Reliable, Affordable, and Environmentally Sound Energy for Use by Pacific Northwest National Laboratory Facilities

A Facility Energy Management Plan for the 21st Century – Revision 3

August 2004

Reliable, Affordable, and Environmentally Sound Energy for Use by Pacific Northwest National Laboratory Facilities

Revision 3, August 2004

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Foreword

This annual revision updates the Pacific Northwest National Laboratory (PNNL) Facility Energy Management Plan (FEMP) to: account for program gains in the last 12 months; update the situation analysis for energy challenges facing PNNL; and provide additional details on the Laboratory's strategy for diversifying energy supply and improving infrastructure efficiency and reliability.

The PNNL FEMP reflects the requirements and philosophy of creating a sustainable environment for conducting research and development. It envisions a comprehensive long-term strategy that uses leading-edge technology developed at PNNL and other national labs, and industries to produce an integrated approach to energy resource conservation and management. The plan consists of five key strategies:
1) emphasizing conservation,
2) modernizing infrastructure,
3) diversifying energy supplies including renewable energy sources,
4) continuous recommissioning of facility systems, and
5) collaborating and communicating best practices, successes, and challenges.

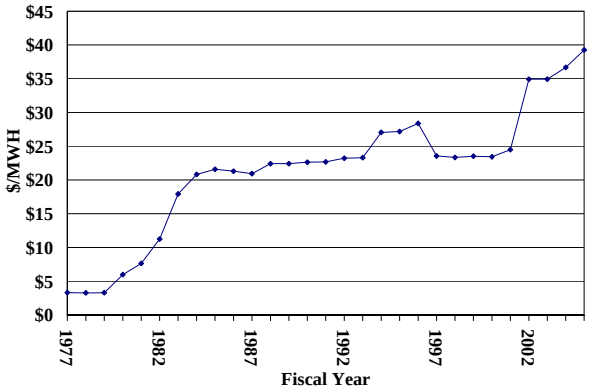
The plan is written as a guide to senior PNNL and Department of Energy-Richland (DOE-RL) managers to communicate the Laboratory's goals and planned actions for achieving greater energy conservation and efficiency, using renewable energy, and conserving water. The plan is updated annually after annual budget preparation (August) to reflect priority actions scheduled for implementation in subsequent budget years.

Situation Analysis
Energy Challenges Facing PNNL

The largest energy component (cost) at PNNL is electricity. Prior to 1980, the Pacific Northwest enjoyed the lowest power generation and transmission rates in the United States (~$3.30/MWH). Then the rates increased by more than 500% between 1980 and 1984 to $21/MWH due to a variety of reasons. The primary reasons included newly completed and defaulted electrical generation projects and addressing fish, wildlife and environmental issues.

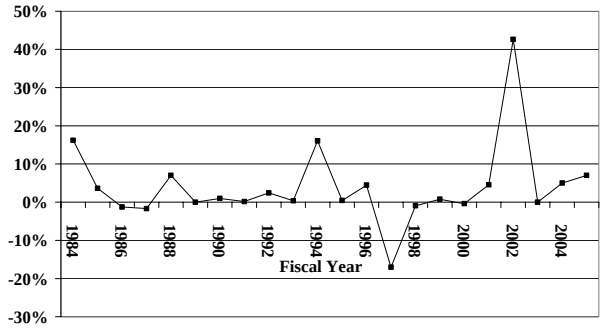
Between 1984 and 1993, the BPA rates were fairly stable. They only increased an average of *$0.20/MWH* or less than an average of *1% per* year.

Historical BPA Electrical Cost for Hanford



Post 1993 annual fluctuations in the BPA rates, however, have ranged from -17% to *43%*.[1]

Annual Change in BPA Electricity Rates



[1] FY77-03 Fluor-Hanford Electrical Utilities

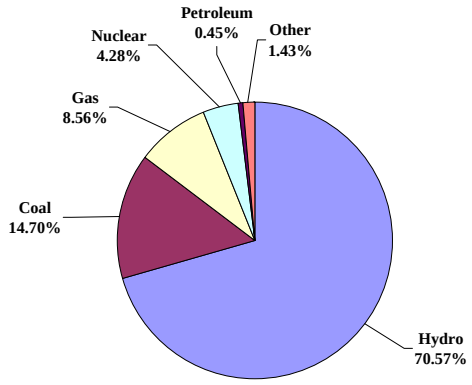
These fluctuations make yearly electrical budget planning very difficult. However, BPA helps customer planning by issuing early warnings of impending rate increases. The estimated rate increases are typically on the high side. For example, the largest fluctuation *(43%)* occurred in FY02 and was caused by the 2001 California power shortage problem and significantly reduced river flows supplying hydroelectric power in the Northwest. A smaller increase (16%) occurred in 1994 due to low river flow conditions and generation plant availability. In 1997, the rate decreased 17% due to unusually good river flow conditions, plant availability, and reduced operating costs.

