# Technology: Enabling the Transformation of Power Distribution

Roadmap & Reforms

30th October 2008

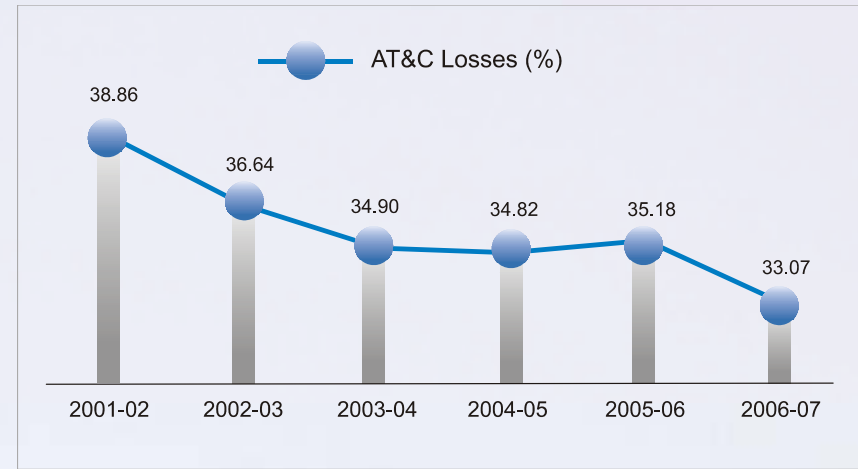# This Is An Update To The 2002 IT Task Force Report

- 2002:
  - Laid out a roadmap on role of IT
  - Limited implementation to date

- 2008:
  - MoP asked for update
  - Suggest what needs to be done for development of Smart Grid
  - Help transform Power Distribution by providing a holistic approach to technology adoption
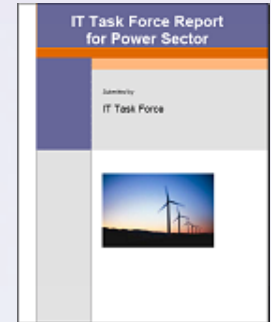
- Distribution has the most pressing need for transformation
  - It also has the highest return of investment (RoI) for technology

- Generation and Transmission have done better, particularly in economic terms
  - However, there is an untapped potential to apply technology for business benefits
  - Technology adoption is generally low

- Across Power sector, there is an urgent need to learn and apply technology for better business results

- **High AT&C losses – 33%**

- Aging and poorly maintained assets

- Unreliable and overloaded system

- Low Demand Side Management (DSM) initiatives

- Corporate governance challenges

- Lack of skilled resources and training

AT&C Losses (%)

Year	AT&C Losses (%)
2001-02	38.86
2002-03	36.64
2003-04	34.90
2004-05	34.82
2005-06	35.18
2006-07	33.07

Scale

- Accelerating demand growth

- Installed capacity 140 GW

- Capacity by 2030 – 40 > 800 GW

- Five fold increase expected (UMPP, MNRE, Nuclear etc.)

- Annual per capita consumption
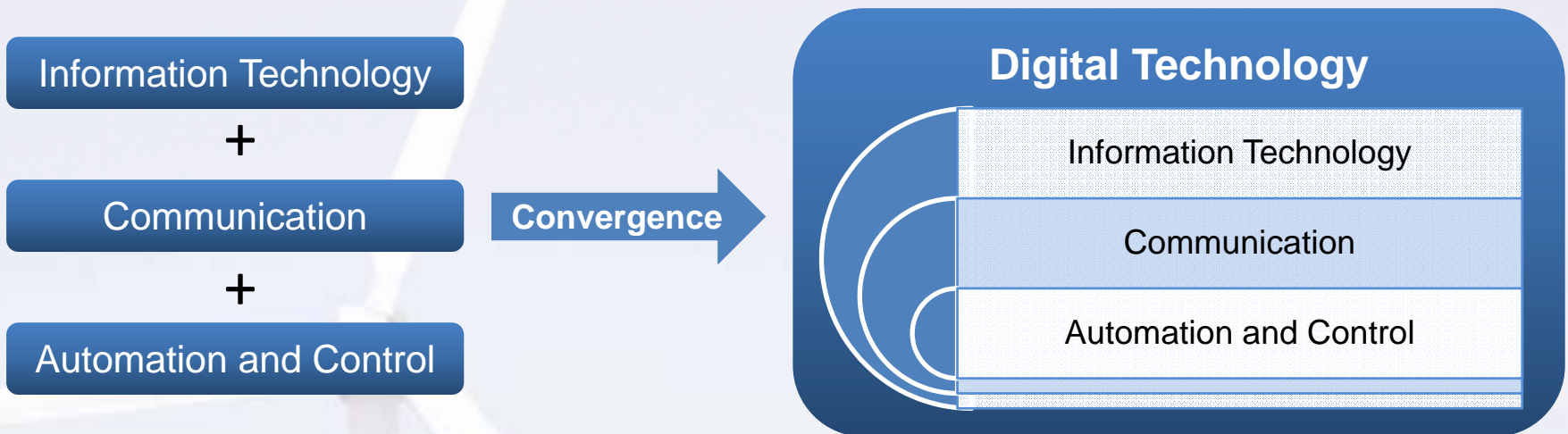 - India 700 kWh
  - World 2600 kWh

