EXECUTIVE SUMMARY

Third largest producer and fourth largest consumer globally

- With production of 1,278.91 TWh in 2015, India was the 3rd largest producer & 4th largest consumer of electricity in the world, with the installed power capacity reaching 326.84 GW by March 2017. The country also has the 5th 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) & around 100 GW under the 13th Five-Year Plan (2017–22)
- Investments of around USD250 billion are planned for the power sector during the 12th Plan Five-Year Plan.
- In June 2017, the government announced intentions to set up an asset reconstruction company for handling the stressed assets in power sector. This would also help in the transfer of stressed power generation assets of stalled power projects, which would then be auctioned.

Robust growth in renewables

- Wind energy is estimated to contribute 60 GW, followed by solar power at 100 GW by 2022.
- The target for renewable energy has been increased to 175 GW by 2022.

Favourable policy environment

- 100 per cent FDI is allowed under the automatic route in the power segment & renewable energy.

Source: Make in India website, Ministry of New and Renewable Energy, IEA, CEA (Central Electricity Authority), TechSci Research, Assorted articles
Notes: TWh - Terawatt Hours, GW – Gigawatt,
Growing demand
• Expansion in industrial activity to boost demand for electricity
• Growing population & increasing penetration & per-capita usage to provide further impetus
• Power consumption is estimated to increase from 1174.07 TWh in 2015 to 1,894.7 TWh in 2022

Attractive opportunities
• Ambitious projects & increasing investments across the value chain
• Diversification into renewable sources increasing growth avenues

Higher investments
• Total FDI inflows in the power sector reached USD11.58 billion during April 2000 to March 2017, accounting for 3 per cent of total FDI inflows in India
• Investment for 7 new transmission systems that includes strengthening of national grid have been sanctioned

Policy support
• 100 per cent FDI allowed in the power sector has boosted FDI inflows in this sector
• Schemes like Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) & Integrated Power Development Scheme (IPDS) have already been implemented for rural & urban areas respectively

Source: CEA, DIPP (Department of Industrial Policy and Promotion), TechSci Research
Notes: FY - Indian Financial Year (April – March), FDI - Foreign Direct Investment, E - Estimates, TWh - Terawatt-Hour, FY22 estimates as per IEA forecasts
FY17: Data for April 2016 – March 2017

For updated information, please visit www.ibef.org
MARKET OVERVIEW AND TRENDS
EVOLUTION OF THE INDIAN POWER SECTOR

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 & distribution of power under state ownership
- Power losses, subsidies, infrastructure bottlenecks & resource constraints

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

2003 onwards Growth Era
- Electricity Act (2003)
- National Tariff Policy (2006)
- New renewable energy policy have been announced
- Amendments made in Electricity Act so as to create competition
- Implementation of Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) & Integrated Power Development Scheme for rural & urban areas respectively
- Implementation of Ujwal DISCOM Assurance Yojana (UDAY) which would enable electrification to all villages & tracking it using the Gram e Vidyutikaran App
- Amendment in National Tariff Policy (2016) has been made, wherein government is focusing more on sustainable utilisation of renewable energy resources

Source: MNRE, Corporate Catalyst India, IFLR, TechSci Research

For updated information, please visit www.ibef.org
POWER

INDIA AMONG TOP FOUR POWER PRODUCERS AND CONSUMERS

* With a production of 1368 TWh, India is the 3rd largest producer & the 3rd 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 2015 (TWh)

- China: 5682 TWh
- US: 4324 TWh
- India: 1368 TWh
- Russia: 1062 TWh
- Japan: 995 TWh
- Germany: 638 TWh
- Canada: 632 TWh

Source: Enerdata, TechSci Research,
Note: TWh - Terawatt Hours
Figures mentioned in the graph is as per latest data available

JUNE 2017

For updated information, please visit www.ibef.org
POWER

POWER GENERATION HAS GROWN RAPIDLY OVER THE YEARS

* With electricity production of 1,038.9 BU in India in FY17¹, the country witnessed growth of around 6.25 per cent over the previous fiscal year.

* Over FY10–FY17¹, electricity production in India grew at a CAGR of 4.34 per cent.

* The 12th Five Year Plan projects that, by 2016–17, total domestic energy production would reach 669.6 million tonnes of oil equivalent (MTOE) & would further increase to 844 MTOE by 2021–22.

Electricity production in India (BU)

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Production (BU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY10</td>
<td>771.6</td>
</tr>
<tr>
<td>FY11</td>
<td>811.1</td>
</tr>
<tr>
<td>FY12</td>
<td>876.9</td>
</tr>
<tr>
<td>FY13</td>
<td>912.1</td>
</tr>
<tr>
<td>FY14</td>
<td>967.2</td>
</tr>
<tr>
<td>FY15</td>
<td>1048.7</td>
</tr>
<tr>
<td>FY16</td>
<td>1107.8</td>
</tr>
<tr>
<td>FY17¹</td>
<td>1038.9</td>
</tr>
</tbody>
</table>

Source: BP Statistical Review, Ministry of Power, TechSci Research; Notes: FY - Indian Financial Year (April-March), BU – Billion Unit
¹Data for April 2016 – January 2017
**POWER**

