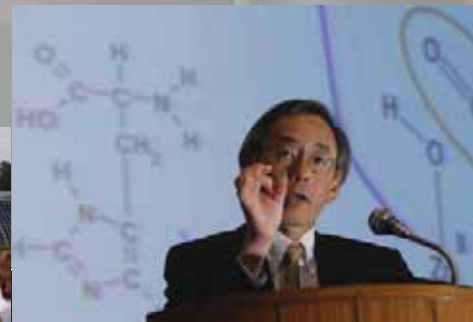


Green Innovations

A growth area of the U.S.-India partnership

The term “green” is sprouting up in every discussion regarding the environment and sustainable development between the United States and India.



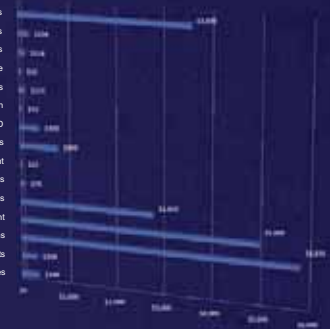
U.S. Government Support of “Green” Initiatives

The future of the U.S. economy takes on a green hue

The United States places a high priority on innovations and advancing technology. As a leader in research and technical expertise the United States government committed over \$19.7 billion (Rs. 88,650 Crores) towards research, the creation of green sector jobs, and improvement of energy efficiency in buildings and infrastructure through the recent Recovery Act (Economic Stimulus Package).

Recovery Act funds

- Tax Credits, Grants, and Rebates
- National Laboratories Advanced Energy Technology, Facility and Infrastructure Improvements
- Wind Energy-Turbine Design, University research facilities, Tech Development Centers
- Water Power -Hydropower Infrastructure
- Solar Energy-development, deployment and Energy Grid Integration Systems
- Fuel Cells -Market Transformation
- Geothermal Technologies -Enhanced Geothermal Systems R&D
- Biomass-Advanced Biofuels Research, Fueling Infrastructure and Biorefinery Projects
- Renewable Energy Projects Community Renewable Energy Deployment
- Small Business Innovation Projects
- Vehicle Technologies
- Weatherization Assistance -Helping citizens make their homes more energy efficient
- State and Local Energy Programs
- Industrial Technologies-Data Centers and energy efficiency projects
- Building Technologies



