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# **The Greening of Government:**

A Study of How Governments Define the Green Agenda

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*Executive Summary*

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## **Foreword**

What are governments doing to ‘green’ *themselves*? How do they define their green agendas? What are the top priorities for the near term? Who leads the green agenda? Will we see the rise of a CGO – a Chief Green Officer? Are green agendas different for cities compared to states or federal agencies? Do countries differ? These and other questions led the Institute for Electronic Government to partner with Keystone Strategy, Inc. in a global research study to explore the greening of government. This document is an executive summary of the findings.

The study methodology included lengthy interviews with executives at all levels of government and industry experts as well as an exhaustive literature search.

The findings are only a snapshot in the infancy of the green government movement. As such, the picture will change dramatically as the movement matures. Ask five people and you will get five definitions of ‘green.’ One study participant characterized the green government movement as still in an ‘evangelistic’ stage. Individuals, businesses, as well as the public sector are struggling to climb a steep learning curve in a rapidly-changing environment. The lack of common vocabulary and standards, as well as difficulties measuring baseline carbon footprints and thus the ability to track progress against mandated energy reductions, are all major hurdles. One participant stated “We don’t have the information to know if we’re making progress or not, but that’s not stopping us.”

Despite uncertainties, commonalities in green government strategy are striking. Without exception, the top three priorities on the green agenda for governments today and in the near term are green buildings, green transportation, and green procurement – all of them associated with energy reduction. Like the private sector, government initiatives are driven by the inextricable link between economics related to global energy demand and environmental implications related to climate change.

As the green government movement matures, we will no doubt witness shifting priorities, emerging management structures, new technologies, and increased focus coupled with significant investments. One thing is certain. Governments are barely past the starting line of a global economic and environmental marathon in a race against time.

Finally, thank you to study participants for taking time to have this important conversation. We hope you find the information useful as you move forward.

**Janet Caldwell**

## Scope

The scope of the study was limited to how governments are “greening” themselves on a day-to-day, operational basis. We reviewed government policies only to the extent that current mandates and legislation directly affect government operations.

## Objectives

The objectives of the study were to learn how governments define their “green agendas,” and how they segment and prioritize specific initiatives in the near term.

## Methodology

The methodology included both primary and secondary research. A literature search was made of global regulatory and industry data for background information. Primary research consisted of a total of 45 one-hour phone interviews. Participants included government executives from the United States, Canada, Europe, and Asia at national, state, and local government levels. In addition, industry experts were interviewed, including experts within IBM – those responsible for IBM’s internal green agenda as well as environmental researchers at IBM Research, and others. A ten-question survey was used as a guide. However, because the study was designed to be probing and qualitative in nature, interviewees were allowed to digress and encouraged to elaborate. Primary research was conducted during the fourth quarter of 2007.

## Research Findings: The Green Agenda

### *The Context and Momentum*

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More than a decade ago the red flags of climate change were hoisted. Yet, global consensus and commitment was elusive. Today, the green cacophony has risen to a deafening crescendo with irrefutable evidence. Nearly every city, state and national government in the world has mandated energy reduction targets within this decade. Complex economic and geo political forces have largely overtaken any debate. What was the tipping point? In short, ten years ago oil prices averaged \$20 a barrel. Climate change and energy supply now represent an inextricably intertwined global economic and environmental crisis:

- “At the root of the stunning rise in the price of oil, up 56 percent this year and 365 percent in a decade, is an unprecedented boom in the world economy. If the Chinese and Indians consumed as much oil for each person as Americans do, the world’s oil consumption would be more than 200 million barrels a day, instead of the 85 million barrels it is today. No expert regards that level of production as conceivable. Forecasts of future oil prices range widely. Some analysts see them falling next year to \$75, or even lower, while a few project \$120 oil. Virtually no one foresees a return to the \$20 oil of a decade ago.” *Rising Demand for Oil Provokes New Energy Crisis*, [New York Times](#), November 9, 2007.
- “There is little surplus oil supply to compete for existing demand. Much of the reason for this strong demand is the powerful global economy, which demands ever-greater supplies of oil. In such a seller’s market - the petroleum industry is producing 30 billion barrels of oil per year but only discovering ten billion - there is not enough competition among oil producers to drive prices down, or keep them at lower levels. Many factors are now in play. These include war, terror and political instability; industrial incidents like plant and pipeline failure; storms and abnormally high and low temperatures; rapid economic growth in the developing world; industry reports and financial news and rumor, especially as they apply to oil demand and supply.” (Peter McKenzie-Brown, *One Decade into a New Era*, [Energy Bulletin](#), October, 2007.