**SOURCES OF POWER WITH SHARES IN TOTAL INSTALLED CAPACITY … (1/2)**

- **Coal**
  - 69.2%
  - India has large reserves of coal. By the end of FY16, total coal reserves in India stood at 308.802 billion tonnes;

- **Gas**
  - India’s proven natural gas reserves measure about 1.5 trillion cubic metres as on 30th March 2016

- **Hydro**
  - 14.04%
  - With a large swathe of rivers & water bodies, India has enormous potential for hydropower; the 12th Five-Year Plan (2012–17) includes additional 30GW of hydroelectric power generation. In FY17 (till March 2017), India has 44.4 GW of hydro power generating capacity

- **Renewable**
  - 15.90%
  - 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 4 solar power plants of 1GW each

- **Nuclear**
  - 1.87%
  - As of March 2017, India has 5.72 GW of net electricity generation capacity using nuclear fuels (across 20 reactors) & 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 2015, Corporate Catalyst India, Indian Power Sector, Ministry of Power, TechSci Research

Notes: MW - Megawatt, GW - Gigawatt

For updated information, please visit [www.ibef.org](http://www.ibef.org)
As of March 2017, total thermal installed capacity in the country stood at 218.32 GW, while hydro & renewable energy installed capacity totalled to 44.47 GW & 57.26 GW, respectively.

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 & 5.3 GW nuclear power.

As a part of the green corridor project, the power lines would transmit 20 gigawatts of power capacity from 34 solar parks across 21 states.

In January 2017, the 2nd unit of Kundankulam Nuclear Power Project, attained a capacity of 1000Mwe & this is anticipated to strengthen the overall power generation capacity in India.

In February 2017, a 40-kilowatt solar power plant was inaugurated at Don Bosco Higher Secondary School in Johrat City, Assam.

In May 2017, the government approved the raising of bonds worth US$351.03 million for renewable energy through the Indian Renewable Energy Development Agency (IREDA) for the approved schemes for green corridor, CPSU (Community Public Sector Union), defence solar projects, solar parks, generation-based incentives for wind projects, etc.

**Installed capacity for different sources of power – FY17 (GW)**

<table>
<thead>
<tr>
<th>Source</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal</td>
<td>218.32</td>
</tr>
<tr>
<td>Hydro</td>
<td>44.47</td>
</tr>
<tr>
<td>Renewables</td>
<td>57.26</td>
</tr>
<tr>
<td>Nuclear</td>
<td>6.78</td>
</tr>
</tbody>
</table>

**Source:** Ministry of Coal, NHPC, Central Electricity Authority (CEA), Corporate Catalyst India, TechSci Research

**Notes:** MW - Megawatt, GW – Gigawatt
**POWER**

GENERATION CAPACITY HAS INCREASED AT A HEALTHY PACE … (1/2)

- Installed capacity increased steadily over the years, posting a CAGR of 10.57 per cent in FY09–17
- As of January 2017, energy generation from conventional sources stood at 824.00 billion units (BU).

**Installed electricity generation capacity (GW)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY07</td>
<td>132.3</td>
</tr>
<tr>
<td>FY08</td>
<td>143.1</td>
</tr>
<tr>
<td>FY09</td>
<td>148</td>
</tr>
<tr>
<td>FY10</td>
<td>159.4</td>
</tr>
<tr>
<td>FY11</td>
<td>173.6</td>
</tr>
<tr>
<td>FY12</td>
<td>199.9</td>
</tr>
<tr>
<td>FY13</td>
<td>223.3</td>
</tr>
<tr>
<td>FY14</td>
<td>237.7</td>
</tr>
<tr>
<td>FY15</td>
<td>272.5</td>
</tr>
<tr>
<td>FY16</td>
<td>280.3</td>
</tr>
<tr>
<td>FY17</td>
<td>326.84</td>
</tr>
</tbody>
</table>

*Source: CEA (Central Electricity Authority), TechSci Research*

Notes: GW – Gigawatt, CAGR - Compound Annual Growth Rate
* Among the different sources of power in India, the CAGR in installed capacity over FY07–FY17 was
  * 10.57 per cent for thermal power
  * 22.06 per cent for renewable energy, the fastest among all sources of power
  * 2.51 per cent for hydro power
  * 5.68 per cent for nuclear power

* According to the India Solar Handbook 2017 released by Bridge to India (BTI), India is expected to become the third biggest solar market across the globe in 2017, with 8.8 gigawatt (GW) of capacity addition projected for the year ahead. Moreover, the country’s solar capacity is expected to reach 18.7GW by 2017, which is about 5 per cent of global solar capacity.
### MAJOR PLAYERS IN THE POWER SECTOR … (1/2)

