JAAI Regional Chapter
Technical Seminar

JICA's Experiences in Renewable Energy and Energy Efficiency

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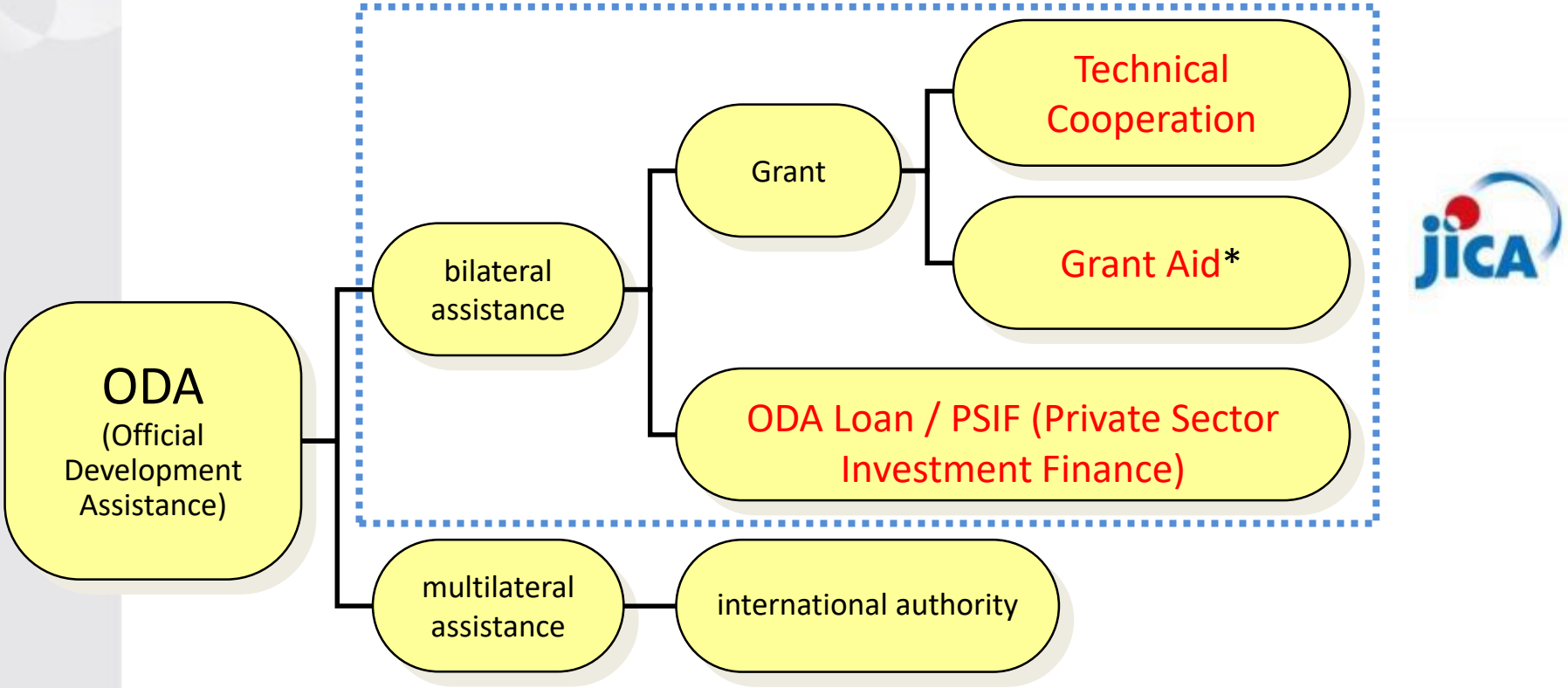
1. About JICA

What is “JICA”?

- ✓ **JICA** is a **governmental agency** of Japan that coordinates official development assistance (ODA)
- ✓ **JICA** is the **world’s largest** bilateral development agency
- ✓ **India** is the **largest and the oldest partner** of JICA



* Part of grant aid is provided by the Ministry of Foreign Affairs.