- Sir Nicholas Stern, former VP of the World Bank and former professor at the London School of Economics, concludes in his report, The Stern Review: Economics of Climate Change, if action is not taken immediately to stem global warming: floods could displace 100 million people, one out of six people in the world could be affected by water shortages, droughts might be so severe as to cause massive migration, and the extinction of many forms of wildlife could happen. All this could be avoided if 1% of global gross domestic product (GDP) is spent to curb global warming, and in the end for every £1 invested now £5 or more will be saved in the future. Doing nothing could reduce global GDP by as much as 20 percent.
- A joint McKinsey and Conference Board report, Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?, November 29, 2007, states almost 40 percent of the opportunity for greenhouse gas reduction identified comes from options that more than pay for themselves over their lifetimes, thereby creating net savings for the economy. For example, improving energy efficiency in buildings, appliances and industrial sectors could yield net savings while offsetting some 85 percent of the projected incremental demand for electricity in 2030.”
- In their 2007 state-of-the-state addresses, a bellwether of top priorities in the states, 45 of 50 U.S. governors endorsed energy conservation or alternative sources of energy, up from less than half of the governors five years ago.

*On January 23, 2008, the European Commission released its Climate Action and Renewable Energy Package, outlining the European Union’s commitments to fight climate change and promote renewable energy up to 2020 and beyond. The EU has committed to reducing its overall emissions to at least 20% below 1990 levels by 2020, and is ready to scale up this reduction to as much as 30% under a new global climate change agreement, if other developed countries make comparable efforts. It also sets a target to increase the share of renewable energy use to 20% by 2020. The package details contributions expected from each member state to meet targets and proposes a series of measures to help achieve them.*

***Economics is a primary driver and underlies secondary drivers of the green agenda.***

One third of respondents cited executive orders or regulations as the primary drivers of their green agendas. Twenty five percent named economics. Nearly one third cited ethics or sustainability as the key drivers. And, ten percent identified energy independence. However, when queried further, almost 70% of respondents referred to economic factors as they described reasons for their responses. For example, many executive orders were initially motivated by economics - cost savings associated with energy reduction. Those who named energy independence associated it with economic implications. Paradoxically, although study participants are motivated by different forces, they share common green priorities all related to energy reduction (green buildings, green transportation, and green procurement).

The literature search conducted in parallel with primary research also highlighted economic development as an important green motivation:

- Massachusetts Governor Patrick, in his January 24, 2008 state-of-the-state address, said, “We joined the Regional Greenhouse Gas Initiative, and launched new bio fuels and green building standards. We won the national wind blade test facility, and supported Cape Wind and other clean energy projects. As a result, the clean energy sector has become one of the strongest growth industries in the Commonwealth and one of the most promising in the world.”

- Global Insight, Inc., in their November, 2007 report, U.S. Long-Term Economic Forecast: Total Government Purchases of Goods and Services, 2002-2014, projected the Federal government would spend \$999 billion in goods and services in 2007. State and local governments would purchase \$1.74 trillion. Worldwide, governments' tremendous green purchasing power is stimulating new markets and economic development. Government procurement of energy-efficient products and clean energy is clearly an important economic engine.”
- U.S. Communities is a national purchasing forum that pools the purchasing power of over 87,000 public agencies. According to the National Association of Counties, in 2007, total purchases on *one* contract for school and office supplies exceeded \$650 million and 26% of those purchases were for green products – up from only 10% in green purchases in 2006.

*In The Stern Review: Economics of Climate Change, Stern concluded that the drive to reduce carbon dioxide emissions could fuel a \$500 billion annual market in new technologies.*

In the private sector, going green makes as much economic sense as environmental sense. The private sector has already embraced “green as the new black” especially when it comes to the built environment:

- ConAgra’s sustainable development program is entering its 15th year. The Nebraska-based food giant launched the effort as a means to find and implement practices that are *simultaneously* good for business and good for the environment. In 2004, the company reported a five-year reduction in operational costs of more than \$60 million.
- Touted as the U.S.’s greenest food manufacturing plant, Kettle Foods’ new 73,000 square-foot plant was awarded Gold level LEED certification in 2007. Among other accolades, the plant offsets 100% of electricity use with renewable wind power through wind turbines installed on the roof.
- Between 1990 and 2006, IBM Corporation reported saving 4.5 billion kWhr of electricity consumption, avoided nearly 3 million metric tons of CO2 emissions (equal to 44 percent of the company’s 1990 global CO2 emissions) and saved over \$290 million through its annual energy conservation actions. IBM expects to double the computing capacity of its data centers within the next three years ... without increasing power consumption or its carbon footprint.

