



World Sustainability & The Energy Problem: A Call for Thinking Differently about Innovation and Intellectual Property

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1. What we do and how we do it: key products and processes
2. The Energy Problem
3. New Business Models: Reverse Innovation & Open Innovation
4. Open Innovation & IP Management
5. GreenXchange

1. What we do and how we do it: key products and processes

Ansaldo Energia, a Finmeccanica company, is a distinguished player in the energy industry, providing reliable and flexible solutions across a complete and innovative product portfolio



New Units

EPC



'08 Orders: 1.371M€
'08 Revenues: 987M€

Equipment



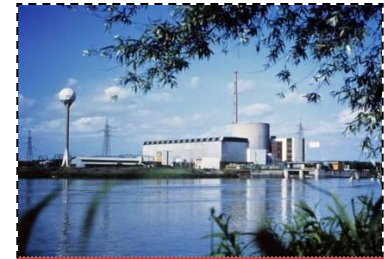
'08 Orders: 1.371M€
'08 Revenues: 987M€

Service



'08 Orders: 640M€
'08 Revenues: 315M€

Nuclear



'08 Orders: 41M€
'08 Revenues: 31M€

- A worldwide recognized brand in Power Generation with an installed capacity of more than 170,000 MW over 1,700 projects completed, in over 90 countries
- Headquartered in Genoa (Italy) with major regional subsidiaries and offices in The Netherlands, Switzerland, USA, Latin America, Africa, Gulf Countries, India, and about 3,400 employees

Ansaldo Energia Group Products & Technologies



New Units

Service

Renewables & Distr. Gen

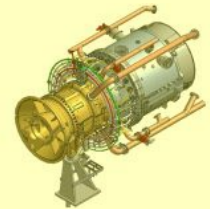
Nuclear

ORIGINAL EQUIPMENT MANUFACTURER - OEM
Power Plants (Combined Cycles, Open Cycles) &
Main Components (Gas Turbines, Steam Turbines, Generators)

EPC Turnkey Contract:
CCGT (1+1) config.
410+MW Power Output
58% Efficiency



F-class upgrade:
AE94.3AN
320MW Power Output
Increased Flexibility
NOx < 15ppm



OEM SERVICE



Construction and Services
Cernavoda NPP (Romania),
AP1000 NPP (China),...

Long Term Service Agreements & Diagnostic Services

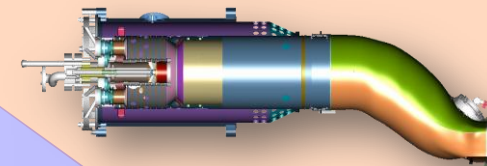


Some 25GW in 11 countries under LTSA

Waste Management and Decommissioning
Superphenix NPP (France),
Ignalina NPP (Lithuania),...

GE-Type Heavy Duty Gas Turbine Specialist

LECIII - Low Emissions Combustion System



Molten Carbonate Fuel Cells (MCFC)
Very high efficiency
Tri-generation & Modularity
Very effective CCS application



Micro-Turbines
Low Emissions
Indoor/outdoor usage
Multi-Fuel (Natural Gas, Biofuels, Diesel, Kerosene, Methanol, LPG, Syngas)



Company Confidential

The Tollgate Process for Product Development

Strategic + R&D Strategy Plan
Market & Customer Value Needs
Field Feedback



Initial Phase (Tollgate 0)

- Scouting & Concept...Fit with R&D Strategy Plan
- **Market, Product & Technology Requirements**

Project Definition (Tollgate 1)

- Conceptual Design
- **Project Plan, Spending & Business Case**

Preliminary Design (Tollgate 2)

- Preliminary Design Reviews

Detailed Design (Tollgate 3)

- Detailed Design Reviews

Production and Validation (Tollgate 4)

