Winds of Opportunity

Gavin Jones
North Europe Leader
Energy and Utilities
Energy supply and Utility Infrastructure is critical to growing economies

- Water & Waste
- Electric Power
- Gas

- Quality of Life
- Social stability
- Foundation for all industry
- Economic growth and competitive posture
- Energy independence/security
- Global Image
Changes in societies also impact business models and the energy value chain.

**Changing Workforce**

US Employee Age Distribution

**The Participatory Customer**

Can you currently choose a different electric power provider than you have now?

- Australia
- Germany
- Japan
- Netherlands
- United Kingdom
- United States

If you did not answer yes, would you like to be able to choose your provider?


**Impact of Economic Growth**

![Graph showing economic growth impact](chart)

**Green and Sustainable**

Projection of world energy-related CO₂ emissions in the IER World Energy Outlook reference and alternative policy scenario

Source: BA (2005), Reference Scenario, Alternative Policy Scenario
# WWF 10 IT Solutions to save the first Billion Tons of CO2

<table>
<thead>
<tr>
<th>Solution Name</th>
<th>Solution Definition</th>
<th>IBM E&amp;U Examples</th>
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<tbody>
<tr>
<td>Smart City Planning</td>
<td>Deploy modern simulation and analysis software to improve urban design and planning to optimise energy efficiency</td>
<td>Use of smartgrids as part of smart cities</td>
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<td>Smart Buildings</td>
<td>Use sensors and controls in buildings to improve efficiency and tailor energy use to energy needs</td>
<td>Linkage of energy efficiency and energy management systems</td>
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<tr>
<td>Smart Appliances</td>
<td>Utilise IT components (Microprocessors and ASICs) within appliances to improve efficiency and tail efficient appliance use with actual needs</td>
<td>Also linkage of appliances to energy pricing</td>
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<td>Dematerialisation Services</td>
<td>Use IT as a form of &quot;service delivery&quot; substituting physical products and interactions - i.e. &quot;use bits instead of bricks&quot;</td>
<td>Use of electronic billing rather than paper bills</td>
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<td>Smart Work</td>
<td>Use IT-based controls and knowledge management systems with individual production processes to improve operations, save energy and increase efficiency</td>
<td>Enterprise Asset Management solutions</td>
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<td>Smart Industry</td>
<td>Deploy design tools and software to forecast, simulate and analyse energy use in production processes to ensure low carbon design of plants and processes</td>
<td>Our energy monitoring solutions such as GreenCert</td>
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<td>Smart Grid</td>
<td>Deploy smart meters and communication technologies within electricity networks to enable two way communication between energy users and energy producers and deliver advanced services such as &quot;time of use metering&quot; or &quot;remote demand management&quot;</td>
<td>Smart Metering</td>
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<td>Integrated Renewable Solutions</td>
<td>Utilise simulation, analytical and management tools to enable a wide deployment of renewable energy, for example removing existing bottlenecks present in transmission infrastructure or enabling a wider use of distributed generation</td>
<td>Intelligent Utility Network Solutions</td>
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<td>Smart Work</td>
<td>Leverage the internet and other advanced communication tools to work remotely and avoid business trips or physical commuting</td>
<td>Linkage with advanced WFM systems to limit truck rolls and remote access to information</td>
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<tr>
<td>Intelligent Transport</td>
<td>Deploy advanced sensors and controls, analytical models, management tools, and ubiquitous telecommunications to provide relevant information to enable less polluting forms of transport (such as public transport)</td>
<td>Plug in vehicle technology</td>
</tr>
</tbody>
</table>
IBM has proven results to match its investments in the Energy & Utilities Industry