The public sector appears to be following suit by virtue of the fact that initiatives which produce the best environmental returns also produce the best financial returns in cost savings. Furthermore, cost savings, coupled with political capital associated with rising green public opinion, partially explains why the green movement enjoys significantly more political support today – regardless political party – than it did in the past.

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***The green government movement is in its infancy.***

Study respondents generally struggled to articulate a clear government-wide agenda for their respective city, state or agency. Instead, they elaborated on individual initiatives or referred to executive orders or legislation that mandate their attention and action. The lack of a common vocabulary and understanding impedes progression up the green learning curve. The need for extensive green education was frequently expressed is essential to decision making and execution.

## ***Leadership is fragmented.***

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In general, a single person or group does not lead or ‘own’ the green agenda. A small minority report centralized green authority; but, even where a lead environmental agency exists, respondents voiced frustration over the lack of authority and accountability throughout their agencies. The absence of line-item funding for the green agenda was also prevalent. Typically, expenses associated with green initiatives are absorbed within existing budgets or self-funded through energy cost savings. Few budget and funding incentives exist because energy bills tend to be paid centrally and costs allocated throughout the organization rather than by actual use. Fragmented leadership results in a fragmented agenda driven at the grass roots rather than by a coordinated overall strategy.

## ***The Top Three Priorities are Green Buildings, Green Transportation, and Green Procurement.***

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Although few respondents reported a formal, stated government-wide green agenda, aggregate responses from government study participants (90%) leave no doubt that the top three green government priorities worldwide today are green buildings, green transportation and green procurement.

### **Green Buildings**

The majority of government respondents named green buildings as their number one priority. And, it is not surprising given the facts. The built environment consumes 18-40% of a developed country’s energy (*APEC Energy Database and IEA 2003 Energy Statistics*). Indeed, governments may have the most to save of any industry by greening buildings. Governments are routinely the largest building owners and landlords. The U.S. government owns or leases 500,000 buildings covering 3.1 billion square feet of floor space accounting for 2% of all U.S. building related greenhouse gases (*The Federal Commitment to Green Building: Experiences and Expectations*, 2003; Canada Greening Government Website). Signed into law on August 8, 2005, EPAAct 2005 requires federal agencies to reduce energy intensity every year in their facilities by 2 percent per year beginning in FY 2006, up to a cumulative 20 percent reduction by the end of FY 2015 (compared to a FY 2003 baseline).

In the United States, the construction market comprises 14.2% of the \$10 trillion U.S. GDP, including all commercial, residential, industrial, and infrastructure construction (*2006 U.S. DOE Buildings Energy Databook*).

Tiered green building certifications around the world play a major role in green building mandates and initiatives. The U.S. Green Building Council is one such certification body with its Leadership in Energy and Environmental Design (LEED) program. Similar efforts include Green Globes in Canada, Comprehensive Assessment Systems for Building Environmental Efficiency in Japan (CASBEE), and the Building Research Establishment’s Environmental Assessment Method in the UK (BREEAM).

### ***According to the U.S. Green Building Council, buildings in the U.S. account for:***

- ***70% of electricity consumption,***
- ***39% of energy use,***
- ***30% of greenhouse gas emissions,***
- ***40% of raw materials use (3 billion tons annually, globally)***
- ***30% of waste output (136 million tons annually), and***
- ***12% of potable water consumption.***

The U.S. Army has budgeted \$41 billion in new construction worldwide between FY 2008 and FY 2013 – *all* of it earmarked green – with the goal of silver LEED certification for every project. Seventeen states, eight Federal agencies, and numerous cities have adopted LEED requirements for all new building construction and all renovations of buildings over a certain number of square feet.

Evidence grows that green construction compared to traditional construction methods is cost effective and delivers significant returns over the life of the asset:

- Davis Langdon, an international sustainable design expert, states in his 2007 study, The Cost of Green Revisited, that “there is no significant difference in average construction costs for green buildings as compared to non-green buildings.” The study included an exhaustive review of hundreds of buildings across industries.
- In March, 2007, Stanford Daily reported on a recent study by Greg Kats of Capital E, “Schools could be healthier, more comfortable, and more productive by using green building techniques for an initial cost premium of under 2%, but with *cost savings of twenty times the cost of going green* over the lifetime of the school. Average national school construction cost is \$150/ft<sup>2</sup>, and the typical cost of greening was an additional \$3/ft<sup>2</sup>, or an additional 2%. Over time, green schools use 30% less energy and water than conventional schools. These changes save water and reduce carbon emissions, and result in direct savings of \$11/ft<sup>2</sup> during the life of the school, which is almost *four times* the cost of greening.”

