CONTENTS

- Executive Summary................................. 3
- Advantage India....................................... 4
- Market Overview and Trends....................... 5
- Growth Drivers....................................... 14
- Success Stories: NTPC, Tata Power, Reliance Power............. 23
- Opportunities........................................ 30
- Useful Information.................................... 36
Fifth largest producer and consumer globally

- With a production of 1,006 TWh, India is the fifth largest producer and consumer of electricity in the world.

Large-scale government initiated expansion plans

- The government targets capacity addition of 89 GW under the 12th Five-Year Plan (2012–17) and around 100 GW under the 13th Five-Year Plan (2017–22).
- Investments of around USD223.9 billion are planned for the power sector during the 12th Plan Five-Year Plan.

Robust growth in renewables

- Renewable energy capacity additions of 30 GW are planned in the next five years to meet the growing energy demand.
- Wind energy is estimated to contribute 15 GW, followed by solar power at 10 GW.

Favourable policy environment

- The National Tariff Policy (2006) ensured adequate return on investment to companies engaged in power generation, transmission and distribution and assured electricity to end-users at affordable and competitive rates.
- Launch of Ultra Mega Power Project (UMPP) scheme through tariff-based competitive bidding.

Source: Ministry of New and Renewable Energy, CEA, Aranca Research, Assorted Articles

Note: TWh - Terawatt Hours, GW - Gigawatt
Growing demand
- Expansion in industrial activity to boost demand for electricity
- Growing population, and increasing penetration and per-capita usage to provide further impetus
- Power consumption is estimated to increase from 821.2 TWh in 2013 to an estimated 1,433.2 TWh in 2022

Attractive opportunities
- Large capacity additions (189GW) targeted in the 12th and 13th Five-Year Plans
- Ambitious projects and increasing investments across the value chain
- Diversification into renewable sources increasing growth avenues

Higher investments
- Total FDI inflows in the power sector touched USD7.8 billion in April 2000–March 2013, accounting for 4 per cent of total FDI inflow in India
- Major investments earmarked by public as well as private sector companies across the value chain

Policy support
- Elimination of licensing for various segments; removal of entry barriers
- Cost reduction and rationalisation of tariffs; development of UMPP
- Fuel supply agreement of power producers with Coal India

Source: Assorted articles and research material, Aranca Research; KPMG
Notes: FY - Indian Financial Year (April – March); FDI - Foreign Direct Investment, E - Estimates, CAGR - Compound Annual Growth Rate, TWh - Terawatt-hour, GW - Gigawatt, FY22 estimates as per IEA forecasts
• Electricity (Supply) Act 1948
• Establishment of semi-autonomous State Electricity Boards (SEBs)

1956–1991 Nationalisation Stage
• Industrial Policy Resolution (1956)
• Generation and distribution of power under state ownership
• Power losses, subsidies, infrastructure bottlenecks and resource constraints

1991–2003 Liberalisation Era
• Legislative and policy initiatives (1991)
• Private sector participation in generation
• Fast-track clearing mechanism of private investment proposals
• Electricity Regulatory Commissions Act (1998) for establishing Central and State Electricity Regulatory Commissions and rationalisation of tariffs

2003 onwards Growth Era
• Electricity Act (2003)
• National Tariff Policy (2006)
• Elimination of licensing for generation projects
• Increased competition through international competitive bidding engaged in power generation, transmission and distribution
• Launch of UMPP scheme
• Various schemes and initiatives such as Jawaharlal Nehru National Solar Mission to promote renewable energy
• Civil nuclear agreement with the US for nuclear technology and fuel
• Fuel supply agreement of power companies with Coal India Ltd (CIL)
• Private equity investments in the sector have surged since 2010

Source: KPMG, Corporate Catalyst India, IFLR, Aranca Research

For updated information, please visit www.ibef.org
With a production of 1,006 TWh, India is the fifth largest producer and consumer of electricity in the world.

Although power generation has grown over 100-fold since independence, demand growth has been even higher due to accelerating economic activity.

World’s leading electricity producers in 2012 (TWh)

- China: 4,700 TWh
- US: 4,308 TWh
- Japan: 1,104 TWh
- India: 1,006 TWh
- Russia: 1,052 TWh
- Germany: 615 TWh
- Canada: 608 TWh

Source: CIA World Factbook, Aranca Research, Energy Statistics 2013, Central Electricity Authority (CEA)

Note: TWh - Terawatt Hours
Electricity production in India (excluding captive generation) stood at 911.6 TWh in FY13, a 4 per cent growth over the previous fiscal year.