In August 2004, BPA announced a decrease (5 - 7.5%) in wholesale power prices to take effect October 1, 2004.[2] However, this is at the risk of higher rates again in 2006. If the 1997-2001 data are not considered, the trend since 1993 is an average wholesale rate increase for electricity of 5.7% which is more realistic for future planning.

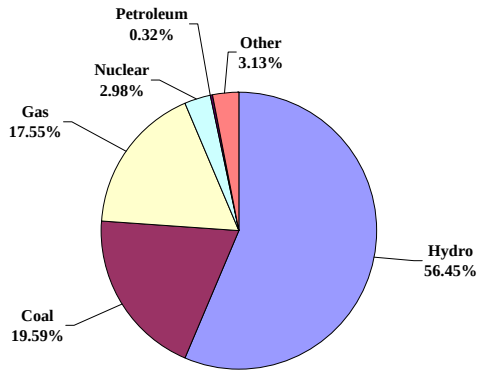
Bonneville Power Administration announced a wholesale electrical rate decrease of 5-7.5% in August, effective October 2004

Currently, PNNL buys retail electrical services from the City of Richland for the North Richland campus for an average of $0.041/kWh. This represents an average increase of over 10% per year for the past three years, but is it is 31% less than the average retail price for electricity in the 300 Area that is currently about $0.062/kWh. Richland electrical rates are predicted to increase another 5 – 7% in May 2005. This may or may not occur due to the recent BPA rate announcement. However, the unpredictable nature of the weather, river runoff, and the volatility of western power markets could make future rates uncertain. Therefore, this Energy Plan includes an aggressive strategy to reduce consumption of electrical energy to minimize the impact of future cost increases. In fact, the strategy is to reduce the overall cost of electricity to the Laboratory, as PNNL continues to grow.

Water will always be a perennial uncertainty in the Northwest and will have the largest impact on the price of electricity due to the majority of the generation capacity being hydroelectric. While hydroelectric generation is still the major asset, its contribution has decreased from 70% in 2000 to 56% in 2003 (figure below)[3] with the increased electrical production from gas, coal, and other (e.g., wind) sources.



PNW Electric Power Generation by Fuel (2000)-22,945 aMW Total

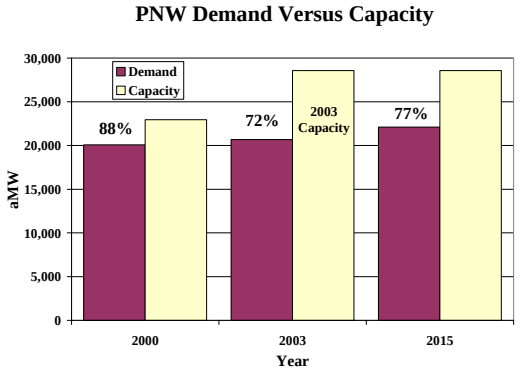


PNW Electric Power Generation by Fuel (2003)-28,571 aMW Total

[2] BPA Announcement, August 18, 2004

[3] "Forecast of Electricity Demand for the 5th Pacific Northwest Conservation and Electric Power Plan-Revised Draft," prepared by Northwest Power Planning Council, May 2003

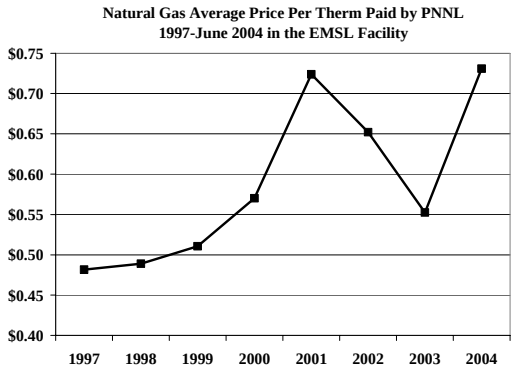
The total Pacific Northwest (PNW) generating capacity has increased nearly 6,000 aMW since the year 2000. But the 2003 demand is projected to increase by only 3,000 aMW by 2015[4].



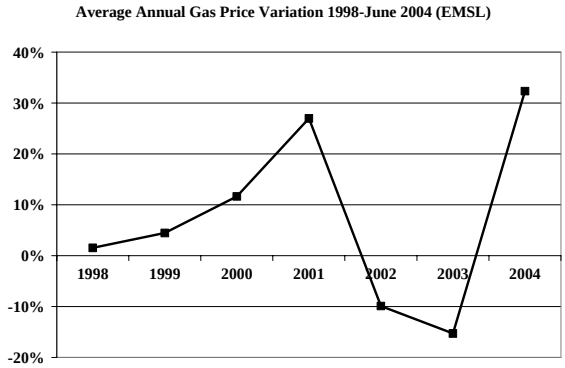
The 2003 Pacific Northwest demand is 72% of capacity instead of 88% in 2000 which should help stabilize electricity prices for a few years. However, the wholesale price of electricity will remain high, continue to increase, and the rates are still subject to large periodic short term price fluctuations. This means PNNL must continue and expand effective energy conservation efforts described in the Progress Section of this Plan.