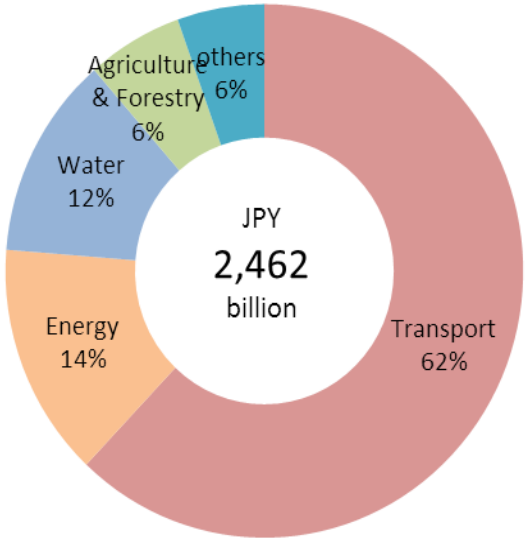
India is JICA's Largest Partner in the World

Soft Loan

Accumulated Commitment by FY2016/17:
- JPY 4.9 trillion in total
  (equivalent to about Rs. 3 lakh crore)

Operational Results in FY2016/17:
Commitment: JPY 308.8 billion
(equivalent to about Rs. 16,000 crore)
Disbursement: JPY 206.1 billion
(equivalent to over Rs. 10,000 crore)

Major Sector (FY2007/08-2016/17)



Terms and conditions: (as of Jan. 2018)
- General terms: Interest rate 1.5%, repayment period 30 years (including 10 years grace period)
- STEP: Interest rate 0.1%, repayment period 40 years (including 12 years grace period)

Grant Aid

One on-going project in health sector in Chennai

Technical Cooperation

- Results in FY 2016/17
JPY 16.0 billion (about Rs. 850 crore)

About 1100 Japanese experts to India
About 250 Trainee from India to Japan

Citizen Partnership / Public-Private Partnership

- Japanese Volunteers
- Japanese NGO activities
- Partnerships with Private-Sector Activities

2. JICA's Approaches to Renewable Energy and Energy Efficiency

Japanese Official Development Assistance
Energy Sector in India - Assistance Strategy -

Global Trend

- Discussion in International Arena
  (UNFCCC COP21, WEO etc)
  - ➢ Improving Energy Efficiency
    (Including to shut down low efficient TPPs)
  - ➢ Further utilization of Renewable Energy (RE)

