CONTENTS

- Executive Summary............................. 3
- Advantage India................................ 4
- Market Overview and Trends................. 6
- Porter Five Forces Model.......................16
- Strategies Adopted...............................18
- Growth Drivers..................................20
- Opportunities....................................30
- Success Stories: NTPC, Tata Power, Reliance Power...... 37
- Useful Information..............................45
Fourth largest producer and fourth largest consumer globally

- With a production of 1,052 TWh, India is the fourth largest producer and fourth largest consumer of electricity in the world. It has fifth largest installed capacity in the world

Large-scale government initiated expansion plans

- The government targets capacity addition of 88.5 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 to 41 GW are planned till 2017 to meet the growing energy demand. The installed capacity reached 32.2 GW as on March 2014
- Wind energy is estimated to contribute 15 GW, followed by solar power at 10 GW

Favourable policy environment

- In FY13, the Government liberalised FDI policy for Power Trading Exchanges
- Cutting of excise duties by 2 per cent on capital goods import in interim budget of 2014-15
- In the Budget 2014-15, the tax holiday has been extended till March 2017

Source: Ministry of New and Renewable Energy, International Energy Agency (IEA), CEA (Central Electricity Authority), Aranca Research, Assorted articles
Notes: 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 853 TWh in 2013 to 1,915 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

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
• 100 per cent FDI allowed in the power sector has boosted FDI inflows in this sector

Higher investments
• Total FDI inflows in the power sector touched USD8.9 billion during April 2000 to March 2014, accounting for 4.09 per cent of total FDI inflow in India
• Major investments earmarked by public as well as private sector companies across the value chain
• Around USD163 million have been allocated for solar power projects in budget 2014-15

Source: CEA, DIPP (Department of Industrial Policy and Promotion), 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
MARKET OVERVIEW AND TRENDS
Before 1956 Introductory stage

- 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 1,052 TWh, India is the fourth largest producer and fourth largest consumer of electricity in the world.

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

World’s leading electricity producers in 2012 (TWh)

- China: 4,716 TWh
- US: 4,327 TWh
- India: 1,052 TWh
- Russia: 1,053 TWh
- Japan: 1,043 TWh
- Canada: 637 TWh
- Germany: 602 TWh

Source: IEA, CIA World Factbook, Aranca Research, Energy Statistics 2013, 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.

During FY14, electricity production stood at 967 TWh.

Over FY07–14, electricity production expanded at a CAGR of 5.6 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.

Source: CEA (Central Electricity Authority), Aranca Research;
Notes: FY - Indian Financial Year (April-March), TWh - Terra Watt Hour
India has large reserves of coal. As of January 2014, total coal reserves stood at 301.5 billion tonnes; of which, 125.9 billion tonnes was proven reserves.

India’s proven natural gas reserves measure about 1.4 trillion 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 30GW of hydroelectric power generation. Currently, India has 40.5 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) are creating a positive environment among investors keen to exploit India’s potential. There are plans to set up four solar power plants of 1GW each.

Currently, India has 4.8 GW of net electricity generation capacity using nuclear fuels (across 20 reactors) and aims to increase it to 45 GW 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, BP Statistical Review 2014, The Hindu, Corporate Catalyst India, Indian Power Sector, Aranca Research

Notes: MW - Megawatt, GW - Gigawatt
As of April 2014, total thermal installed capacity stood at 168.4 GW, while hydro and renewable energy installed capacity totalled 40.5 GW and 31.7 GW, respectively. At 4.8 GW, nuclear energy capacity remained broadly constant from that in the previous year.

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 hydro power and 5.3GW nuclear power.

The capacity addition target for 2014–15 is 842 MW of hydro power, 14.9 GW of thermal power and 2 GW of nuclear power. Total capacity target is 17.8 GW.

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 245.39 GW at the end of April 2014.

Installed capacity increased steadily over the years, posting a CAGR of 10.6 per cent in FY09–14.