Natural gas is the second largest component of energy cost for the Laboratory. Natural gas is used at PNNL as a source of fuel for office and laboratory heating. Overall, natural gas accounted for 34% of the total *laboratory* energy consumed in FY03, down from 46% in FY02.

Natural gas prices were fairly stable after deregulation, but started increasing significantly in 2000 due to demand from new natural gas fired electrical generation. Market price manipulation in the west and southwest US during the California energy crisis drove up prices in 2001. In addition, western Canadian natural gas, once captive to western US markets, became available to the eastern US and Canada from a new cross Canadian pipeline. This east-west interconnection has also added to price instability as eastern US natural gas markets now drive the price of natural gas across the whole North American continent. The average natural gas price started to decrease in 2002, but then increased 30% in late 2003 due to low natural gas reserves and the increasing price of oil. To lower the risk, PNNL is protected from winter price spikes by buying into seasonal, secured contracts for natural gas. Additional price stability, if desired, could be assured by buying into multiple year secured contracts.



The recent price variation in natural gas was more than double the electrical retail price variation.



The Northwest Power Planning Council believes that natural gas prices may remain volatile for a number of years.[5] Natural gas supplies have not expanded as expected in response to high prices in 2001, leading to concerns about declining conventional natural gas supplies. This concern is particularly valid if natural gas fueled electrical power generation increases and the price of crude oil remains high. Natural gas

[4] ibid

[5] Terry Morlan, Presentations: Fuel Price and Electricity Demand Forecast Revisions, Northwest Power Planning Council, April 1, 2003, April 22, 2003, and July 16, 2003.

price increases can be expected to follow or exceed electrical energy price increases in the near term. As long as natural gas usage continues to increase, crude oil prices remain high, and there is little margin between production capacity and reserves, natural gas prices will remain high and volatile. The short term price variations could be large if gas shortages appear; particularly, in the winter season. The bottom line appears to be higher natural gas prices are here to stay and PNNL must continue to focus on measures that conserve natural gas usage.

Renewable energy technologies tap natural flows of energy – such as water, wind, solar, geothermal, and biomass sources – to produce electricity, fuels, and heat. Non-hydropower renewable electricity generation is projected to grow at a faster rate than all other generation sources, except natural gas[6]. The long-term challenge facing renewable energy remains its economics. As electricity prices in general increase and renewable energy prices decrease due to increased production efficiency and reduced surcharges, renewable energy becomes more cost competitive.

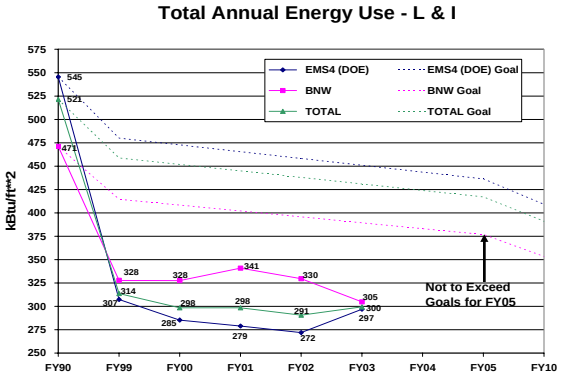
Currently, PNNL purchases 14.1% (12,000,000 kWh/year) of its electrical energy from renewable sources other than hydroelectric power. This is almost double the DOE 430.2A goal of 7.5% by 2010 and has gained PNNL both notoriety and awards. The cost penalties for the purchase are as follows: no cost penalty is charged for 10% of the renewable purchase, $0.011/kWh is the cost penalty for 67% of the purchase, and $0.007/kWh for 23% of the purchase. It is important to help develop the renewable market and continue to look for cost effective ways to do so as the penalty charges for renewable energy sources continue to decrease.

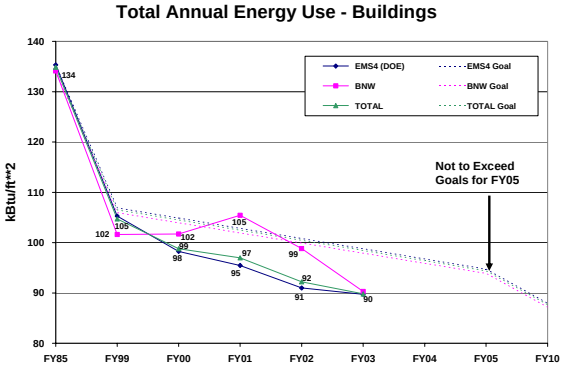
[6] Report of the National Energy Policy Development Group to the President of the United States, May 2001

Positive Progress

PNNL's Progress Toward Energy Reduction Goals

PNNL has made significant progress towards meeting DOE reduction goals for energy consumption. Through a proactive energy management program and investment in facility infrastructure, PNNL has reduced its energy consumption by 42.7% in the Laboratory and Industrial Facility category (compared to the FY 1990 baseline) and by 33.4% in the General Building category (compared to the FY 1985 baseline). Appendix A details the Laboratory's energy management goals and current progress to their achievement.