***Governor Schwarzenegger's California Sustainable Building Task Force reports that investing from 0% to 2% in a building's construction cost for sustainable design results in 20% savings over the life of the building – more than ten times the initial investment.***

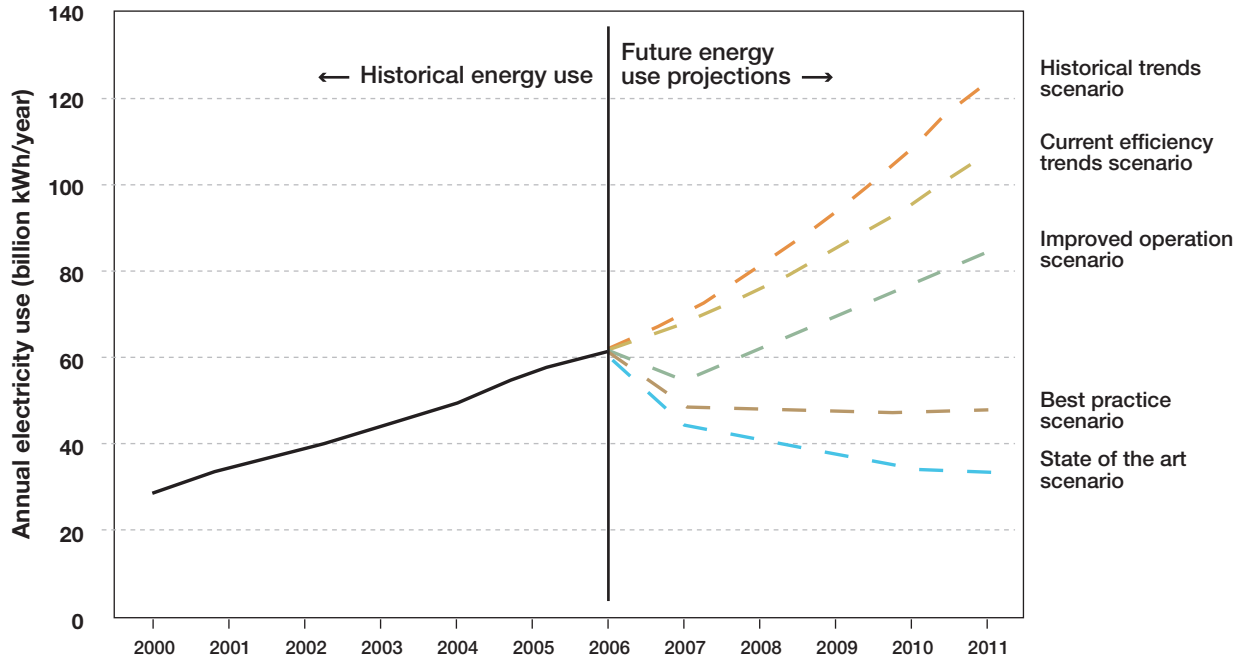
#### Green Data Centers

For buildings with data centers, energy consumption statistics are even more staggering. Lighting, heating, ventilation and air-conditioning systems are only part of a building's energy appetite. Energy use is also directly correlated with office equipment distributed throughout a building – PCs, printers, fax machines, copiers. Energy consumed can somewhat be reduced by using certified energy-efficient equipment. However, the data center, where computing equipment is highly concentrated, is the 800 pound gorilla. Each square foot of an average data center uses 10-30 times more energy than the equivalent square foot of office space:

- The Environmental Protection Agency and ENERGY STAR Report to Congress on Server and Data Center Energy Efficiency, Public Law 109-431, August, 2007, estimates that servers and data centers in the U.S. consumed about 61 billion kilowatt-hours in 2006 at cost of \$4.5 billion in electricity. That is roughly equivalent to electricity consumed by some 5.8 million average U.S. households. Federal servers and data centers account for approximately 10% of this electricity use (6 billion kilowatt hours) at a cost of about \$450 million annually. Server hardware is no longer the primary cost in data center economics. The purchase price of a new server is already exceeded by the capital cost of power and cooling to support it and will soon be exceeded by lifetime energy costs of the server itself. As depicted in the following chart, *the EPA report found data center electricity has doubled since 2000 and, left unchecked, will double again between 2006 and 2011:*

## Comparison of Projected Electricity Use, All Scenarios, 2007-2011

Chart recreated from the [Report to Congress on server and Data Center Energy Efficiency Public Law 109-421](#), U.S. Environmental Protection Agency, ENERY STAR Program, August 2, 2007.