• Fastest growing of IBM’s 16 Industries
  • Two consecutive years of double digit growth
  • 11 straight quarters of growth
• Leader in Smart Grid growth area
  • Unique Global IUN Coalition
  • Lead 7 out of 11 largest AMM deployments (4 out of 5 in the US)
  • IUN Maturity Model
• Traction across our entire solutions portfolio
  • Hundreds of real solution references and case studies
  • Joint Client-IBM Research/Innovation Projects
• Creation of Center of Excellence for Nuclear Power (CoENP)
  • Nuclear Power Advisory Council (NPAC)
  • HPC MoU with EDF (CONFIDENTIAL)
• Significant software acquisitions relevant in the E&U space (MRO, Filenet, ISS, MicroMuse, Cognos)
• Strongly engaged at policy & regulatory level
  • US: GWA Alliance, DOE EAC Invite, Al Gore Invite
  • Australia: Founding Member of Smart Grid Australia
  • EU: SmartGridEU and President Barroso meeting
  • China & India: Similar activities underway
IBM’s commitment to Energy & the Environment began over 35 years ago

1971 IBM formally establishes a Corporate policy on Environmental Affairs

1992 IBM becomes charter member of EnergyStar program

1990 40% reduction in IBM’s total worldwide CO2 emissions due to its energy conservation efforts between 1990 and 2005.

1996 In remarks at a White House briefing on climate change, Vice President Gore applauded IBM's new PFC emissions reduction goal.

2006 IBMers “jam” on innovations for a better planet

- Big Green Innovations
- Intelligent Utility Network

Collaborating to solve problems
IUN is a central component to IBM’s Energy and Environment Initiative

Applying innovative information technology and services that really matter to businesses, governments, people and the planet

**Intelligent Transportation Systems**
Measure & improve transportation usage
- Reduce traffic congestion
- Reduce CO2 emissions
- Increase mass transit usage
- Reduce energy usage
- Improve environment

**Intelligent Utility Networks**
Measure & improve energy mgmt
- Improve efficiency usage,
- Reduce outages
- Improved grid management
- Manage distributed energy

**Carbon Management**
Measure & reduce carbon emissions
- Carbon Mgmt Strategy
- Carbon Mgmt Intelligence
- Supply chain management
- Property, buildings, workplace

**Energy Efficient Technologies & Services**
Create & manage efficient IT
- Active energy management
- IT facilities infrastructure efficiency
- IT operations efficiency
- Monitoring and verification of efficiency goals
- Demand-side efficiency

**Advanced Water Management**
Measure and manage water systems usage and quality with real-time knowledge
- Weather event mgmt; flood management
- Real-time monitoring and analytics for water usage and water quality
IUN Growth Initiative strongly embedded in IBM’s Corporate Strategy

Long-Term EPS Roadmap (May 2007)

2008 Market Opportunity

- Big Green Innovations $3B
- Carbon Management $2B
- Intelligent Transportation System

Intelligent Utility Network

$10B

Green IT $38B
IBM’s Solution Framework

**Generation Solutions**
- Nuclear PLM
- Enterprise Asset Mgt
  - Workforce Mgt & Safety
  - Asset Lifecycle Mgt
  - Supply Chain Mgt
- Fleet Optimization
  - Energy Supply Chain Mgt
- Distributed Generation Optimization

**Utilities Network Revitalisation (UNR)**
- Enterprise Asset Mgt
  - Mobile Workforce Mgt
  - Asset Lifecycle Mgt
  - Supply Chain Mgt
  - Analytics

**Customer Operations Transformation (COT)**
- Customer Management
- Customer Care
- Customer Systems

**Intelligent Utility Network (IUN)**
- Advanced Meter Mgt
- Network Automation

**Solution Architecture for Energy (SAFE)**

**Communication Networks**

**Infrastructure:** servers, storage and associated services
IBM has developed a Solution Architecture For Energy (SAFE)

The IUN analytics reference architecture is designed to optimize IBM products and allow for industry specific differentiation.
Plugging in the consumer

Innovating utility business models for the future
New concerns are making consumers pay much more attention to energy.

**Customer Concerns**

- Concerns about climate change
- Concerns about rising costs
- Higher expectations for availability and power quality
- Higher expectations for corporate responsibility

**New Behaviors**

- Managing usage for efficiency
- Leveraging provider choice and convenience
- Moving to self-generation of power
- Being more active in driving change

Source: IBM Institute for Business Value (IBV) analysis
The convergence of increased climate change concerns, customer control and technology will produce new customer segments and industry models.