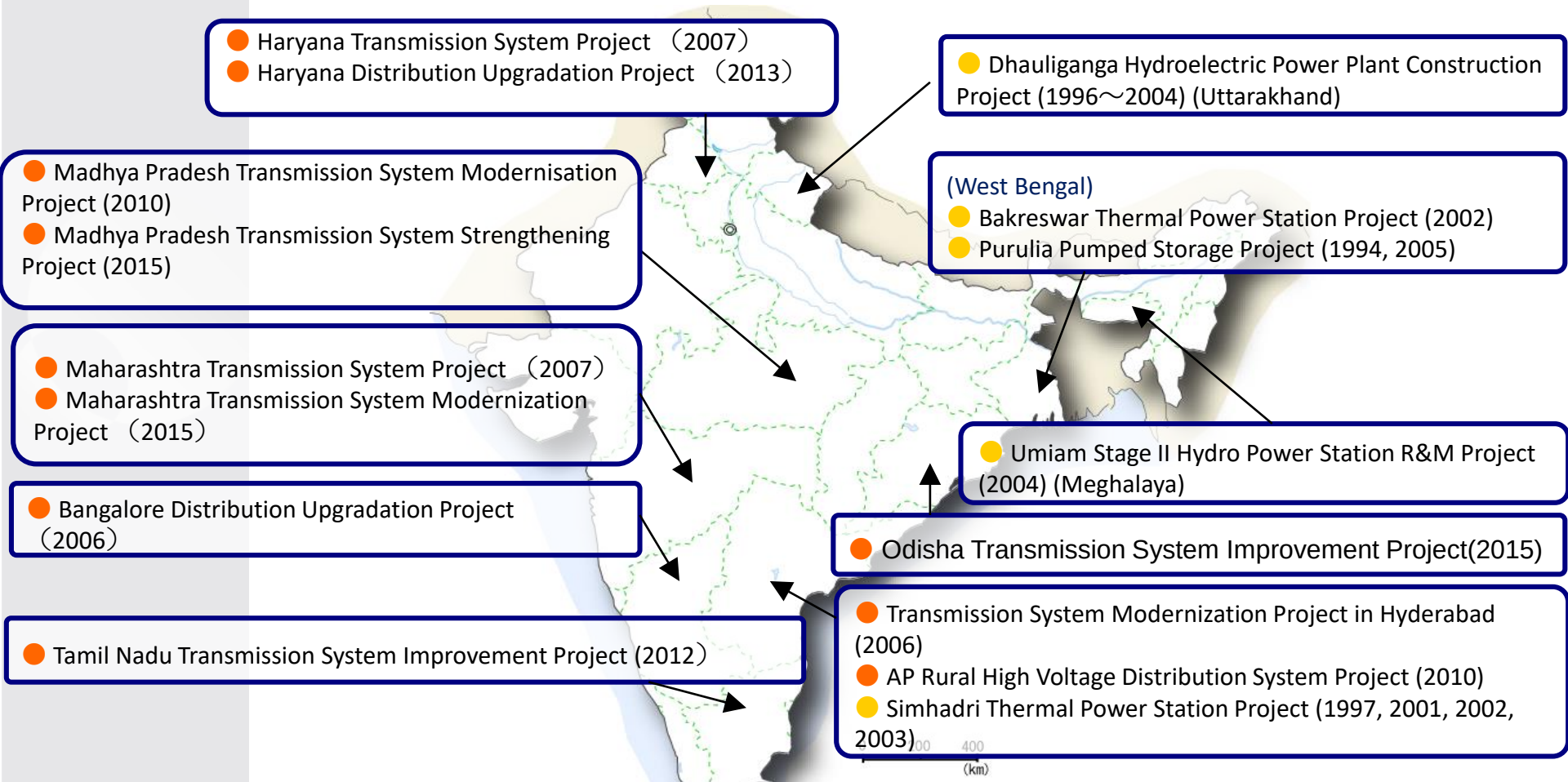
India's Trend

- Electricity demand with rapid economic growth
  - ➢ No subcritical TPPs from 2017
  - ➢ 175 GW of RE by 2022
  - ➢ Pumped Storage for grid stabilization

JICA's Thought

- **T&D Loss Reduction**
- **Renewable Energy**
- **Grid Stabilization Technologies**
- **High Efficient TPPs with Environmental Facilities**

Recent ODA loan projects in Energy sector



- Haryana Transmission System Project （2007）
- Haryana Distribution Upgradation Project （2013）

- Dhauliganga Hydroelectric Power Plant Construction Project (1996～2004) (Uttarakhand)

- Madhya Pradesh Transmission System Modernisation Project (2010)
- Madhya Pradesh Transmission System Strengthening Project (2015)

(West Bengal)
- Bakreswar Thermal Power Station Project (2002)
- Purulia Pumped Storage Project (1994, 2005)

- Maharashtra Transmission System Project （2007）
- Maharashtra Transmission System Modernization Project （2015）

- Umiam Stage II Hydro Power Station R&M Project (2004) (Meghalaya)

- Bangalore Distribution Upgradation Project （2006）

- Odisha Transmission System Improvement Project(2015)

- Transmission System Modernization Project in Hyderabad (2006)
- AP Rural High Voltage Distribution System Project (2010)
- Simhadri Thermal Power Station Project (1997, 2001, 2002, 2003)

