Financial Cooperation of JICA ~Toward a sustainable investment environment~

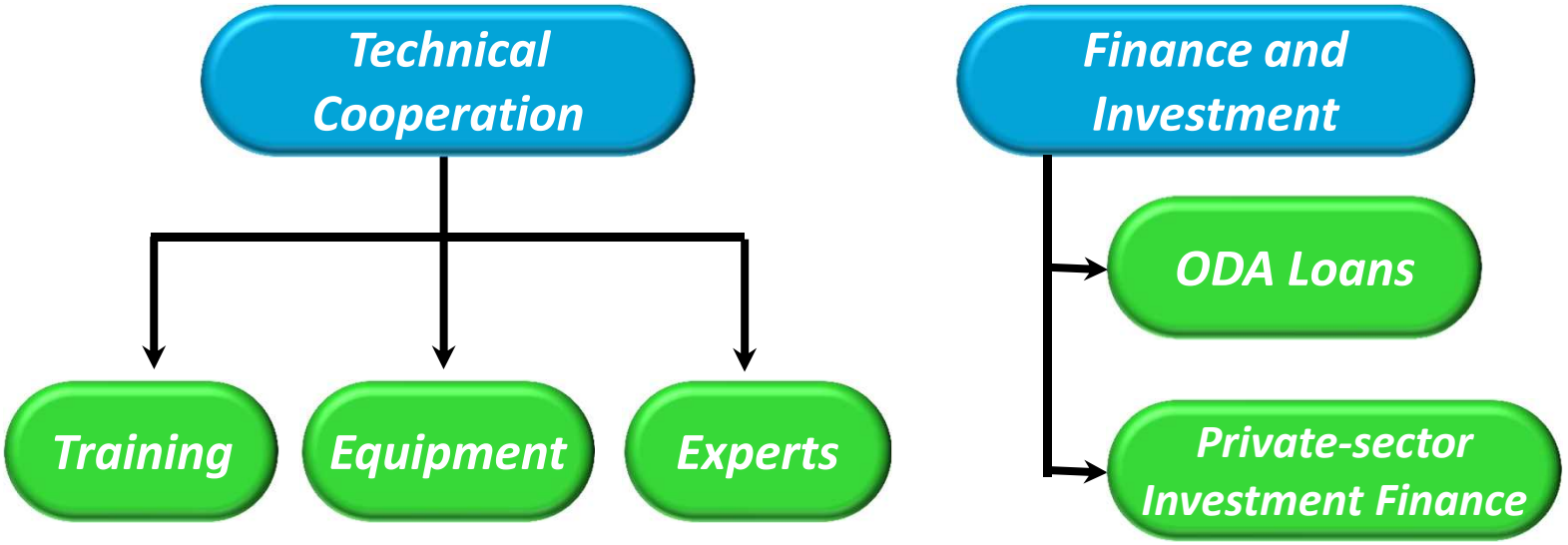
31 August, 2017

Akio SAITO

Chief Representative,
JICA Brazil Office

1. JICA and Type of Assistance

Japan International Cooperation Agency
- One of the largest agency of bilateral cooperation in the world - In Brazil, JICA has started its cooperation since 1959.