Source: www.energy.gov/recovery as of April 15, 2010 figures in million dollars





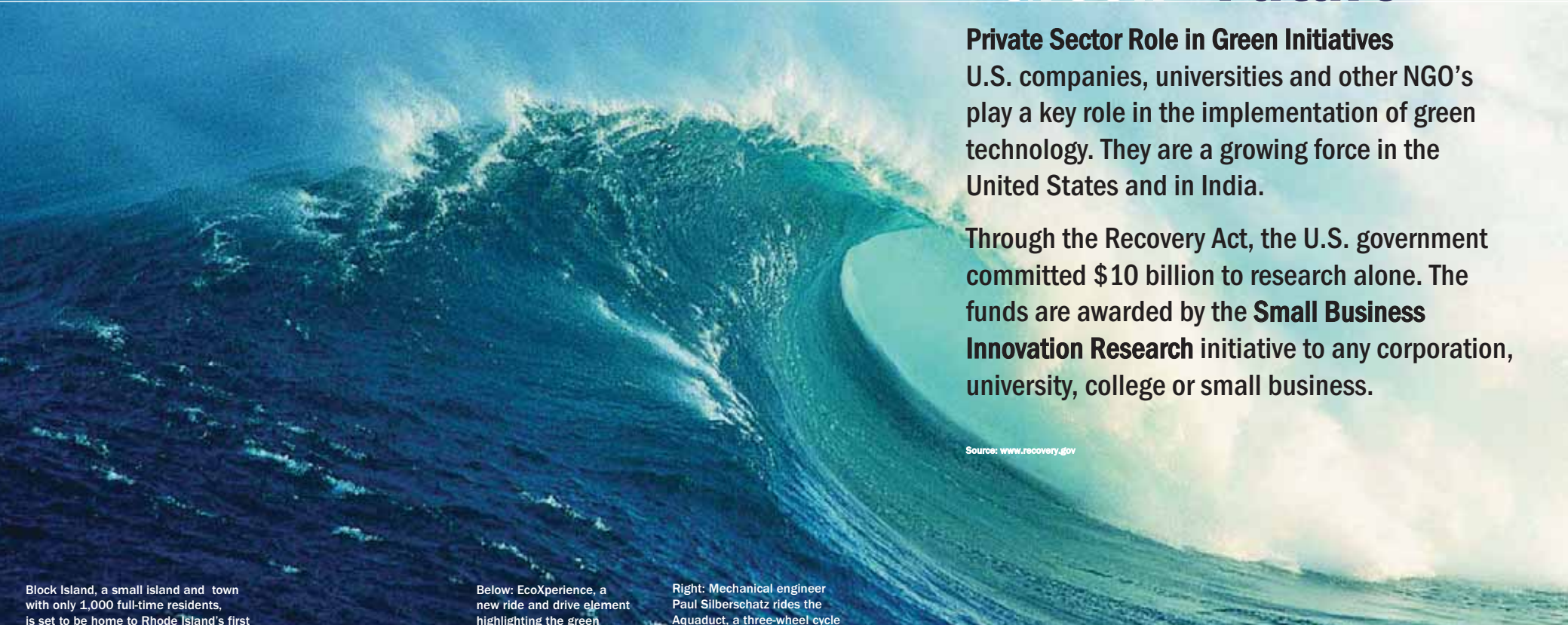
Investing in the “Green” Future

Private Sector Role in Green Initiatives

U.S. companies, universities and other NGO’s play a key role in the implementation of green technology. They are a growing force in the United States and in India.

Through the Recovery Act, the U.S. government committed \$10 billion to research alone. The funds are awarded by the **Small Business Innovation Research** initiative to any corporation, university, college or small business.

Source: www.recovery.gov



Block Island, a small island and town with only 1,000 full-time residents, is set to be home to Rhode Island’s first offshore wind farm. Powerful ocean winds lie right off Block Island’s south shore. Deepwater Wind LLC is leading the effort with plans to construct eight wind turbines three miles off shore and 100 turbines 15 miles offshore. The project will be completed by 2012 and the 108 turbines will generate 1.3 million megawatt hours annually, which will provide 15 percent of Rhode Island’s electricity.

Below: EcoXperience, a new ride and drive element highlighting the green future of the automotive industry is shown at the 2009 North American International Auto Show in Detroit. Auto show attendees experienced the latest in technology in a ride-and-drive format on a track built in Michigan Hall. (AP Photo/Paul Sancya)

Right: Mechanical engineer Paul Silberschatz rides the Aquaduct, a three-wheel cycle that filters dirty water into drinking water, in downtown Little Rock, Arkansas. The cycle, intended for use in developing countries, won first place in the Innovate or Die contest to build a pedal-powered machine to save energy. (AP Photo/Danny Johnston)





Left: Roseann Mitchell, of the Community Action Agency, checks air-flow readings as part of a blower door test assessment, in San Francisco. (AP Photo/Ben Margot)



Left below: Don Crary poses for a photo with a cross section of a form used in the construction of the walls in his energy efficient home, in Imperial, Missouri. In addition to the extra thick walls, in which the forms are filled with concrete, and compact fluorescent light bulbs that turn off when leaving a room, visitors to the Crary home walk on renewable hardwood floors and can tour a basement whose systems save a bundle on utility bills. (AP Photo/Jeff Roberson)

Investing in America's "Green" Homes

Through the Department of Energy, \$5 billion goes to U.S. citizens to make their homes more energy efficient. This includes the installation of new windows, better insulation, energy efficient appliances, and more.



Rod Valencia installs a smart meter for CenterPoint Energy, in Houston, Texas. The utility company, which serves 2.2 million customers in the metropolitan Houston area, expects to spend \$1 billion over five years on smart grid and hopes it will pay for itself in efficiency savings. (AP Photo/Pat Sullivan)

A high efficiency compact fluorescent light bulb saves 6 percent off regular electric bills at a home in Elizabethtown, Pennsylvania. (AP Photo/Carolyn Kaster)

Installers Arin Gharibian and Hayk Mkrtchyan, employees of California Green Design, assemble supports for solar electrical panels on the roof of a home in Glendale, California. (AP Photo/Reed Saxon)

At a SmartHome exhibit, a monitor displays the energy and water usage of the home. The modular home uses less than half the energy and a third of the water of traditional homes. (AP Photo/M. Spencer Green)



Investing in America's "Green" Public Spaces

In addition to improving America's homes, millions of dollars goes to improving public buildings and spaces. Many of the benefits of these improvements are the same as with private homes: less money spent on energy costs and use of less resources for heating or cooling. Some public buildings and spaces receiving funds include: libraries, schools, government offices, national monuments, roads, power grids and more.