— When IBM’s CFO saw energy costs skyrocketing out of control five years ago, a study of its own eight million square feet of data centers in six continents revealed that data centers comprise 6% of total space, yet account for 30% of total energy use. And, energy costs were growing at 18% a year. Each square foot of an average data center uses 10-30 times more energy than the equivalent square foot of office space.

In data centers, 60%-70% of energy consumed is by its surrounding building infrastructure and 30%-40% is consumed by the computing equipment itself. Most of the infrastructure cost is from air-conditioning systems on the computer room floor and chillers (on roof or back of buildings) that create the coolant pumped into the data center. The EPA concluded that state-of-the-art practices, such as those outlined below, could save 55% of annual data center energy costs compared to 2006:

— Typically, individual servers, storage and network devices have notoriously low utilization rates and generate enormous energy loads. By aggressively consolidating and virtualizing servers and storage, the amount of equipment and energy consumption can be reduced dramatically. Virtualization allows an organization to replace multiple dedicated servers that operate at low utilization levels into one host server that provides the same services and operates at a much higher utilization level. For example, the U.S. Postal Service eliminated the need of 791 of its 895 physical servers through aggressive virtualization and saved 3.5 million kWh per year.

- Even greater energy-efficiency gains are possible by optimizing data center infrastructure systems and operations such as airflow management, temperature and humidity, more efficient uninterruptible power supply, high-efficiency power distribution, water chillers, variable speed fans, and pumps, and systems management hardware and software.

## **Green Transportation**

Green transportation, the number two priority, includes congestion charging, fleet management, and tele-work initiatives. Like green buildings, the goals of green transportation initiatives are to decrease overall energy consumption while increasing the percentage use of clean energy, and to save money.

### Congestion Charging

Congestion charging is a traffic management innovation using state-of-the-art technologies to ease urban traffic congestion and emissions. Stockholm currently has one of the most successful systems in the world and the largest in Europe. Vehicles in congestion zones are taxed for road use depending on the time of day, particularly during peak traffic times. A system of laser, microwave tag and beacon, and camera technologies photograph front and rear license plates and relay images to a central system. Images are processed using optical character recognition technology. Data concerning the vehicle owner is then extracted from the National Car Registry and billing information is sent to financial applications, which issue tax notices and handle payment and fines. Drivers settle their accounts by direct debit if they have a transponder installed in the vehicle, or can pay at some retail stores, at banks, or over the Internet. Taxes collected over the cost of the system are earmarked for transport improvements.

In Stockholm, not only are traffic congestion and travel time reduced, but benefits also include decreased energy consumption and decreased air pollution. After the initial seven-month pilot, traffic was down 20-25%, traffic speeds were up, use of public transit increased by 40,000 people per day, and greenhouse gasses fell nearly 40%. Public transport time schedules even had to be redesigned because of the dramatic decrease in congestion – increase in speed & travel time. By referendum, Stockholm voters approved a permanent implementation and the Swedish Parliament voted approval in 2007. Among others, Singapore, and cities in the UK, Chili, and Norway employ congestion charging methods. Numerous other major world cities are currently investigating implementations, including New York City, San Francisco, Copenhagen, Birmingham, and Manchester.

### Fleet Management

Green fleet management initiatives include replacing or converting fleet vehicles with energy-efficient alternative fuel vehicles, as well as optimizing transportation routes to reduce mileage and fuel consumption. In the U.S. Federal government, agencies that operate fleets of at least 20 vehicles are required to reduce total consumption of petroleum products by 2% annually through 2015, while increasing consumption of non-petroleum-based fuel by 10% per year.

According to the GSA FY 2006 Federal Fleet Report, the U.S. Federal government owns 630,740 motor vehicles worldwide. Nearly 63,000 vehicles are replaced each year. In January 2007, President Bush signed *Executive Order (E.O.) 13423: Strengthening Federal Environmental, Energy, and Transportation*, a mandate that requires U.S. agencies with 20 or more vehicles to decrease petroleum consumption by 2% per year relative to their fiscal year (FY) 2005 baseline through FY 2015. The order also requires agencies to increase alternative fuel use by 10% per year relative to the previous year and to purchase plug-in hybrid vehicles when life-cycle cost analysis demonstrates the cost to be reasonably similar to other vehicles. The Energy Policy Act (EPAAct) of 1992 set forth