- Tamil Nadu Transmission System Improvement Project (2012）

(More than two States)
- Rural Electrification Project （2005）
- New and Renewable Energy Development Project(2011, 2014)
  Micro, Small and Medium Enterprises Energy Saving Project (2008, 2011, 2014)

Legend
- Generation
- Transmission and Distribution

3. Highlights of JICA's Activity (Power Sector)

High profile operation result

- **9.3GW** of efficient generation capacity (3% of Indian total Capacity)
- **1.0GW** of Renewable Energy
- **85 Projects**
- **JPY 1.3 Trillion (≒ Rs. 80,000 crore, US$ 1.2 bil.)** (**30%** of JICA's total cooperation in India)

- ODA Loan

New Power Plant, Transmission & Distribution Lines, Energy Efficiency & Conservation, New and Renewable Energy, Grid Stabilization

- Technical Cooperation

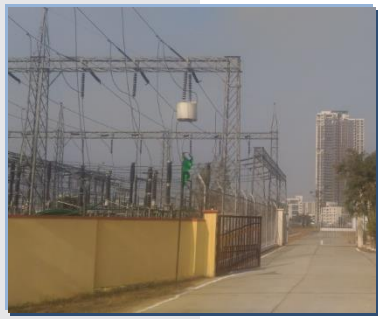
Technical Assistance for Energy Efficiency & Conservation, New and Renewable Energy

Study for Updating Exhausted Coal Thermal Power Plant

Good Practice

SIMHADRI THERMAL POWER STATION PROJECT

- 97% of Capacity Factor
- 11.9% of total power supply in Andhra Pradesh in 2009
- 2005 "International Project Management Award"



Good Practice

HARYANA TRANSMISSION SYSTEM PROJECT

- Transmission loss : 2.2% (lowest in India) <<< original 2.7%

Financing to IREDA*

***Indian Renewable Energy Development Agency Ltd**

About Rs. **3,600** Crore was committed since 2011

36 sub-projects in wind, solar, and small hydro

Financing to SIDBI*

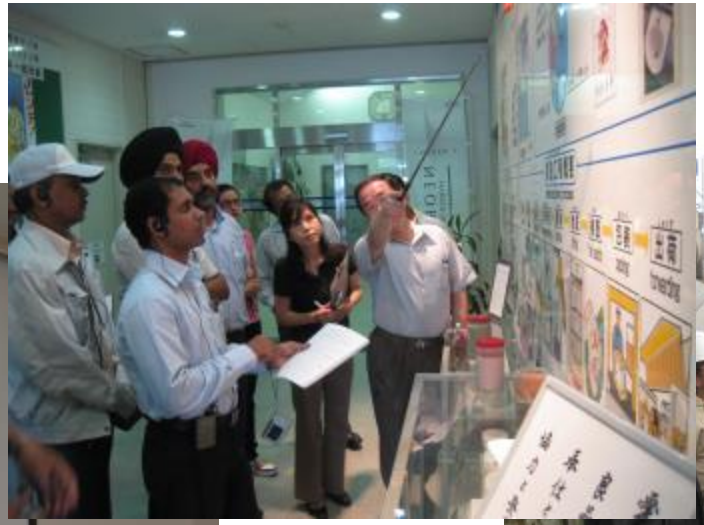
***Small Industries Development Bank of India**

About Rs. **4,800** Crore was committed since 2008

Covering **over 5,000** sub-projects
in industries, commercial buildings, etc.