<table>
<thead>
<tr>
<th>Company</th>
<th>Business description</th>
</tr>
</thead>
</table>
| **NTPC**        | • NTPC is the largest power producer in India & is also the 6th largest thermal power producer in the world, with installed capacity of 47.17 GW (including JVs). By 2032, NTPC plans to reach 128,000 MW of power capacity. Coal-based power accounts for more than 84.7 per cent of the total capacity.  
  • It has also diversified into hydro power, coal mining, power equipment manufacturing, oil & gas exploration, power trading & distribution. |
| **TATA POWER**  | • Tata Power is India’s largest integrated power company, with significant presence in solar, hydro, wind & geothermal energy space. The company accounts for 52 per cent of total generation capacity in the private sector. The company has an installed capacity of 10.0 GW in FY16. By 2022, the company plans to increase the generating capacity to 18 GW, distribution networks by 4 GW & energy resources by 25 million tonnes per annum. |
| **RELIANCE Power** | • The company has more than 35,000 MW of power generation capacity, both operational & under development. Reliance Power has an operational power generation capacity of 6 GW. FY13 saw the development of 3,960-MW Sasan UMPP in Madhya Pradesh.  
  • In FY15, the company accounted for a generation performance of 1048 billion units. |
| **CESC Limited** | • CESC Limited is a vertically integrated player engaged in coal mining & generation & distribution of power. It owns & operates 3 thermal power plants generating 1225 MW of power. These are Budge Budge Generating Station (750 MW), Southern Generating Station (135 MW) & Titagarh Generating Station (240 MW). |
| **NHPC**        | • NHPC is the largest hydro power utility in India, with an installed capacity of 6.5 GW; it has drawn up a massive capacity expansion plan of adding 6.7 GW by 2017.  
  • NHPC is constructing 9 projects, aggregating an installed capacity of 4.2 GW. NHPC added 1.9 GW & 1.1 GW during the 10th & 11th Plan periods, respectively. |

*Source: Company websites, News articles, Industry sources, TechSci Research*  
*For updated information, please visit www.ibef.org*
### MAJOR PLAYERS IN THE POWER SECTOR … (2/2)

<table>
<thead>
<tr>
<th>Company</th>
<th>Business description</th>
</tr>
</thead>
</table>
| ![PFC Logo](https://example.com/pfc/logo.png) **Power Finance Corporation Limited (PFC)** | • Power Finance Corporation Limited (PFC) is an NBFC engaged in financing & development activities within the Indian power sector  
• Major products & services include project term loans, lease financing, direct discounting of bills, short-term loans & consultancy services |
| ![Adani Power Logo](https://example.com/adani/power/logo.png) **Adani Power** | • Adani Power is one of India’s largest private thermal power producers, with total capacity at 10.5 GW in 2016; the company aims to generate 20 GW of power by 2020  
• The company is one of the world’s largest single-location thermal power plants in Mundra, Gujarat |
| ![Power Grid Logo](https://example.com/pgcil/logo.png) **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 72.25 GW at the end of XII Plan. In 2016, inter-regional capacity is 47.45 GW. |
| ![Damodar Valley Corporation Logo](https://example.com/dvc/logo.png) **Damodar Valley Corporation** | • Damodar Valley Corporation is engaged in power generation, distribution & transmission of electric power, irrigation and flood control |
| ![SJVN Logo](https://example.com/sjvn/logo.png) **SJVN Limited** | • SJVN Limited is the second largest hydro power company in India  
• The company plans to diversify into wind power projects soon |

*Source: Company websites, News articles, TechSci Research  
Note: NBFC - Non-Banking Financial Company*
PORTER'S FIVE FORCES ANALYSIS

**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: TechSci Research
**POWER**

**STRATEGIES ADOPTED**

**Control generation costs**
- Companies are developing captive coal fields to reduce price volatility & 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

**Acquiring sources of fuel supply**
- 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
- Essar Power have captive coal mines in Indonesia from which it extracts coal for power plants in India
- Government has enabled the power utilities for swapping their coal supplies with the nearest sources so as to save miscellaneous costs & decongest the rail network

**Diversifying generation technologies**
- Companies are using multiple-generation technologies based on a project’s requirement
- Companies such as NTPC & Reliance Power already have coal-fired, gas-fired & hydroelectric capacity
- This helps them diversify, reduces dependence on a single source

**Additional revenue streams**
- Most of the companies are now looking to sell their carbon credits to generate additional revenue by employing supercritical technology

**Digital India**
- Launch of smart grid mission with 14 DISCOMS as a pilot
- Smart metering for high – end users of electricity
- Under Union Budget 2017, government approved the 'Pradhan Mantri Gramin Digital Saksharta Abhiyan' (PMGDISHA) for 6 crore rural households

Source: TechSci Research
POWER

GROWTH DRIVERS
STRONG DEMAND AND POLICY SUPPORT DRIVING INVESTMENTS

Growing demand

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

Inviting

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 (2016): focus on renewable energy & private investment through competitive bidding

Resulting in

Increasing investments

- Rising FDI inflows: FDI of USD8547 million was made till FY15, which increased to USD11,589 million till March 2017
- Growing M&A activity
- Large investments in equipment manufacture & power generation

Source: Corporate Catalyst India, Ministry of Power, TechSci Research,


For updated information, please visit www.ibef.org
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 FY15-16, GDP growth is likely to average 7.6 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 1,905 TWh by FY22.

