



Public Works and
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Canada

Travaux publics et
Services gouvernementaux
Canada

Canada



Innovations Solutions

2000-2001

Innovations and Solutions Program Annual Report

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FOREWORD

FOREWORD

The development of innovative and sustainable real property solutions is the driving force behind the Innovations and Solutions (I&S) Program residing within Public Works and Government Services Canada (PWGSC). By funding carefully selected projects, the Program not only fosters technology development and transfer activities, but also helps further the department's policy agenda in support of broader government objectives.

The I&S Program, previously known as the Technology, Development and Transfer Program, offers opportunities for PWGSC to maintain a leading-edge expertise to keep the department at the forefront of real property management. This is done in partnership with other government departments, and private-sector organizations, allowing the substantial leveraging of limited resources.

The 2000-2001 Annual Report highlights numerous projects that have demonstrated ways to provide supportive work environments for Government of Canada employees, and to increase operational efficiencies of PWGSC real property. The I&S Program has also contributed greatly to the development of public policy objectives, particularly in the areas of sustainable development, greenhouse gas emissions reduction and the Government of Canada's disability strategy.

Looking ahead, I am confident that the I&S Program will continue to provide PWGSC with the expertise and tools that it needs to meet upcoming challenges, seize emerging opportunities, add value to client service delivery and support overall government objectives.



Carol Beal, P. Eng.
Assistant Deputy Minister, Real Property Services
Public Works and Government Services Canada

PROGRAM Program Highlights HIGHLIGHTS

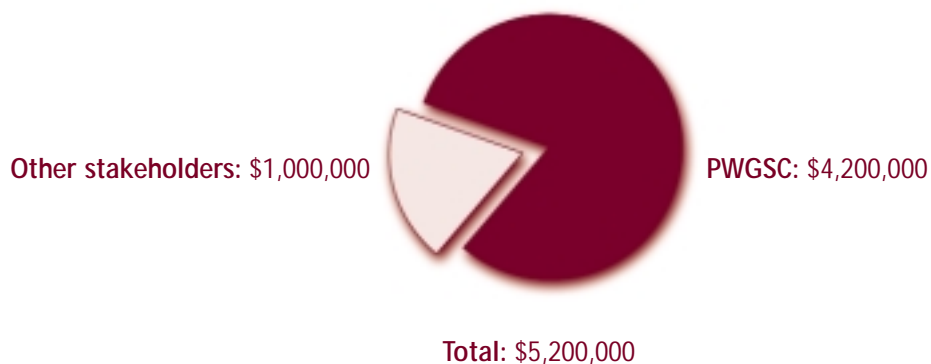
PWGSC demonstrated leadership at the federal level by co-sponsoring and publishing a guidance document entitled *Sustainable Development in Government Operations: A Coordinated Approach*, which sets common directions for Government of Canada departments. In addition to funding this initiative, the I&S Program provided support to sustainable practices within PWGSC, based on commitments made in the department's updated Sustainable Development Strategy that was published in 2001. Among the key elements of this strategy are the greening of the department's Project Delivery System and the reduction of greenhouse gas (GhG) emissions. Over the past fiscal year, the department has played an important role in helping to ensure the operational and financial viability of the Government of Canada target to reduce GhG emissions in response to the Kyoto Protocol. In support of the federal approach, a departmental GhG reduction strategy was established this year, identifying measures and action plans for PWGSC's inventory.

The I&S Program also supports the development and trial implementation of new technologies to maximize the performance of real property facilities, while reducing costs. Working with government and non-government partners, PWGSC is examining non-intrusive methods to control humidity levels in heritage buildings. Projects have been undertaken to determine the economic viability of fire-resistant and corrosion-resistant building materials. Accessibility is another area where the I&S Program contributed in 2000-2001 to help PWGSC in supporting public policy objectives.

As one of Canada's largest landlords, PWGSC provides workspace for some 179,000 federal public servants across the country. Through the I&S Program, Innovative Officing approaches have been developed to provide cost-effective solutions to ensure that office spaces are responsive and support increased productivity. This year's projects explored how to give workers more personal control over lighting, ventilation and the layout of their open-plan offices. Other studies investigated ways to improve acoustics in open-plan spaces and to offer design solutions for fully functional green office space. Successful demonstration projects featured examples of the workplace of choice.

The Innovations and Solutions Program 2000-2001 Annual Report offers many examples of how innovative real property solutions can extend the life cycle of PWGSC facilities, contribute to the creation of productive workplaces, support policy development and save taxpayers' money.

Sources of Funding



In 2000-2001, the I&S Program funded more than 90 projects, receiving approximately \$5.2 million from PWGSC and other stakeholders sharing common interests including: the National Research Council Canada, the Canadian Standards Association, the Canada Mortgage and Housing Corporation, Natural Resources Canada and private-sector organizations.

ENVIRONMENTAL Environmental Initiatives INITIATIVES

Policy Driven

PWGSC is deeply committed to its government-wide sustainable development leadership role. Carrying out this role includes cooperating with other federal departments and agencies to develop and promote the use of common sustainable development methods, performance measures and reporting requirements. Through its I&S Program, PWGSC shares information with clients and helps avoid duplication of effort within the Government of Canada as a whole.