- Product Validation
- **Commercial Introduction...Launch Customer**

Market Survey

- **Market Feedback**

Design Process

**Rigorous and Selective Screening of Ideas.....Market-Driven
Development Process.....Closing the Loop is a Must**

Market & Customers

Value Generation

Short & Long Term Needs

**Field Experience &
Service Feedback**

Breakthrough

Technology Partners

Technology Sharing & Growth

Network of Collaborations

Create Differentiations

Value Generation &
Breakthrough

Sales & Commercial

Competitive Solution

Maximize Margin

Customer Intimacy & Focus

Manufacturing & Sourcing

Process Capability

Optimized Supply Chain

Concurrent Engineering

Prototyping & Cost Reduction

Product & Service Engineering

Product Configuration

Field & Operation Feedback

Design Expertise



Key Processes

- Open Innovation
- Life Cycle Assessment
- Product life extension
- Environmental, Health & Safety procedures

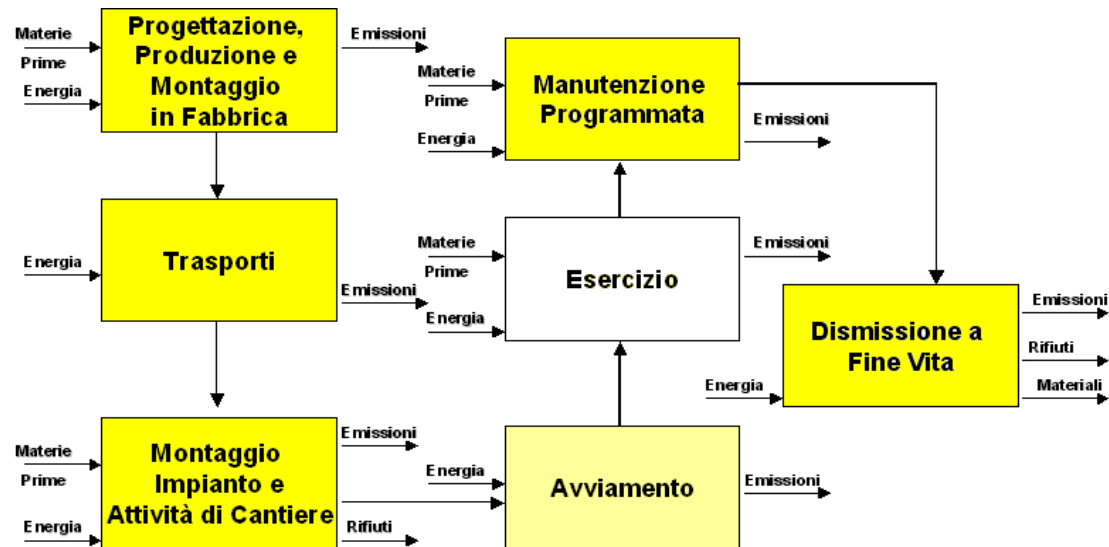
Key Products

- Low NOx gas turbine burners
- Low BTU gas combustors (e.g Bio/Syngas)
- Increase efficiency, through Service, of existing plants
- Water saving power plants (ZLD)

What is it?

“un procedimento oggettivo di valutazione dei carichi energetici ed ambientali relativi a un processo o ad un’attività, effettuato attraverso l’identificazione dell’energia e dei materiali usati e dei rifiuti rilasciati nell’ambiente. La valutazione include l’intero ciclo di vita del processo o attività, comprendendo l’estrazione e il trasporto delle materie prime, la fabbricazione, il trasporto, la distribuzione, l’uso, il riuso, il riciclo e lo smaltimento finale” (SETAC)

Obiettivo dello studio effettuato all’interno di Ansaldo Energia è stato quello di determinare, analizzare e proporre misure correttive per ridurre gli impatti ambientali associati al ciclo di vita di un impianto a ciclo combinato per la produzione di energia elettrica da 800 MW



Dall’analisi della fase di esercizio sono esclusi tutti gli impatti associati alla combustione, essendo questo processo già ottimizzato e controllato da norme ambientali.

What is it?

- To ensure reliable and safe operation of GT even beyond the component design lifetime, Ansaldo Energia has developed the Life Time Extension Program.
- The 100 kEOH Life Time Extension is a package aimed to provide at least further 100.000 EOH operating life to Gas Turbines.

