



# **Cleaner technologies in petroleum Industry - Reliance success story**

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**2<sup>nd</sup>. Indiachem Gujrat-2011 conference (October 13-15, 2011) , Gandhinagar. \*Views are personal**



## Milestones in Clean technology concept

- **Env. problems are not new, but in recent years gained significance due to Threat on survival of a mankind**
  - **1950s- Publication of **Limits to Growth** by Club of Rome**
  - **1962 – Publication of “**Silent spring**” by Rachel Carlson**
- Awareness does not always lead to action : 1<sup>st</sup> concrete step took 25 y.**
- 1. 1972 – UN-Conference on **Human Environment** (Stockholm)**
  - 2. 1987- Bruntland commission Report **Our common Future** “Concern about the future generation”**
  - 3. 1987: Montreal Protocol for protection of Ozone layer**
  - 4. 1992- Earth Summit: Rio declaration - Development & Environment**
  - 5. 1996 : ISO 14001- Environment Management System**
  - 6. 1997- Triple bottom line concept of Elkington**
  - 7. 2000 : Global Sustainability reporting became reality**
  - 8. 2005 – 2010 : Climate change major threat.**
    - **Kyoto protocol (2005);**
    - **Al Gore & IPCC Nobel Prize (2007)**



## Current scenario

- **World Bank (June 2011): Brainstorming by 70 top minds, **Conclusion:** “Poverty & Climate change are two major challenges.**
- **Nicholas Stern report : Earth would be warmer by 5 °C, a change not seen in last 30 mill. Years by 2100.**
- **We are already running at over 100% earth capacity utilization. If all countries mimic US consumption pattern, will require 5 earth.**
- **By 2050 the population will rise from 6.8 bill to 10 bill. And energy consumption will double.**
- **In real world politics no growth means pain (Loosing homes, unemployment, social service cuts, collapse of economy, etc)**

## What is the Solution ?

**“New Industrial Revolution”** Innovations radically different from high carbon (Energy), high resource based manufacturing.

# The Challenge



- **Cancun Agreement (2010) Intl. commitment to limit global warming to 2 °C above pre Ind. Level.**

**Stabilize warming to 2 °C (CO2 conc. To 450 ppm) by 2050**

## Hard Facts

- **GHG Emission is product of Population, per capita income & carbon intensity.**
- **2000- 2050 Carbon budget - 886 Gt.CO2. Already used up 1/3<sup>rd</sup> (282 Gt. CO2). GHG increased by 5.9% in 2010 than in 2009.**

## Targets

- **30% GHG emission reduction e.g. 4.9% reduction/ann till 2050.**
- **Increase in Population @ 0.7% (7 bill. To 10 bill.) and global economy @ 1.4% (Same since 1990) is estimated.**
- **Thus, carbon intensity has to fall by  $4.9+0.7+1.4 = 7\%$ / ann. Till 2050. If all reach to EU income level than it will be 11.2%/ann.**



# What is Clean Technology ?

**Single definition hard, but attributes can be. Clean Technology** refers to a diverse range of products, services and processes that

- a) Harnesses renewable materials and energy sources
- b) Dramatically reduce the use of natural resources
- c) Significantly reduce or eliminates environmental impacts.
- d) Create value by lowering costs, improving efficiency/ performance.

Thus, CT encompasses technologies that deals with environmentally benign sources as well as technologies that convert polluting sources to environmental friendly products & services.