In 2000-2001, PWGSC continued to demonstrate significant progress in “greening” its own operations by identifying and successfully applying innovative solutions.

Sustainable Development Strategy 2000

SUSTAINABLE DEVELOPMENT STRATEGY 2000

Fiscal year 2000-2001 marked the end of a three-year cycle since the first tabling of the Sustainable Development Strategy (SDS). With funding provided by the I&S Program, a series of consultations was held throughout the year to address sustainable development objectives with departmental branches, regions and clients. Subsequently, an interactive Web site was launched to gather client input on the proposed sustainable development objectives.

With client feedback and lessons learned from the 1997 SDS, a revised SDS was tabled in Parliament in February 2001.

In June 2000, PWGSC co-sponsored and published a federal guidance document with Natural Resources Canada and Environment Canada entitled *Sustainable Development in Government Operations: A Coordinated Approach*. The purpose of the document is to set common directions for the sustainable development strategies that Government of Canada departments were required to table in 2001. It outlines best practices for departments to adopt in the areas of procurement, waste management, water conservation, energy efficiency, vehicle fleet management, land-use management and human resources management. This approach has received substantial support.

PWGSC faces many challenges in meeting its sustainable development commitments. These commitments are addressed through projects funded by the I&S Program that focus on two main areas. The first involves the development of the policies and tools to ensure that sustainable commitments are reflected in the daily activities of the department. The second includes partnership with external stakeholders to exploit new and emerging technologies, allowing PWGSC to fulfil its leadership role.

Reducing Greenhouse Gas Emissions

Over the past fiscal year, the department has played an important role in helping to ensure the operational and financial viability of the Government of Canada's target to reduce greenhouse gas emissions as part of the Federal House-in-Order strategy, in response to the Kyoto Protocol.

In support of this initiative, PWGSC developed a GhG Emissions Reduction Strategy to achieve its departmental target. As part of the development of this strategy, the I&S Program has provided funding for the formation of a committee of technical representatives from all regions to examine strategic energy management areas, and to assess the cost-effectiveness and potential of key measures to contribute to emissions reduction. Topics included on-site electricity generation (micro-cogeneration), opportunities arising from the impending deregulation of electric utilities in Ontario, and the incorporation of renewable, "green power" technologies into PWGSC buildings. The results of this study confirmed PWGSC's contribution to the Government of Canada's target to reduce GhG emissions.

The Canadian Environmental Protection Act

The revised *Canadian Environmental Protection Act* contains new requirements for pollution prevention. The department has provided input to Environment Canada as the Act's regulations are developed. PWGSC is working on cost-effective approaches to achieve compliance once the new regulations come into effect.

Environmental Management System Manual

PWGSC has committed to having an environmental management system (EMS) consistent with ISO 14001 in place by March 31, 2002. In 2000-2001, first drafts of the corporate EMS manuals were prepared. The draft manuals will be refined in the coming months, with final publication planned for March 2002.

The development of an EMS manual is considered a mandatory step in ensuring that proper environmental procedures are understood and followed within an organization. Recognizing that an EMS goes beyond promoting compliance with environmental regulations, the department has moved toward integrating environmental considerations into all decision-making processes so that environmental issues are addressed as a matter of course.

Greening the Project Delivery System

In 2000-2001, PWGSC began working on an initiative to green its project delivery system (PDS). With the goal of incorporating green measures and practices into the PDS, several initiatives were funded through the I&S Program in the past fiscal year. They include:

- ❖ investigating how to enhance the process of life-cycle costing; and
- ❖ increasing the environmental sustainability of projects carried out by the department.

Funding has also been committed to assess various design tools such as the Green Building Tool and other tools developed in the United States and Canada, which are used to determine the effectiveness of implementing sustainable practices during both new construction and renovation projects.

During the fiscal year, PWGSC became a member of the Royal Architectural Institute of Canada's new Sustainable Building Canada Committee. Along with several federal government departments and private-sector organizations, PWGSC is helping to promote the development and implementation of green and sustainable building practices, and foster information exchange among interested parties.

Greening the National Master Specification

PWGSC is continuing to update the National Master Specification (NMS) to include more sustainable and environmentally responsible choices for products, materials and work methods as well as adding new performance based specifications aimed at design-build contracts. As of fiscal year 2000-2001, 481 of the 705 sections have been "greened." Specification writers will also find references to the latest environmental standards applying to the Canadian construction industry, plus best practices in both prescriptive and performance construction specification writing. The NMS is produced in cooperation with the private sector.

Construction, Renovation and Demolition Waste Reduction

PWGSC has made a commitment within its sustainable development strategy to incorporate construction, renovation and demolition (CRD) waste-management practices into its projects. This includes investigating how to most effectively divert waste from building projects to be recycled or reused in future construction. To effectively track this commitment, the department started incorporating CRD practices into the Property and Building Management System – a monitoring system used to ensure accurate management of building projects. The goal is to guarantee that 25 percent of projects initiated in 2000-2001 incorporate CRD waste-management practices, so that by 2004 all PWGSC projects will be applying these practices.