Over FY07–13, electricity production expanded at a CAGR of 5.5 per cent.

The Planning Commission’s 12th Plan projects that total domestic energy production would reach 669.6 million tonnes of oil equivalent (MTOE) by 2016–17 and 844 MTOE by 2021–22.

Electricity production in India (TWh)

<table>
<thead>
<tr>
<th>Year</th>
<th>TWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY07</td>
<td>663</td>
</tr>
<tr>
<td>FY08</td>
<td>705</td>
</tr>
<tr>
<td>FY09</td>
<td>724</td>
</tr>
<tr>
<td>FY10</td>
<td>772</td>
</tr>
<tr>
<td>FY11</td>
<td>811</td>
</tr>
<tr>
<td>FY12</td>
<td>876</td>
</tr>
<tr>
<td>FY13</td>
<td>912</td>
</tr>
</tbody>
</table>

**Source:** Central Electricity Authority (CEA), Aranca Research; Notes: FY - Indian Financial Year (April-March), TWh - Terra Watt Hour

CAGR: 5.5%
India has large reserves of coal. As of April 2012, total coal reserves stood at 293.5 billion tonnes; of this, 118.1 billion tonnes were proven reserves.

India’s proven natural gas reserves measure about 1,074 billion cubic metres.

With a large swathe of rivers and water bodies, India has enormous potential for hydropower; the 12th Five-Year Plan (2012–17) includes additional 30,000 MW of hydro-electric power generation. Currently, India has 39.6 GW of hydro power generating capacity.

Wind energy is the largest renewable energy source in India; projects like the Jawaharlal Nehru National Solar Mission (aims to generate 20,000 MW of solar power by 2022) is creating a positive environment among investors keen to exploit India’s potential.

Currently, India has 4.8 GW of net electricity generation capacity using nuclear fuels (across 20 reactors) and aims to increase it to 20GW by 2020; with one of the world’s largest reserves of thorium, India has a huge potential in nuclear energy.

**Source:** Ministry of Coal, NHPC, CEA, The Hindu, Corporate Catalyst India, Aranca Research

**Notes:** MW - Megawatt, GW - Gigawatt
As of April 2013, total thermal installed capacity stood at 151.7GW, while hydro and renewable energy installed capacity totalled 39.6GW and 27.5GW, respectively. Nuclear energy capacity remained broadly constant from that in the previous year, at 4.8GW.

For the 12th Five-Year Plan, a total of 88.5 GW of power capacity addition is targeted, of which 72.3 GW constitutes thermal power, 10.8GW of hydro power and 5.3GW of nuclear power.

The capacity addition target for 2013–14 is 1,198 MW of hydro power, 15,234 MW of thermal power and 2,000 MW of nuclear power. Total capacity target is 18,432 MW.

Source: Ministry of Coal, NHPC, CEA, The Hindu, Corporate Catalyst India, Aranca Research
Notes: MW - Megawatt, GW - Gigawatt
India’s installed power generation capacity was 223.6 GW at the end of April 2013.

Installed capacity increased steadily over the years, posting a CAGR of 10.9 per cent in FY09–13.

Source: Central Electricity Authority (CEA), Aranca Research
Note: GW - Gigawatt, Data for FY13* is as on April-2013
CAGR - Compound Annual Growth Rate
Among the different sources of power in India, the CAGR in installed capacity over FY09–13 was

- 12.8 per cent for thermal power
- 20.1 per cent for renewable energy, the fastest among all sources of power
- 1.8 per cent for hydro power

Source: Central Electricity Authority (CEA), Aranca Research,
Notes: Data for FY13 is as on April 2013,
CAGR - Compound Annual Growth Rate
### MAJOR PLAYERS IN THE POWER SECTOR … (1/2)

<table>
<thead>
<tr>
<th>Company</th>
<th>Business description</th>
</tr>
</thead>
</table>
| **NTPC**         | • NTPC is India’s largest power producer and the sixth-largest thermal power producer in the world, with installed capacity of 41,184 MW (including 5,364 MW through JVs). By 2032, NTPC plans to reach 128,000 MW power capacity. Coal-based power accounts for more than 90 per cent of the total capacity.  
• It has also diversified into hydro power, coal mining, power equipment manufacturing, oil and gas exploration, power trading and distribution. |
| **Tata Power**   | • Tata Power is India’s largest integrated power company, with significant presence in solar, hydro, wind and geothermal energy space. The company accounts for 52 per cent of total generation capacity in the private sector, with an installed capacity of 8,521 MW. |
| **Reliance Power** | • The company has over 35,000 MW of power generation capacity, both operational and under development. Reliance Power has an operational power generation capacity of 2,500 MW. FY13 saw the development of the 3,960 MW Sasan UMPP in Madhya Pradesh. |
| **CESC Limited** | • CESC Limited is a vertically integrated player engaged in coal mining, and generation and distribution of power.                                                                                                  |
| **NHPC**         | • NHPC is the largest hydro power utility in India, with an installed capacity of 5,295MW; it has drawn up a massive capacity expansion plan of adding 6,697 MW by 2017.  
• NHPC is constructing nine projects aggregating to a total installed capacity of 4271 MW. NHPC added 1,970 MW and 1,150 MW during the 10th and 11th Plan periods, respectively. |