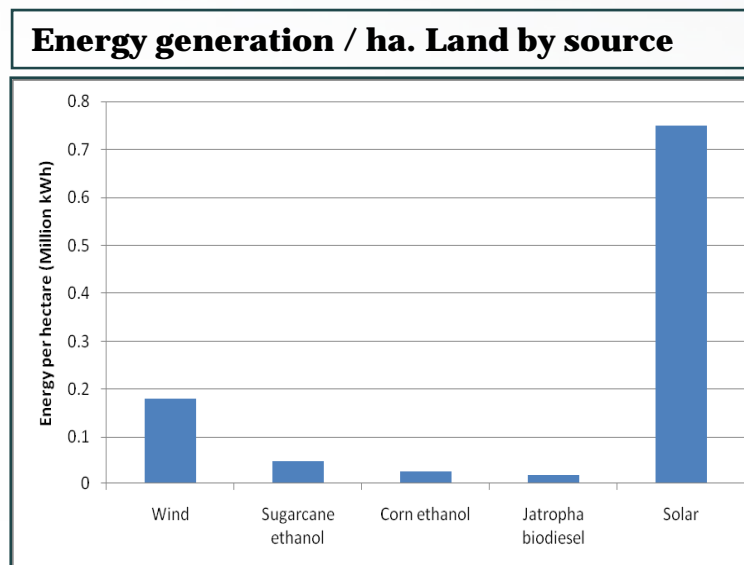
**Three interdependent barriers : Policy, capital & infrastructure**  
The key to unlocking growth lies in stable, transparent and long-term Policy, which attracts confident investing (capital flow), which in turn can promote development of infrastructure for cleantech segments. **Gujarat is a classic example.**



# Clean Technology: Ray of hopes

- Existing energy supply (14 tWh/year) from various sources, abundant but issue is efficient & env. Friendly harnessing
- Basic oxygen furnace in steel prodn.- productivity increased 1000% over years (9% ann.).
- Creative destruction : Destruction of incandescent bulb (5%) by CFL (35-40%) → LED (70%) → Omni-directional (85%) without toxic Hg. Saving eq. to 39 x 500 MW plant.
- Energy efficiency - Able to meet 30% target Of 2050. The Energy Star project
- Wind & Solar energy cost reduced dramatically in last decade.
- German plan: by 2050 on major energy will be renewable and by 2021 shut off of all 17 nuclear plants.

Energy resource	Life Cycle CO2 emission (Kg./kWh)	cost
Coal	0.95 – 0.84	++
Oil	0.8	++
Nat. Gas	0.45	+
Solar	0.01- 0.073	+++++
Wind	0.07 – 0.12	+++
Nuclear	0.02 – 0.06	++++



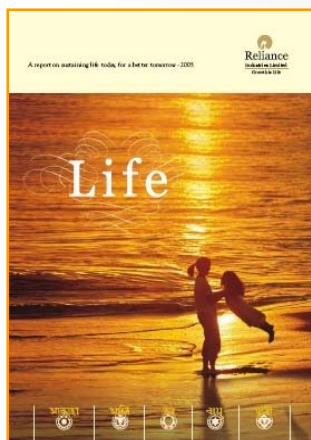
# Reliance case: Economic Foot print 2010-11



- **India's No.1, Fortune 500 company 6 years in row (175 rank by revenue) and among 100 most profitable companies of the world. Involved in Oil & Gas exploration, refining, petrochemicals, fiber & textile, retail, SEZ, etc.**
- **2<sup>nd</sup> place in Boston Consulting Group 2010 listing & world's top ten sustainable value creator between 2000-2009**
- **Only Indian co. to get a perfect score from CLSA Asia-Pacific & listed Asia's best CSR companies. Sus. Report 2009- highest rating by World bank.**
- **2010-11 Turnover - Rs.2586 bill.(\$ 58 bill.), Assets - Rs. 2847 bill. (\$ 63.8 bill.), Net Prof.- Rs. 202.86 bill.(\$ 4.5 bill.)**
- **Largest producer: Polyester fiber & Yarn (2.5 mill.TA) 7% world cap., 5<sup>th</sup>-p.Xylene & PP; 8<sup>th</sup> PTA & MEG;**
- **World largest deep water gas Facility. KG-D6 commissioned (Sept.08) cap. 55,000 beq. Oil/ d & 50-60 mmscmd gas.**
- **With SEZ refinery (558000 B/d) RIL-World largest refining (1.24 mill. barrels/ d) at single location and among top 10 private refiners globally, owning 25% of world's most complex refining capacity.**
- **RIL acquired pan India broad band wireless excess license and soon will revolutionize the digital footprint of India.**
- **Strategic partnership with BP to exploit full potential of our domestic oil & gas**