Incorporating Environmental Aspects Into Product Design and Development

PWGSC continues to participate in the creation of the International Organization for Standardization (ISO) document entitled *Incorporating Environmental Aspects into Product Design and Development*. This document is intended to be an educational tool on how an organization can introduce environmental aspects into design and development processes. Meetings of the developing partners, which include private-sector and international participants, have been held over the past two years. Publication of the document is expected in early 2002.

Environmental Training Program

Working with the concept that each employee should practice environmental responsibility, the Environmental Training Program was launched in Fall 2000. The training program comprises a series of courses that are designed to ensure that PWGSC's goal of greening its operations is achieved.

Of the courses being offered to PWGSC employees, one has been deemed mandatory for employees delivering real property services – the course on environmental responsibilities and liabilities. This course identifies employee responsibilities in complying with environmental legislation relevant to the department, discusses management techniques to facilitate compliance, and emphasizes the liabilities and consequences of non-compliance. In 2000-2001, 16 Green

Buildings workshops were held across the country on topics such as general sustainability concepts, latest techniques available for sustainable design and CRD waste management.

The Environmental Training Program will continue to evolve to meet employee needs and requirements, and PWGSC plans to perform effectiveness studies every two to three years.



PWGSC recovered mercury from the Ivory Island light station in British Columbia, which helped fulfill the Department's sustainable development commitments.

Contaminated Sites Management Working Group

CONTAMINATED SITES MANAGEMENT WORKING GROUP

A significant accomplishment of PWGSC's Contaminated Sites Management Working Group in the fiscal year 2000-2001 involved collecting and reporting contaminated site liabilities associated with PWGSC's real property inventory. Steps taken by the working group this year also included the development of terms of reference for the completion of environmental site assessments and providing policies and guidance documents to regions for use in the assessment program. Additional steps included providing modifications to pertinent databases so that required information could be forwarded to the Treasury Board's Directory of Federal Real Property Contaminated Sites Inventory and to the Public Accounts of Canada.

Enhanced Recycling Opportunities

ENHANCED RECYCLING OPPORTUNITIES

PWGSC has started a project to create a systematic approach for the disposal, handling, recycling and reusing of pallets and batteries used in its office buildings. Working with a private consulting firm, a pilot project has been created for Place du Portage III in Hull, Quebec. The initial report outlining the Portage III pilot was delivered in 2000-2001. This system has the potential to be expanded and modified according to the varying needs of regions across Canada.

Office Moves Made Greener

OFFICE MOVES MADE GREENER

It is estimated that the amount of waste created during an office move is approximately six times that which would be disposed of during normal operations. Almost 98 percent of this is made up of paper and reusable office supplies such as old binders and used file folders. Through the development of its Green Move Protocol in 2000-2001, PWGSC set the stage for reducing huge volumes of waste materials by diverting them from landfill sites to be recycled or reused.

The first pilot project occurred in March 2001 during the move of 125 PWGSC employees within the Ottawa-Hull region. By coordinating and supervising the disposal of office materials, it was determined that approximately 97 percent of the waste resulting from the move was successfully diverted from landfill disposal to either recycling streams or for reuse within PWGSC offices. PWGSC intends to offer the Green Move Protocol service to clients.

Technology Driven

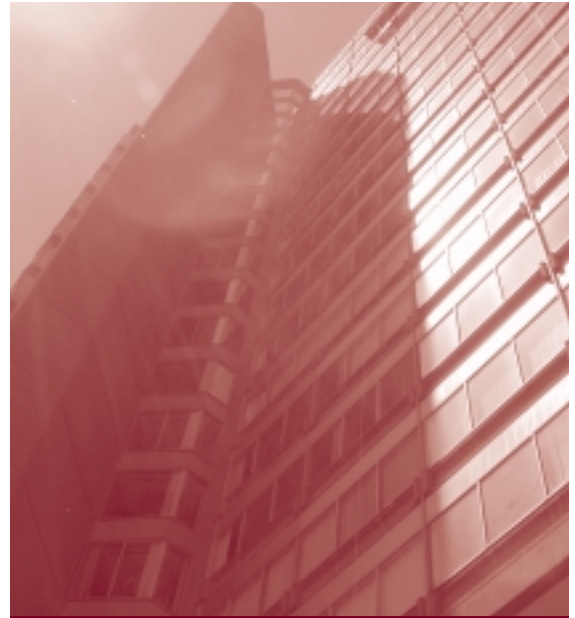
PWGSC evaluates emerging technologies that support the sustainability aspect of office building projects. The I&S Program provides funding for the evaluation of such technologies that would help PWGSC continue to meet client requirements as well as its own sustainable development goals.