Customer Benefits

- Full compliance with the most stringent environmental emission requirements
- Efficiency increased at partial load in combined cycles Extension of the gas turbine expected lifetime, gaining a complete new 100 kEOH operational life cycle
- Avoidance of maintenance cost escalation: the 100 kEOH LTE overhaul allows maintenance costs to remain as low as those borne for the first 100 kEOH
- Reduction of downtimes thanks to minimization of unscheduled outages caused by unexpected component failures
- Lower operating risk – positive effect on the insurability of the machine
- Full exploitation of each rotor component – saving in new spare parts procurement
- Rationalization of spare parts – saving in spare parts storing



What is it?

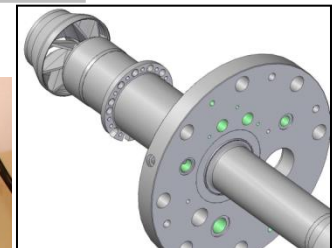
The **VeLoNOx** is a new combustion system designed by Ansaldo Energia to reduce significantly emissions


Customer Benefits


- Full compliance with the most stringent environmental emission requirements
- Efficiency increased at partial load in combined cycles

Technical Advantages

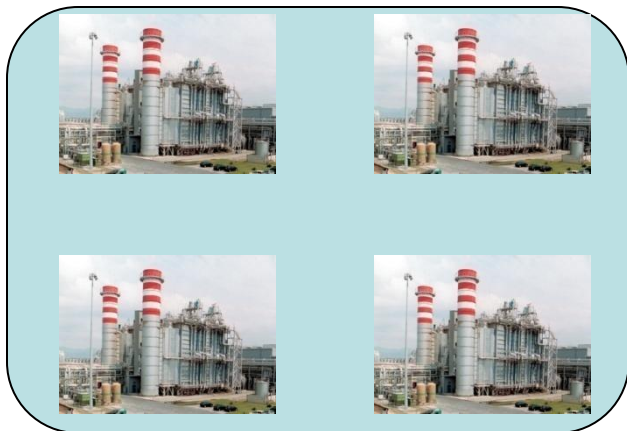
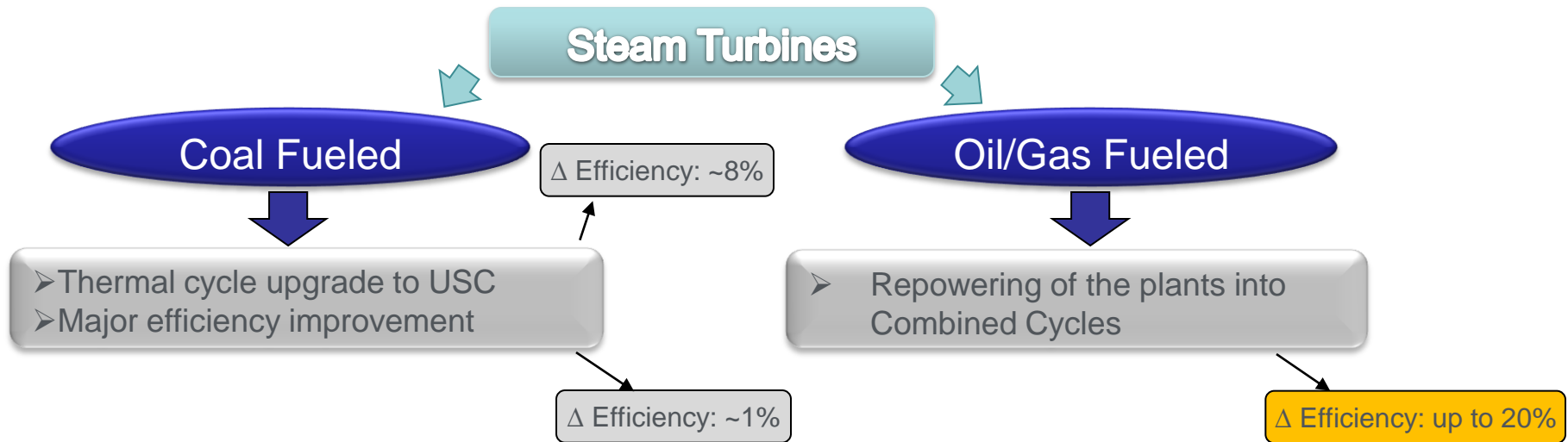
- Nox emissions down to 30 mg/Nm³
- Higher exhaust temperature at partial load