**Share of electricity consumption in industrial sector**

<table>
<thead>
<tr>
<th>Year</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY07</td>
<td>37.60%</td>
</tr>
<tr>
<td>FY08</td>
<td>37.70%</td>
</tr>
<tr>
<td>FY09</td>
<td>37.80%</td>
</tr>
<tr>
<td>FY10</td>
<td>38.60%</td>
</tr>
<tr>
<td>FY11</td>
<td>39.30%</td>
</tr>
<tr>
<td>FY12</td>
<td>44.90%</td>
</tr>
<tr>
<td>FY13</td>
<td>44.40%</td>
</tr>
<tr>
<td>FY14</td>
<td>43.80%</td>
</tr>
<tr>
<td>FY15</td>
<td>58%</td>
</tr>
<tr>
<td>FY16</td>
<td>44%</td>
</tr>
</tbody>
</table>

*Source: TechSci Research, Ministry of Statistics and Program Implementation*

*Notes: TWh - Terawatt Hours, RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana, CEA*
98 GW of generation capacity was added during FY11-16; future investments will benefit from strong demand fundamentals, policy support & increasing government focus on infrastructure

- Per capita consumption grew at a CAGR of 10 per cent between FY06 & FY15
- Per capita consumption grew 4.7 per cent in FY15 but tapered to 6.44 per cent in FY15, reaching 1075 KWh

During the 12th Plan, Government of India planned for capacity addition of 1,18,537 MW, which includes 88,537 MW through conventional sources & 30,000 MW through renewable sources, by 2016-17

Per capita electricity consumption in the country grew at a CAGR of 9.63 per cent, during FY06-FY16, reaching 1075 KWh in FY16

**Per-capita electricity consumption (KWh)**

Source: CEA, TechSci Research
Notes: RGGVY - Rajiv Gandhi Grameen Vidyutikaran Yojana
P : Provisional

**CAGR: 9.63%**
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 & 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 & necessary clearances for enhancing investor confidence
- According to Union Budget 2015-16, 5 new UMPPs, each of 4000MW, have been proposed to setup in the plug- and – play mode

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 & distribution network
- Linking disbursement of central government funds (to states), with actual reduction in transmission & 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: Ministry of Power, TechSci Research
Notes: R-APDRP - Restructured Accelerated Power Development and Reform Programme, SERC - State Electricity Regulatory Commission, AT&T - American Telephone & Telegraph Systems
### POLICY SUPPORT AIDING GROWTH IN THE SECTOR

<table>
<thead>
<tr>
<th>National Electricity Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide electricity to all areas</td>
</tr>
<tr>
<td>• Prepared in consultation with state governments, CEA, and other stakeholders</td>
</tr>
<tr>
<td>• Supply of reliable and quality power in an efficient manner and reasonable rates</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feed – in Tariff</th>
</tr>
</thead>
<tbody>
<tr>
<td>• This Scheme used for promoting generation of electricity from renewable energy sources</td>
</tr>
<tr>
<td>• Allows Power Producers to sell renewable energy generated electricity to an off – taker at a pre – determined tariff for a given period of time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>National Tariff Policy (2016)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The National Tariff Policy for Electricity was amended by the Union Government on 20 January, 2016</td>
</tr>
<tr>
<td>• The policy aims to achieve the objectives of UDAY scheme</td>
</tr>
<tr>
<td>• Special focus on renewable energy has been laid. In order to promote use of renewable energy, solar Renewable Purchase Obligation (RPO) is proposed to increase to 8 per cent by 2022</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIMSTEC Trans-Power Exchange and Development Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>• In April 2017, the Indian Government approved the proposal of the Ministry of Power for signing of an MoU for establishment of the BIMSTEC Grid Interconnection. The MoU will be signed at the upcoming 3rd BIMSTEC Energy Ministers’ Meeting.</td>
</tr>
<tr>
<td>• The BIMSTEC is an international organization involving a group of Asian &amp; South Asian countries, namely, Bangladesh, India, Myanmar, Sri Lanka, Thailand, Bhutan &amp; Nepal. The main objective of BIMSTEC is technological and economic co-operation among south Asian and south east Asian countries along the coast of the bay of Bengal.</td>
</tr>
</tbody>
</table>

*Source: Ministry of Power, TechSci Research*

Notes: R-APDRP - Restructured Accelerated Power Development and Reform Programme, SERC - State Electricity Regulatory Commission, AT&T - American Telephone & Telegraph Systems

For updated information, please visit [www.ibef.org](http://www.ibef.org)
### POLICY ADOPTED DURING BUDGET FY15 & FY16

<table>
<thead>
<tr>
<th><strong>POWER</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation-based incentives</strong></td>
</tr>
<tr>
<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</td>
</tr>
<tr>
<td>• USD147.3 million would be allocated to the Ministry of New &amp; Renewable Energy</td>
</tr>
<tr>
<td><strong>Public Private Partnership (PPP)</strong></td>
</tr>
<tr>
<td>• To reduce dependency on imported coal, a Public Private Partnership (PPP) policy framework would be devised with Coal India Ltd. to increase coal production</td>
</tr>
<tr>
<td><strong>Liberalised FDI policy</strong></td>
</tr>
<tr>
<td>• During FY13, the Government liberalised FDI policy for Power Trading Exchanges</td>
</tr>
<tr>
<td>• Foreign Investment in power exchanges registered under the CERC Regulations, 2010, allowed up to 49 per cent (FDI-26 per cent and FII-23 per cent)</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>• Funding of USD746.82 million from (NCEF) &amp; USD775.63 million from IEBR has been planned for year 2016-17 to develop &amp; use renewable energy resources in an eco-friendly &amp; sustainable manner</td>
</tr>
<tr>
<td><strong>Low-interest funds</strong></td>
</tr>
<tr>
<td><strong>Growing Investments</strong></td>
</tr>
<tr>
<td>• In the Union Budget 2017-18, the government has set a target for full electrification of 18,452 villages by March 1, 2018. An amount of US$716.04 million will be spent for this purpose.</td>
</tr>
<tr>
<td>• Benefit under section 35 (2AA) of the Income Tax Act to industry/private sponsored research programmers</td>
</tr>
<tr>
<td>• Further incentives are available for setting up of projects in notified areas</td>
</tr>
</tbody>
</table>