Ultra Low-Energy Buildings

ULTRA LOW-ENERGY BUILDINGS

At present, guidelines for the energy efficiency of new building design are defined by the Model National Energy Code for Buildings (MNECB). Within the context of the departmental strategy for the reduction of GhG emissions, PWGSC began the evaluation of the potential impacts of the latest energy-efficient technologies, such as high-performance windows and solar air-preheating systems, and the feasibility of applying them in small and large office buildings. Life-cycle costing is applied to all measures.

The resulting information has been incorporated into a computer simulation model that will calculate the energy savings outcome when specific sets of measures are used in combination. Initial computer simulation results have shown that an additional 25-percent energy reduction can be attained when compared to the current MNECB, without first-cost increases. The goal is to create a technical report that will make recommendations for new NMS specifications. This would allow for transfer of the knowledge to the building industry to contribute to the creation of a unified approach to new building designs.



Preliminary research by PWGSC in the area of ultra low-energy buildings suggests there could be benefits if used in upgrading windows in existing buildings.

Researching Distributed Generation Technologies

RESEARCHING DISTRIBUTED GENERATION TECHNOLOGIES

The I&S Program provided funding this fiscal year to investigate the benefits of installing distributed generation technologies in various PWGSC buildings throughout the country.

Successful application of a microturbine system at the Health Canada building in Scarborough, Ontario, has allowed the department to gain direct knowledge and expertise from its project partners – including Natural Resources Canada, Enbridge Consumers Gas and Ontario Power Technologies – and gain experience in a demonstration of the benefits of these technologies.

In the second phase of this three-year project, which included reviewing results from the Scarborough project, PWGSC has confirmed that these new technologies can provide economic and environmental benefits in relation to the reduction of GhG emissions. The final report on this project is expected in 2002.



PWGSC is developing sustained methods to reduce and reuse concrete and steel waste created from construction and demolition projects.

Improving Waste-Reduction Technologies

IMPROVING WASTE-REDUCTION TECHNOLOGIES

While PWGSC has committed to diverting construction waste from the landfill with its CRD waste-management practice, the I&S Program is funding another project to improve the design of buildings and building products with the goal of increasing their reuse potential when the asset is eventually renovated or demolished.

This fiscal year, the project focused on investigating currently available technologies that can be incorporated to improve the design and reuse of building materials. The two-year Waste-Reduction Technologies project will produce guidelines on the design, construction and disassembly of building components.

Energy Efficiency Through Building Recommissioning

ENERGY EFFICIENCY THROUGH BUILDING RECOMMISSIONING

Working toward the achievement of PWGSC's target to reduce GhG, a project began this fiscal year to study building recommissioning and its role in reducing carbon dioxide emissions. The recommissioning process aims to improve building performance, indoor air quality, thermal comfort, health and safety, and minimize the need for additional retrofit work. Performed regularly, it can be one of the most cost-effective approaches for improving the energy efficiency of large buildings. This year, PWGSC has teamed up with Natural Resources Canada to begin the investigation into available tools for recommissioning. It is estimated that the development and use of appropriate tools for recommissioning buildings and building services could reduce energy usage in buildings by as much as 20 percent.

BUILDING Building and Infrastructure Initiatives INITIATIVES

Developing Standards and Best Practice Guidelines

DEVELOPING STANDARDS AND BEST PRACTICE GUIDELINES

PWGSC works with stakeholders and industry partners to create building standards and guidelines that benefit both government and the private sector. Examples of this work include:

- ❖ CSA Standard S806, "The Design and Construction of Building Components with Fibre Reinforced Polymers (FRP)," has been developed. The final draft of the standard was completed this fiscal year. The standard will provide practicing engineers with the tools to design buildings using FRP materials and will ultimately be included in the NMS.
- ❖ *The Best Practice Guidelines for Building Envelope Systems* is being drafted with the Canada Mortgage and Housing Corporation, the Canadian Precast/Prestressed Concrete Institute and private industry. This guide illustrates how various wall components and systems should be used as an integral part of the building envelope.
- ❖ Design-building specifications will be developed and incorporated into the NMS to ensure consistent standards for users of infrared thermography technology. The guidelines will be finalized in 2002 and will also be used as the basis of the ISO standards for the use of infrared thermographic inspection of walls for insulation irregularities.

PWGSC uses I&S Program funding to contribute to the evaluation and demonstration of new technologies for cost-effective implementation as well as operation and maintenance in office buildings and other structures.

Controlling Humidity Levels in Heritage Buildings

CONTROLLING HUMIDITY LEVELS IN HERITAGE BUILDINGS

Several PWGSC projects are looking at how to maintain comfortable humidity levels within heritage buildings while preserving the stone work of the buildings.