-  Ansaldo Energia, respecting the most stringent environmental laws and acting as player in the reaserch against water resources pollution, has conceived **CRIOS™**, the proprietary ZLD system to
 - reduce the needs of fresch water consumption
 - comply with some local regulation that prohibits any liquid effluents emission from the industrial sites

-  Zero Liquid Discharge allows to eliminate the liquid waste stream from the power plant and recycle high purity water for reuse. In many cases, plant water consumption can be reduced from 10 - 90%. This can
 - minimize the potential risk associated with plant waste streams
 - help improve unfavorable public perceptions of new facilities
 - help optimize the overall facility life cycle costs in areas of acute water shortage.

Retrofits: Increased Efficiency



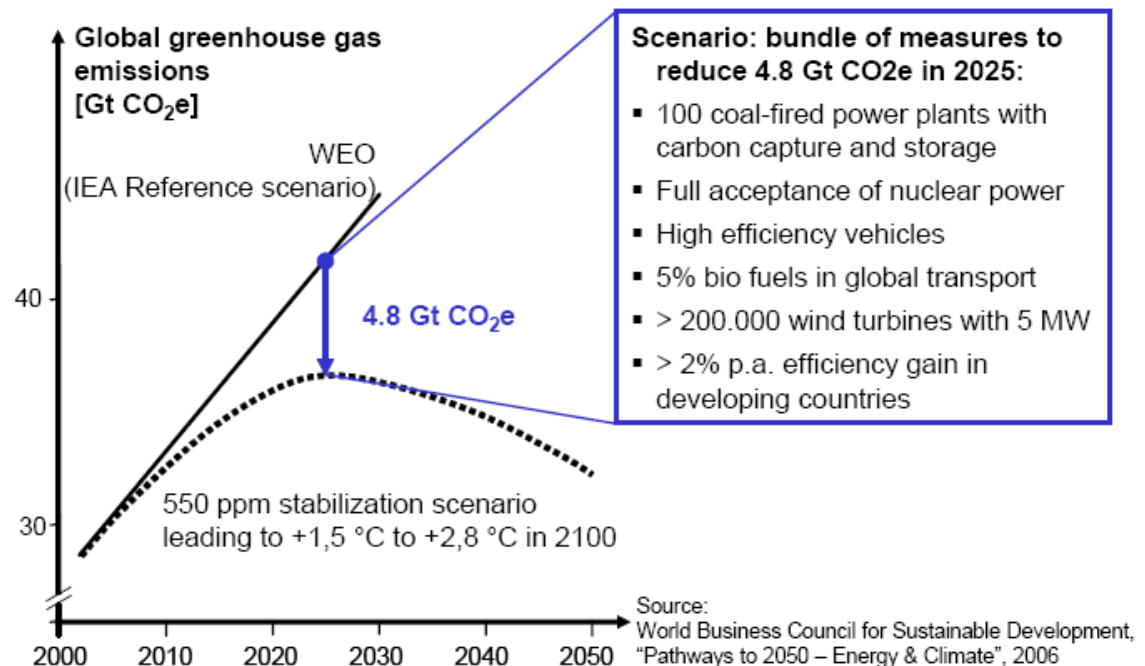
Δ Efficiency:
up to 20%



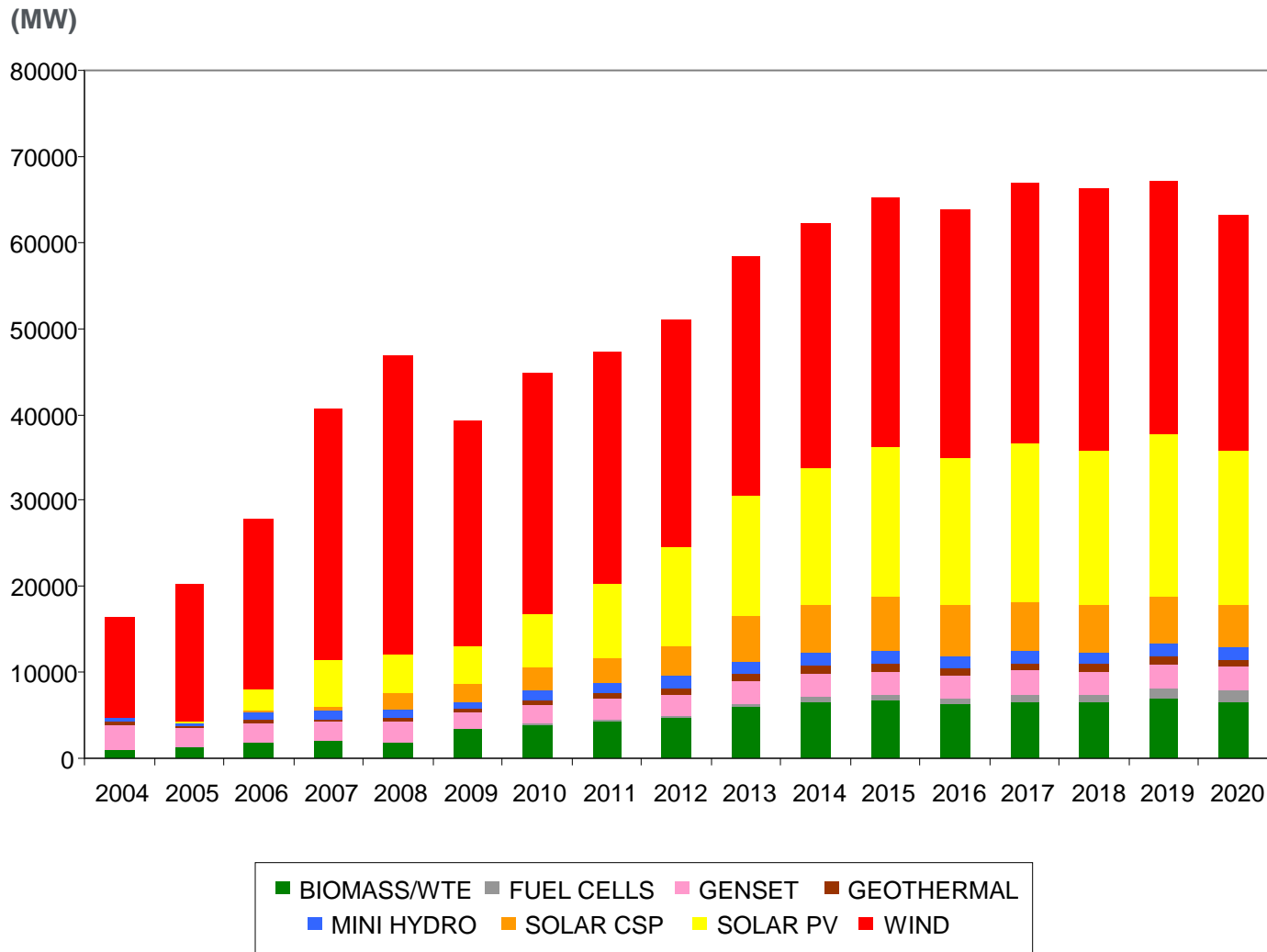
2. The Energy Problem

The Energy Problem: an unprecedented challenge

The “Energy Problem” today means facing an unprecedented challenge, on a global scale. By 2050, the world demand for energy will be double than today, but even more importantly the mix of power generation technologies and their impact on the environment will have to be dramatically changed in order to preserve a living earth.