2. Terms and Conditions *(reviewed semi-annually)*

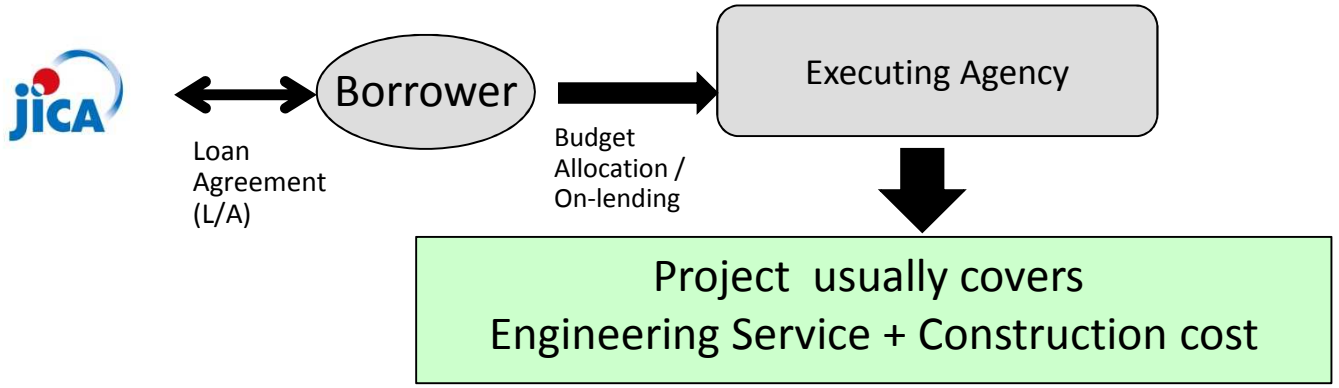
April 1, 2017

Terms	Standard / Option	Interest Rate		Repayment Period (years)		Conditions for Procurement
		(Fixed)	(Floating)		Grace Period	
General Terms	Longer option		¥LIBOR+125bp	40	12	Untied
	Standard	1.40%	¥LIBOR+105bp	30	10	
	Option 1	1.20%	¥LIBOR+95bp	25	7	
	Option 2	1.00%	¥LIBOR+85bp	20	6	
	Option 3	0.80%	¥LIBOR+75bp	15	5	
Preferential Terms	Longer option		¥LIBOR+105bp	40	12	
	Standard	1.20%	¥LIBOR+85bp	30	10	
	Option 1	1.00%	¥LIBOR+75bp	25	7	
	Option 2	0.80%	¥LIBOR+65bp	20	6	
	Option 3	0.60%	¥LIBOR+55bp	15	5	
Preferential Terms for High Specification	Standard	0.70%		30	10	
	Option 1	0.65%		25	7	
	Option 2	0.60%		20	6	
	Option 3	0.55%		15	5	
Consulting Services		0.01%		same as those for main components		

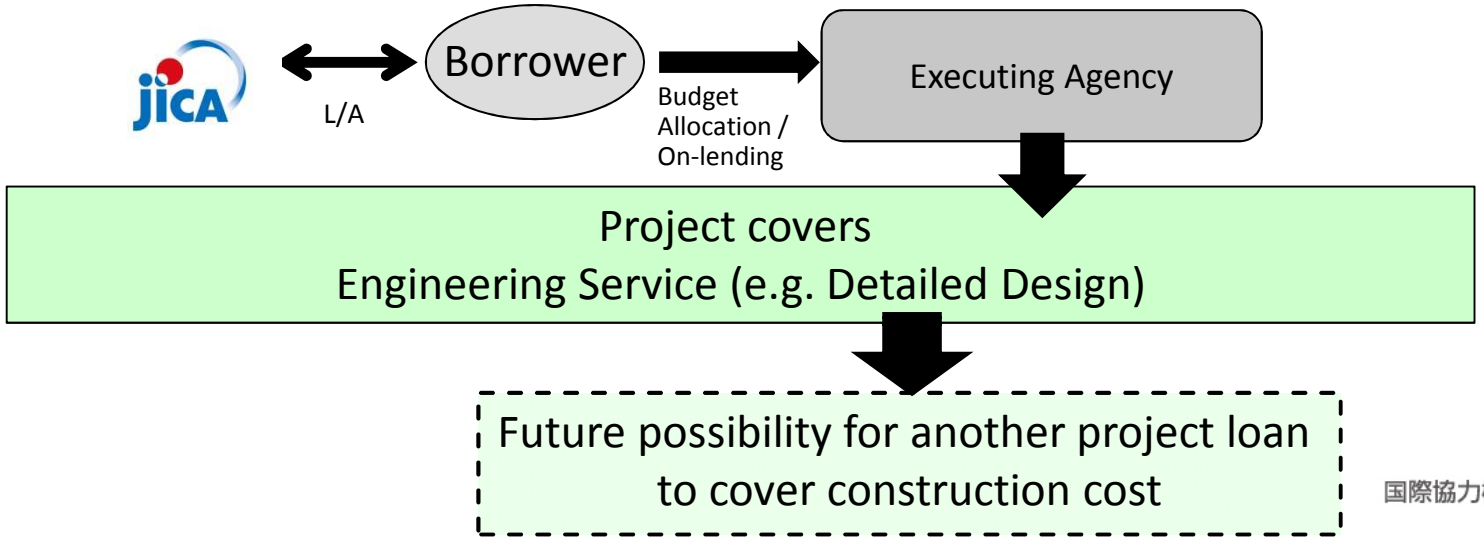
For Upper-Middle-Income Countries, Floating Term will be applied in principle, although Fixed Term could be applied.