Source: CEA (Central Electricity Authority), Aranca Research
Notes: GW – Gigawatt, CAGR - Compound Annual Growth Rate
Among the different sources of power in India, the CAGR in installed capacity over FY09–14 was

* 12.3 per cent for thermal power
* 19.7 per cent for renewable energy, the fastest among all sources of power
* 2.1 per cent for hydro power
* 4.6 per cent for nuclear power

Source: CEA, Aranca Research, Notes: Data for FY13 is as on June 2014, 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 43.1 GW (including 5.9 GW through JVs). By 2032, NTPC plans to reach 128,000 MW of 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 8.6 GW. By 2017, Tata Power plans to achieve 25 GW of power capacity. |
| **Reliance Power** | • The company has more than 35,000 MW of power generation capacity, both operational and under development. Reliance Power has an operational power generation capacity of 2.6 GW. 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 5.7 GW; it has drawn up a massive capacity expansion plan of adding 6.7 GW by 2017.  
                     • NHPC is constructing nine projects, aggregating an installed capacity of 4.2 GW. NHPC added 1.9 GW and 1.1 GW during the 10th and 11th Plan periods, respectively. |
### MAJOR PLAYERS IN THE POWER SECTOR ... (2/2)

<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 8.6 GW; the company aims to generate 20 GW 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  
• Target to enhance inter-regional capacity to about 65.5 GW at the end of XII Plan. In 2013, inter-regional capacity is 33.9 GW |
| **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.*
## Competitive Rivalry
- Rivalry is not intense due to oligopoly structure
- In India, the projected demand is already above the supply levels
- Competitive rivalry is expected to increase due to government encouraging private players to enter the sector

## Threat of New Entrants
- Capital intensive nature of the industry makes it difficult for new entrants
- Regulatory approvals, land remain a major problem

## Substitute Products
- Does not have any substitutes

## Bargaining Power of Suppliers
- Bargaining power of suppliers is high as presence of bigger players block the new entrants

## Bargaining Power of Customers
- Medium, as for retail consumers, government sometimes interferes to regulate prices. However, prices are not regulated for industrial customers

Source: Aranca Research
POWER

STRATEGIES ADOPTED

AUGUST 2014
Companies are developing captive coal fields to reduce price volatility and ensure uninterrupted supply of fuel to control generation cost.

Most of the power companies are now located near energy source. This helps minimise costs of fuel transport.

Power companies are now looking at securing adequate supplies of fuel by targeting not only domestic but also overseas resources.

Reliance Power already has coal reserves in Indonesia.

Companies are using multiple-generation technologies based on a project's requirement.

Companies such as NTPC and Reliance Power already have coal-fired, gas-fired and hydroelectric capacity.

This helps them diversify, reduces dependence on a single source.

Most of the companies are now looking to sell their carbon credits to generate additional revenue by employing supercritical technology.

Source: Aranca Research
STRONG DEMAND AND POLICY SUPPORT DRIVING INVESTMENTS

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

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 (USD1,066 million in FY14)
- Growing M&A activity
- Large investments in equipment manufacture and power generation

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.

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

Share of industry in electricity consumption

Source: Estimates as per BMI India Power Report Q3 2011, Aranca Research
Notes: TWh - Terawatt Hours, RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana, CEA
82 GW 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

Per capita consumption has grown at a CAGR of 5.5 per cent between FY06 and FY13

Per capita consumption grew 7.9 per cent in FY12 but tapered to 3.8 per cent in FY13, reaching 917.2 KWh

Source: CEA, Aranca Research
Notes: RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana; * - Provisional
POLICY SUPPORT 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 upgradation 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
## POLICIES ADOPTED DURING BUDGET FY14 & INTERIM BUDGET FY15