Training Program in Japan

Over **250** Indian experts participated in JICA's training program courses in Japan just in the last decade

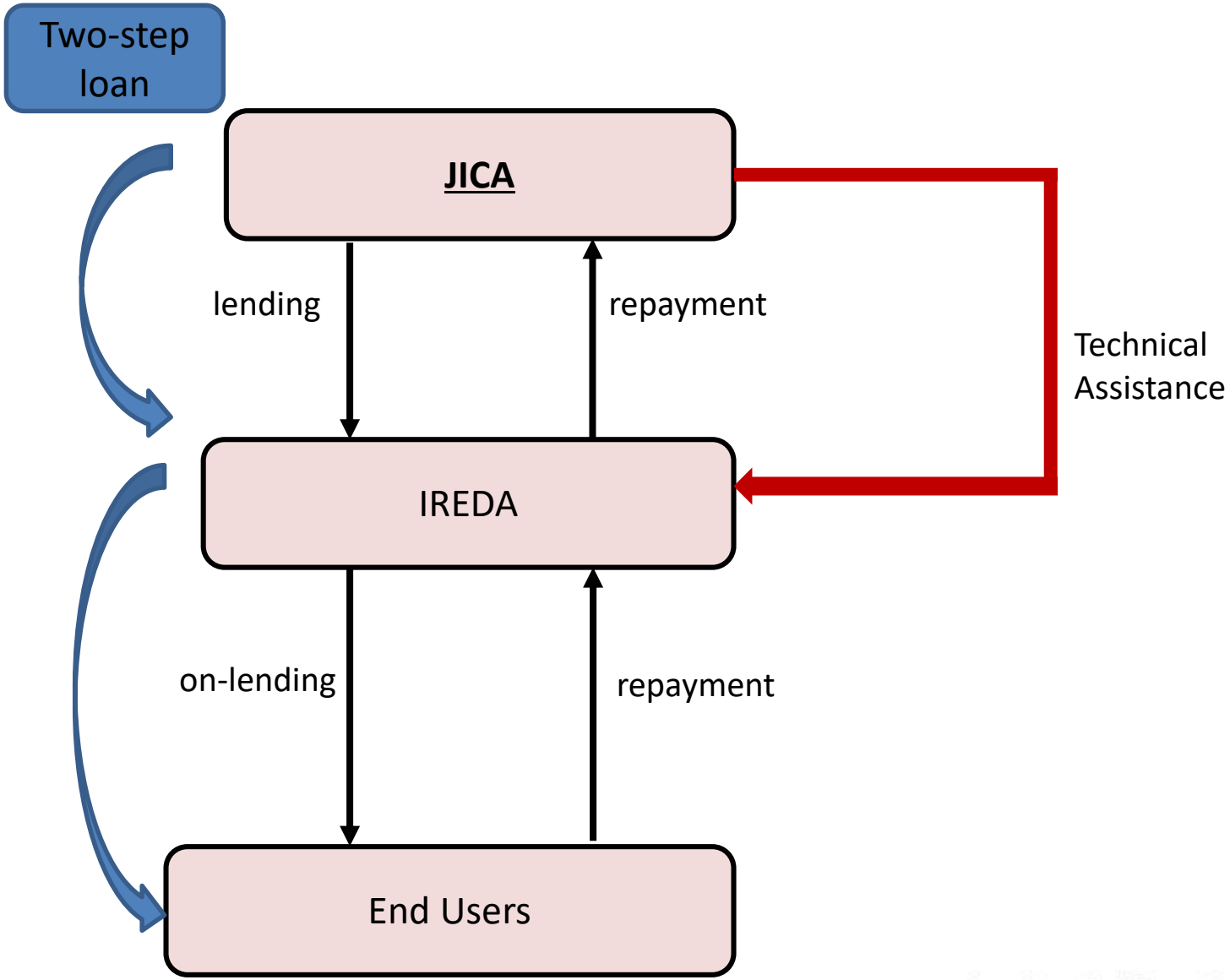


4. Case Studies (Renewable Energy)

New and Renewable Energy Development Project (Phase I ～ II)

- JICA extends concessional loans to Indian Renewable Energy Development Agency (IREDA).
- IREDA provides on-lending soft loans to new and renewable energy development projects or to investments for energy efficiency and conservation.
- JICA also provides technical assistance (grant) for capacity development and facilitating the process.