3. Types of ODA Loans

1. Project Loan

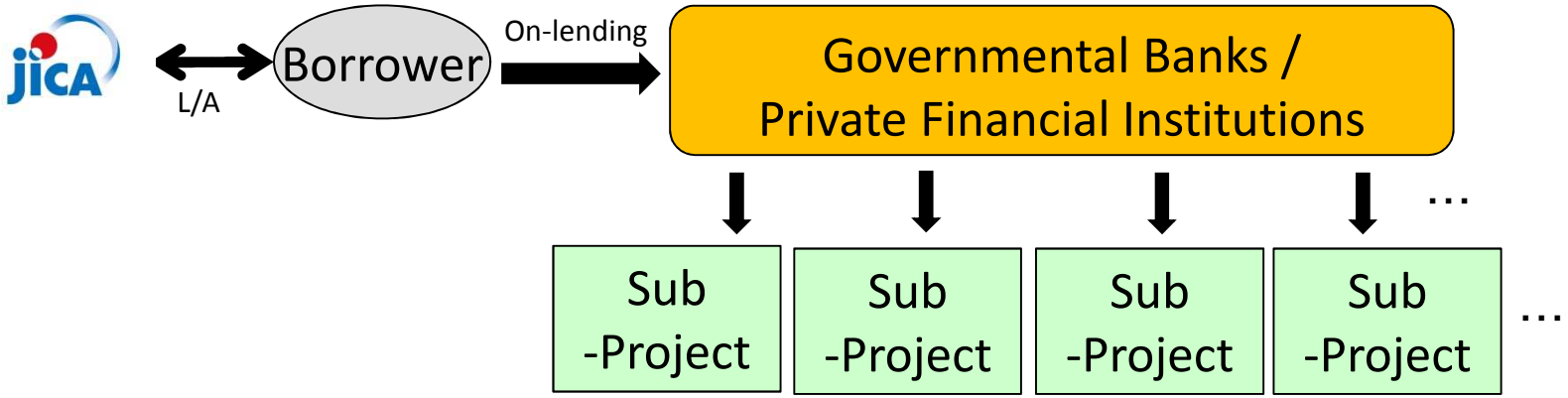


2. Engineering Services Loan (E/S Loan)

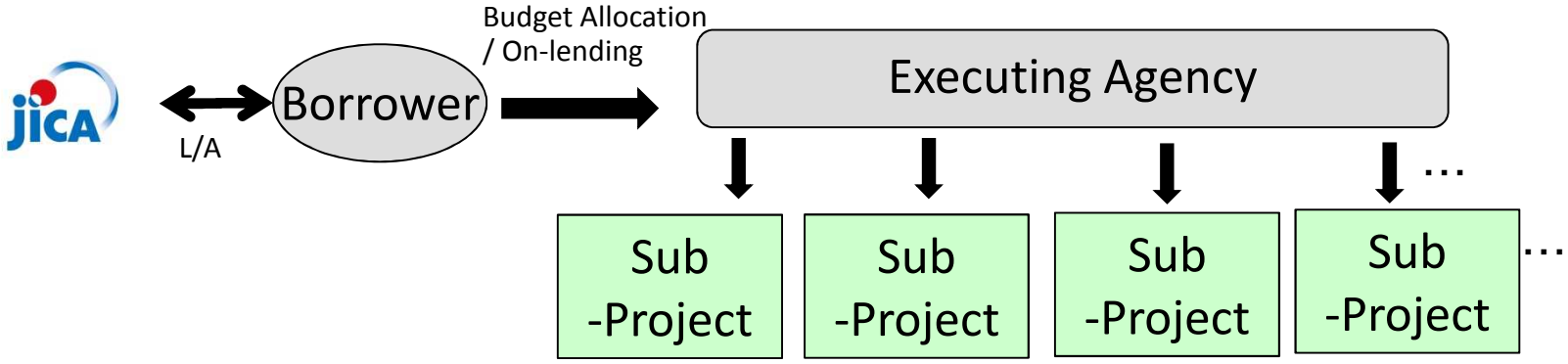


3. Types of ODA Loans

3. Two Step Loan

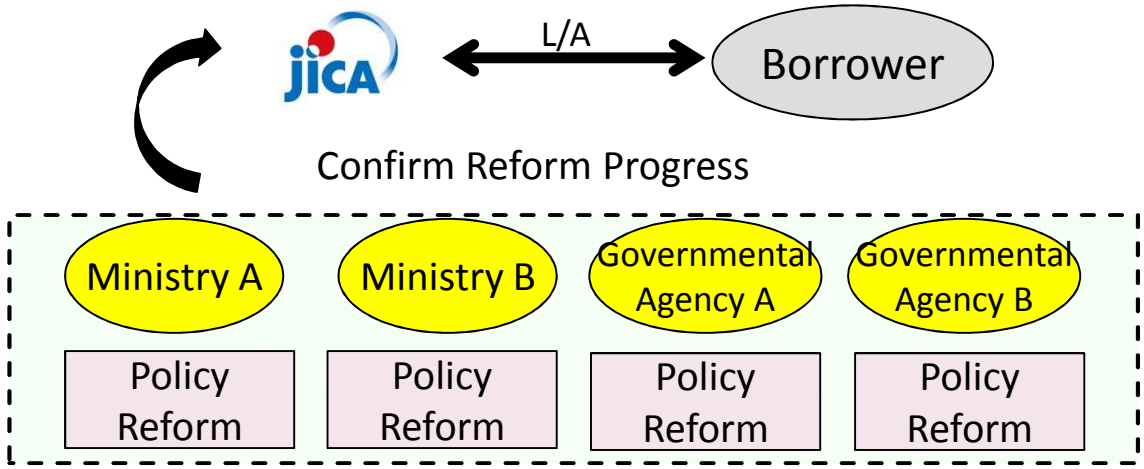