*Source: Company websites, News Articles, Industry Sources, Aranca Research*
<table>
<thead>
<tr>
<th>Company</th>
<th>Business description</th>
</tr>
</thead>
</table>
| Power Finance Corporation Limited (PFC) | • Power Finance Corporation Limited (PFC) is an NBFC engaged in financing and development activities within the Indian power sector  
• Major products and services include project term loans, lease financing, direct discounting of bills, short-term loans and consultancy services |
| Adani Power | • Adani Power is one of India’s largest private thermal power producers, with total capacity of 4,620 MW; the company aims to generate 20,000 MW of power by 2020  
• The company is building one of the world’s largest single-location thermal power plants in Mundra, Gujarat |
| Power Grid Corporation of India Limited (PGCIL) | • Power Grid Corporation of India Limited (PGCIL) is the single largest transmission utility in India; it is responsible for planning, co-ordination, supervision and control over inter-state transmission systems |
| Damodar Valley Corporation | • Damodar Valley Corporation is engaged in power generation, distribution and transmission of electric power, irrigation and flood control |
| SJVN Limited | • SJVN Limited is the second largest hydro power company in India  
• The company plans to diversify into wind power projects soon |

*This list is indicative.*

Source: Company websites, News Articles, Aranca Research
Notes: NBFC - Non-banking Financial Company
Policy support

- Electricity Act (2003): highly liberal framework for generation
- Fuel supply agreement of power companies with Coal India Ltd
- Development of UMPPs
- National Tariff Policy (2006): private investment through competitive bidding

Increasing investments

- Rising FDI inflows (USD536 million in FY13)
- Growing M&A activity
- Large investments in equipment manufacture and power generation

Growing demand

- Increase in industrial activity
- Increasing penetration, per-capita consumption
- Growing middle class and consumer base

Inviting

Resulting in

Source: Corporate Catalyst India, Ministry of Power, Aranca Research,
Notes: FDI - Foreign Direct Investment, M&A - Merger and Acquisition,
R-APDRP - Restructured Accelerated Power Development and Reform Programme, T&D - Transmission and Distribution
Multiple drivers (industrial expansion, growing per-capita incomes) are leading to growth in power demand; this is set to continue in the coming years—

During FY10–15, GDP growth is likely to average 8.0–8.5 per cent

India is set to become a global manufacturing hub with investments across the value chain

Power consumption is estimated to increase from 821.2 TWh in 2013 to 1,433.2 TWh by 2022

India’s power demand is expected to rise up to 1,915 TWh by FY22

Source: Estimates as per BMI India Power Report Q3 2011, Aranca Research
Notes: TWh - Terawatt Hours, RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana, Central Electricity Authority (CEA)
INDUSTRIAL EXPANSION AND STRONG GDP GROWTH DRIVING POWER DEMAND … (2/2)

* 82GW worth of generation capacity is set to be added during FY11–FY15; future investments will benefit from strong demand fundamentals, policy support and increasing government focus on infrastructure

* Residential consumption has grown at a fast pace; growth was 14 per cent in FY11

* Government initiatives like RGGVY and ‘Power for all’ will further drive the demand

Source: Estimates as per BMI India Power Report Q4 2012, Mckinsey, Aranca Research
Notes: RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana
Policies and Initiatives Aiding Growth in the Sector

**Electricity Act, 2003**
- Elimination of licensing for electricity generation projects
- Increased competition through international competitive bidding
- Demarcation of transmission as a separate activity

**National Tariff Policy, 2006**
- Adequate return on investment to companies engaged in power generation, transmission and distribution
- Uniform guidelines to SERCs for fixing tariffs
- Assured electricity to consumers at reasonable and competitive rates

**Ultra Mega Power Projects (UMPPs)**
- Launch of the UMPP scheme through tariff-based competitive bidding
- Ease of land possession, provision of fuel, water and necessary clearances for enhancing investor confidence