Increased Climate Change Concerns

Increased Customer Involvement

Technology Evolution

Stratification of Traditional Customer Base

Frugal Goal-Seeker (FG)
Energy Stalwart (ES)
Passive Ratepayer (PR)
Energy Epicure (EE)

Shifts in Business Models

Operations Transformation (OT)
Participatory Network (PN)
Passive Persistence (PP)
Constrained Choice (CC)

Transformation of Industry Value Chain

Energy Flow

Information Flow

Source: IBM Institute for Business Value (IBV) analysis
Decision-making responsibility taken and income available for energy choices will lead to different types of behavior.

Two factors will determine the nature of the interface between utilities and consumers in the future:

1. The degree to which consumers **take initiative in decision-making** in their energy supply and usage toward meeting specific goals.

2. The consumers’ **disposable income available for energy choices** in supply and conservation.

### Residential and Small Commercial Energy Customers

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<tr>
<td>Low</td>
<td>An energy consumer who is willing to take modest action to address specific goals or needs in energy usage, but is constrained in what they are able to do because disposable income is limited.</td>
<td>An energy consumer who has specific goals or needs in energy usage, and has both the income and desire to act on those needs.</td>
<td>An energy consumer who is relatively uninvolved with decisions related to energy usage and uninterested in taking or unable to take added responsibility for these decisions.</td>
<td>A very high-usage energy consumer who is relatively unconstrained by budget limits, but has little or no desire for conservation or active involvement in energy control; likely to own many high-consumption devices for gaming, computing, entertainment, etc.</td>
</tr>
<tr>
<td>High</td>
<td></td>
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Source: IBM Institute for Business Value (IBV) analysis
If consumers elect to take more responsibility for their energy usage, they will reap more benefits from technological advances.

Operations Transformation
Some combination of grid and network technology evolves to enable shared responsibility, but consumers either cannot exert much control or elect not to and the balance of benefits favors the utility.

Participatory Network
A wide variety of grid and network technology evolve to enable shared responsibility, and consumers’ strong interest in specific goals creates new markets (virtual and physical) and new product demands, which balances benefits more equally between the consumers and utilities.

Passive Persistence (PP)
Traditional utility market structures dominate, and consumers either accept or prefer the traditional supplier-user relationship.

Constrained Choice (CC)
Consumers take firm steps to move toward more control, but are limited to certain “levers” (technologies, behaviors, or choices in providers) by regulatory and/or technological constraints.

Source: IBM Institute for Business Value (IBV) analysis
The new, two-way flows of information over an intelligent grid with increased customer participation is the key to the value chain shift.

Interrelationships of physical network elements, energy/information flows, and value chain elements.

Source: IBM Corporation

* See previous page for color key
In the **full participatory network** (FPN) value chain, new consumer-focused business niches emerge, giving consumers more flexibility and choice.

Source: IBM Institute for Business Value (IBV) analysis
The “Smart Grid” provides for innovation, operational improvement and processes transformation to meet the demands of a new energy future.

The Intelligent Utility Network (IUN) takes advantage of Grid digitization & pervasive communications networks...enabling “Informed Decision Making”
IBM is positioned to help Utility companies to win from the coming changes.

**Generation Solutions**
- Nuclear PLM
- Enterprise Asset Mgt
- Workforce Mgt & Safety
- Asset Lifecycle Mgt
- Supply Chain Mgt
- Plant Optimization
- Energy Supply Chain Mgt
- Distributed Generation Optimization

**Utilities Network Revitalisation (UNR)**
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- Analytics

**Customer Operations Transformation (COT)**
- Customer Management
- Customer Care
- Customer Systems

**Shared Services**

**Delivery Options**

**Intelligent Utility Network (IUN)**
- Advanced Meter Mgt
- Network Automation

**Solution Architecture for Energy (SAFE)**

**Communication Networks**
Infrastructure: servers, storage and associated services

**Increased Climate Change Concerns**

**Increased Customer Involvement**

**Technology Evolution**

**Stratification of Traditional Customer Base**

**Shifts in Business Models**

**Transformation of Industry Value Chain**

Source: IBM Institute for Business Value (IBV) analysis

**Presentation**

**Business Analytics/ Application and Optimization Tools**

**Data Integration and IT Infrastructure**

**Data Communication**

**Network Data Sources**
Thank You

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