Power Generation New Capacity: Renewables & Distributed Energy



- Booming Renewables & Distributed Generation Market, mostly driven by Wind installations in EU, North Am., China and India
- Considerable orders for Solar PV have started in 2006 due to incentives in many EU countries but, as price of this technology is quickly decreasing, in the next ten years Solar PV orders could reach volumes close to those for Wind power.
- Concentrated Solar Power (CSP) and Biomass & Waste to Energy markets are also estimated to show large growth rates in the close future
- More mature technologies like Gensets, Mini Hydro and Geothermal should keep their historical market levels while innovative technologies like Fuel Cells are not forecast to provide substantial contributions at least over the projected period

Source: AEN internal elaboration

“...**Climate change** is one of the greatest challenges of our time. As leaders of the world’s major economies, both developed and developing, we intend to respond vigorously to this challenge, being convinced that climate change poses a clear danger requiring an **extraordinary global response**, that the response should respect the **priority of economic and social development of developing countries**, that moving to a low-carbon economy is an opportunity to **promote continued economic growth and sustainable development**, that the need for and deployment of transformational **clean energy technologies at lowest possible cost** are urgent, and that the response must involve balanced attention to mitigation and adaptation.”

G-8 Declaration on Energy & Climate (July 9, 2009)

“....Drawing on global best practice policies, **we undertake to remove barriers, establish incentives, enhance capacity-building, and implement appropriate measures to aggressively accelerate deployment and transfer of key existing and new low-carbon technologies**, in accordance with national circumstances..... We welcome the leadership of individual countries to spearhead efforts among interested countries to advance actions on technologies such as energy efficiency; solar energy; smart grids; carbon capture, use, and storage; advanced vehicles; high-efficiency and lower-emissions coal technologies; bio-energy; and other clean technologies.
.....**We will consider ideas for appropriate approaches and arrangements to promote technology development, deployment, and transfer....**”

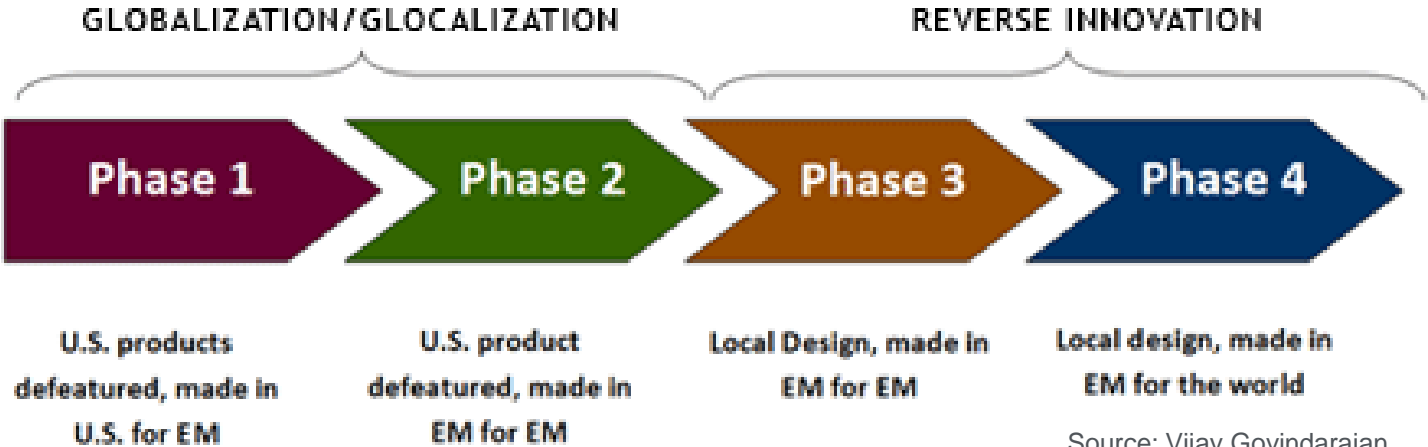
3. New Business Models: Reverse Innovation & Open Innovation

In the last few years, more and more businesses, including major corporations, have started adopting **Open Innovation** approaches, powered by the Web, as well as **Reverse Innovation** approaches, which not only foster better products and services to the market, but also impose new business models and a redefinition of the value chains.