**R-APDRP**
- R-APDRP was launched by Ministry of Power with the purpose of reducing AT&T losses up to 15 per cent by up-gradation of transmission and distribution network
- Linking disbursement of central government funds (to states), with actual reduction in transmission and distribution losses. Sanctioned projects of more than USD5.8 billion

**Fuel Supply Agreement**
- Fuel supply agreement with Coal India Ltd will ensure the availability of coal for power companies over the long term

Source: KPMG, CRISIL, Ministry of Power, Aranca Research
Notes: R-APDRP - Restructured Accelerated Power Development and Reform Programme, SERC - State Electricity Regulatory Commission, AT&T - American Telephone & Telegraph Systems
**Generation-based incentives**
- Government to reintroduce ‘generation-based incentives’ for wind power projects to boost capacity addition in the sector
- USD147.3 million would be allocated to the Ministry of New and Renewable Energy

**Public Private Partnership (PPP)**
- To reduce dependency on imported coal, a Public Private Partnership (PPP) policy framework would be devised with Coal India Limited to increase coal production

**Liberalised FDI policy**
- During FY13, the Government liberalised FDI policy for Power Trading Exchanges
- Foreign Investment in power exchanges registered under the Central Electricity Regulatory Commission Regulations, 2010, allowed up to 49 per cent (FDI-26 per cent and FII-23 per cent)

**Low-interest funds**
- Low-interest–bearing funds to be provided from National Clean Energy Fund (NCEF) to Indian Renewable Energy Development Agency Ltd (IREDA) for on-lending to viable renewable energy projects

**Growing investments**
- The total plan outlay for the power sector for FY14 is estimated at USD1.6 billion, a significant 27 per cent higher than the revised estimate of USD1.5 billion for FY13
- While the proportion of plan expenditure in the total outlay was 59 per cent in FY13, that for FY14 is a whopping 96 per cent

**Higher capex by PSUs**
- The total capex by power PSUs is estimated to be USD9.4 billion in FY14 as against USD9.3 in FY13
- Power Grid Corporation of India will incur USD3.7 billion of capex in FY14, same as that in FY13

*Source: Union Budget FY13, Various News Articles, Aranca Research, Note: PSUs - Public Sector Units*
Elimination of customs duty

- The government has fully exempted basic customs duty and a concessional countervailing duty (CVD) of 1 per cent to steam coal for a period of two years till FY14

External commercial borrowings (ECBs)

- Power companies can utilise 40 per cent of fresh ECBs raised towards refinancing of Rupee loan availed from domestic banks under the approval route.
- The withholding tax on ECBs has been reduced to 5 per cent from 20 per cent till FY15

Higher limit for Tax free bonds

- The limit for tax-free bonds for the power sector has been increased to USD2 billion from USD1 billion
- The government has also extended the tax holiday by one year; this allows power producers to claim tax exemption up to 10 years

Source: Union Budget FY13, Various News Articles, Aranca Research
Power is one of the key sectors attracting FDI inflows into India.

During FY06–12, FDI inflows into the sector increased from a mere USD87 million in FY06 to USD1.7 billion in FY12.

FDI inflows stood at USD536 million in FY13.

Power accounted for 4 per cent of total inflows in the sector in FY13.

Cumulative FDI inflows into the sector in FY00–13 were USD7.8 billion.

Source: Department of Industrial Policy and Promotion, Aranca Research
Private equity investments in the sector have surged since 2010

Goldman Sachs’ private equity fund invested USD135 million afresh in the privately held wind energy firm ReNew Power Pvt Ltd. It had invested USD200 million in 2011.

ReNew Wind Power has several wind projects in the development stage; one year back, it had commissioned its first 25.2-MW wind farm at Jasdan in Rajkot, Gujarat. ReNew had 200 MW of installed wind power portfolio as of 30 April 2013.

GSPC Distribution Networks Ltd’s investment of USD674.2 million in Gujarat Gas Co Ltd was the largest PE transaction in the Indian power sector in 2012.

Notes: FDI - Foreign Direct Investment, PE - Private Equity

| Acquirer                                      | Target                                                             | Deal date     | Deal value (USD million) |
|-----------------------------------------------|                                                                   |              |                          |
| Goldman Sachs                                 | ReNew Wind Power Pvt Ltd                                         | 5 June 2013  | 135.0                    |
| Consortium led by Deutsche Investitions, FE   | NSL Renewable Power Pvt Ltd                                      | 29 April 2013| 60.0                     |
| Clean Energy Group & IFC                      |                                                                    |              |                          |
| Ascent Capital Advisors India Pvt Ltd,       | Bharat Light and Power Pvt Ltd                                   | 22 January 2013| 18.6                     |
| VenturEast, Draper Fisher Jurvetson Intl.     |                                                                    |              |                          |
| GSPC Distribution Networks Ltd                | Gujarat Gas Co Ltd                                               | 3 October 2012| 674.2                    |
| Foundation Capital; Helion Venture Partners   | Azure Power India Pvt Ltd                                        | 7 September 2012| 8.0                      |

Source: Thomson One Banker, Industry News, VC Circle, Aranca Research
Global power giants like GDF Suez of France and E.ON of Germany plan to enter the Indian market.