**Source:** Union Budget, Various News articles, TechSci Research, Notes: PSUs - Public Sector Units, CERC: Central Electricity Regulatory Commission \nIEBR: Internal and Extra Budgetary Resources
### RECENT POLICIES ADOPTED

<table>
<thead>
<tr>
<th>Policy</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spinning Reserve</strong></td>
<td>In order to meet the peak load shortages and grid stability, spinning reserves have been created.</td>
</tr>
</tbody>
</table>
| **Energy Conservation Campaign** | - Replacing nationwide street lights with LED lights  
- Plan to save 10 per cent energy that would light up 11 crore lives  
- Replacing 1 crore bulbs in Delhi within one year |
| **National Mission on Enhanced Energy Efficiency** | In August 2014, Government had launched the policy with an investment of USD128 million  
- Funds energy efficient electrical appliances  
- Implementation of 2 schemes – Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) & Integrated Power Development Scheme (IPDS) for rural & urban areas |
| **Power to the people** | Implementation of a new scheme – Ujwal DISCOM Assurance Yojana (UDAY) which would enable electrification for all villages by reducing losses through programmes that involve public participation |
| **Ujwal Discoms Assurance Yojana (UDAY)** | In February 2017, India Ratings & Research (Ind-Ra) assigned UP Power Corporation (UPPCL)’s proposed US$ 1.48 billion bond a provisional ‘IND AA(SO)’ rating. This makes it India’s 1st state government revenue-supported bond |
| **National Tariff Policy (2016)** | The National Tariff Policy for Electricity was amended by the Union Government on 20 January, 2016, and aims to achieve the objectives of UDAY scheme  
- Special focus on renewable energy has been laid. In order to promote use of renewable energy, solar Renewable Purchase Obligation (RPO) is proposed to increase to 8 per cent by 2022 |

*Source: Ministry of Power, Various News articles, TechSci Research*
Power is one of the key sectors attracting FDI inflows into India.

From April 2000 to March 2017, India recorded FDI of US$5.18 billion in non-conventional energy sector. New & renewable energy sector witnessed maximum power generation capacity addition, since 2000.

FDI inflows into the sector increased from USD4627 million in FY07 to USD11,589 million in FY17.

Power sector accounted for 3 per cent of total inflows till March 2017.

Cumulative FDI inflows into the sector in April’16–March’17 were USD1.11 billion.

FDI inflows into the power sector (USD million)
INCREASING INVESTMENTS: FDI INFLOWS AND KEY DEALS … (2/3)

* EIG Global Energy Partners made an investment of USD125 million in Greenko Group, which is planning to develop its wind farms & hydropower assets in India by means of Greenfield projects & acquisitions
* GE Energy Financial Services plans to invest USD24 million in a solar power project by Welspun Renewables Energy Pvt Ltd.
* The Ministry of New & Renewable Energy (MNRE) signed an agreement with Germany-based KfW Development Bank, to fund floating solar projects in Maharashtra & Kerala, at an estimated cost of USD44.47 million in June 2016. Both the plants are expected to generate over 310 GW of green energy
* SunEdison, world’s largest renewable energy company, plans to continue its focus on ‘Make in India’ initiative by further reducing the cost of renewable energy & developing over 15 gigawatts (GW) of wind & solar projects in the country by 2022
* In April 2017, 12 agreements & MoUs worth US$9 billion of investments are to be signed between India & Bangladesh. An agreement worth US$2 billion investments in Bangladesh power sector by Adani Power.
* In April 2017, L&T’s construction division received an order from Qatar General Electricity & Water Corporation worth US$780.9 million, for network expansion & power transmission.
* In May 2017, PE Actis LLP announced plans to invest USD500 million in Solenergi Power Pvt. Ltd., its 2nd green energy platform in the country. The company was also awarded Rewa Solar Power Project in Madhya Pradesh.