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# Global Sustainability reporting



No.	Year	Title	GRI Appl. Level
1	2004-05	Life	In-Accordance (E&Y)
2	2005-06	My Reliance, My Life.	GRI Checked A+ (E&Y)
3	2006-07	Small Acts, Big Impact.	GRI Checked A+ (E&Y)
4	2007-08	Transforming Life, Redefining Tomorrow.	GRI Checked A+ (KPMG)
5	2008-09	Transforming Tomorrow, Today.	GRI Checked A+ (KPMG)
6	2009-10	Think Sustainability, Think Transformation, Think Reliance	GRI Checked A+ (KPMG)



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# RIL- Env. footprint : (2006-07 Vs. 2010-11)



## **Production- 75.59% Increase**

### **GHG and Energy**

- **18.46% decrease in Sp. GHG emission (From 0.386 T to 0.314 T CO<sub>2</sub>/T of product)**
- **18.67 % decrease in Sp. energy consumption**
- **95.92% increase in renewable energy use**

### **Water environment**

- **100% increase in Water recycle**
- **10.15 % decrease in Effluent discharge**
- **6 sites – Zero discharge**

### **Air environment**

- **17.53 % reduction in SO<sub>2</sub> emission**
- **23.58 % reduction in PM emission**
- **55.9% Increase in NO<sub>x</sub> emission**
- **90.8 % reduction ODS emission**

### **Hazardous waste**

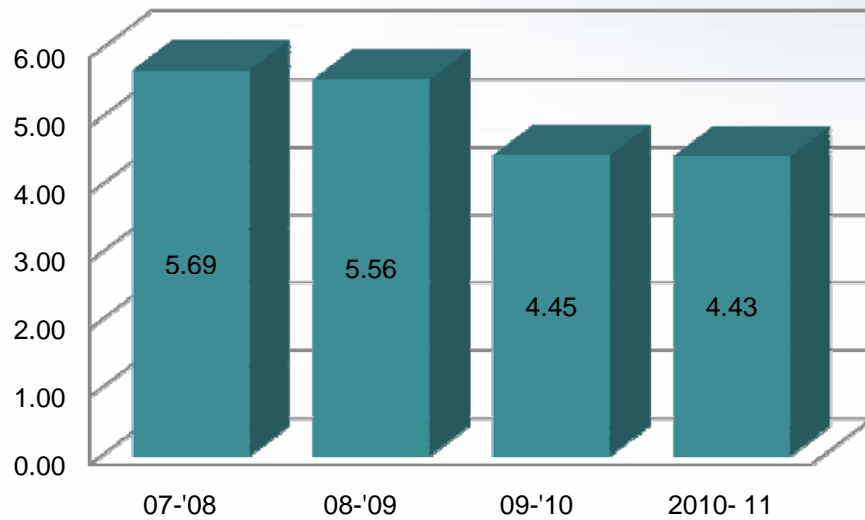
- **74 % of Haz-waste is recovered and reused**