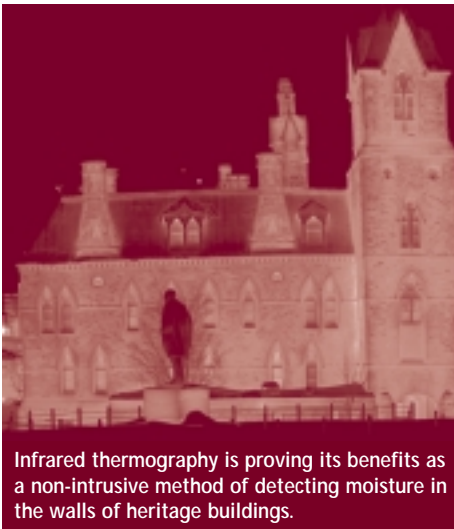
Bedford Row

Throughout the past winter, PWGSC continued to monitor the data readings from wall sensors installed throughout the Bedford Row building located in Halifax, Nova Scotia. Researchers have found that they are able to raise the building's winter humidity levels to 22-25 percent without detecting any signs of mould, fungi or condensation inside exterior wall assemblies. Prior to this project, winter humidity levels were recorded at 17-20 percent, which are below accepted winter humidity comfort levels.

This information is being included in a set of guidelines prepared by PWGSC for heritage building specialists. The outcome of this project will provide long-term benefits by helping preserve the longevity of these historic buildings while maintaining a working environment that is both comfortable and healthy for occupants.

Dynamic Buffer Zone

The Dynamic Buffer Zone (DBZ) is proving to be an important system for stone heritage buildings with the need for higher levels of humidity. The DBZ system works by pumping warm, dry air into spaces within the exterior walls of buildings to stabilize the temperature and address condensation problems. This past fiscal year, a DBZ system was installed in the Parliamentary Precinct's Bank of Nova Scotia building on Sparks Street in Ottawa. PWGSC also continued to monitor results of the DBZ system installed during the retrofit of the East Memorial Building in Ottawa. Results from this project are providing valuable information on how to prevent condensation and moisture damage during winter months. This information is of value to clients who are interested in installing the system in other heritage buildings, archives and museums.



Infrared Thermography

PWGSC's research into non-destructive procedures to detect moisture and mould growth in wall assemblies using infrared thermography was the topic of a series of internal presentations. This technology is gaining momentum as a preferred method to detect moisture and moulds within various wall systems and maintain healthy, sustainable office buildings for PWGSC's staff and clients.

This fiscal year, PWGSC worked with the Canada Mortgage and Housing Corporation and private consultants to use infrared thermography to detect moisture in the walls of condominiums being retrofitted in Vancouver. Projects such as this are addressing both the health and safety issues surrounding the presence of mould within external walls, and the energy and durability issues related to moisture contamination within these assemblies.

The final report on the use of infrared thermography technology will be shared at presentations with PWGSC clients and private industry in the coming fiscal year.

Fire-Resistant Building Materials

PWGSC has identified new technologies that increase the durability and sustainability of office buildings. The department has found that slabs containing Fibre Reinforced Polymers (FRP), which are non-corrosive and possibly more durable than traditional steel-reinforced concrete, could become a long-term, cost-effective building material. This fiscal year, PWGSC and the National Research Council entered into a joint project to determine the fire resistance of FRP-reinforced concrete slabs and the thickness of the concrete cover required to protect the integrity of the materials and slabs. During this first phase of a three-year program, I&S funding was provided for a review of existing knowledge of the fire resistance of FRP-reinforced concrete slabs.

FRP-reinforced concrete slabs have the potential to reduce the number of major repairs due to corrosion and related costs and improve the durability of PWGSC's 300,000 square metres of parking garage space. Long-term, *in situ* testing is currently being done in the Laurier-Taché parking garage, located in Hull, Quebec, to determine the economic viability and expected service life of FRP rebars. Based on the research to date, FRP as a reinforcement material in corrosive environments shows great promise with potential savings of up to 20 percent in annual maintenance costs in PWGSC's parking garage structures. It should be noted that this figure is an estimate, as it is difficult to accurately quantify savings at this stage.

Seismic Safety for Heritage Buildings

SEISMIC SAFETY FOR HERITAGE BUILDINGS

PWGSC has successfully applied its innovative seismic technologies to several of its own buildings and has involved clients in further tests. In 2000-2001, PWGSC's Pacific region applied seismic measures to a heritage pumphouse on the Esquimalt Graving Dock. The pilot project was successful in proving the benefits of using cost-effective non-intrusive measures that can be applied without affecting the building's daily operations.

Development of Corrosion-Resistant Low-Alloy Steels

DEVELOPMENT OF CORROSION-RESISTANT LOW-ALLOY STEELS

Steel corrosion in PWGSC's building supply, especially in parking garages, can result in regular and costly building upgrades. In the second year of a three-year I&S project, PWGSC is working with Natural Resources Canada to develop low-alloy steels with superior corrosion resistance. This leading-edge project has the potential to triple or even quadruple the service life of steel used in concrete, which could translate into significant long-term economic benefits for building owners.

In 2000-2001, nine steel ingots of varying combinations of alloy metals such as chromium, nickel and copper were cast and rolled in the steel rolling laboratory at the Canada Centre for Mineral and Energy Technology (CANMET). PWGSC has now begun corrosion testing the ingots to compare traditional steels to these new steels and measure the cost-effectiveness of each sample to determine the design that is most likely to be easily accepted by the design and construction industries.



