cray CX1 advantages

- ➔ **Unparalleled performance** dramatically reduces the time needed to run complex, high-resolution earth system models with thousands of simulations
- ➔ **"Ease of everything" computing** enables individuals and workgroups to operate and maintain their own systems
- ➔ **Compact design** combines HPC, graphics, and storage capabilities in a single chassis
- ➔ **Affordable cost** gives technical workstation users the computing capabilities previously available only to large research centers

Johnson researched the Cray CX1 supercomputer on the Web and discovered that it met their technical and pricing requirements. So within three days he ordered the machine sight unseen, without even talking with Cray technical consultants. "Coming from Cray, we knew that the engineering and hardware were going to be rock-solid. Combined with the HPC solution from Microsoft, it offered the perfect solution for our needs."

### Turn it on, and it's virtually ready to go

The Cray CX1 supercomputer was one of the easiest systems that Lakes Environmental has ever installed. The startup and setup routines were quick and easy to follow. Within a month, they'd created and tested some demonstration code. Another month later, they were running actual simulations and charging customers.

At Lakes Environmental, the supercomputer is a shared cluster resource, so it's kept in the server room where everyone can access it remotely. They never turn the system off, and it has never gone down or experienced any other failure. That has saved their team from spending considerable hours on support and maintenance.

### Breakthrough formula for success

The Cray product provides better simulation accuracy and much faster execution than any machine previously available to Lakes Environmental. "The processing power of the Cray CX1 system is light years ahead," Johnson says. "Reports that used to take two weeks can now be run in two days." When information can be turned around this quickly, customers are able to refine and improve upon it by examining new possibilities.

**"The Cray CX1 supercomputer is truly a plug-and-play solution. The product sets itself up without the hassle of bringing in a new power system or fiddling with any wires. It even comes with a screwdriver, so you don't have to run around looking for one."**

—Mike Johnson

Johnson adds that having a Cray CX1 deskside supercomputer in-house has provided Lakes Environmental with a huge competitive advantage. Not only are they the fastest in their field, the Cray CX1 system also gives them additional credibility. Organizations are excited about the prospect of having their data on a Cray machine. Within several months of adopting the solution, Lakes Environmental acquired four new customers—a success that Johnson says wouldn't have happened without the Cray CX1 supercomputer on board.

### Expand your business potential

Lakes Environmental plans to grow their business by renting space on the Cray CX1 system. Customers around the world will be able to submit their own simulations, which will queue up and run themselves. For organizations that run reports only once or twice a year, this enables them to tap into the power of HPC with remarkable ease. And it will create a whole new revenue source for Lakes Environmental.

To accommodate this additional business, Lakes Environmental plans to purchase as many as eight additional Cray CX1 supercomputers. They expect to add the machines when existing ones exceed 120 percent utilization.

Does Johnson recommend this Cray system? Without a doubt," he says. "For scientists working on advanced solutions, the Cray CX1 supercomputer is the best way to go."

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