Using Resources Wisely

Increasing Energy and Water Conservation and Efficiency at PNNL

Conservation and efficiency improvement are crucial components of PNNL's energy plan. Energy efficiency is the ability to use less energy to produce the same amount of useful work or services. Energy conservation is closely related and is simply using less (usually by eliminating needless use or wasteful practices). Water conservation and efficiency improvements are similar. Improved energy and water efficiency and conservation reduce consumption and costs while maintaining PNNL facilities operational readiness.

Over the last few years, PNNL has significantly improved its energy efficiency by developing and expanding the use of energy efficient technologies. PNNL's strategy for consuming less energy involves:

- Promoting energy efficiency strategies. Communicating energy efficiency tips to staff through the Laboratory's bi-weekly newsletter.

- Performing continuous building re-commissioning through the Lab's "Plan B" efforts.

- Implemented a project in FY03 that installed WattStopper motion sensor power plug strip technology in offices and laboratories and deploying computer monitor energy savings settings via the Network. These measures reduced the overall electrical energy use by as much as 4% if sustained by continued deployment.

- Retrofitting lighting systems and installing motion sensors and separate lighting circuits to allow turning off unneeded lights.

- In FY04, as a technology demonstration project, PNNL replaced six parking lot lights with solar powered parking lot lights.

- Fixing the energy infrastructure. PNNL's goal is to reduce energy consumption per gross square foot by 30% by 2005 and 35% by 2010 relative to 1985 for those facilities included within the Buildings energy-reporting category in the DOE EMS4 (Energy Management System) database and by 20% and 25%, respectively, compared to a 1990 baseline for those facilities included within the Laboratory and Industrial facilities category. By the end of FY03 PNNL had reduced 42.6% of its energy use when compared to the 1990 baseline, exceeding the 1990 goal ahead of schedule. By the end of FY03, PNNL exceeded the FY05 Buildings category goal of 30% energy reduction, having achieved a 33.4%% reduction in energy use in the Buildings Category.

- Monitoring total facility demand and demands for individual major loads.

- In FY05, the continuous monitoring of energy use in NSB and ETB will be re-initiated to determine why these buildings are again using excess energy.

- Identifying load reduction measures for PNNL in the event of rolling blackouts or mandatory load reductions of either natural gas or electricity. The internal load reduction procedures and plans submitted to the City of Richland and DOE can be found in *Appendix B.*

- Developing metering plans for evaluating buildings that do not currently have metered data or improving the energy efficiency of

office buildings to obtain the ENERGY STAR® label.

- Two buildings (Sigma 2 and Sigma 5) achieved the ENERGY STAR®Building in FY03. PNNL is the first Office of Science national laboratory to achieve two facilities designated as ENERGY STAR®. Another distinction of significance is that these two facilities are the first and only two Eastern Washington buildings achieving this designation. PNNL worked to improve, qualify and secure this designation by performing energy audits and implementing the identified energy efficiency opportunities. Some of the opportunities included lighting retrofits, lighting controls and metering strategies.

- Encouraging energy efficiency and conservation to PNNL occupants through a Conserving Energy & Water website and through messages from the Laboratory Director's desk.

- Providing training opportunities on smart energy practices so that PNNL staff can practice energy efficiency year around.

- Purchasing energy efficient appliances, office equipment, lighting, utility systems, etc., institutionalizing the weigh-in of energy efficiency and conservation into purchasing practices. This includes the selection of DOE/EPA ENERGY STAR®products. Computers and peripheral equipment selected in the Managed Hardware Program comply with advanced energy efficient criteria developed by the computer industry.

PNNL's strategy for consuming less water involves:

- Auditing grounds management for water savings opportunities. PNNL has reduced its river water use by more than 35% over the past three years on PNNL owned landscape.

- In FY04, PNNL developed a Water Management Plan. PNNL's goal is to accomplish 70% of identified life-cycle cost-effective water conservation actions by 2010. It is using as a guide best management practices published by the Federal Energy Management Program and other non-government industry groups.

- In FY04, PNNL replaced sixteen urinals with waterless urinals which reduced our water usage by approximately 576,000 gals per year.

PNNL Infrastructure

Delivery of Facility Strategic Plan Investments

Over the last ten years, PNNL has invested over $200 million in new facilities and facility retrofit and revitalization projects. The end result has been modern facilities that are more energy efficient. In addition, 29% of the research campus is new; and, PNNL has vacated 102 facilities/structures that resulted in considerable energy savings for the Laboratory.