PWGSC works with Natural Resources Canada's CANMET Technology Laboratory to develop steels with superior corrosion resistance.

INNOVATIVE Innovative Officing Solutions SOLUTIONS

Through the flagship Innovative Officing initiative, PWGSC continues to play a lead role in promoting the design of office space that is functional, flexible, innovative, technologically advanced and responsive to the evolving needs of employees. Through support from the I&S Program, PWGSC collaborates with regional partners, clients, agencies and private industry to ensure that productive, supportive state-of-the-art work environments are provided in line with the Government of Canada's goal of becoming an employer of choice.

Post-Occupancy Evaluation

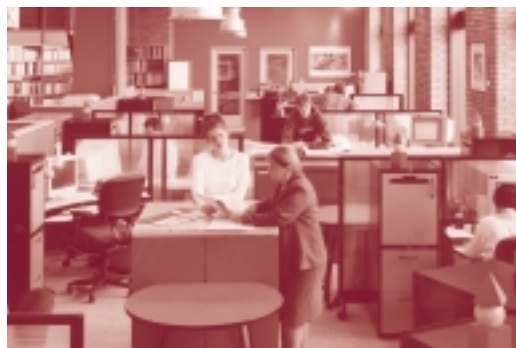
A post-occupancy evaluation was conducted at the demonstration site at 25 Eddy Street, in Hull, Quebec to track employee satisfaction and project delivery, and to build on lessons learned. In response, existing workstations were traded for furniture and screens on wheels to allow for ease of movement in the event of organizational changes, minimizing costs and disruption. The improved demonstration site is used by PWGSC for both virtual and actual tours, and to promote a multifunctional office approach.

By using a consistent evaluation method, trends analysis will provide direction for future accommodation projects.

Research and Knowledge Sharing

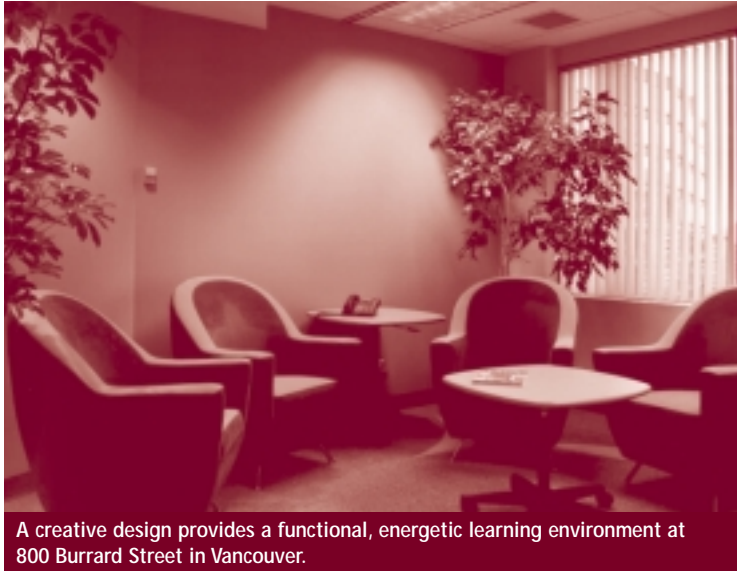
This fiscal year, PWGSC researchers visited private and public companies to share ideas and learn about new developments in the areas of human resources, technology, connectivity and sustainability. Some examples of innovative officing sites that were visited include Nortel offices

The I&S Program is funding projects which will contribute to the workplace of choice for public servants housed in PWGSC buildings.



The development of innovative office designs are moving office concepts away from traditional cubicles to open-space offices that provide employees with individual work spaces while fostering the spirit of teamwork.

in Ottawa and Montréal; Dunn & Bradstreet and Alias Wavefront in Toronto; and Federal Technology Services in Washington, D.C. Researchers also visited the Intelligent Workplace Lab at Carnegie Mellon University in Pittsburgh and attended the International Interior Design Exposition, in Toronto, as well as exhibited an information booth “Step into your Future” at the International Facilities Management Association Conference in New Orleans. Through the use of seminars, information displays and demonstrative tours, PWGSC has continued to foster the implementation of innovative office solutions throughout PWGSC and its client departments.



A creative design provides a functional, energetic learning environment at 800 Burrard Street in Vancouver.

Projects Across the Country

To help promote innovative and sustainable office accommodation approaches with clients across the country, the I&S program has supported the following projects.

800 Burrard Street, Vancouver

In the Pacific region, the I&S Program sponsored an initiative whereby PWGSC employees on the 14th floor at 800 Burrard Street worked with a consultant to design their new office, resulting in an open-space concept that uses bright colours and creative design to provide a functional energetic learning environment. The floor will be used as a demonstration site for PWGSC employees and clients.

740 Bélair Avenue, Montréal

In the Québec Region, PWGSC started planning for a more holistic approach for replacing a government building located at 740 Bélair Avenue. Instead of simply tearing the existing building down and putting up a similar structure, PWGSC saw this as an opportunity to incorporate green building concepts into each step, including dismantling the old building, decontaminating the site, reusing and recycling the building's materials into the new structure and managing the new building's operations.