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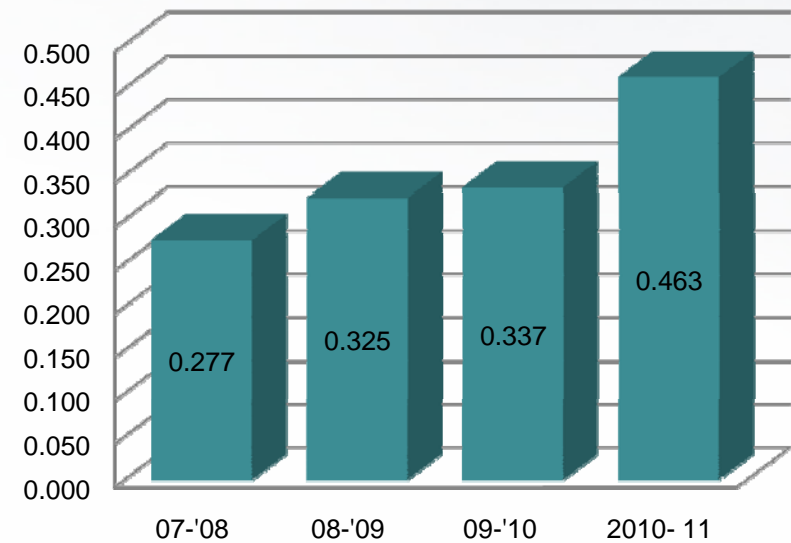
# Energy consumption



**Sp. Direct Energy cons. (mill.GJ/T product)**



**Renewable energy consn. (mill. GJ)**



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## Some of Clean Technologies at RIL- JMD



- **Total water demand from sea (world largest Mem. Desal Unit) Zero eff. discharge. Treated eff. use- Horti., Fire, CT, coke Cutting,**
- **One of the few world refineries to have Coker plant to maximize the resource & Energy efficiency, additionally convert HW to by-product.**
- **Production of eco-friendly ULS Diesel & Petrol- enable catalytic control of air emissions (Euro-IV)**
- **Storage tanks: With Swivel Angle side entry mixers; Floating roof with double seals & all new tank bottom with impermeable membrane**
- **About 75% of Haz-waste (slop oil & oily sludge) is recycled/ reused**
- **Tail Gas Treatment unit with more than 99.9 % in Sulphur Recovery**

**Green cover - 2,200 acres with 3.3 mill. plants. Asia's largest mango orchard**



1998 - 2011



- **857 Solar heaters (Redn.7 KTACO2 & 7 lac Unit ele.)**
- **Product transportation by Ships, Pipelines & Rly.**



# Energy efficiency & Refining business



- **Refining business is energy intensive**
- **Fuel & Loss approx. 10% crude processed (Approx. Rs. 7000 cr.)**

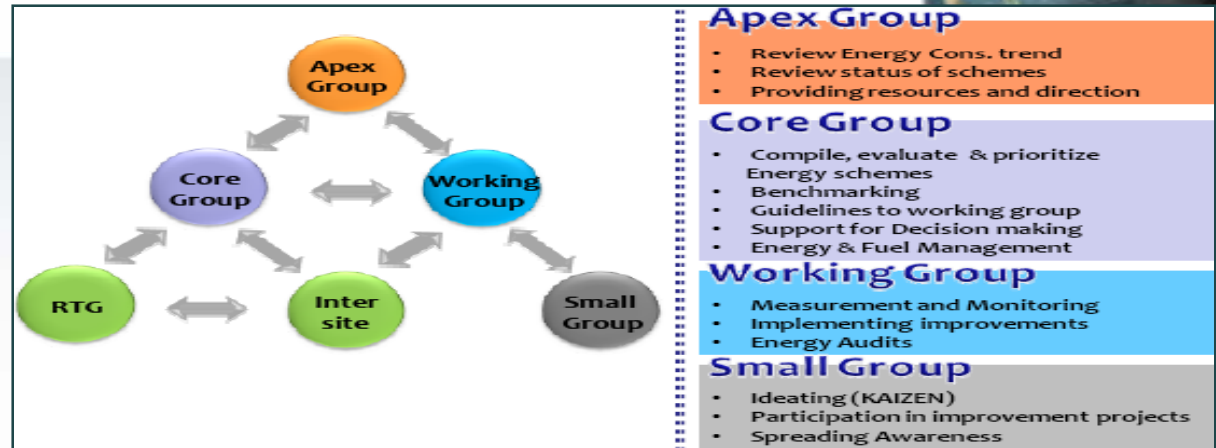


**For more details visit [www. Greenbusinesscenter.com/events/aug.2011](http://www.Greenbusinesscenter.com/events/aug.2011)  
(CII-Energy Excellence Award)**