In the energy industry, as the problems are bigger than any one firm, sector or country can face, launching sharing and **Collaboration Projects** aimed at developing green innovation is a must, so that the network efficiencies of Open Innovation can help solving the problems of sustainability.

“Reverse Innovation” isAny innovation likely to be adopted first in the developing world.

THE AMERICAN MULTINATIONAL APPROACH TO EMERGING MARKETS(EM)



Source: Vijay Govindarajan

Reverse Innovation does not imply any IP opening

Two Different Definitions:

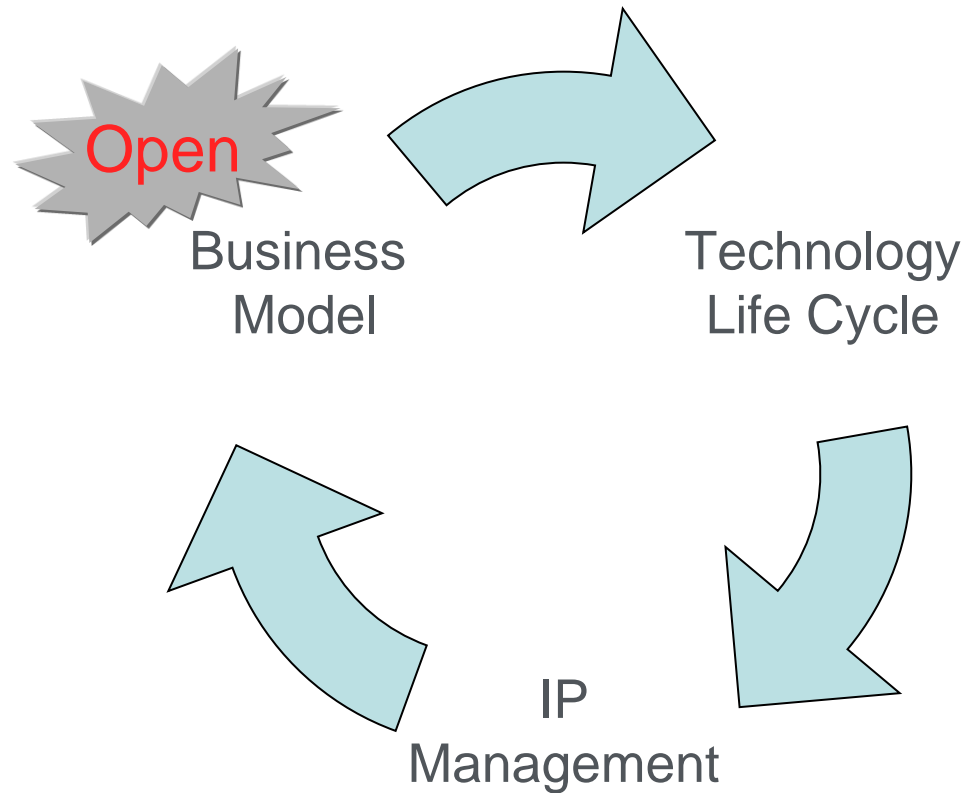
- Innovation based upon IP that is “open”, i.e. free for all to use (like open source SW and similarly new-emerging collaborative business models) (*)
- Organizational openness, i.e. opening the firm to outside ideas, buy and sell IP, “Connect & Develop” vs. “Research & Develop” (**)

(*) Eric von Hippel, a professor at the MIT Sloan School of Management, is supporting this definition

(**) Henry Chesbrough, a professor at the Hass School of Business, University of California, is supporting this definition, which has been adopted by multinational corporations such as Procter & Gamble

- “Secondary” or “intermediate” markets for innovation have emerged
- A new value chain for innovation is born, with new players (e.g.: innovation “brokers”) and a redefined “division of labor”