Notes: FDI - Foreign Direct Investment, PE - Private Equity, Thomson One Banker
For updated information, please visit www.ibef.org
<table>
<thead>
<tr>
<th>Acquirer</th>
<th>Target</th>
<th>Deal date</th>
<th>Value (USD mn)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tata Power</td>
<td>Welspun Energy</td>
<td>14 June 2016</td>
<td>1,528</td>
</tr>
<tr>
<td>GIC</td>
<td>Greenko Group plc</td>
<td>August 2015</td>
<td>255</td>
</tr>
<tr>
<td>EIG Global Energy Partners</td>
<td>Greenko Group</td>
<td>October 2014</td>
<td>125</td>
</tr>
<tr>
<td>Standard Chartered Private Equity Ltd</td>
<td>Sterlite Power Grid Ventures Ltd</td>
<td>07 July 2014</td>
<td>83.4</td>
</tr>
<tr>
<td>ADB, Goldman Sachs, Global Environment Fund</td>
<td>ReNew Wind Power Pvt Ltd</td>
<td>03 July 2014</td>
<td>140</td>
</tr>
<tr>
<td>ADB, DEG</td>
<td>Welspun Renewables</td>
<td>June 2014</td>
<td>85</td>
</tr>
<tr>
<td>IDFC</td>
<td>GMR Energy</td>
<td>24 Feb 2014</td>
<td>-</td>
</tr>
<tr>
<td>Consortium led by Deutsche Investititons, FE</td>
<td>NSL Renewable Power Pvt Ltd</td>
<td>29 April 2013</td>
<td>60.0</td>
</tr>
<tr>
<td>Clean Energy Group &amp; IFC</td>
<td></td>
<td></td>
<td></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>

Notes: FDI - Foreign Direct Investment, PE - Private Equity, Thomson One Banker
POWER

OPPORTUNITIES
Demand for electricity is expected to increase at a CAGR of 7 per cent to 1,894.7 TWh over FY07–22.

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

All India per capita consumption of electricity is expected to reach 1348 TWh by FY17.

Various reforms being undertaken by the government are positively impacting India’s power sector. In wake of the surging domestic coal production, the country’s power sector is becoming increasingly stable.

Electricity demand forecast (TWh)

- FY07: 690.59
- FY15: 1174.07
- FY17E: 1348.4
- FY22E: 1894.7

CAGR: 7%

Source: International Energy Agency (IEA), CEA, Demand estimates based on IEA forecasts, TechSci Research
Notes: TWh - Terawatt Hour,
      CAGR - Compounded Annual Growth Rate
      E - Estimated
The government is targeting capacity addition of around 88.54 GW under the 12th (2012–17) & 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 USD250 billion.

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

In March 2017, Bhoruka Power Corp. announced its plans is to raise USD120 million, to increase their hydro & wind renewable energy capacity to 1 gigawatt by 2020.
The per-capita electricity consumption of India stood at 1000 KWh in FY15, lower than the global average of 2,803 KWh, 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.

The peak power requirement by the country in FY17 stood at 159.54 GW.

To meet the rising electricity demand, the Central Government plans to expedite market opportunity of US$ 14.94 billion for power transmission.

Source: NTPC presentation, CEA, TechSci Research
Notes: KWh – Kilo Watt Hour, GW - Gigawatt Hour,
CURRENT TRENDS POINT TO OPPORTUNITIES ACROSS THE VALUE CHAIN

<table>
<thead>
<tr>
<th>Generation</th>
<th>T&amp;D</th>
<th>Power Grid Corporation of India Ltd (PGCIL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adani Power</td>
<td>Loan from ADB of USD600 million for development of high-voltage transmission system</td>
<td></td>
</tr>
<tr>
<td>Germac Energy and Sepco III (JV)</td>
<td>Plans to invest USD3.7 billion that would fuel its expansion plans</td>
<td></td>
</tr>
<tr>
<td>Tata Power</td>
<td>Developing an integrated national grid, including strengthening of 5 regional grids; project investment is worth about USD16 billion</td>
<td></td>
</tr>
<tr>
<td>Reliance Power</td>
<td>Proposed an investment outlay of USD2.8 billion for setting up 9 transmission corridors</td>
<td></td>
</tr>
</tbody>
</table>

- Estimated investment of USD6.6 billion for setting up 10,000 MW solar plant in Rajasthan
- As of 2017, company with total capacity of 10.48 GW plans to increase capacity to 20 GW by 2020
- In Feb 2016, investment of ~USD1.53 billion was made for setting up 1,600 MW power plant in Jharkhand
- Coal-fired plant in Tamil Nadu; investment of USD1.3 billion
- Nuclear power ambition; studying entry strategy with minimum investment of USD3.0 billion
- Developing 3000 MW gas – based power plant in Bangladesh; investment of USD3 million in phases
- Developing a 6,000 MW solar park in Rajasthan by 2025

To meet the rising electricity demand, the Central Government plans to expedite market opportunity of USD 14.94 billion for power transmission.


For updated information, please visit www.ibef.org
RENEWABLE ENERGY IS FAST EMERGING AS A MAJOR SOURCE OF POWER

* Wind energy is the largest source of renewable energy in India; it accounts for an estimated 64.77 per cent of total installed capacity (24.7 GW). There are plans to double wind power generation capacity to 20 GW by 2022.
* Biomass is the 2nd 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.
* In May 2017, India’s solar power tariffs fell to a new low of USD0.038 per unit during the auction of a 250 megawatt capacity at Bhadla in Rajasthan. This bid was placed by South Africa’s Phelan Energy Group & Avaada Power to win contracts to build capacities of 50MW & 100MW, respectively, at Adani Renewable Energy Park Rajasthan Ltd.
* On account of anticipated decline in solar panel prices, due to supply glut in international market, solar power prices in India are estimated to fall by 2018.
* In March 2017, the Power Ministry has launched an application named - GARV-II, to provide real time data related to rural electrification regarding all un-electrified villages in India.
* Declining solar power prices as compared to thermal power has prompted the government to switch to the renewable energy resources.