Conceptual diagram of the project



Outline of our support through IREDA

[Phase 1]

JICA loan: JPY30 billion, Interest Rate:0.55%, Repayment Period: 30 (10) years

Sector	Number of projects	Total project cost (Rs. Lakhs)	Loan Amount (Rs. Lakhs)	MW Capacity
Solar	2	24,195	16,847	32
Wind	12	508,747	171,696	791
Hydro	2	17,435	11,809	31
EEC	1	27,627	14,255	EE for 12 cooperative sugar mills
Cogen	1	11,500	10,339	25

[Phase 2]

JICA loan: JPY30 billion, Interest Rate:0.25%, Repayment Period: 30 (10) years

Sector	Number of projects	Total project cost (Rs. Lakhs)	Loan Amount (Rs. Lakhs)	MW Capacity
Solar	10	105,380	58,499	139
Wind	9	343,441	94,942	468
Hydro	8	34,664	24,038	50

4. Case Studies (Transportation)

Energy Saving Technology !

&

Modal Shift !

Numerous private transportation

>> Mass transit public transport

《Delhi Metro》

over 200km long and nearly 3 million passengers/day.

- ✓ **Reduction of fuel consumption : 276,000 t/year**
- ✓ **Reduction of vehicles No. : 390,971 /day**
- ✓ **Reduction of pollutants : 577,148 t/year**

JICA's assistance for Metro projects

*The amount of JICA Loan includes the estimated amount of future commitment.

Delhi Metro

Project Cost: Aprox. JPY1,274 bill.
(JICA Loan: Aprox. JPY684 bill.)

Phase 1 (65km): Completed
Phase 2（125km）: Completed
Phase 3（139km）: TBC in FY2018

Kolkata Metro

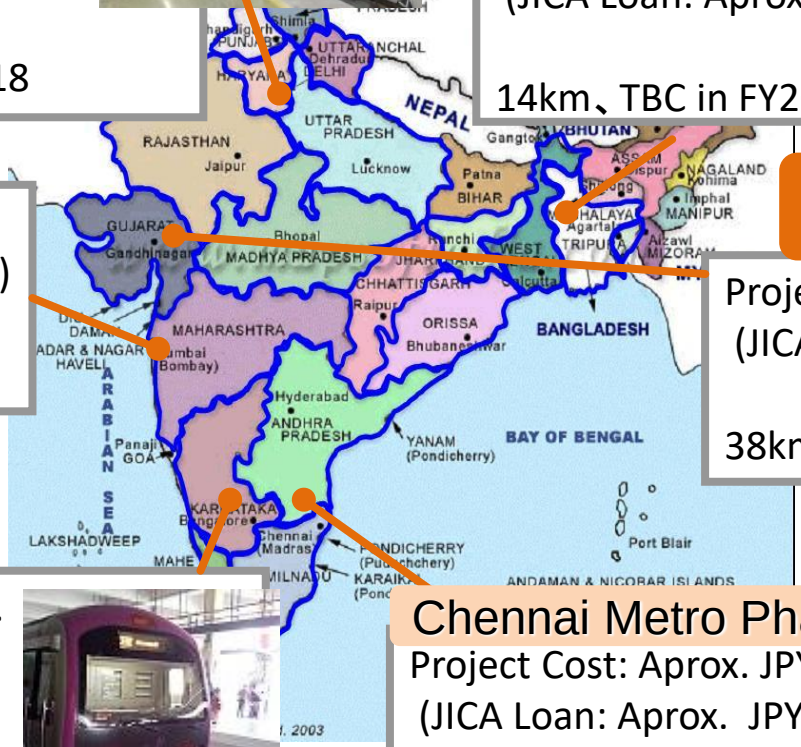
Project Cost: Aprox. JPY140 bill.
(JICA Loan: Aprox. JPY82 bill.)

14km、TBC in FY2019

Mumbai Metro

Project Cost:Aprox. JPY347 bill.
(JICA Loan: Aprox. JPY188 bill.)

33km、TBC in FY2021



MEGA -Metro-Link Express for Gandhinagar and Ahmedabad -

Project Cost: Aprox. JPY246 bill.
(JICA Loan: Aprox. JPY113 bill.)