Morgan Stanley Infrastructure’s private equity fund invested USD425 million in Asian Genco Pvt Ltd, an infrastructure company which has investments in Indian power generation assets and engineering services businesses.

<table>
<thead>
<tr>
<th>Acquirer</th>
<th>Target</th>
<th>Deal date</th>
<th>Deal value (USD million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Athena Capital Partners LLP</td>
<td>SPS Ispat and Power Ltd</td>
<td>08 July 2011</td>
<td>67.6</td>
</tr>
<tr>
<td>India Infrastructure Fund</td>
<td>Caparo Energy (India) Ltd</td>
<td>17 June 2011</td>
<td>78.5</td>
</tr>
<tr>
<td>Warburg Pincus India Pvt Ltd</td>
<td>Diligent Power Pvt Ltd</td>
<td>11 May 2011</td>
<td>150.0</td>
</tr>
<tr>
<td>Blackstone Group LP</td>
<td>Moser Baer Projects Pvt Ltd</td>
<td>18 August 2010</td>
<td>300.0</td>
</tr>
<tr>
<td>Morgan Stanley Infrastructure</td>
<td>Asian Genco Pvt Ltd</td>
<td>18 March 2010</td>
<td>425.0</td>
</tr>
</tbody>
</table>

Source: Thomson One Banker, Economic Times, Aranca Research
Notes: FDI - Foreign Direct Investment, PE - Private Equity
During FY07–13, NTPC’s sales increased at a CAGR of 12.3 per cent; CAGR in profits was 10.5 per cent.

NTPC accounts for 18.5 per cent of the country’s capacity, though it contributes 27.4 per cent of total power generation.

The company has an installed capacity of 41,184 MW. It aims to become a 128,000 MW capacity company by 2032.

Currently, 17,909 MW of capacity is under construction.

It spent approximately USD 2.2 billion in FY12, with plans to spend an additional USD 4 billion in FY13 in expansion activity.

The company plans to set up a 800 MW advanced ultra supercritical plant, a first-of-its-kind in India.

Source: NTPC website, Annual Reports, Economic Times, Aranca Research
Note: CAGR - Compound Annual Growth Rate, MW - Megawatt
NTPC has taken over and successfully turned around a number of sub-optimally performing stations.

High operational efficiency (indicated by plant load factor and availability factor) is NTPC’s trademark.

It is a pioneer in high-efficiency supercritical and ultra supercritical coal-bed power plants in India.

NTPC has formulated a business plan for capacity addition of around 1,000 MW through renewable resources by 2017.

Impact of NTPC takeover of sub-optimal plants (PLF)

Before takeover
- Badarpur: 66%
- Unchahar: 19%
- Talcher: 18%
- Tanda: 22%

After takeover
- Badarpur: 66%
- Unchahar: 86%
- Talcher: 86%
- Tanda: 92%

Source: NTPC website, Annual Reports, Economic Times, Aranca Research
Notes: PLF - Plant Load Factor, After Takeover - Figures for FY08, MW - Megawatt
NTPC: A PUBLIC SECTOR SUCCESS … (3/3)

- Capacity addition at a CAGR of 19 per cent during 1982–2012

- In 2012, NTPC formed a joint venture with Bangladesh for a 1,320-MW plant and was awarded the 800-MW Kudgi-I project.

- Highest ever capacity addition of 2,660 MW during 9MFY13, contributing 24 per cent of total addition in the country.

- As of December 2012, the company’s total installed power generation capacity stood at 39.7 GW, which includes 4.9 GW from other group companies.

NTPC: Capacity additions over the years (GW)

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY95</td>
<td>15</td>
</tr>
<tr>
<td>FY03</td>
<td>20</td>
</tr>
<tr>
<td>FY07</td>
<td>25</td>
</tr>
<tr>
<td>FY09</td>
<td>30</td>
</tr>
<tr>
<td>FY12</td>
<td>35</td>
</tr>
<tr>
<td>9M'13</td>
<td>39.7</td>
</tr>
</tbody>
</table>

Source: NTPC website, Annual Reports, Economic Times, Aranca Research
Notes: PLF - Plant Load Factor, After Takeover - Figures for FY08, GW - Gigawatt
During FY06–12, Tata Power’s profits increased at a CAGR of 11.5 per cent to USD244.1 million.