4. Open Innovation & IP Management



IP Management is the next big challenge for Open Innovation

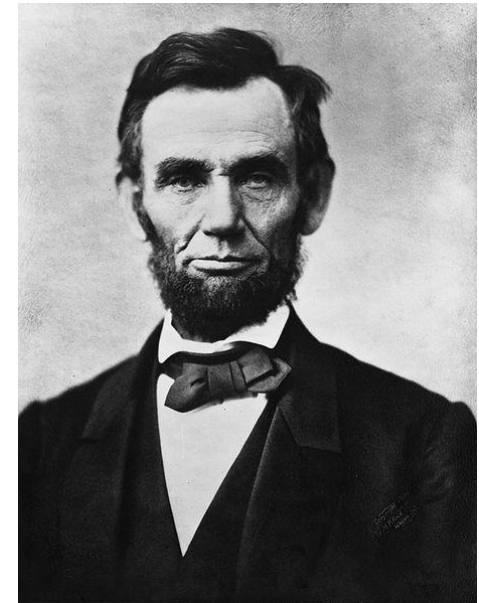
Clean Energy Patents Reached a New High in 2Q09 (274 Green Patents)

The Patent system and the enforcement of IP rights will promote or hinder technological innovation with regard to climate change?

A draft negotiating text for the UN Climate Change Conference in Copenhagen contains provisions for “*compulsory licensing for specific patented technologies*” as well as “*pooling and sharing publicly funded technologies and making the technologies available in the public domain at an affordable price.*”

"The patent system added the fuel of interest to the fire of genius, in the discovery and production of new and useful things."

Abraham Lincoln, Second Lecture on Discoveries and Inventions (1859)



“Since power plants are built in the home country, most of the investments are in the home country....So developing technologies for much more efficient buildings is something that can be shared in each country. If countries actively helped each other, they would also reap the home benefits of using less energy. So any area like that I think is where we should work very hard in a very collaborative way — by very collaborative I mean **share all intellectual property as much as possible**.....But there hasn't been a coordinated effort. And so it's like all countries becoming allies against this common foe, which is the **energy problem.**”



Steven Chu, 1997 Nobel Prize in Physics and U.S. Secretary of Energy (2009)

- Although there are very different opinions and the debate is open, there is also some evidence that:
 - a. Users-centered innovation processes (as opposed to manufacturer-centered) are more and more successful, and this is mainly due to the users' ability to freely benefit from know-how developed by other
 - b. Ways to promote technology transfer at affordable prices need to be found in sectors where the status of the planet and/or the development of nations and populations are of concern

5. GreenXchange

- A new project launched by Creative Commons with Best Buy and Nike, which aims to examine how the digital commons can help holders of patents collaborate for sustainability



LEAD THROUGH OPEN INNOVATION.

When we are guided only by the light we carry with us, we see only where we are—the way ahead and behind remains dark. When we light the torches as we go, we truly lead, illuminating a path for all to follow.

We used to think the best way to win was through secrecy, competition, and proprietary trademarks.

Then the digital folks proved that an open model of shared knowledge for common use could be just as successful, if not more so.

OPEN INNOVATION

CONSIDER WHAT WE HAVE IN COMMON.

We all want sustainable innovation.
We all have dedicated time and resources to it.
We all have something to offer that each other
could benefit from.

What if we shared?
What could that lead to?

Shortcuts revealed by shared intellectual property
could create new partnerships, and new revenue
streams from existing knowledge.

Consider this:
We share a common purpose. By sharing ideas,
we could achieve uncommon results.

- The future is shifting from pure IP rights to collaborative business models
- This requires legal structures which define risks and rewards
- A number of experimental project is underway
- A sustainable world is both in the social and in the economical interest of all stakeholders

Time is the scarcest resource we have on the planet, thus the race to save the planet requires a very rapid diffusion of sustainable technologies from the epicenters of innovation to the rest of the world. This involves sharing Intellectual Property as much as possible, exploring ideas such as using patent pools and using technologies that support networked and community-based knowledge transfer.