In the next ten years, PNNL will embark on an aggressive campaign to build new facilities and revitalize older ones – an additional three quarters of a million square feet of new space is planned. It will be important at the start of this process to thoroughly evaluate the options for implementing comprehensive utility strategies that will modernize PNNL's research infrastructure, minimize operating costs, improve standby power capability and reduce PNNL's vulnerability to energy supply disruptions. These options include combined heating, cooling, and power systems (either centralized or distributed) and renewable energy technologies such as

geothermal heat pumps, photovoltaic solar panels, and wind energy.

Appendix D is a comprehensive list of PNNL investment opportunities and financial returns for planned energy efficiency and conservation technology deployment and/or retrofit projects. This list will be updated annually to reflect investment priorities and new opportunities identified through recommissioning or energy audit activities. *Appendix D* is used as an input to the Facility Strategic Plan for capital investments and to the Facility Operations annual work plans and building life-cycle plans for required maintenance.

PNNL's strategy for improving infrastructure to increase energy efficiency and conservation involves:

- Eliminating remaining surplus facilities.
- Implementing PNNL's vision for the Research Campus of the Future. New facilities for national security work, bio-molecular research, scientific computing, biomass research, and process engineering. Designating new facilities with significant public access and exposure as "showcase" facilities to highlight energy and water efficiency and renewable energy improvements.
- Designing sustainable buildings with emphasis on obtaining leadership in this area by achieving new building design certification using the Leadership in Energy and Environmental Design (LEED) Green Building rating system[7].
- Evaluating and implementing, if life cycle cost effective, both mature existing technologies, such as ground source heat pumps and combined heat and power (CHP) systems, as well as new distributed generation technologies such as microturbines, PV solar, and fuel cells.
- Using energy efficiency and water conservation as selection criteria when acquiring leased buildings or extending existing leases.
- Expanding the use of or initiating new energy savings performance contracts (ESPCs) and utility energy savings contracts (UESCs). Through ESPCs and BPA mortgage contracts, PNNL has invested over $13 million to improve infrastructure and reduce utility costs.
- Retrofitting facilities with new, more efficient system designs (e.g., lighting systems, air compressor systems, motor and pump systems and heating systems).

Systems Monitoring and Improvement

Continuous Recommissioning of Facility Systems to Improve Efficiency

Even with modern control systems, building energy systems gain inefficiencies over time due to sensor drift, equipment aging, and operator efforts to eliminate complaints with less than optimal work-arounds. At the core of PNNL's strategy to conserve energy and improve efficiency is the recommissioning of buildings to identify and implement energy efficiency opportunities.

Recommissioning of approximately 75% of square footage, to date, has avoided more than $425K in utility costs

[7] Green Building Rating System™, Version 2.0, March 2000, published by the U.S. Green Building Council

PNNL's strategy for recommissioning involves:

- Using surveys and inspections to continuously identify and correct low-cost/no-cost operational and maintenance deficiencies that hinder energy conservation. *Using fiscal year 1999 as a baseline, PNNL has avoided over $425,000 to date in energy costs as a direct result of recommissioning efforts*.

- Auditing facilities to identify future energy retrofit projects and to accelerate the replacement of inefficient equipment. A detailed Energy Audit Schedule can be found in *Appendix C*. No formal audits are planned for FY-05.

- Developing and implementing energy management monitoring and analysis tools.

- Correcting building operational inefficiencies, verifying energy use, and improving design and construction practices.

Diversifying Energy Supplies to Meet 21st Century Demands

Increasing PNNL's Use of Renewable and Alternative Energy

DOE has established targets of 3% of purchases from non-hydro renewable power by fiscal year 2005 and 7.5% of power purchases by 2010. In 2002, PNNL collaborated with the Hanford Contractor (Fluor) and DOE-RL to buy 5% green power for the 300 Area PNNL operated facilities. In FY03, PNNL purchased cost competitive green power (wind), bringing the total wind power purchased to 13.7% of the electricity needs campus wide.

Currently, renewable energy sources comprise 14.1% of PNNL's total electrical energy use. PNNL's strategy to diversify its energy supply involves:

- Evaluating and implementing the use of off-grid generation systems (such as fuel cells, microturbines, wind energy systems, photovoltaic systems, etc.,) when such systems are life-cycle cost-effective and offer benefits including energy efficiency, pollution prevention, and source energy reductions.

- Evaluating the acquisition of either "green power" or "green tags" to promote the development and use of renewable power.

- Diversifying "green power" purchases to include small hydro, wind and landfill gas. PNNL will be further reviewing new cost effective out-year purchases of an even broader diversification of renewable energy resources.

Strengthening Collaboration, Communication, and Education

Enhancing Relationships with other Labs and our Stakeholders

A key strategy of PNNL is to team researchers and practitioners to field test practical energy solutions. PNNL also partners with government, educational, and commercial institutions to share energy efficiency and best practice opportunities. PNNL's strategy for collaboration involves:

- Evaluating energy efficiency and best practice opportunities from other laboratories.