<table>
<thead>
<tr>
<th>Policy</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation-based incentives</td>
<td>Government to reintroduce 'generation-based incentives' for wind power projects to boost capacity addition in the sector; Cutting of excise duties by 2 per cent on capital goods import. USD147.3 million would be allocated to the Ministry of New and Renewable Energy.</td>
<td>Union Budget FY13, Various News Articles, Aranca Research, Note: PSUs - Public Sector Units</td>
</tr>
<tr>
<td>Public Private Partnership (PPP)</td>
<td>To reduce dependency on imported coal, a Public Private Partnership (PPP) policy framework would be devised with Coal India Limited to increase coal production.</td>
<td></td>
</tr>
<tr>
<td>Liberalised FDI policy</td>
<td>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).</td>
<td></td>
</tr>
<tr>
<td>Low-interest funds</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Growing investments</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Higher capex by PSUs</td>
<td>The total capex by power PSUs is estimated to increase to USD9.4 billion in FY14 from USD9.3 billion in FY13. Power Grid Corporation of India will incur USD3.7 billion of capex in FY14, same as that in FY13.</td>
<td></td>
</tr>
</tbody>
</table>
### POLICIES ADOPTED DURING BUDGET FY13

**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*
INCREASING INVESTMENTS: FDI INFLOWS AND KEY DEALS … (1/3)

* Power is one of the key sectors attracting FDI inflows into India

* During FY06–14, FDI inflows into the sector increased from a mere USD87 million in FY06 to USD1066 million in FY14

* FDI inflows stood at USD1.07 billion in FY14

* Power accounted for 4.09 per cent of total inflows in FY14

* Cumulative FDI inflows into the sector in FY00–14 were USD8.9 billion

* 100 per cent FDI allowed in the power sector has boosted FDI inflows in this sector

Source: DIPP, Public Information Bureau, 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.

GE Energy Financial Services plans to invest USD24 million in a solar power project by Welspun Renewables Energy Pvt Ltd.

<table>
<thead>
<tr>
<th>Acquirer</th>
<th>Target</th>
<th>Deal date</th>
<th>Value (USD million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDFC</td>
<td>GMR Energy</td>
<td>24 Feb 2014</td>
<td>-</td>
</tr>
<tr>
<td>Goldman Sachs</td>
<td>ReNew Wind Power Pvt Ltd</td>
<td>5 June 2013</td>
<td>135.0</td>
</tr>
<tr>
<td>Consortium led by Deutsche Investitions, FE Clean Energy Group &amp; IFC</td>
<td>NSL Renewable Power Pvt Ltd</td>
<td>29 April 2013</td>
<td>60.0</td>
</tr>
<tr>
<td>Ascent Capital Advisors India Pvt Ltd, VenturEast, Draper Fisher Jurvetson Intl.</td>
<td>Bharat Light and Power Pvt Ltd</td>
<td>22 January 2013</td>
<td>18.6</td>
</tr>
<tr>
<td>GSPC Distribution Networks Ltd</td>
<td>Gujarat Gas Co Ltd</td>
<td>3 October 2012</td>
<td>674.2</td>
</tr>
<tr>
<td>Foundation Capital; Helion Venture Partners</td>
<td>Azure Power India Pvt Ltd</td>
<td>7 September 2012</td>
<td>8.0</td>
</tr>
</tbody>
</table>
Global power giants such as 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.

### Private Equity deals

<table>
<thead>
<tr>
<th>Acquirer</th>
<th>Target</th>
<th>Deal date</th>
<th>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
Demand for electricity is expected to increase at a CAGR of 9 per cent to 1,915 TWh over FY07–22

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

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

Source: Business Standard, Capacity addition estimates by CEA, Aranca Research
Notes: TWh - Terawatt-hour, E - Estimates
Peak power requirement in FY14 stood at 136 GW; of which, a demand of 130 GW was met

The per-capita electricity consumption of India stood at 911 in FY13 lower than the global average of 2,803, representing huge 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.
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