The I&S Program provided funding to bring together a team of experts – architects, engineers, energy and environment specialists, and project and maintenance managers – to evaluate the project and make recommendations. The team examined the existing building with a view to optimizing its deconstruction. The team also determined the extent of contamination in the existing building, the methods of decontamination to be used and their cost implications. This information was very helpful in preparing the procedures for documenting this Green Building Project and to establish baseline data to support validation.

Ten of the team's recommendations were retained and will be included in the project. The new building is expected to be completed in 2003.

Universal Design Principles

To fulfil its commitment to the Government of Canada Disability Strategy, PWGSC has been chairing the Interdepartmental Working Group on Universal Design to assess the feasibility and impact of incorporating “universal design” principles into federal office buildings. Universal design refers to products and environments that can be used by all people, to the greatest extent possible, without the need for adaptation or specialized design.

The results of this initiative have been laid out in PWGSC's report entitled *Impact of Universal Design on Federal Office Facilities*. This fiscal year, extensive consultations were undertaken with Government of Canada custodial departments, central agencies, the Canadian Standards Association, building code authorities and consumer groups. Feedback from these consultations has been very supportive and has been incorporated into a final report to be shared with the federal community. It is expected that pilot projects will be undertaken to test the results of the report.

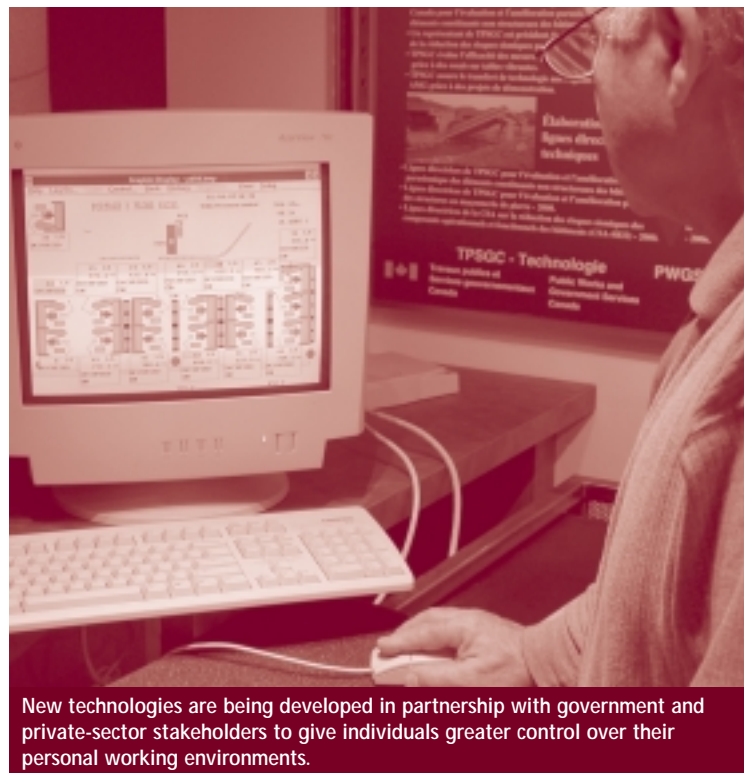
Developing Barrier-Free Design Standards

I&S funding supports PWGSC's participation on the CSA's Technical Committee on Barrier-Free Design. As part of the process of updating the CAN CSA B651 95 "Barrier-Free Design" standard this fiscal year, committee members formally recommended, along with industry and government partners, that this standard be adopted in place of current accessibility requirements identified in the National Building Code of Canada.

Lighting Solutions

The I&S Program has contributed funding to allow PWGSC's participation in a consortium that includes the National Research Council and private-sector partners. This consortium has been created to develop innovative personalized lighting solutions for office spaces by quantifying, in a laboratory setting, the economic and environmental value offered by several types of lighting systems and control technologies.

This fiscal year, the first of a four-year project, a lighting control laboratory was created, and testing was done using both computer simulation and human volunteers. Analysis of these initial tests has proven that the use of personal lighting systems enhances both the quantity and quality of lighting and reduces energy consumption. Initial results have shown that allowing for more individual control over office lighting can translate into an energy reduction in watts per square metre by more than 50 percent over traditional office lighting. It is expected that new lighting standards and best practices coming out of this project will benefit both PWGSC and clients in the form of increased energy savings and improved satisfaction.



New technologies are being developed in partnership with government and private-sector stakeholders to give individuals greater control over their personal working environments.



PWGSC, in partnership with the National Research Council of Canada, is creating guidelines that will assist property and project managers design functional spaces that take into consideration the effects of office layout on acoustics.

Acoustics in Open-Plan Offices

ACOUSTICS IN OPEN-PLAN OFFICES

In 2000-2001, as part of its innovative research to improve the functionality and comfort of the office environment, PWGSC collaborated with other government departments and private-sector partners on a project managed by the National Research Council of Canada to determine which design approach is best for a particular office. This fiscal year's work focused on measurements taken in simulated workstations and the effect of furniture and screen placement on noise diffraction. By varying the height of screens and reorganizing work stations, it was found that the acoustic characteristics of open-office space could be improved.