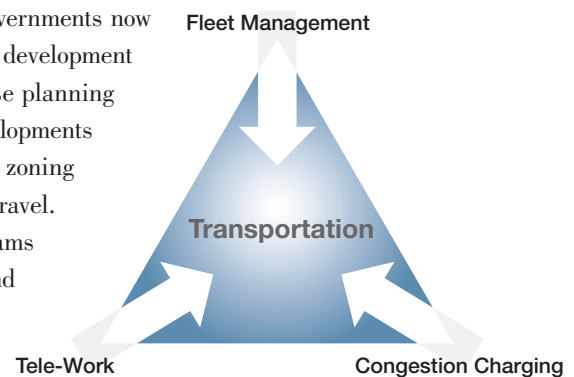
statutory requirements for the acquisition of alternative fuel vehicles by Federal agencies. In FY 2000 and beyond, 75% of light-duty vehicle acquisitions must be alternative fuel vehicles.

At the time of the study, 23 U.S. states had state fleet directives for clean vehicles, increasing the use of alternative fuels, and/or reducing fuel consumption. Montana Governor Schweitzer is calling for state agencies to apply a Montana CAFE (corporate average fuel economy) standard and mobilize state vehicle fleets to achieve an average of 30 miles per gallon or better. Virginia Governor Kaine's *Executive Order 48 (2007)* is fairly typical with regard to minimizing vehicle miles (and thus fuel): "All agencies and institutions shall take necessary actions to minimize vehicle miles traveled related to state operations." According to Gartner, as part of green fleet management, transportation departments "will optimize the dispatch and management of vehicles such as waste collection trucks, local police cars, and public buses by deploying Fleet Management Systems based on geographic positioning system (GPS) or cellular technology aimed at more efficiently managing resources and reducing fuel consumption and emissions."

#### Tele-Work

Tele-Work enables employees to work from home or at nearby tele-centers, rather than travel to the office. *Environmental Building News* reports that "...energy used by workers getting to work is about 30 percent more than that consumed by the building itself." Tele-working is significant at the U.S. Federal level. Fifty percent of the General Services Administration's workforce will tele-work by 2012.

Maximizing tele-work is one part of the solution. Local governments now position green building requirements within sustainable development zoning practices – green land use planning. Green land use planning encourages mixed use developments and transit-oriented developments that combine residential, commercial/office and retail in zoning ordinances that reduce worker commutes and general travel. Non-profits and NGOs partner with governments in programs like One Planet Living, sponsored by the World Wildlife Fund and BioRegional Development Group to develop sustainable communities from a holistic perspective – with goals of zero carbon, zero waste, natural habitats, local sustainable food, transport, and water. Governments also routinely support innovations to increase public transit, to promote ridesharing programs, and to facilitate people movement in inner cities with short-term rentals of electric vehicles and bicycles as green alternatives to taxicabs.



#### **Green Procurement**

Respondents identify green procurement as the number three priority. Green procurement was defined as the purchase of clean energy, alternative or renewable energy, energy-efficient green products and services, as well as emerging requirements for suppliers to conform to various governmental green policies.

- Green products generally refer to certified energy-efficient products. In the U.S., the ENERGY STAR Program and EPEAT (Electronic Product Environmental Assessment Tool) have set product standards that meet or exceed energy-efficient criteria set by the government. The European Union and many individual countries have similar programs. Online government IT procurement systems used by buyers now facilitate purchase of green products – recommending purchases based on certification programs like ENERGY STAR. In some cases, these electronic

purchasing systems block non-green purchases. More advanced practices reported in the study incorporate the total cost of ownership (life cycle costs) into green purchasing criteria and employ methodologies that compute those costs.

- As indicated earlier in the paper, increasing the percentage of green energy procured by governments (clean, alternative, renewable) is an economic and environmental cornerstone of the green movement worldwide. The *U.S. Executive Order 13423 Strengthening Federal Environmental, Energy, and Transportation Management*, January, 24, 2007, is only one example. At least 50% of current renewable energy purchases by Federal agencies must come from renewable sources.
- Supplier green requirements are a growing trend in both public and private sectors. The UK is considering carbon caps associated with consulting contracts – to cap the number of air miles traveled by consultants during a consulting engagement with the government. On January 23, 2008, Wal-Mart announced, “Wal-Mart will see that their suppliers meet specific environmental, social and quality standards by including the clause in the contracts. Further, Wal-Mart will work with suppliers to make the products on its shelves more accessible, more energy efficient and more affordable.”