38km、TBC in FY2020

Bangalore Metro

Project Cost:Aprox. JPY307 bill.
(JICA Loan: Aprox. JPY65 bill.)

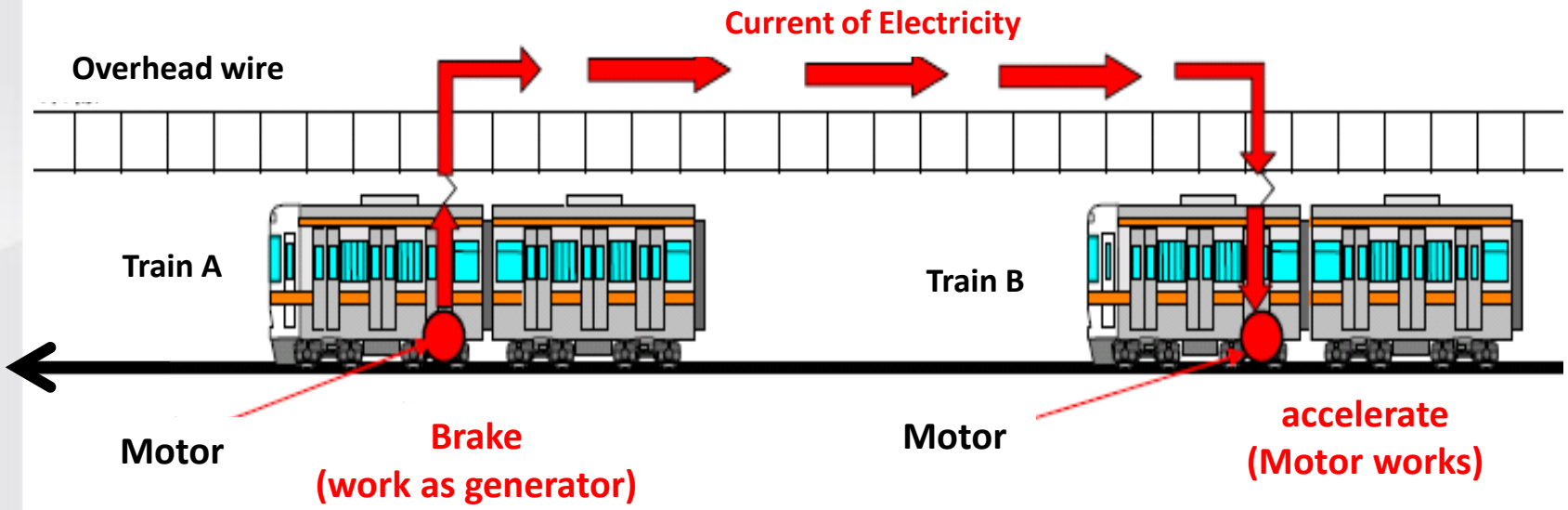
42km、completed

Chennai Metro Phase1

Project Cost: Aprox. JPY277 bill.
(JICA Loan: Aprox. JPY146 bill.)

43km、TBC in FY2018

Regenerative Braking System



- When train A brake is applied, the motor of train A works as a generator.
- By supplying electricity from Train A to overhead wire, the electricity generated by Train A can be used by Train B for powering.
- Thus, electricity generated by fossil fuel power plant can be saved and, in turn, GHG emission will be reduced.
- Delhi Metro was the world 1st registered railway project at the UNCDM* scheme.
  *UNCDM = Clean Development Mechanism at the United Nations

5. Key Messages

■ Power Sector

Loss Reduction !
Energy Efficiency !
Renewable Energy !

■ Other than Power Sector
(e.g. Metro)

Energy Saving Technology !
Modal Shift !

With full utilization of Japan's expertise and technology

Thank you!

धन्यवाद

c.f. http://www.jica.go.jp/india/english/office/about/message.html
http://www.jica.go.jp/india/english/office/others/brochures.html