The company has an installed generation capacity of 8,521 MW in India and is present in all segments of the power sector.

The thermal power generation capacity stands at 7,647 MW, while clean energy generation such as hydro, solar and wind stands at 852 MW.

The company is developing its first 4,000 MW Ultra Mega Power Project at Mundra (Gujarat) based on supercritical technology.

Its international presence includes a 30 per cent stake in coal mines and a geothermal project in Indonesia, and a hydro project in Bhutan in partnership with The Royal Government of Bhutan.

The company is eyeing the clean energy segment; it recently acquired stakes in two Australian companies in the sector.

Source: Company website, Annual Reports, Economic Times, Aranca Research
Note: MW - Megawatt
The company estimates its installed capacity to expand fivefold in the next five years to 25,000 MW (CAGR of 30 per cent from FY07 and 47 per cent from FY12).

Recognising the enormous potential in renewable energy, the company intends to increase the share of renewable sources to 25 per cent of its total generating capacity in the near future.

Installed capacity in mega watts (MW)

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY07</td>
<td>2,300</td>
</tr>
<tr>
<td>FY11</td>
<td>3,120</td>
</tr>
<tr>
<td>FY12</td>
<td>5,297</td>
</tr>
<tr>
<td>FY17E</td>
<td>25,000</td>
</tr>
</tbody>
</table>

Source: Company website, FY17 estimate as per press release, 15th July 2011

Note: MW - Megawatt, CAGR - Compounded Annual Growth Rate
Reliance Power has 2,500 MW of operational capacity and over 20,000 MW under implementation

It won three of the four Ultra Mega Power Projects (UMPPs) awarded by Government of India, and is constructing India’s largest 2,400 MW gas-based power plant

It has three captive coal blocks in India, with aggregate coal reserves of around 2 billion tonnes and three coal concessions in Indonesia, with estimated coal resources of another 2 billion tonnes

Planned peak coal production of 95 million tonnes

In FY12, the Rosa plant recorded annual generation of 8 billion units

---

**Revenues and Net Profit (USD million)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Income (USD million)</th>
<th>Net Profit (USD million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY10</td>
<td>178</td>
<td>144</td>
</tr>
<tr>
<td>FY11</td>
<td>421</td>
<td>167</td>
</tr>
<tr>
<td>FY12</td>
<td>577</td>
<td>181</td>
</tr>
<tr>
<td>FY13 E</td>
<td>973</td>
<td>186</td>
</tr>
</tbody>
</table>

*Source: Reliance Power website, Annual Reports, Industry News, Aranca Research
Note: MW - Megawatt*
Both units of the 600 MW Butibori coal project in Maharashtra are ready for production.

First unit of the 3,960 MW Sasan UMPP project in Madhya Pradesh was commissioned in March 2013, and coal production from Moher Mines started in September 2012.

At the 2,400-MW gas project in Samalkot, Andhra Pradesh, four gas turbines are ready for generation.

Hydro power projects of 5,292 MW capacity are currently under development in Arunachal Pradesh (4,220 MW), Himachal Pradesh (672 MW) and Uttarakhand (400 MW).

---

**Generating Capacity (million units)**

<table>
<thead>
<tr>
<th>Year</th>
<th>FY10</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
<td>2,842</td>
<td>4,289</td>
<td>8,012</td>
</tr>
</tbody>
</table>

Note: MW - Megawatt, E - Estimate*
Demand for electricity is expected to expand at a CAGR of 7.5 per cent over FY07–22 to 1,915 TWh.

Current production levels are not enough to meet demand; annual demand outstrips supply by about 7.5 per cent.