4. Sector Loan



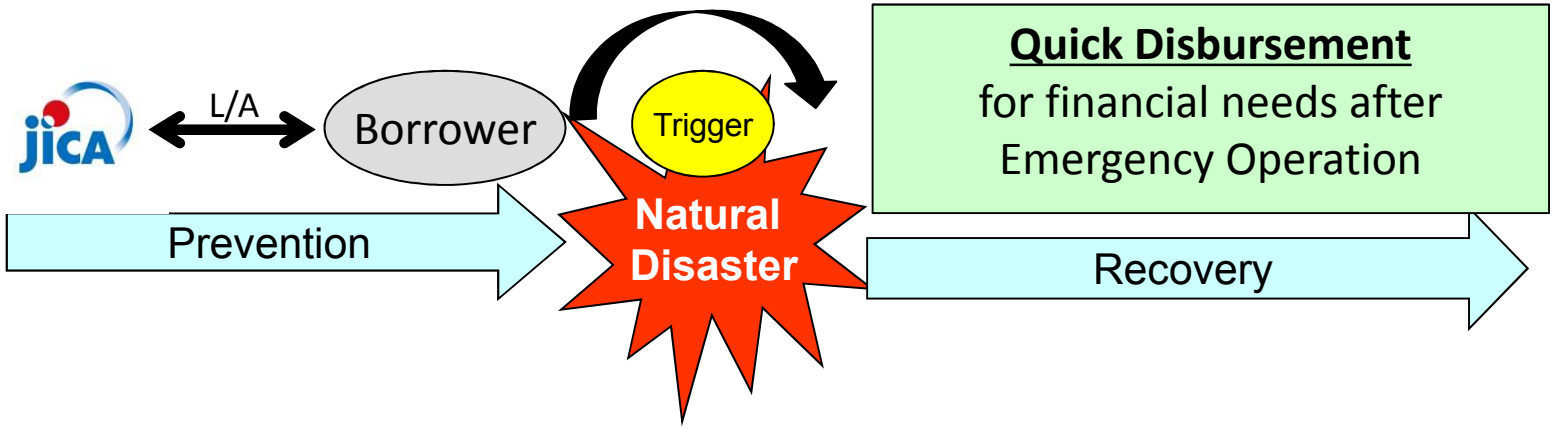
3. Types of ODA Loans

5. Program Loan (DPL: Development Policy Lending)



3. Types of ODA Loans

6. Stand-by Emergency Credit for Urgent Recovery(SECURE)

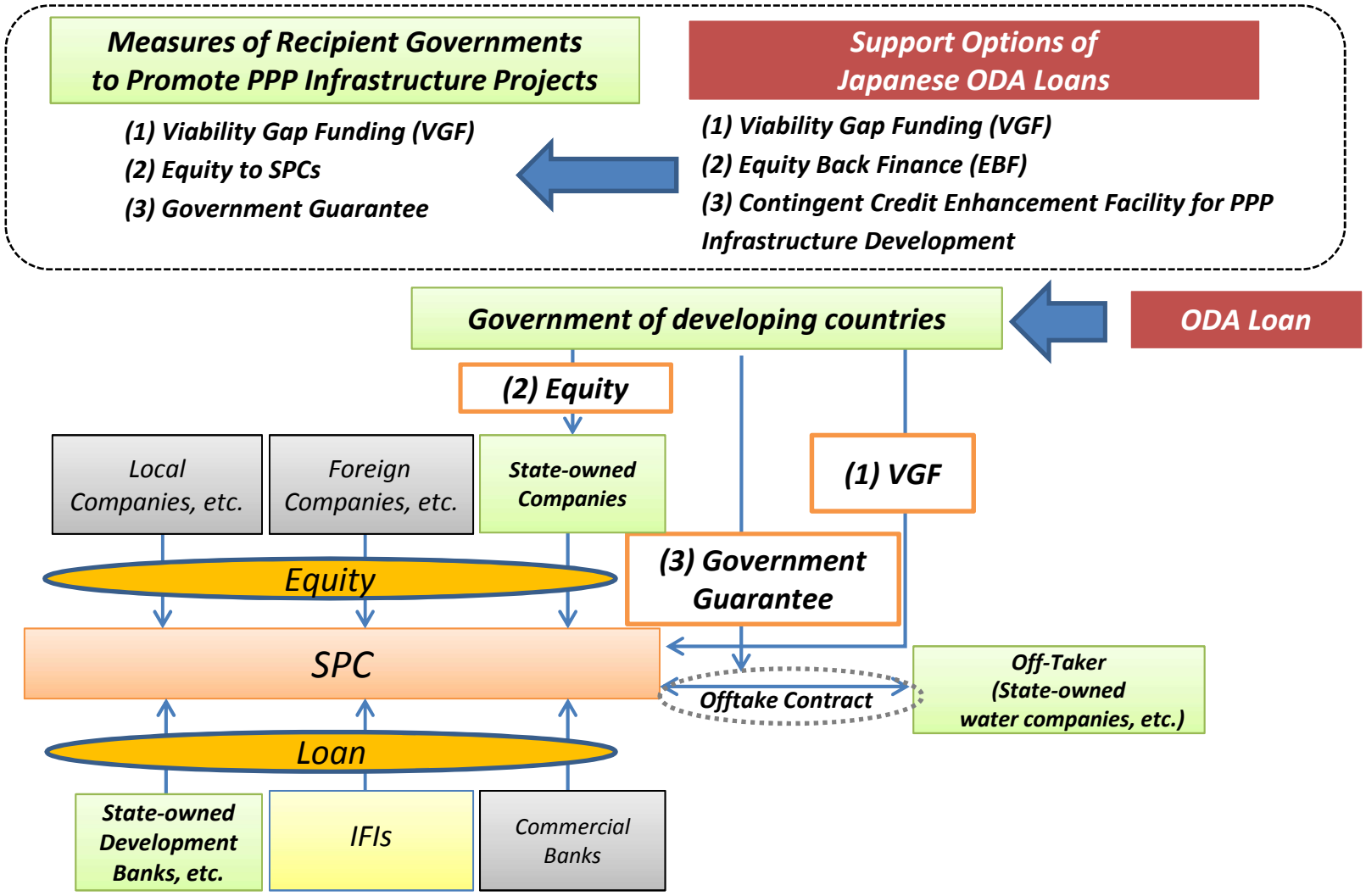