Complexity

- Economic and Business Issues
  - Energy efficiency
  - Tariff structure
  - Complex pricing

- Consumer Involvement and Choice
  - Transparency
  - Quality of service

- Climate Change
  - Clean energy sources
  - Distributed generation
 - Bi-directional flow

*Illustration: **RGGVY** has both gigantic scale and enormous complexities, including distribution generation and renewable energy. Bi-directional flow capabilities would help maximize its reach and benefits.*

- Our Strategic Advantages:
  - Lack of legacy technology infrastructure
  - Learning from mistakes of other countries and players
  - Huge investment planned for future
  - Resources to take on these challenges
  - Anticipatory knowledge of future challenges

- Benefits:
  - Leapfrog to the state of the art in the industry
  - Lower cost than global levels
  - Positive impact on price of power
  - Achieve business agility through a responsive infrastructure

- Technology should be looked at in totality

Information Technology
+
Communication
+
Automation and Control

Convergence →

Digital Technology

Information Technology
Communication
Automation and Control

- IT, Communication, Automation/Control must be planned and implemented in synergy to achieve optimal results
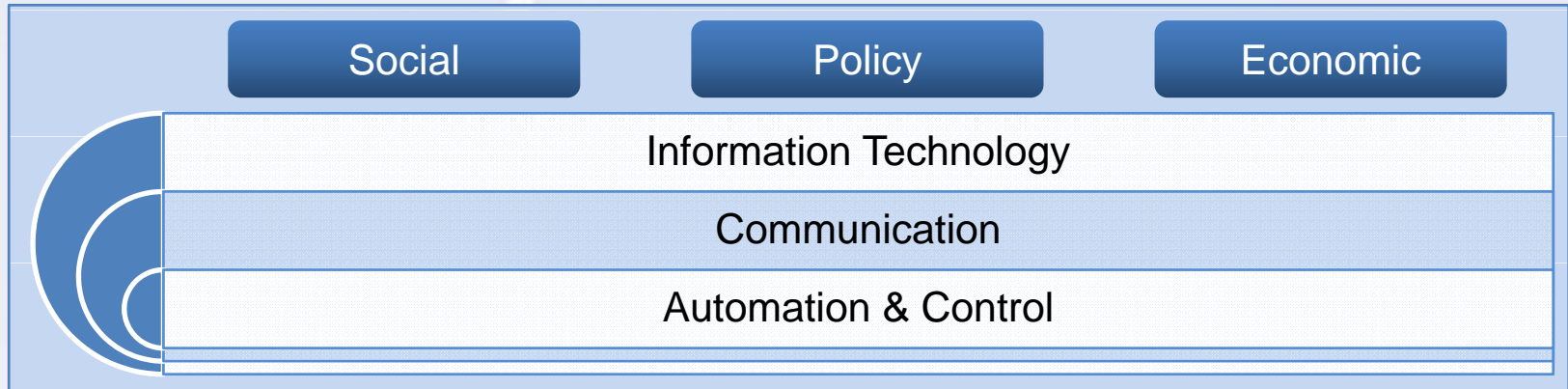
- Technology needs to be applied in harmony with **Social, Political and Economic context** specific to the DISCOM
- There is large disparity across DISCOM's in maturity of technology adoption
- Blind copying of technology can be highly unproductive

Distribution Technology Trajectory (DTT)

Illustrative

A system for :
- **Curtailing AT&C losses**
- Driving transparency
- Driving accountability

DTT- Step 1
- 2002 Report and Part of R-APDRP

A system for:
- Operational efficiency
- Customer service excellence
- Automated control

DTT- Step 2
- R-APDRP and beyond

DTT- Step 3
- Smart Grid

A system that is:
- Self-healing
- Adaptive
- Interactive
- Secure from attacks
- Accommodates all generation and storage options
- Supports bi-directional energy flow
- Distributed across geographies and organizational boundaries

1 to 3 years   **3 to 5 years**   **5 to 15 years**

Self-healing, **Adaptive, Interactive**, **Secure** from attacks, **Distributed** across organisational boundaries, accommodates all generation and storage options and supports **bi-directional** energy flow