# Energy Management

**Dedicated team of professionals & employee involvement**



Intra site	Inter site	External
Boiler / Heater Audit	Steam System Audit	Steam Trap Health Survey
Insulation Audit	Process compressors & Turbine drive Audit	Heat Integration Study
Lighting Audit & Illumination Survey	Process heat exchanger Audit	Insulation Audit
Motor loading Audit	Mechanical Refrigeration System & VAC Audit	Statutory Audits
Pump Efficiency Audit	Compressed air system Audit	- Electrical Energy System Audit
Steam Trap / Leak Audit	Furnace Audit	- Power System Audit
Other Energy systems		

**International Bench marking (Shell & Solomon Indices)**

**International Gap analysis & audits for improvement (ATK, Shell, KBC)**

More details on [www.Greenbusinesscenter.com/events/](http://www.Greenbusinesscenter.com/events/) (CII-Energy Excellence Award)

# Energy conservation Projects



## **1. Reduction in LPS consumption in stripper reboilers of Amine treating Unit**

- **Methyl Di-Ethyl Amine treatment to Fuel gas for Sulfur removal in 13 Amine absorbers at old refinery. Amine is regenerated in 4 ATU and recycled.**
- **High strength MDEA results in lower circulation rate and reduction in Low Pressure Steam (LPS) & Power**
- **Optimization study using simulation for all absorbers reduced 100 m<sup>3</sup>/h MDEA circulation & 10 MT/h LPS in ATU. Saving Rs. 6.95 Cr. / ann.**

## **2. Improvement in air compressor efficiency**

- **In Utilities 6 compressors each 20,000 m<sup>3</sup>/h cap.**
- **Six sigma project taken up. Identified problem. Intercooler tube replacement with phenolic coated fins @ cost Rs. 2.4 Cr.**
- **Power saving : 1.25 MW/h = Rs. 5.35 cr./ ann.**

## **3. Optimization of coker FGRS to reduce MP steam consumption & flare losses**

- **Penal officer observation: Increase in seal pot level (70 to 90%) increase the Back pressure and Gas slippage to flare is avoided.**
- **Implementation Resulted in 6 TPD flare gas recovery and reduction in 30 TPD MP steam consumption. Saving of Rs. 6 cr. by Opn. excellence.**