Green Lighting System at Washington Monument: Energy SmartPARKS program, a collaboration between the U.S. Departments of Energy and the Interior, helps the National Park Service make America's parks and landmarks more energy-efficient. Several examples are already in place, including the prominent Washington Monument in Washington, DC. The new lighting system is twice as bright, saves 52,633 kWh per year and reduces carbon emissions by 36 tons each year.

At the Klamath County administration building in Klamath Falls, Oregon, sidewalks heated by geothermal energy keep snow from piling up. With a brew pub, college campus and commercial greenhouses all warmed by heat from deep within the earth, it serves as a model for a fledgling new green energy source that is gaining steam with the help of \$338 million in federal stimulus money. (AP Photo/Jeff Barnard)

A solar powered parking meter regulates public parking spaces without drawing on the public power grid.

The Andrew W. Breidenbach Environmental Research Center located in Cincinnati, Ohio, was originally built in 1975. Updates to the building include new, energy efficient annexes and an extensive "retrofit" of the old building for a more energy efficient air circulation system. It received the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) Gold-level certification for new construction in December 2008. The LEED rating system is the nationally accepted benchmark for design and construction.

Solar panels set in front of the Department of Natural Resources "green building" in Jefferson City, Missouri. (AP Photo/Kelley McCall)



“Green” Work at American Educational Institutions

Ball State University is building America’s largest ground source geothermal heating and cooling system. Getting energy from under ground, the system will cool and heat nearly 50 buildings on Ball State’s Muncie, Indiana campus, replacing four coal-burning boilers. The switch to geothermal will save the university \$2.2 million in fuel costs and cut its carbon footprint in half.



Workers drill boreholes for a geothermal heating and cooling system at Ball State University’s campus in Muncie, Indiana
(Photo courtesy of Ball State University)



U.S.-India “Green” Partnerships

U.S. companies actively promote the use of green products and services in the United States and in India. The following are some examples of various U.S.-India partnerships in operation already. These include government, private, and public-private initiatives and partnerships.



U.S. Secretary of State Hillary Clinton speaks at the USIBC Synergies Summit in Washington, D.C.

“ We need to make sure that the partnership between Washington and New Delhi, our capitals, will be as advanced and fruitful as the linkages that already exist between Manhattan and Mumbai, or Boston and Bangalore. ”



U.S.-India Green Cooperation on Energy and Climate Change

U.S.-India Green Partnership, November 24, 2009

President Barack Obama and Prime Minister Manmohan Singh launched a Green Partnership, reaffirming their countries' strong commitment to taking vigorous action to combat climate change, ensuring their mutual energy security, working toward global food security, and building a clean energy economy that will drive investment, job creation and economic growth throughout the 21st century. Toward that end, Prime Minister Singh and President Obama agreed to strengthen U.S.-India cooperation on clean energy, climate change and food security.

Indo-U.S. Clean Energy Research and Deployment Initiative, November 24, 2009

Supported by U.S. and Indian government funding and private

sector contributions, this initiative will include a Joint Research Center operating in the United States and India to foster innovation and joint efforts to accelerate deployment of clean energy technologies.

Support for an Indian Environmental Protection Authority, November 24, 2009

The Indian EPA would focus on creating a more effective system of environmental governance, regulation and enforcement. Working with India's Ministry of Environment and Forests, the U.S. Environmental Protection Agency will provide technical support to help establish an Indian National Environmental Protection Authority.

Confederation of Indian Industry-Sohrabji Godrej Green Business Centre

This Green Business Centre in Hyderabad, Andhra Pradesh not only represents the promise of a green economy, it demonstrates the importance of the partnership between India and the United States in the 21st century.

India announces two nuclear power sites for the United States, October 17, 2009

The government of India announced that it has allocated two sites to the United States for the construction of civil nuclear power plants. These sites would be Chhayamithi Viridi in Gujarat and Kovvada in Andhra Pradesh. This announcement follows an agreement made between the governments for expanded cooperation on the peaceful uses of clean, nuclear energy.

United States promotes renewable energy in India, August 10, 2009

The first USA pavilion was launched at the third Renewable Energy Show in New Delhi, showcasing cutting-edge, American, renewable energy technologies.