EXAMPLE: SECURE in Peru

- Borrowers : The Republic of Peru
- Executing Agency : Ministry of Economic and Finance
- Amount : 10 bilion JPY
- Objetctive :

To develop the disaster risk management capacity of Peru by supporting efforts in disaster prevention and response, and to support rehabilitation after natural disasters by responding to emergent financial needs, thereby contributing to immediate rehabilitation

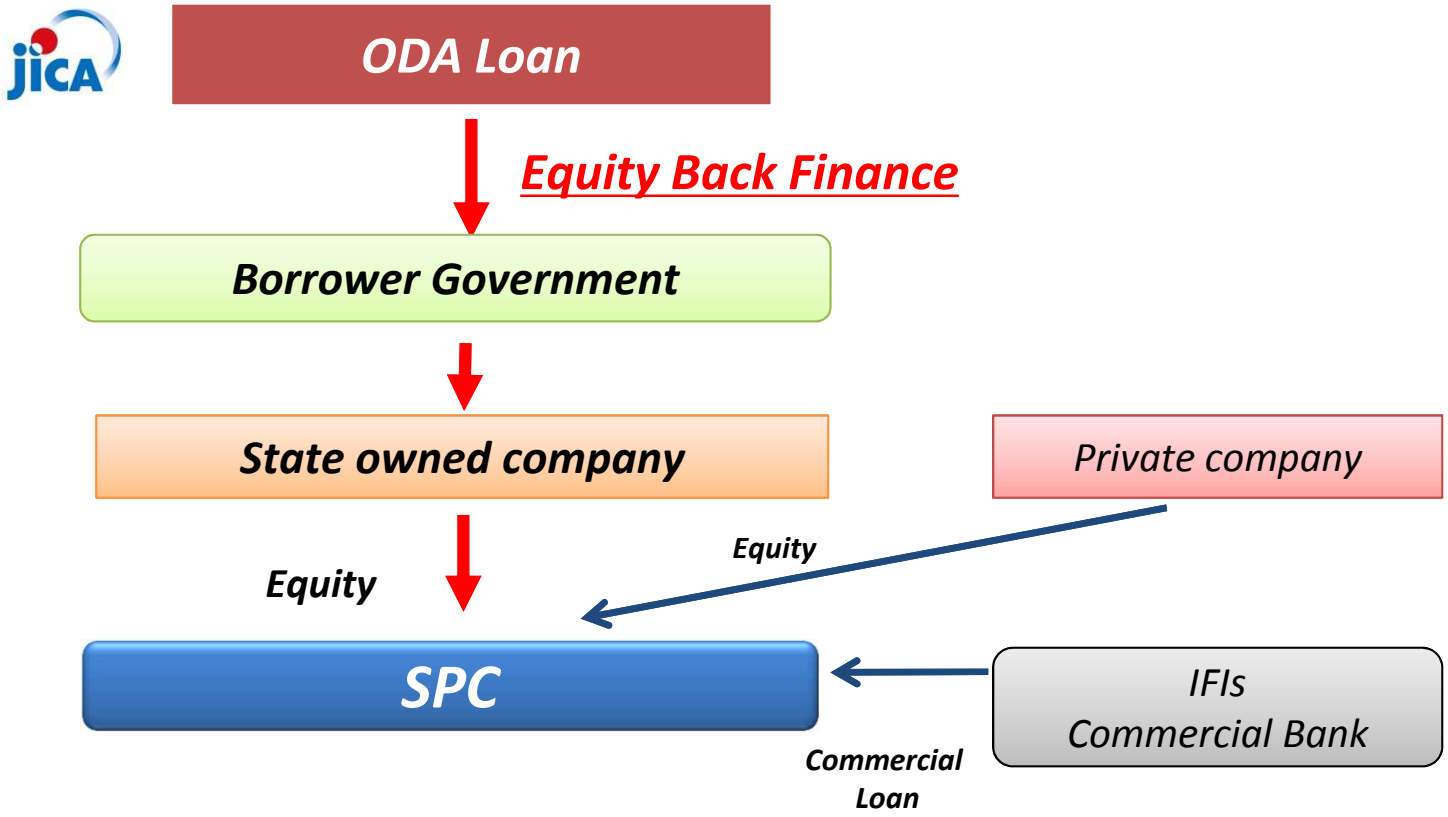
4. Comprehensive Support for Promoting PPP Infrastructure Projects