For updated information, please visit www.ibef.org
As of April 2014, total installed power capacity from renewable energy sources (excluding Hydro power) was 31.7 GW. This accounts for 12.9 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 2014 Global Status Report (REN21), Business Monitor International (BMI), Aranca Research, CEA.
Notes: 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
During FY07–13, NTPC’s sales increased at a CAGR of 12.9 per cent; CAGR in profits was 6.8 per cent

NTPC accounts for 16 per cent of the country’s capacity, though it contributes 25.6 per cent of total power generation

The company has an installed capacity of 43.1 GW. It aims for 128 GW of capacity by 2032

Currently, 22.4 GW of additional capacity is under construction

It spent approximately USD2.2 billion in FY12, and an additional USD3.7 billion in FY13 in expansion activity

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

![Graph showing Revenues and net profit (USD billion) for FY06 to FY14](image)

Source: NTPC website, Annual Reports, Economic Times, Aranca Research
Notes: CAGR - Compound Annual Growth Rate, MW - Megawatt
NTPC has taken over and successfully turned around numerous 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.

NTPC has already commissioned 95 MW of solar PV projects and another 15 MW of solar PV projects and 8 MW small hydro projects are under implementation.

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

Before takeover
- Badarpur: 32%
- Unchahar: 18%
- Talcher: 19%
- Tanda: 15%

After takeover
- Badarpur: 74%
- Unchahar: 93%
- Talcher: 96%
- Tanda: 84%

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 18.8 per cent during 1982–2013

* 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 4.2 GW during FY13, contributing 24 per cent of total addition in the country

* As of FY14, the company’s total installed power generation capacity stood at 43.12 GW, which includes 5.9 GW from other group companies

Source: NTPC website, Annual Reports, Economic Times, Aranca Research
Notes: PLF - Plant Load Factor, After Takeover - Figures for FY08, GW - Gigawatt
During FY07–14, Tata Power’s revenues increased at a CAGR of 22.6 per cent to USD5.9 billion.

The company has an installed generation capacity of 8.6 GW in India and is present in all segments of the power sector.

The thermal power generation capacity stands at 7.4 GW, while clean energy generation such as hydro, solar and wind stands at 1.2 GW.

The company is developing its first 4 GW 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 GW (CAGR of 27 per cent from FY07 and 37 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

In the year 2014, the company acquired a 39.2 MW wind farm at Jamnagar in Gujarat and commissioned a 25-MW solar power project at Palaswadi in Maharashtra

Source: Company website, FY17 estimate as per press release, 15th July 2011
Notes: MW - Megawatt, CAGR - Compounded Annual Growth Rate
Reliance Power has 2.5 GW of operational capacity and more than 20 GW under implementation.

It won three of the four Ultra Mega Power Projects (UMPPs) awarded by Government of India, and is constructing India’s largest 2.4 GW 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.

The company has started mining in Moher and Moher-Amlohr in September 2012.

Reliance Power has planned peak coal production of 95 million tonnes.

In FY12, the Rosa plant recorded an annual generation of 8 BU.

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.

At the 2.4-GW gas project in Samalkot, Andhra Pradesh, four gas turbines are ready for generation.

Hydro power projects with capacity of 5.3 GW are currently under development in Arunachal Pradesh (4.2 GW), Himachal Pradesh (672 MW) and Uttarakhand (400 MW).

Notes: MW - Megawatt, E - Estimate
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Web site: http://www.inwea.org/
CAGR: Compound Annual Growth Rate

FDI: Foreign Direct Investment

FY: Indian Financial Year (April to March)

So FY10 implies April 2009 to March 2010

GW: Gigawatt

M&A: Merger and Acquisition

MW: Megawatt

NBFC: Non-Banking Financial Company

PE: Private Equity

PLF: Plant Load Factor

R&D: Research and Development
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

### Exchange rates (Fiscal Year)

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<th>Year</th>
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<td>2012–13</td>
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<td>2013–14</td>
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### Exchange rates (Calendar Year)

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</tbody>
</table>

Average for the year 2014* - from January to March 2014
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