### ***Challenges for the green agenda***

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Interviewees cited a range of challenges. Foremost was the lack of centralized leadership and accountability (55%). Even where a lead environmental agency exists, respondents voiced frustration over the lack of authority and accountability through government agencies. Thirty percent highlighted the lack of information/need for education as their most difficult challenge. Others challenges mentioned included difficulties measuring progress against mandates, lack of funding, difficulty prioritizing, need to modify behavior and lifestyle, the need for breakthrough technologies, politics, and poor implementation structures. The lack of funding dedicated to a green agenda seems to be compounded by diffused responsibility and accountability.

### **Energy Monitoring, Calculating Carbon Footprints and Measuring Progress**

All respondents report they are under some degree of mandated energy reduction targets within specific time frames. However, for the most part, they report having few to no effective energy monitoring systems in place. The conundrum is how to prove compliance over time without data needed to establish a baseline against which to measure progress.

The carbon footprint is the standard bearer in energy monitoring. A carbon footprint is defined as the total amount of greenhouse gases (carbon dioxide, methane, ozone, carbon monoxide, and others) relevant to climate change produced by an activity within a time frame, usually expressed in equivalent tons of carbon dioxide (CO<sub>2</sub>). Sometimes the measurement is equivalent tons of carbon (1'000 kg CO<sub>2</sub> equals 270 kg carbon) and thus the term ‘carbon footprint.’ Carbon footprints can be calculated for the world, countries, industry sectors, factories, buildings, enterprises, cities, down to individuals, a car, a refrigerator or any thing or activity that consumes energy.

There is little disagreement over the definition of a carbon footprint. However, there are major differences in practice – the boundaries of what to calculate, what factors to include and a myriad of methodologies to perform measurements and estimates. Calculating carbon footprints is both an art and a science. Some are determined by exact measurements. And, consistent with ISO recommendations, some are determined by estimation methods where either actual data does not exist or would be too expensive to obtain. Some carbon footprints represent a measure in time; others include the

entire life cycle. For example, a building's carbon footprint may be expressed at the point in time or over its lifetime to include how much raw material was used and how much waste was produced during construction.

Over time, energy monitoring and reporting will become more standardized based on quantification, better modeling and estimation approaches, and commonly accepted accounting principles.

The scope of this study was limited to how governments are currently greening themselves (reducing their own carbon footprints) on an operational basis. However, the private sector green world of carbon caps, carbon trading, carbon certificates, carbon offsets, and carbon taxes may be coming soon to a government agency near you. And, yes, even down to individuals. All loom on the horizon.

## Conclusions and Recommendations

### *A word of caution: Take a broad view.*

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One of the biggest mistakes governments can make right now is to 'not see the forest for the trees.' In this early state, take a broad view of 'green,' its many facets, and implications. Fifteen years ago, some governments defined the e-government very narrowly – as back office e-procurement – because that was one of the first e-gov initiatives widely adopted. Those governments fell behind as e-government rapidly grew to encompass portal websites, online citizen services and economic development applications, to name a few. Similarly, buildings, transportation and procurement with a focus on energy efficiency may be at the top of the list now, but the green movement is evolving even as you read this document. Start where it makes sense, but keep the entire green spectrum in mind. Other green initiative areas mentioned in the study were:

- Agriculture (particularly related to production of bio-fuels)
- Air quality
- Buildings
- Citizen engagement
- Congestion road charging
- Data centers
- Eco-tourism
- Environmental conservation (habitat preservation, water, species protection)
- Fair trade
- Fire prevention and suppression
- Fleet management
- Flood control
- Forestry and carbon sinks
- Green chemistry
- Grid management (grid computing, power grid)

*Some governments are on the leading edge. In the Netherlands, each government agency reports greenhouse gas emissions in a unified way to a centralized department. In the UK, the Department for Environment, Food and Rural Affairs (Defra) is beginning an effort to calculate its baseline carbon footprint for its agencies using an ISO standard for determining greenhouse gas emissions. In addition, the project will estimate the proportion of the footprint attributable to the use of IT as well as analysis of employee travel data. The baseline will be used to measure progress against reduction targets and serve as a role model for other UK departments.*

- Packaging
- Procurement
- Public transportation
- Recycling, life-cycle management
- Renewable energy projects (solar, wind, tidal, geo-thermal)
- Tele-work
- Urban land use planning
- Waste management (including hazardous waste)
- Wastewater treatment
- Water (clean, pumping, water utilities)
- Watershed planning
- Weather & climate modeling

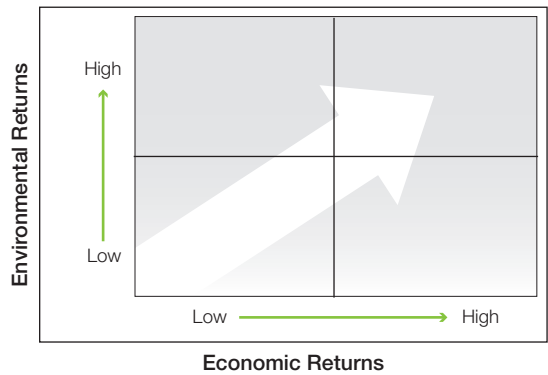
***The Green Roadmap: Governments are in various stages of development and execution.***

The aggregation of primary and secondary research data collected in this study suggests an emerging green roadmap where economic and environmental returns are highly correlated.