Governmental Green Partnerships

U.S.-India Power Sector Climate Change Initiative

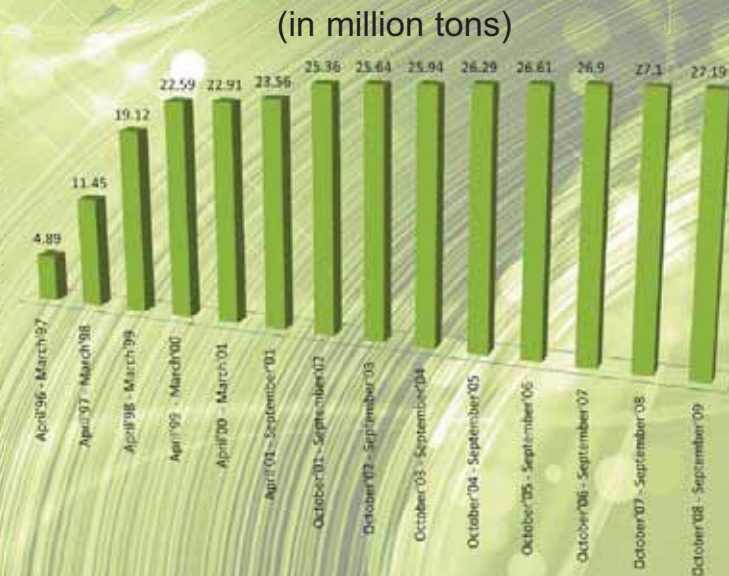
Agreement signed in July 1994



Centre for Power Efficiency & Environmental Protection (CenPEEP)
Implementing Greenhouse Gas Pollution Prevention



The National Thermal Power Corporation (NTPC) established CenPEEP in collaboration with USAID to reduce the long-term Greenhouse Gas (GHG) emissions from Indian thermal power plants. Through partnerships between U.S. and Indian organizations, the program has promoted and deployed efficient power generating technology practices and built local institutional capacity since 1995. CenPEEP adopted a win-win strategy by combining environmental concerns and utility needs. CenPEEP focused on an Optimization Program which balanced the dual objectives of reducing carbon dioxide emissions and facilitating more efficient power generation.



Cumulative carbon dioxide emissions avoided
from April 1996 to September 2009



Lighting Remote Villages with Electricity from Rice Husk

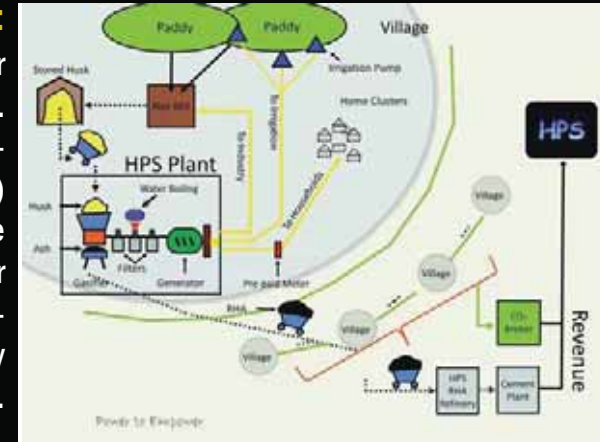
Husk Power Systems uses discarded rice husks to generate electricity for remote villages in Bihar. The plants operate as carbon neutral power generators.



Husk Power Systems (HPS) in Bihar provides power to over 50,000 rural Indians in a financially sustainable, scalable, environmentally friendly, and profitable manner. HPS owns and operates 35-100 kW “mini power-plants” that use discarded rice husks to deliver electricity to off-grid villages in the Indian “Rice Belt”. HPS-produced electricity always follows the Three R's: It is always Reliable, Renewable, and Rural.

Technology:

Each 32-40KW ‘Mini’ Power Plant can electrify 3-4 villages. The solid fuel (rice husk) converts to clean liquid gas (fuel) through partial oxidation. The fuel is then used in local power generators. The gas/fuel is distributed in cheap and locally available bamboo poles.



Environmental Impact:

Plant is carbon neutral – It is non-polluting, renewable and saves about 90 tons of CO2 per power plant each year;
No local pollution – burns cleanly (previously, every household was consuming 5-7 liters of kerosene per month).
Uses locally available rice husks – does not need mining and long distance transportation .



A smart prepaid meter developed with IDEO.