- Replicating model programs from other DOE laboratories.

- Networking with Battelle facility managers to share best practices in energy management.

- Establishing and enhancing communications with utility providers to understand their needs for load reductions and availability of alternative sources of energy (e.g., non-hydro renewable power).

- Participating in facility management association and DOE workshops and conferences.

- Increasing the number of trained energy managers as needed to verify effective implementation of the Laboratory's energy plan.

- Teaming with PNNL researchers to deploy PNNL technologies in Laboratory facilities.

- Sharing information about our energy program and facility diagnostic tools with other organizations like the International Facility Managers Association (IFMA).

Appendix A - *Energy Management Goals*

Goal	Progress
Reduce energy consumption per gross square foot by 30% by 2005 and 35% by 2010 against the 1985 baseline for facilities included in the Building energy-reporting category.	PNNL has reduced 33.4% of its energy use when compared to the 1985 baseline and has met the 2005 Goal of 30%. More work will be required to guarantee meeting the 2010 goal of 35% reduction.
Reduce energy consumption per gross square foot by 20% by 2005 and 25% by 2010 against the1990 baseline for facilities included in the Industrial and Laboratory Facilities energy-reporting category.	PNNL has reduced 42.6% of its energy use when compared to the 1990 baseline, exceeding this goal ahead of schedule.
Implement water management through water efficiency programs and plans.	Reduced river water use on PNNL owned landscape by 35% since 1999. Developed a PNNL Water Management Plan. Installed 16 waterless urinals in FY04. Installed a closed loop cooling system in PSL in FY04. A closed loop cooling system in RTL will be fully operational in FY05.
10% annual progress to complete energy audits in DOE buildings.	Appendix C shows the completed energy audits. No formal audits were conducted in FY04 or are planned for FY05.
Annual progress toward installing by January 2005, in DOE-owned buildings, all life-cycle cost-effective energy and water conservation measures identified by facility audits.	Water conservation initiatives and infrastructure improvements are progressing according to the Strategic Plan.
Annual progress toward qualifying office buildings for the ENERGY STAR® label.	Eight office buildings were evaluated for ENERGY STAR®. Sigma II qualified for the ENERGY STAR® label in FY03 after staff led a campaign to reduce energy consumption. Sigma V, after investing $60,000 in energy conservation measures qualified for the ENERGY STAR® label in FY03. PNNL is evaluating what additional investments are required to qualify more buildings in 2005.
Increased number of trained energy managers.	PNNL has three Certified Energy Managers assigned to Facilities and Operations; however, there are a number of resident subject matter experts represented who conduct energy research and development (policy and technology) at PNNL.

Appendix A - *Energy Management Goals (Cont.)*

Goal	Progress
Increase use of alternative funding.	Over $13 million used to date. In 2002, PNNL started and/or completed ESPC's for Richland North and 300 Area standby power and compressed air. In addition, PNNL secured $600,000 in BPA obligations to use in the implementation of energy conservation measures in our facilities in FY03. PNNL received more than $227,000 in FEMP funding, in FY02, to implement lighting retrofits in the 300 Area and $60,000 from BPA for continuous energy monitoring in FY05. The next phase in the Richland North ESPC will start construction in FY05. An additional phase is being planned to convert Richland North from steam to hot water. That phase may also start in FY05.
Increased use of off-grid generation systems.	In FY02, PNNL recommissioned a solar heating system in Building 337 to provide hot water for the kitchen area. Six PV solar powered parking lot lights were installed in Richland North in FY04. Implementations of microturbines in other facilities are being planned for the future. Evaluation of distributed generation options for the RCF has started.
7.5% use of non-hydro renewable power by 2010.	PNNL collaborated with DOE-RL and Fluor, in 2002, to buy 5% green power from BPA. PNNL also bought wind power to meet 13.7% of its electrical usage in FY03. In FY04 PNNL increased its green power source purchase to equal 14.1% of the total electrical energy usage. This diversified green power portfolio now also includes landfill gas combustion generation which covers 100% of MSL's electrical power needs.