**Electricity demand forecast (TWh)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Demand (TWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY07</td>
<td>690</td>
</tr>
<tr>
<td>FY12</td>
<td>969</td>
</tr>
<tr>
<td>FY17E</td>
<td>1,392</td>
</tr>
<tr>
<td>FY22E</td>
<td>1,915</td>
</tr>
</tbody>
</table>

CAGR: 7.5%

Source: International Energy Agency (IEA), Demand estimates based on IEA forecasts, Aranca Research
Notes: TWh - Terawatt Hour, CAGR - Compounded Annual Growth Rate
**POWER**

**POWER GENERATION: OVERALL FUNDAMENTALS WILL REMAIN STRONG … (2/2)**

- The government is targeting capacity addition of around 89 GW under the 12th (2012–17) and around 100 GW under the 13th (2017–22) Five-Year Plan

- The expected investments in the power sector during the 12th Plan (2012–17) is USD223.9 billion

- There is a tangible shift in policy focus on the sources of power. The government is keen on promotion of hydro, renewable and gas-based projects, as well as adoption of clean coal technology

---

**Addition to generation capacity under Five-Year Plans (GW)**

<table>
<thead>
<tr>
<th>Plan</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th+9th+10th</td>
<td>56</td>
</tr>
<tr>
<td>11th</td>
<td>55</td>
</tr>
<tr>
<td>12th</td>
<td>89</td>
</tr>
<tr>
<td>13th E</td>
<td>100</td>
</tr>
</tbody>
</table>

*Source: Business Standard, Capacity addition estimates by Central Electricity Authority (CEA), Aranca Research
Notes: TWh - Terawatt-hour, E - Estimates*
Peak power requirement in FY12 stood at 130 GW compared to the capacity of 116 GW.

The per-capita electricity consumption of India stood at 819 lower than global average of 2,803 representing enormous potential for growth.

The addition of approximately 106 GW to the existing capacity is expected to boost GDP growth to 8 per cent by FY17.

Source: NTPC presentation, Central Electricity Authority (CEA), Aranca Research
Note: GW - Gigawatt Hour
CURRENT TRENDS POINT TO OPPORTUNITIES ACROSS THE VALUE CHAIN

**Generation**
- Adani Power: Plans to invest USD17.7 billion in power generation by 2014
- Germac Energy and Sepco III (JV): Coal-fired plant in Tamil Nadu; investment of USD1.3 billion
- Tata Power: Nuclear power ambition; studying entry strategy with minimum investment of USD3.0 billion
- Reliance Power: USD2.5 billion investment in hydro power in Arunachal Pradesh, with a combined generation capacity of 2.5 GW

**T&D**
- Power Grid Corporation of India Ltd (PGCIL): Loan from ADB of USD600 million for development of high-voltage transmission system
- Developing an integrated national grid, including strengthening of five regional grids; project investment is worth about USD16 billion
- Joint development of an India–Sri Lanka undersea transmission link with the Ceylon Electricity Board at an estimated cost of USD573 million

Source: BMI India power report Q3 2011, Aranca Research
Notes: JV - Joint Venture, T&D - Transmission and Distribution, GW - Gigawatt
India has the sixth largest renewable (e.g., hydro power) power generation capacity (2012)

- As of April 2013, total installed power capacity from renewable energy sources (excluding Hydro power) was 27.5 GW. This accounts for 12.3 per cent of the total installed power capacity and forms 6.5 per cent of the total electricity mix.

- Wind energy is the largest source of renewable energy in India; it accounts for an estimated 87 per cent of total installed capacity (18.3 GW). There are plans to double wind power generation capacity to 20 GW by 2022.

- Biomass is the second largest source of renewable energy, accounting for 12 per cent of total installed capacity in renewable energy. There is a strong upside potential in biomass in the coming years.

- Solar energy accounts for 1 per cent of total renewable energy installed capacity. The country’s true potential for solar power stands at an estimated 5,000 TWh per annum.

- Capacity addition of 30 GW is planned using various renewable energy technologies during the 12th Five-Year Plan. Wind Energy is estimated to contribute 15 GW, followed by solar power at 10 GW and the remaining by other sources.

Source: Renewables 2012 Global Status Report (REN21), Business Monitor International (BMI), Aranca Research, Central Electricity Authority

Note: TWh - Tera Watt Hour; GW - Gigawatt
In 2010, India stood fifth in the Asia-Pacific region in nuclear electricity net generation (behind Japan, South Korea, China, Taiwan)

Currently, the country has net installed capacity of 4.8 GW, using nuclear fuels, across 20 reactors. Of the 20 reactors, 18 are pressurised heavy water reactors (PHWR) and two are boiling water reactors (BWR)

The government aims to quadruple India's nuclear power generation capacity to 20 GW by 2020; currently, seven nuclear power reactors of 4,890 MWe capacity are under construction

For FY14, the government plans to add 2GW of installed nuclear capacity

Nuclear Power Corporation of India Limited (NPCIL) plans to construct five nuclear energy parks with a capacity of 10,000 Mwe

The (2X1 GW) Kudankulam Atomic power project, Tamil Nadu, by NPCIL is scheduled for completion by March 2014