Hydro power generation capacity in 2015 (GW)

<table>
<thead>
<tr>
<th>Country</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>296</td>
</tr>
<tr>
<td>Brazil</td>
<td>91.7</td>
</tr>
<tr>
<td>US</td>
<td>79.7</td>
</tr>
<tr>
<td>Canada</td>
<td>79</td>
</tr>
<tr>
<td>Russia</td>
<td>47.9</td>
</tr>
<tr>
<td>India</td>
<td>47</td>
</tr>
<tr>
<td>Rest of World</td>
<td>422.7</td>
</tr>
</tbody>
</table>

Source: Renewables 2015 Global Status Report (REN21), TechSci Research, CEA, Notes: TWh - Tera Watt Hour; GW – Gigawatt

Figures mentioned in the graph is as per latest data available.
Currently, the country has net installed capacity of 6.78 GW, using nuclear fuels, across 20 reactors. Of the 20 reactors, 18 are Pressurised Heavy Water Reactors (PHWR) & 2 are Boiling Water Reactors (BWR).

The government aims to triple India’s nuclear power generation capacity to 20 GW by 2020; currently, 3 nuclear power reactors of 5,780 MWe capacity are under construction.

Nuclear Power Corporation of India Limited (NPCIL) plans to construct 5 nuclear energy parks with a capacity of 10,000 Mwe.

The Kudankulam Atomic power project, Tamil Nadu, by NPCIL is expected to start operating by 2016-17 with an installed capacity of 1000 MW.

Unit II of Kudankulam plant has started functioning in May 2016 with an installed capacity of 1000 MW. The Kudankulam nuclear power plant’s 2nd unit attained criticality on 10th July, 2016.

As estimated by Nuclear Power Corporation of India, the plant would start generating 400 MW in 45 days, after attaining criticality.

Notes: GW – Gigawatt, Mwe - Megawatt Electric, PHWR - Pressurised Heavy Water Reactors, BWR - Boiling Water Reactors, E – Estimates
As on 31. 03. 2015, NTPC accounted for 16 per cent of the country’s capacity, though it contributed 25 per cent of total power generation.

As of June 6, 2016, the company had an installed capacity of 47.17 GW, and is aiming to attain a capacity of 128 GW by 2032.

As of 2016, 24 GW of additional capacity is under construction.

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

In FY16, with an investment of USD2.37 billion, 2360 MW capacity has been approved for NP Kunta Ultra Mega Solar PV Project, Mandsaur Solar PV Project, Bhadla Solar PV Project & coal based project.

In April 2017, NTPC has tied up with Bangladesh India Friendship Power Company (BIFPCL) to set up a 1,320 MW coal based Maitree Super Thermal Power Project in Bagerhat district of Khulna division, Bangladesh. The firm is 50:50 JV company between NTPC and BPDB.
During 2012-2016, NTPC grew at a CAGR of 1.31 per cent, in terms of gross power generation.

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

As on 9 May 2016, NTPC commissioned 9 solar PV projects (Renewable energy projects) with an installed capacity of 310 MW.

As on August 2015, the company had commissioned its first hydro project at Koldam.

In FY16, NTPC coal stations achieved highest PLF amongst Central, State & Private Sector, accounting for PLF value of 78.61 per cent.

In terms of PLF, top 3 power stations in the country belong to NTPC which includes Talcher Thermal - PLF 93.15 per cent, Singrauli - PLF 92.61 per cent & Talcher-Kaniha - PLF 90.95 per cent.

Gross Generation of Power 2012-2016 (Million Units)

<table>
<thead>
<tr>
<th>Year</th>
<th>2012-13</th>
<th>2013-14</th>
<th>2014-15</th>
<th>2015-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>232028</td>
<td>233284</td>
<td>241975</td>
<td>241261</td>
</tr>
</tbody>
</table>

Source: NTPC website, Annual Reports, TechSci Research
NTPC: A PUBLIC SECTOR SUCCESS … (3/3)

- Highest ever capacity addition of 51.41 GW during FY17.

- As of 2016, the total installed power generation capacity of the company stood at 51.41 GW

NTPC: Generation capacity over the years (GW)

Source: NTPC website, Annual Reports, Economic Times, TechSci Research
Notes: PLF - Plant Load Factor,
GW – Gigawatt
**TATA POWER: SURGING AHEAD IN THE PRIVATE SECTOR … (1/2)**

- During FY09–16, Tata Power’s revenues increased at a CAGR of 5.92 per cent, with the revenues for FY16 reaching to USD5.7 billion.

- In FY16, the company has an installed generation capacity of 10.0GW in India & is present in all segments of power sector.

- The thermal power generation capacity stands at 7.6 GW, while clean energy generation such as hydro, solar & wind stands at 1.2 GW.

- The company is developing its 1st 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 & a hydro project in Bhutan in partnership with The Royal Government of Bhutan.

- In April 2017, Tata Power Renewable Energy Ltd, a wholly-owned subsidiary of Tata Power commissioned a 100 MW wind farm project in Nimbagallu in Andhra Pradesh.