Appendix B - *Load Reduction Plans*

Contractor	PACIFIC NORTHWEST NATIONAL LABORATORY (PNNL)	Area	300
Primary Contact		Alternate Contact	
Name	PNNL SINGLE POINT CONTACT ROOM (SPC)	Name	Energy Program Coordinator
Telephone No.	375-2400	Telephone No.	376-2971
Cell Phone No.	ALT. # 375-2154	Cell Phone No.	N/A
Pager No.	N/A	Pager No.	N/A
% Curtailment	Action	Fuel Savings	Impacts
5%	1. LOWER/RAISE (SEASONAL) THERMOSTATS IN ALL FACILITIES. TURN OFF ALL ELECTRIC PROCESS HOT WATER HEATERS.	200 KW	MAJOR INCONVENIENCE
10%	2. TURN OFF NON-ESSENTIAL LIGHTING IN ALL FACILITIES. TURN OFF PORTABLE SPACE HEATERS IN ALL FACILITIES.	497 KW (INCLUDES ACTION #1)	MAJOR INCONVENIENCE, POSSIBLE WORK STOPPAGE.
15%	3. SELECTED HVAC SHUT DOWN IN BUILDINGS: 331-H, 337, 350, AND 3760.	686 KW (INCLUDES ACTIONS #1,2)	WORK STOPPAGES, PROBABLE STAFF RELOCATION/SEND HOME.
20%	4. SELECTED HVAC SHUTDOWN IN BUILDINGS: 306W, 318, 323, 326, 329, 331, 336, AND 338.	1,054 KW (INCLUDES ACTIONS #1,2,3)	WORK STOPPAGES, PROBABLE STAFF RELOCATION/SEND HOME.

Reference
Use Category

Approved - Facility Management Services Manager — Date

Approved - Security Operations Manager — Date

Contractor	PACIFIC NORTHWEST NATIONAL LABORATORY (PNNL)	Area	RICHLAND NORTH
Primary Contact		Alternate Contact	
Name	PNNL SINGLE POINT CONTACT ROOM (SPC)	Name	Energy Program Coordinator
Telephone No.	375-2400	Telephone No.	376-2971
Cell Phone No.	ALT. # 375-2154	Cell Phone No.	N/A
Pager No.	N/A	Pager No.	N/A
% Curtailment	Action	Fuel Savings	Impacts
5%	1. TURN OFF NON-ESSENTIAL LIGHTING IN ALL BUILDINGS.	255 KW	MINOR INCONVENIENCE.
10%	2. START GENERATORS AND CARRY CONNECTED LOADS AT THE ANNEX, PGF AND EDL. EMSL HVAC IN NIGHT SET-BACK	490 KW (INCLUDES ACTION #1)	MAJOR INCONVENIENCE. POSSIBLE AIR EMISSION ISSUES. ADDITIONAL FOSSIL FUEL COSTS.
15%	3. START GENERATORS AND CARRY CONNECTED LOADS AT RTL AND EMSL.	882 KW (INCLUDES ACTIONS #1,2)	MAJOR INCONVENIENCE. POSSIBLE AIR EMISSION ISSUES. ADDITIONAL FOSSIL FUEL COSTS.
20%	4. START GENERATOR AND CARRY CONNECTED LOADS AT LSL-II.	1,264 KW (INCLUDES ACTIONS #1,2,3)	MAJOR INCONVENIENCE. POSSIBLE AIR EMISSION ISSUES. ADDITIONAL FOSSIL FUEL COSTS. REDUCED AUTOMATIC EQUIP. REDUNDANCY AT LSL-II.

Reference
Use Category

Approved - Facility Management Services Manager Date

Approved - Security Operations Manager Date

PNNL NATURAL GAS ALLOCATION
Supplemental Control Room Procedures

1.0 Objective

This procedure provides guidance to the Battelle Single Point of Contact (SPC) regarding actions to be taken in the event that Cascade Natural Gas Corporation contacts the Battelle SPC to request a natural gas allocation (reduction).

2.0 Applicability

This procedure is applicable to the Control Room Technicians (CRTs) and shall be implemented when notified of a natural gas allocation (reduction).

3.0 Definitions

None

4.0 Roles and Responsibilities

Security Operations Manager	• Assure CRTs are trained and can perform the actions outlined in the procedure.
Facility Management Services Manager	• Assure the Security Operations Manager is notified of any changes to the Natural Gas Allocation Procedure as defined in 5.0 below.
Control Room Technicians	• Assure natural gas allocation notifications are completed following this procedure. • Gather applicable information from the caller regarding the request for natural gas allocation. See Gas Allocation Order (Exhibit 3 or 4). • Complete Gas Allocation Order. • Make appropriate PNNL staff notifications to advise of gas allocation. • FAX gas allocation order to appropriate PNNL staff.

5.0 Work Instructions

Battelle has contracted with Cascade Natural Gas Corporation (CNG) to provide natural gas to the RRC facilities and EMSL that may be subject to an allocation or entitlement (reduced volume) of natural gas. In the event it is necessary for CNG to allocate gas services, they will phone the customer's representative. Battelle has provided CNG with a list of personnel authorized to accept gas allocation orders (Exhibit 1). A list of CNG representatives is attached as Exhibit 2.

Notification of an allocation will be accomplished by CNG contacting an authorized representative of Battelle by telephone and reading the allocation order. The order number, date, time, allocation volume by service, effective date and time, reason for allocation, Battelle representative, and CNG dispatcher shall be noted on the allocation order form. A blank copy of the allocation order form is attached as Exhibit 3 for the RRC and exhibit 4 for EMSL.