A mini power plant in Bihar





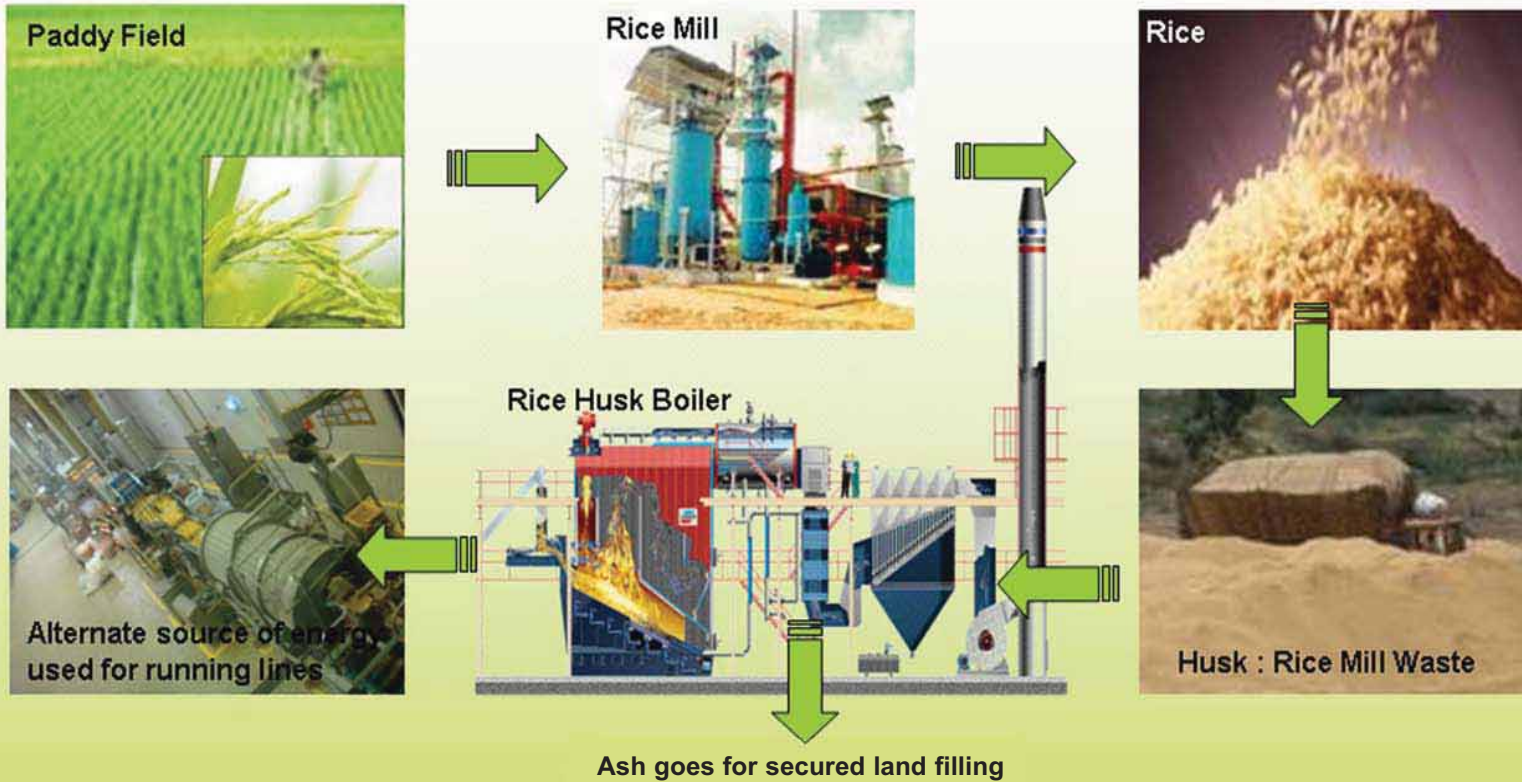
PEPSICO
INTERNATIONAL

uses local rice husk waste to generate power for their Kolkata Plant



Performance with Purpose - Wealth from Waste

An initiative of PepsiCo (Frito-Lay Div.) Kolkata Plant



Currently generating 79,535 KWH/day energy and potential to generate up to 2,38,605 KWH/day
15% of the energy requirement of the plant is catered through Renewable Energy