Information and Communication Enabled Power Infrastructure

| Generators | Transmission System | Sub-Stations | Consumers |

| Distributed Generation Sources | Market Participants | Electric vehicles | Smart Home Appliances |
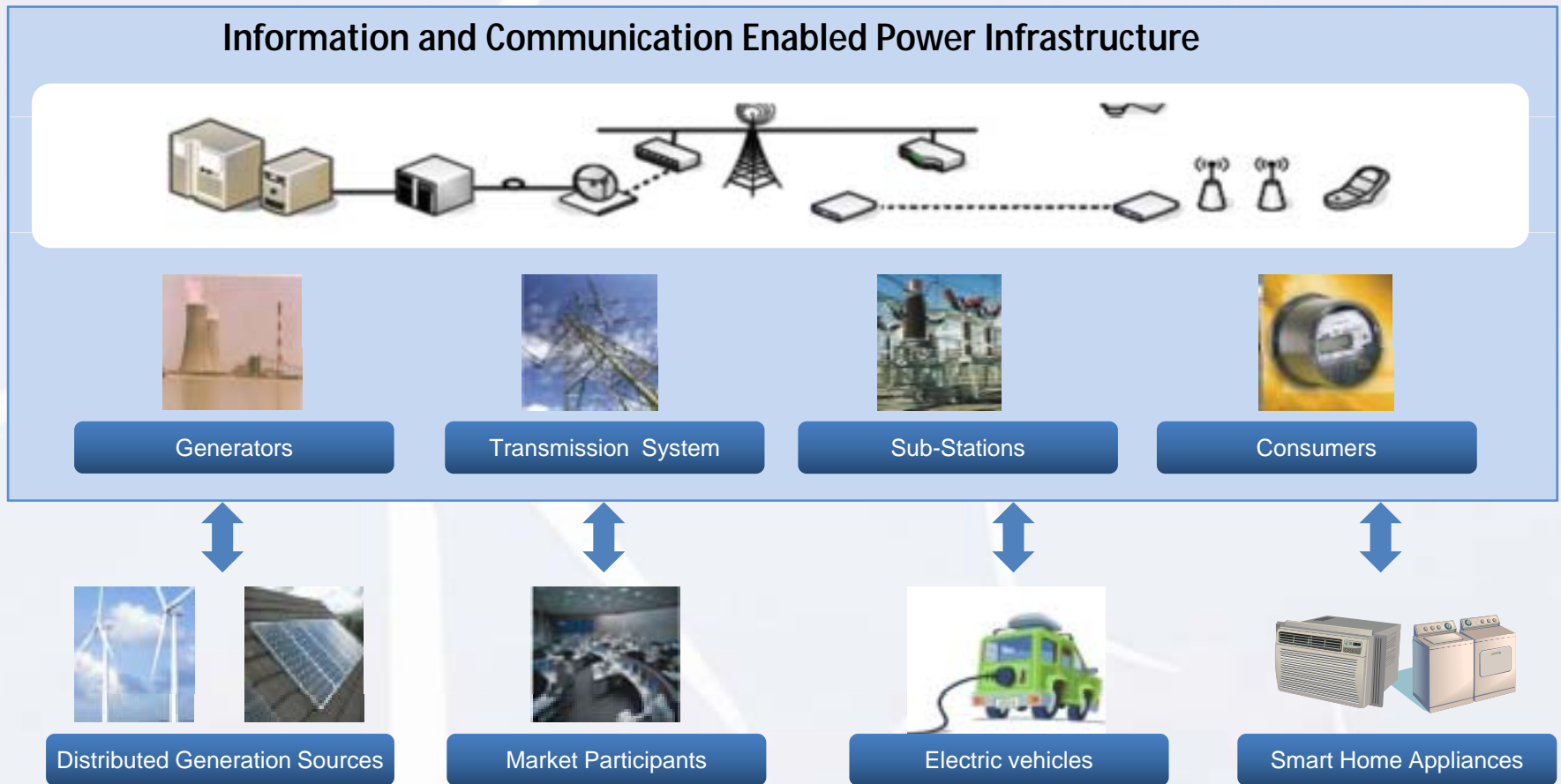
But Let's Not Expect Magic From Technology

- Technology alone can not directly:
  - Change work practices and culture
    - Not a substitute for providing incentive to employees to change
  - Create political will
  - Reduce AT&C losses
  - Change subsidy model
  - Change governance and project management
  - Address environmental challenges
  - etc.

- **But Technology can act as a powerful tool to help address all the above, and more**

- Each DISCOM must define its own priorities and create a customized roadmap
  - Business strategy to drive technology strategy and roadmap

- Holistic approach instead of ad-hoc approach
  - Focus on business process re-engineering, program management, change management and governance
  - Do cost-benefit analysis

- Adopt standards and future proof designs

- Coordination at the state and national levels for research, prototyping and pilot projects

- Phenomenal addition of infrastructure
  - Spending 2000 billion dollars (Generation and T&D)
  - Lasting for next several decades
  - Needs thorough examination of all issues

- A national level coordinator can ensure synergy and increase rate of change
  - National Body, perhaps created by an Act of Parliament
  - Stakeholders from across the industry

- Authority to coordinate, create and assign responsibility
  - For economic/financial analysis, governance and policy, standards, technology transition, research and adoption, human resource development

Thank You