- The CRT will record the information on the "Gas Allocation Order" (Exhibit 3 or 4).
- The CRT will read back the completed order before terminating the call.

Subsequent CRT notifications within PNNL are listed below by area:

- Notify Dale Schielke (375-2273 or 531-7651) and advise of the allocation(s).
- FAX a copy of the complete allocation order(s) to Dale Schielke at 375-6430.
- FAX an additional copy of the completed allocation order(s) to Marc Berman at 372-2686.

If Dale Schielke cannot be contacted as above, then please contact Marc Berman at 376-2971 (work), or 542-1327 (home).

6.0 References

None

7.0 Exhibits

1. Battelle personnel authorized to accept gas allocation orders.
2. Cascade Natural Gas representatives.
3. Gas Allocation Order Form (Acc. # 0125)
4. Gas Allocation Order Form (Acc. # 0140)

Appendix C - *Energy Audits Completed*

Building	**Square Feet**	**FY Completed**
Sigma 5	47,900	FY01
Sub-Total by Year & % of Total Space	47,900	2.54%
2400 Stevens	93,351	FY02
ISB1	50,200	FY02
ISB2	60,080	FY02
ETB	100,364	FY02
EESB	99,670	FY02
ESB	12,595	FY02
MSL	45,190	FY02
329	39,420	FY02
331	114,978	FY02
3020 (EMSL)	200,000	FY02
Sub-Total by Year & % of Total Space	815,848	43.32%
318	37,025	FY03
320	31,437	FY03
326	63,589	FY03
336	6,438	FY03
337	70,424	FY03
338	18,315	FY03
350	22,048	FY03
3760	21,700	FY03
Sub-Total by Year & % of Total Space	270,976	14.39%
Residual Space & % of Total Space Remaining	748,470	39.74%

Note: Due to substantial progress in FY-01, 02, and 03 (60% of total space), no formal audits were conducted in FY-04 or planned in FY05.

Appendix D - *Energy Investment Opportunities*

Anticipated Year(s)	Planned Project	Total Annual Savings ($K)	Approximate Cost to Implement ($K)	Simple Pay Back (Yrs)
FY04	331 Aerosol Project-completed	25	193	7.7
FY05	Proposed North Richland Infrastructure to include: Occupancy Sensor for VAV Setback at PSL,RTL, Math, ROB, and HVAC upgrades at the Auditorium and the Annex - 4	30	278	9.3
FY05	Proposed North Richland Infrastructure (RRC) to include: Steam to Hot Water Conversion - 5	101	2,728	27.0
FY05	Math-ROB Perimeter induction unit controls and interior supply setback	19	98	5.2
FY05	DX cooling units for LSL animal rooms - Improved lab space conditions increase chiller life cycle	16	140	8.8
FY05	RTL Fume hood and pressurization control - Meters lab air flow for better temperature control	37	484	13.1
FY05	RTL - VAV for offices	14	155	11.1
FY06	PSL - Control upgrade, fume hood and pressurization control	91	1363	15.0
	Total	**333**	**5,439**	**16.3**

Appendix E - *Energy Management Awards*

In FY04 PNNL received two energy management awards:

The first award was the International Facilities Management Association (IFMA) Facility Management Achievement Award of Excellence.

> The Facility Management Achievement Award recognizes an individual or team whose FM program or idea has had a substantial positive effect on contributing to the success of their organization.
>
> The facility operations department took the initiative to implement a sustainable FM policy to promote energy conservation, acquire technology improvements to increase energy efficiency and conserve water, and transition to affordable and environmentally sound sources of energy.
>
> This resulted in cost savings of more than $340,000; reduction in use of 9 million gallons of river water that was then made available for use in adjoining farmlands and leased properties; the achievement of the Environmental Protection Agency's Energy Star label; reduction in the number of kilowatt hours and the purchase of energy produced at a wind farm; and securing more than $2.6 million in alternative financing in order to implement energy conservation measures without increasing the cost to the organization.

The second award was the Presidential Award for Leadership in Federal Energy Management.

> Awarded to the PNNL for its outstanding efforts to efficiently manage energy use, including the use of alternative financing, energy conservation, renewable energy, and ENERGY STAR® standards. PNNL's *Plug into Savings* energy conservation project saved almost 3.0 million kilowatt hours ($118,728) in 2003, which represents almost 3.6 percent of PNNL's total 2003 electricity use. PNNL has institutionalized its efforts in policies and practices by incorporating energy efficiency goals into the Facilities and Operation Directorate's long-term strategic plan and into the performance measures used to determine the operating contractor's annual award fee from the Department of Energy. To facilitate similar energy and water conservation efforts by others, PNNL has participated in local sustainability workshops, contributed energy conservation material to local schools, created a website and monthly newsletter to disseminate best practices, and presented elements of its energy conservation approach at three conferences.