Shrinking Carbon Foot Prints by 5000 MT/Year



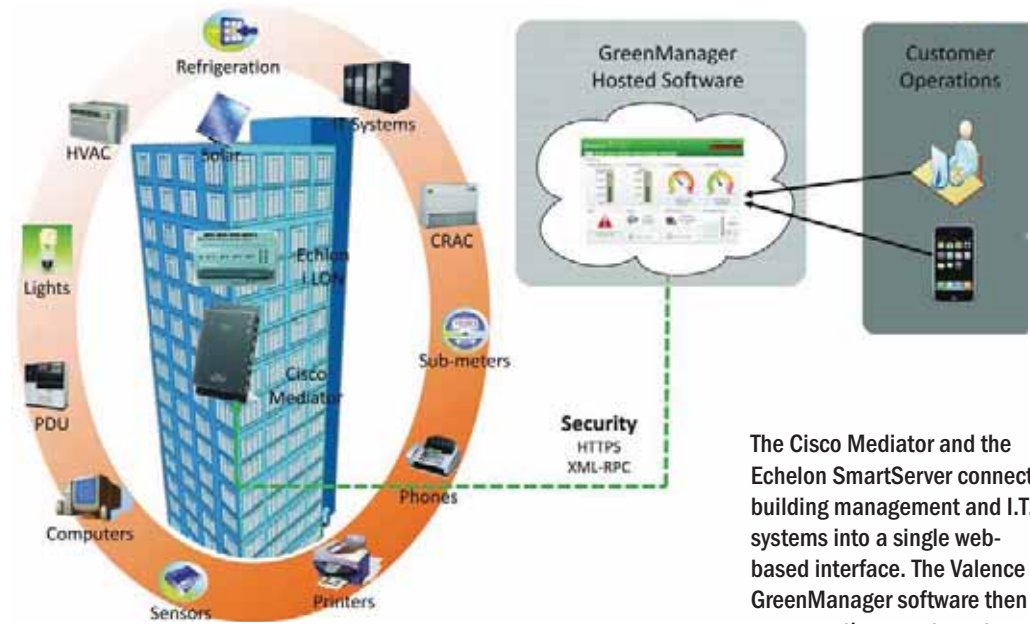
VALENCE ENERGY®

"Real-Time Optimization of Energy Savings Through Monitoring, Analytics & Control"

Valence Energy provides web-based, real-time energy management "GreenManager" software that helps schools and commercial buildings achieve energy savings in buildings and campuses. The company is based in Silicon Valley, California and Bangalore, India.



The software dashboard provides real-time monitoring and analysis of energy use.



The Cisco Mediator and the Echelon SmartServer connect building management and I.T. systems into a single web-based interface. The Valence GreenManager software then accesses these systems to monitor, analyze and control for energy savings.

Indus School Bangalore Partners with Valence Energy

- ✓ Solution: Valence Energy "GreenManager" software with Echelon SmartServer and smart meters for real-time energy management on individual buildings
- ✓ Reduces energy consumption through smart energy management and student participation
- ✓ Engages students in an international project to address climate change
- ✓ Positions the school as a leader in the community.



City of San Francisco Mayor Newsom with Indus School students and Valence Energy project manager, Agustin Fonts, inaugurate the smart energy system at the Indus School Bangalore.



BorgWarner

BorgWarner creates energy efficient powerful drivetrain systems for hybrid and electric vehicles. These systems use less energy while maintaining a high level of vehicle performance.



Up to 20% more fuel efficient¹

eAssist



Up to 12% more fuel efficient²

DualTronic™ PowerSplit



Up to 50% more fuel efficient³

eGearDrive™ Electric Drive Transaxle



10 - 15% more fuel efficient⁴

eGearDrive™ Electric AWD Transaxle



Exhaust Gas Recirculation Technology

-80% reduction in NOx versus an engine without EGR



Up to 45% reduction in NOx

Variable Cam Timing Phaser



Interior heating system required for hybrid and electric vehicles

Cabin Heater (High Voltage)



Delivers 15% - 30% better fuel economy




Turbocharging Technology



Up to 40% reduction in hydrocarbon emissions

Electric Air Pump

Advanced Drivetrain Technologies for Hybrid & Electric Vehicles

-  better fuel economy
-  reduced emissions
-  great performance

¹ As compared to conventional ICE propulsion on a MPG gasoline equivalent basis (duty cycle dependent)
² vs. conventional 4 speed automatic
³ As compared to conventional AWD (energy storage system dependent)
⁴ vs. base DualTronic™ PowerSplit





India's First 1MW Rooftop Solar Plant

U.S. Green Technology Contributes to Commonwealth Games

Suniva manufactures high-efficiency solar cells that are used domestically in the United States and exported to countries worldwide.