This year's study marked the second year of the four-year project that will lead to design guidelines and the creation of software to assist designers and property and project managers in addressing acoustics issues in open-plan offices.

Intelligent Building AUTomation Systems Project

INTELLIGENT BUILDING AUTOMATION SYSTEMS PROJECT

Inefficient operation of a building's mechanical systems can create energy loss, equipment failure and increased operating expenses. Through I&S funding, PWGSC worked in conjunction with Natural Resources Canada and industry partners on the Intelligent Building AUTomation Systems (IBAUTS) project. IBAUTS partners are examining and developing innovative technologies and techniques for implementing intelligent building controls into their real property inventory.

During the first year of the three-year project, in collaboration with its IBAUTS partners, PWGSC examined advanced automation systems, including redesigned interfaces for building operation and control systems, and using input from building occupants to control air and light output.

A key benefit of this project is the potential impact that intelligent building systems can have on energy consumption, which in turn leads to reduced GhG emissions. The implementation of IBAUTS into PWGSC buildings could improve both energy consumption and thermal comfort by up to 30 percent.

OUTREACH Outreach Activities ACTIVITIES

Technology Transfer

TECHNOLOGY TRANSFER

The I&S Program supports seminars and workshops to encourage the dissemination of information collected through PWGSC projects to staff and clients, and to academic, consultant and private-sector professionals. Many seminars were offered in 2000-2001 to demonstrate new practices relating to real property management. Sessions were held on new techniques and practices for building envelopes and heritage conservation.

TechnoClips

TECHNOCLIPS

A new publication allows Government of Canada employees to access information about the latest innovations and developments resulting from I&S-funded projects. *TechnoClips* is a bimonthly on-line publication that was launched in January 2001 and is available on Publiservice, the government-wide extranet.

It can be accessed at: <http://publiservice.gc.ca/institutions/newsletters/technoclips/index-e.html>.

Web Site Support

WEB SITE SUPPORT

The I&S Program encourages the development of information dissemination vehicles such as the Green Building Materials Virtual Sample Room – a Web site (www.designinggreen.com) that is promoting the use of environmentally sustainable building materials. This fiscal year, the list of products included on the site – such as glass, insulation and paints – was substantially increased.

The site's virtual sample room helps consumers identify products and services that are less harmful to the environment. Founding partners of the Web site include the Canada Mortgage and Housing Corporation, the Department of National Defence, Human Resources Development Canada and Environment Canada.

A key element to technology development and transfer is knowledge sharing among PWGSC staff, clients and other stakeholders. The I&S Program funds a variety of activities aimed at communicating and promoting the results and successes of the program.



More environmentally-friendly products are listed in the virtual sample room, available at www.designinggreen.com.



Publications

Several documents were published this year with the support of I&S funding. *The Environmentally Responsible Construction and Renovation Handbook*, originally published jointly with Environment Canada in 1995, was revised in 2000-2001. It acts as a resource book for building professionals to provide information on issues relating to green construction, including waste management, lighting strategies to gain energy efficiency and "green roofs." A companion document to this handbook was also created this year, in collaboration with Environment Canada and private consultants. *Green Office at a Glance* uses a checklist format to highlight sustainable methods of greening an office space, renovation project or new building construction.



A third document published in 2000-2001 was the revised edition of *An Architect's Guide for Sustainable Design of Office Buildings*. The guide provides building professionals with current sustainable design practices for office buildings. Originally published in 1996, the revised edition includes references to relevant NMS in the various areas, such as landscaping, interior design, mechanical systems and electrical services.

PWGSC Collaborators

The achievements highlighted in this report demonstrate the benefits of our cooperation with other federal departments and partners in industry and education. The following list contains some of the many organizations that collaborated with PWGSC to make the I&S Program successful.

Other Government of Canada Departments

- Natural Resources Canada (Program for Energy Research and Development, Energy Efficiency Lab, Canada Centre for Mineral and Energy Technology)
- National Research Council of Canada (Institute for Research in Construction, Canadian Code and Materials Commission, National Building Code of Canada)
- Canada Mortgage and Housing Corporation
- Department of National Defence
- Health Canada
- Human Resources Development Canada
- Royal Canadian Mounted Police
- Environment Canada
- Industry Canada
- Standards Council of Canada

Non-governmental Organizations

- International Organization for Standardization (ISO)
- Canadian Precast/Prestressed Concrete Institute
- Building Envelope Council of Ottawa Region
- American Society for Non-Destructive Testing
- Canadian Standards Association (Technical Committee on Barrier-Free Design)
- Royal Architectural Institute of Canada
- International Energy Agency
- Université de Montréal
- University of Ottawa
- Carleton University
- University of Alberta
- Université de Sherbrooke
- University of Manitoba
- University of Taiwan
- Royal Military College of Canada
- Canadian Process Control Association
- Various private-sector organizations