**Nuclear energy production in India in (GW)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>4.4</td>
</tr>
<tr>
<td>2020E</td>
<td>20</td>
</tr>
</tbody>
</table>

**Source:** Ministry of New and Renewable Energy, Business Monitor International, CEA, Aranca Research

**Note:** GW - Gigawatt; Mwe - Megawatt Electric

PHWR - Pressurised Heavy Water Reactors

BWR - Boiling Water Reactors

CAGR: 24.0%
Council of Power Utilities
A-2/158, Janakpuri, New Delhi-110058, India
Tel : 91 11 25618472, 45652708
Fax : 25611622
E-mail : cvjvarma@gmail.com, cvjv1933@yahoo.com
Web site: www.indiapower.org

Hydro Power Association (India)
Flat no 6, Green Park Apartment, Shriram Society, Warje,
Pune - 411058, Maharashtra, India
Tel: 91 20 25233338
E-mail: hypaindia@gmail.com, president@hpaindia.org,
secretary@hpaindia.org
Website: http://hpaindia.org/

Bureau of Energy Efficiency (BEE)
Ministry of Power, 4th Floor, SEWA Bhawan, R. K. Puram,
New Delhi – 110066, India
Tel: 91 11 26179699
Fax: 91 11 26178352
E-mail: webmanager-bee@nic.in
Website: http://www.beeindia.in/
Indian Wind Energy Association (INWEA)
PHD House, 3rd Floor, Opp. Asian Games Village, August Kranti Marg, New Delhi-110016, India
Tel: 91 11 26523042
E-mail: manish@inwea.org
Web site: http://www.inwea.org/
GLOSSARY … (2/2)

* R-APDRP: Restructured Accelerated Power Development and Reform Programme
* T&D: Transmission and Distribution
* TWh: terawatt-hour
* RGGVY: Rajiv Gandhi Grameen Vidyutikaran Yojana
* USD: US Dollar
* Wherever applicable, numbers have been rounded off to the nearest whole number
## Exchange Rates (Fiscal Year)

<table>
<thead>
<tr>
<th>Year</th>
<th>INR equivalent of one US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-05</td>
<td>44.95</td>
</tr>
<tr>
<td>2005-06</td>
<td>44.28</td>
</tr>
<tr>
<td>2006-07</td>
<td>45.28</td>
</tr>
<tr>
<td>2007-08</td>
<td>40.24</td>
</tr>
<tr>
<td>2008-09</td>
<td>45.91</td>
</tr>
<tr>
<td>2009-10</td>
<td>47.41</td>
</tr>
<tr>
<td>2010-11</td>
<td>45.57</td>
</tr>
<tr>
<td>2011-12</td>
<td>47.94</td>
</tr>
<tr>
<td>2012-13</td>
<td>54.31</td>
</tr>
</tbody>
</table>

## Exchange Rates (Calendar Year)

<table>
<thead>
<tr>
<th>Year</th>
<th>INR equivalent of one US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>45.55</td>
</tr>
<tr>
<td>2006</td>
<td>44.34</td>
</tr>
<tr>
<td>2007</td>
<td>39.45</td>
</tr>
<tr>
<td>2008</td>
<td>49.21</td>
</tr>
<tr>
<td>2009</td>
<td>46.76</td>
</tr>
<tr>
<td>2010</td>
<td>45.32</td>
</tr>
<tr>
<td>2011</td>
<td>45.64</td>
</tr>
<tr>
<td>2012</td>
<td>54.69</td>
</tr>
<tr>
<td>2013</td>
<td>54.45</td>
</tr>
</tbody>
</table>

Average for the year
India Brand Equity Foundation (IBEF) engaged Aranca to prepare this presentation and the same has been prepared by Aranca in consultation with IBEF.

All rights reserved. All copyright in this presentation and related works is solely and exclusively owned by IBEF. The same may not be reproduced, wholly or in part in any material form (including photocopying or storing it in any medium by electronic means and whether or not transiently or incidentally to some other use of this presentation), modified or in any manner communicated to any third party except with the written approval of IBEF.

This presentation is for information purposes only. While due care has been taken during the compilation of this presentation to ensure that the information is accurate to the best of Aranca and IBEF’s knowledge and belief, the content is not to be construed in any manner whatsoever as a substitute for professional advice.

Aranca and IBEF neither recommend nor endorse any specific products or services that may have been mentioned in this presentation and nor do they assume any liability or responsibility for the outcome of decisions taken as a result of any reliance placed on this presentation.

Neither Aranca nor IBEF shall be liable for any direct or indirect damages that may arise due to any act or omission on the part of the user due to any reliance placed or guidance taken from any portion of this presentation.