4-1. Equity Back Financing (EBF)

< Objective of the scheme>

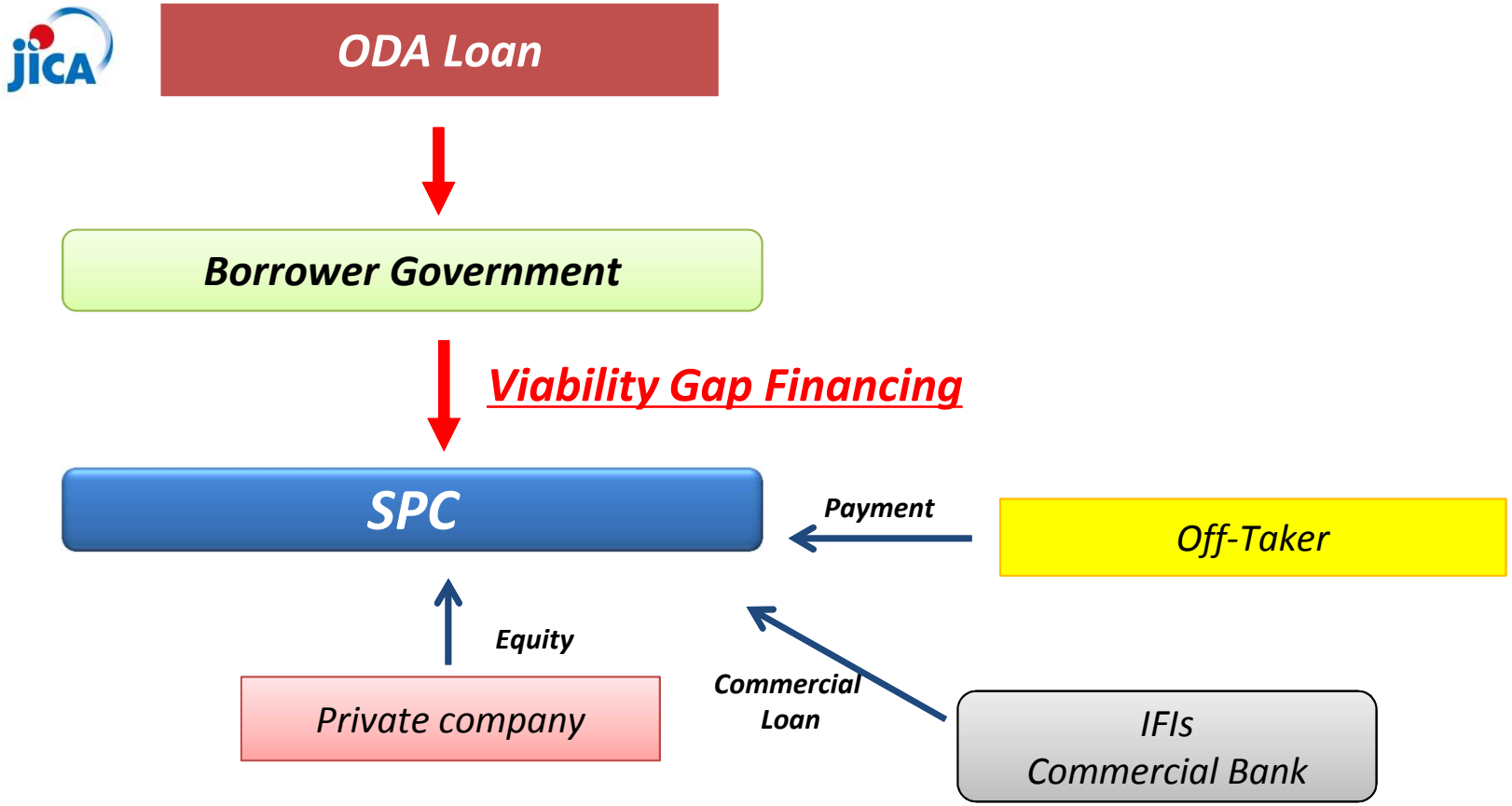
- *Proceeds of the Yen Loan will be used as an equity contribution by the Borrower Government to PPP infrastructure projects.*