The beginning stage of development (lower left quadrant) is characterized by grass roots activities within an individual agency or department – sometimes one physical office within an agency. Often driven by the office green champion, initiatives tend to be quick, low-cost fixes with relatively low environmental and economic returns. Examples include recycling, changing light bulbs, centralizing printing, and turning off equipment at night or weekends.

The upper left quadrant represents the proverbial ‘low-hanging fruit’ – low cost initiatives with potential for high green impact. These are generally agency-wide activities. Using the light bulb example, this may be changing all light bulbs in all postal service facilities – office buildings, post office branches, and mail sorting facilities.

Cross-boundary, inter-governmental characteristics emerge in the lower right quadrant with moderate returns. Returns at this stage appear to be sub-optimized only by the lack of horizontal/vertical leadership and supporting management structures.



The upper right quadrant represents the most advanced stage. This stage has well defined, top-down leadership, and is supported with significant, earmarked investments and long-term vision. Activities are highly integrated and largely driven by executive order, regulation, or international agreements that require systematic enterprise-wide actions. The advanced stage incorporates the total cost of ownership (life cycle costs) into decision making. Sophisticated measurement and reporting mechanisms are linked with internal budget accountability and internal as well as external performance accountability. High green impact and high financial returns can be expected.

## ***Seven Recommendations to Move the Green Agenda Forward***

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### **1. Be proactive and get started.**

There is no excuse for doing nothing. Recognize that it will take time for formal enterprise-wide green strategies and management structures to catch up. In the meantime, plenty of best practices already exist at all levels of government and in most functional areas that can be readily replicated. Take the initiative to launch meaningful green efforts.

### **2. Put someone in charge.**

Successful execution requires leadership and accountability to achieve results. Ultimately, an enterprise-wide green leader is ideal. Consider a cross-boundary steering or advisory committee to institutionalize green and facilitate government-wide execution of green initiatives. Don't have a government-wide 'chief green officer' yet? For now, look to your own department or agency to establish a green platform from which to launch initiatives.

### **3. Develop a clear green agenda with quantifiable goals.**

Establish specific energy reduction targets and commensurate cost savings targets. Take inventory of green initiatives and adopt new initiatives to fill gaps. Create a portfolio that includes both relatively easy "low-hanging fruit" initiatives to achieve early successes in the near term as well as more difficult, ambitious initiatives that will stretch the organization but deliver significant long-term energy reductions, cost savings, and environmental benefits.

### **4. Identify your stage of development**

Assess your organization against the green roadmap. Where are you now and where do you want to be within your own time targets? The stage of development may vary department-by-department or even initiative-by-initiative within one government. Continue to benchmark best practices at each development stage. And, use the roadmap to plan steps to advance.

### **5. Determine energy baselines & track progress**

You get what you measure. Progress can only be determined against a baseline. Define energy and carbon footprint boundaries, what factors to include, what data is needed, and what calculation methodologies to employ. Find out how energy costs are distributed and billed throughout the organization and evaluate effective alternatives. Consider more granular utility metering where energy consumption is historically high, such as data centers. Work toward the ultimate goal of a standardized enterprise-wide measurement and reporting system across all agencies, including progress against stated energy reduction and cost saving targets. Weigh results during performance-based management and budget reviews. Consider incentives, sanctions, caps and offsets.

### **6. Close the knowledge gap – educate and communicate.**

First of all ...educate yourself. Devote time to become informed about green and stay abreast of rapidly-changing developments. Educate employees and citizens about what green means, how the government is responding on an operational, day-to-day basis, and what benefits are expected. Then maintain on-going communication.

### **7. Employ proven change management techniques and cross pollinate.**

Take communication a step further and start to change behavior. Encourage a sense of individual employee responsibility for success of the green agenda. Back it up with rewards and consequences. Do not discourage or underestimate the effects of grass-roots green efforts. Rather, replicate innovative successes across agencies. Create blogs for employees to share ideas. Endorse pledging efforts. Support citizen engagement projects.



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