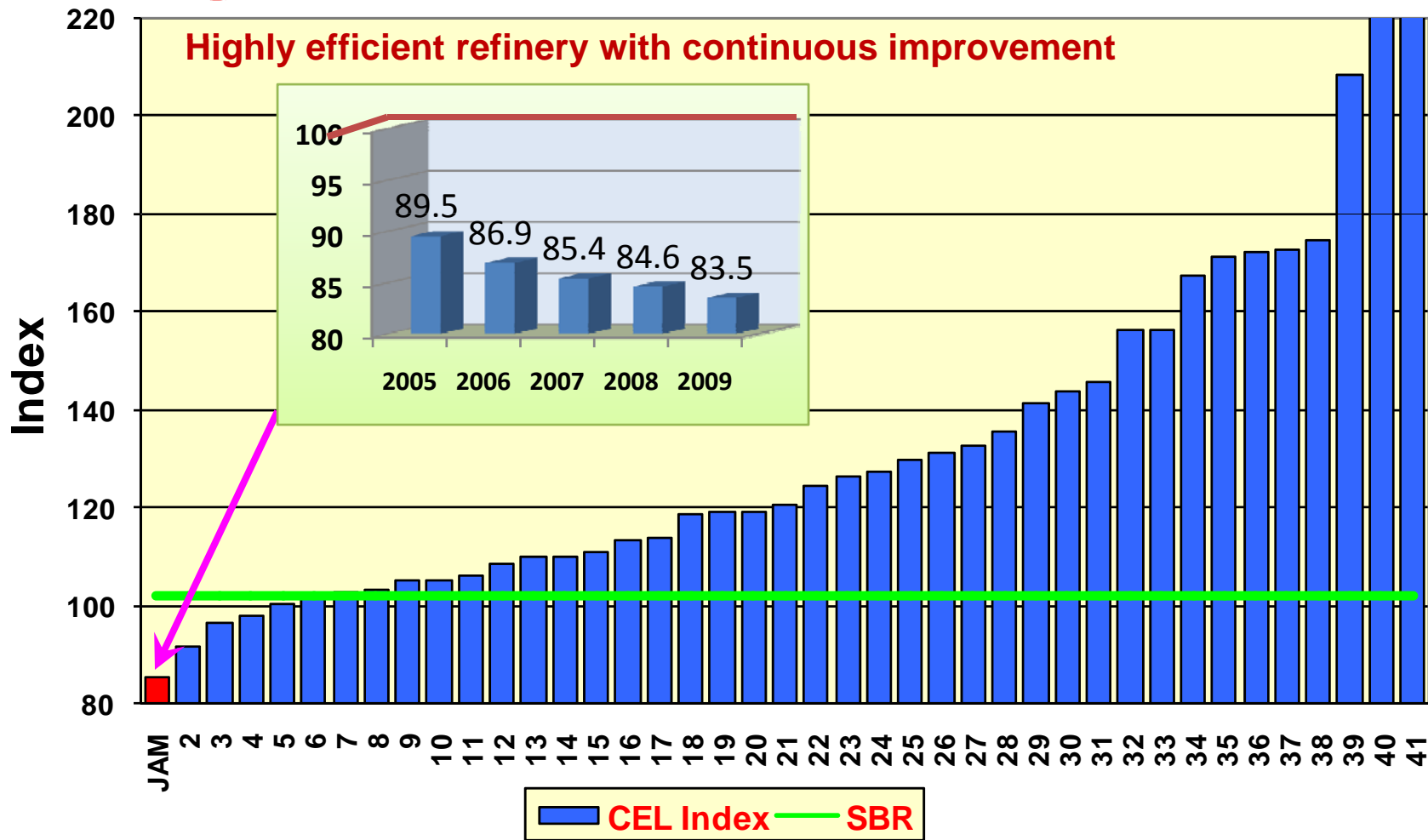
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# RIL Refinery Energy & Loss performance



## Energy & Loss Performance Corrected Energy and Loss (CEL) index

Highly efficient refinery with continuous improvement



# Benefits of EnCon projects (last 3 yrs.)



**Rs. 197.4 cr. saving in 3 yrs.  
Only at JMD and HMD**

1. JMD- 79.96 Cr.
2. HMD- 117.44 Cr.

Sr. No	Year	No. of En-Con Projects Implemented	Investment	Savings	Payback Period
			Rs. Lakhs	Rs. lakhs/Ann	Months
1	2010-11	12	435	3596	1.5
2	2009-10	9	8	1900	0.6
3	2008-09	5	45	2500	0.5
<b>Total</b>		<b>26</b>	<b>488</b>	<b>7996</b>	<b>0.7</b>

## Energy Conservation Projects

Year	No. of projects Implemented	Investment Made (Rs. Lacs)	Savings achieved (Rs. Lacs p.a.)
2008-09	78	2,155	4,360
2009-10	77	1,352	2,065
2010-11	69	4,506	5,319
<b>Total</b>	<b>224</b>	<b>8,013</b>	<b>11,744</b>

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October 13-15, 2011

Dr. J. D. D.

# Epilogue



***We need a new way of thinking  
to solve the problems caused  
by the old way of thinking.***

***Albert Einstein***

***Thank you***