

## MEGAWATT EXPERIENCE | ENERGY EFFICIENCY

<b>PROJECT #8 – National Center for Atmospheric Research, Wyoming Supercomputer Center</b>			
<b>Location</b>	Cheyenne, WY	<b>Year</b>	2009
<b>Collaborators</b>	The Integral Group, H+L Architecture, RMH Group and others		
<b>Contract Value</b>	\$~70,000,000 construction budget		

### About the Project



MegaWatt Consulting led the design Charrette and conceptual design in partnership with The Integral Group (formally Rumsey Engineers) of this new 153,000 SF building designed to accommodate and secure the Scientific Computing Division's (SCD) future in sustaining the computing initiatives and needs of UCAR's scientific research constituents. Final design was based upon NCAR's actual computing and data storage needs and a thorough review of future High Performance Computing (HPC) and storage technologies, leading to a 625 Watts/SF HPC space and a 250 Watts/SF medium density area. The data center is divided into two raised floor modules of 12,000 SF each with a separate data tape system area to reduce costs, increase efficiency and provide different temperature and humidity requirements than the HPC area. Also provided is a 16,000 SF office and visitor area heated by waste heat from the data center and a total facility capacity of 30 MVA.

Unique requirements of this high density, HPC data center were to also achieve ultra-high energy efficiency and LEED Silver certification for a modest construction budget. Various cooling options were analyzed, including Kyoto and other heat wheels, air economization, a creative solution of direct heat exchange with city water supply pipe and variations of water economized systems. Ultimately, LEED Gold certification and an annual operating PUE of about 1.14 is expected. This low of a PUE was thought to be impossible at the time of design (early 2009), especially for such high-density at TIER III. Through creative problem solving, the low PUE is obtained by designing a 9' interstitial space above the raised floor combined with a 10' waffle-grid raised floor to provide a low-pressure drop air recirculation system designed as part of the building. Ten day one chillers of 100 tons each provide supplemental cooling and optimum efficiency as load varies during hot summer months, while an indirect evaporative system with 96 fans in a fan wall provide ultra-low energy use cooling. An on site water supply tank, a total of nine standby

	generators at full build out of 2.5 MVA each, six 750 kVA UPS modules and other systems support the total low PUE and low construction budget for this high density HPC data center.		
<b>Project Reference</b>	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Ms. Krista Lauren Project Director University Corporation for Atmospheric Research (303) 497-2003   <a href="mailto:krista@ncar.edu">krista@ncar.edu</a></td> <td style="width: 50%; text-align: right;">Mr. Peter Rumsey Principal The Integral Group (510) 663-2070   <a href="mailto:prumsey@integralgroup.com">prumsey@integralgroup.com</a></td> </tr> </table>	Ms. Krista Lauren Project Director University Corporation for Atmospheric Research (303) 497-2003   <a href="mailto:krista@ncar.edu">krista@ncar.edu</a>	Mr. Peter Rumsey Principal The Integral Group (510) 663-2070   <a href="mailto:prumsey@integralgroup.com">prumsey@integralgroup.com</a>
Ms. Krista Lauren Project Director University Corporation for Atmospheric Research (303) 497-2003   <a href="mailto:krista@ncar.edu">krista@ncar.edu</a>	Mr. Peter Rumsey Principal The Integral Group (510) 663-2070   <a href="mailto:prumsey@integralgroup.com">prumsey@integralgroup.com</a>		