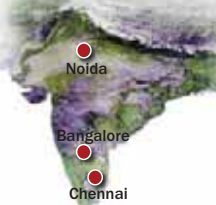
Suniva Founder and CTO Dr. Ajeet Rohatgi and Suniva CFO Jim Modak stand in front of Suniva panels on the roof of Thyagaraj Stadium.



Designed incorporating Suniva's high-efficiency ARTisun® series solar cells in modules, the Thyagaraj power plant was developed using a total of 3,640 280Wp modules. The project implemented and commissioned by Reliance India Limited (RIL) Solar Group is expected to generate around 1.4 million kWh of electricity per year to fulfill the power requirements of the stadium, with surplus electricity being fed into the grid at 11KV. The solar power generated from this project is expected to result in emissions reduction of more than 2,640,000 lbs. of CO₂ per year. The Thyagaraj Stadium, developed by the Government of Delhi, is planned to be a model green stadium and will host Netball in the upcoming Commonwealth Games.

Suniva Inc., is a U.S. manufacturer of high-efficiency silicon solar cells and high power solar modules to make solar-generated electricity cost-competitive with fossil fuels. Suniva founder and CTO Dr. Ajeet Rohatgi developed critical processes at the Georgia Institute of Technology's University Center of Excellence for Photovoltaic Research. Ranked #2 in The Wall Street Journal's Top 10 Venture-Backed Clean Technology Companies in 2010, Suniva is making solar sensible as it sells its products worldwide. Suniva is also the 2010 recipient of the Renewable Energy Exporter of the Year, awarded by the Export-Import Bank of the United States. www.suniva.com





THE WORLD'S LEADING SUPPLIER OF PV MANUFACTURING EQUIPMENT FOR THIN FILM AND CRYSTALLINE SILICON SOLAR PRODUCTS.



THIN FILM SOLAR PANELS

Low cost, designed for large scale applications

The Applied SunFab[®] solar panel production line enables customers to manufacture the world's largest and most powerful, 5.7m² thin film solar panels. The 5.7m² panel is better suited for large scale solar installations. The unique racking system design and architecture of the panel results in installation costs 17% less than conventional technologies.

APPLIED SUNFAB



A New Model for Accelerating Utility Scale Solar and Economic Growth

The fab2farm[®] solar deployment model, with the Applied SunFab as the cornerstone, enables governments, utilities and communities to create manufacturing ecosystems that deliver ultra-low cost solar energy and enable rapid deployment of solar electricity across sun-rich countries.



ATON PVD 5.7

This system deposits a reflective metal layer which conducts the electric current away from the cell to the junction box.

- More than 200 glass coating systems in production as of 2009
- Low cost of ownership
- Unmatched uniformity in film deposition

PECVD 5.7

This system deposits the critical layers of silicon which convert the photons from sunlight into an electric current. These layers are 25 times thinner than the diameter of a human hair.

- Market leading platform in LCD manufacturing
- Over 500 systems in production as of 2009
- Dedicated microcrystalline chambers allow for greater homogeneity of critical absorber layers



CRYSTALLINE SILICON (c-Si) SOLAR CELLS

Higher efficiency cells, ideal for constrained spaces

Applied Materials' portfolio of equipment for c-Si solar extends from wafering to cell manufacturing. Our best-in-class equipment addresses the high value processes in cell manufacturing where high productivity, ultra thin wafer handling, and automation can drive significant cost reduction.



HGT MaxEdge[®]

MaxEdge wire saw uses unique technologies to cut extremely thin wafers with extremely thin wires. It increases overall wafering productivity by 50%.

- Uses less silicon
- Saves on material costs



ATON PVD

The ATON PVD system is used for deposition of a silicon nitride anti-reflective and passivation layer onto the wafer.

- High throughput >3500 wafers per hour (wph)
- >90% uptime
- Excellent uniformity results in consistent efficiency and appearance



BACCINI SOFT LINE

The Baccini Soft Line is an integrated back-end processing system used to deposit thin lines of wiring onto the solar cell. It also finishes the edges of the cell, tests the quality of the cells and sorts them as needed.

- Handles wafers as thin as 1/30th of a millimeter
- High throughput of 1,440 wafers per hour
- Precise and repeatable alignment capabilities enable high efficiency cells