- Tata Power’s defense engineering unit is planning to invest around USD83.3 million in Vemagal, Kolar district.

---

**Revenue (USD billion)**

<table>
<thead>
<tr>
<th></th>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
<th>FY12</th>
<th>FY13</th>
<th>FY14</th>
<th>FY15</th>
<th>FY16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.81</td>
<td>4.00</td>
<td>4.26</td>
<td>5.55</td>
<td>6.08</td>
<td>5.91</td>
<td>5.50</td>
<td>5.70</td>
</tr>
</tbody>
</table>

CAGR: 5.92%

**Source:** Company website, Annual Reports, Economic Times, TechSci Research

**Notes:** MW - Megawatt
The company estimates its installed capacity to expand fivefold in the next 5 years to 25 GW

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 & commissioned a 25-MW solar power project at Palaswadi in Maharashtra

As of FY16, the company has an installed capacity of 9,183 MW

In comparison to FY15, the company’s generation capacity increased by 5 per cent in FY16

The company being first independent power producer in India has been awarded with OHSAS 18001:2007 certification for its wind operations

In March 2017, Tata Power entered into partnership with Nokia, to modernise electrical grids with advanced communication network. Tata Power Delhi Distribution Ltd. was allowed access to internet protocol/multiprotocol label switching network to support management of electrical grids in Delhi, by Nokia.
RELIANCE POWER: ON A GROWTH TRAJECTORY … (1/2)

- Reliance Power has 6 GW of operational capacity & approximately 15 GW under implementation
- It won 3 of the 4 Ultra Mega Power Projects (UMPPs) awarded by Government of India so far. These 3 projects are located in Sasan (MP), Krishnapatnam (Andhra Pradesh) & Tilaiya (Jharkhand)
- Additional three units of 660 MW each at the 3,960 MW Sasan project were commissioned in FY14
- Sasan UMPP is the largest integrated power plant & coal mining project globally
- The company’s coal production capacity has reached ~100 MTPA. It is the largest private sector coal producer in India
- The company’s ongoing projects would increase its production capacity to 20,000 MW of coal-fired capacity, 2400 MW of gas-fired capacity & 5,292 MW of hydroelectric capacity
- The company had ~12,000 MW capacity under implementation in FY16

Revenues and net profit (USD million)

Source: Reliance Power website, Annual Reports, TechSci Research
Notes: - Decline due to negative translation effect, MW – Megawatt, MTPA - Million Tonnes Per Annum
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).

As on September 2015, three Coal based projects with capacity 5,760 MW, two solar projects with capacity 140 MW, one Wind and Coal blocks projects each with capacities 45 MW and 20 MTPA respectively have started production.

![Generating capacity (billion units)](chart)

Source: Reliance Power website, Corporate Presentation, Annual Reports, TechSci Research

Notes: MW - Megawatt
INDUSTRY ASSOCIATIONS … (1/2)

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 ... (1/2)

* **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
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 USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004–05</td>
<td>44.81</td>
</tr>
<tr>
<td>2005–06</td>
<td>44.14</td>
</tr>
<tr>
<td>2006–07</td>
<td>45.14</td>
</tr>
<tr>
<td>2007–08</td>
<td>40.27</td>
</tr>
<tr>
<td>2008–09</td>
<td>46.14</td>
</tr>
<tr>
<td>2009–10</td>
<td>47.42</td>
</tr>
<tr>
<td>2010–11</td>
<td>45.62</td>
</tr>
<tr>
<td>2011–12</td>
<td>46.88</td>
</tr>
<tr>
<td>2012–13</td>
<td>54.31</td>
</tr>
<tr>
<td>2013–14</td>
<td>60.28</td>
</tr>
<tr>
<td>2014–15</td>
<td>61.06</td>
</tr>
<tr>
<td>2015–16</td>
<td>65.46</td>
</tr>
<tr>
<td>2016-2017E</td>
<td>67.23</td>
</tr>
</tbody>
</table>

### Exchange rates (Calendar Year)

<table>
<thead>
<tr>
<th>Year</th>
<th>INR equivalent of one USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>43.98</td>
</tr>
<tr>
<td>2006</td>
<td>45.18</td>
</tr>
<tr>
<td>2007</td>
<td>41.34</td>
</tr>
<tr>
<td>2008</td>
<td>43.62</td>
</tr>
<tr>
<td>2009</td>
<td>48.42</td>
</tr>
<tr>
<td>2010</td>
<td>45.72</td>
</tr>
<tr>
<td>2011</td>
<td>46.85</td>
</tr>
<tr>
<td>2012</td>
<td>53.46</td>
</tr>
<tr>
<td>2013</td>
<td>58.44</td>
</tr>
<tr>
<td>2014</td>
<td>61.03</td>
</tr>
<tr>
<td>2015</td>
<td>64.15</td>
</tr>
<tr>
<td>2016 (Expected)</td>
<td>67.22</td>
</tr>
</tbody>
</table>

Source: Reserve bank of India, Average for the year
India Brand Equity Foundation (IBEF) engaged TechSci to prepare this presentation and the same has been prepared by TechSci 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 TechSci and IBEF’s knowledge and belief, the content is not to be construed in any manner whatsoever as a substitute for professional advice.

TechSci 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 TechSci 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.