4-2. Viability Gap Financing (VGF)

< Objective of the scheme >

- *To meet the funding gap of economically essential infrastructure projects, proceeds of the Yen Loan will be used as a subsidy (Viability Gap Fund (VGF)) contribution by developing countries to PPP infrastructure projects .*



4-3. CCEF-PPP

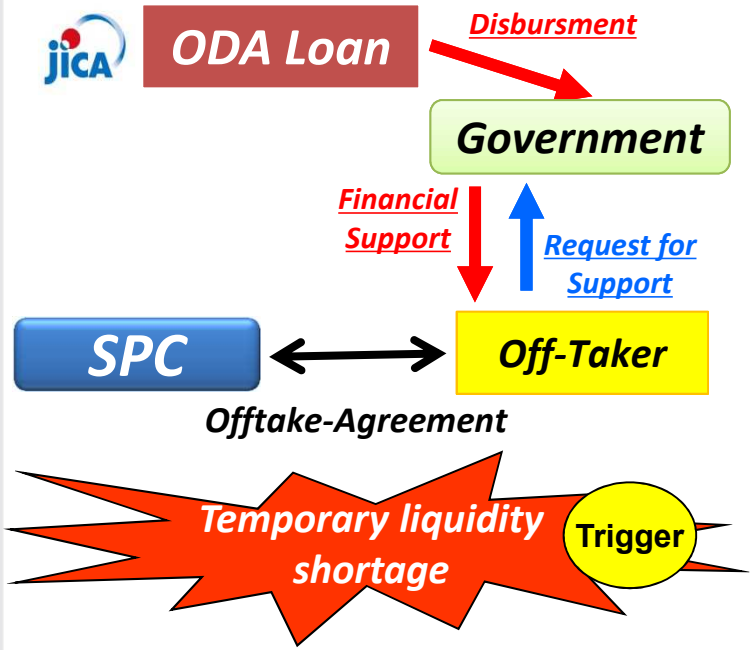
Contingent Credit Enhancement Facility for PPP Infrastructure Development

＜Objective＞

- To complement the credit of the government to gurantee payments of the off-taker based on a seles-contract.
- Thereby promoting infrastructure investments through PPP approach with the optimal risk sharing between the public and the private entities.

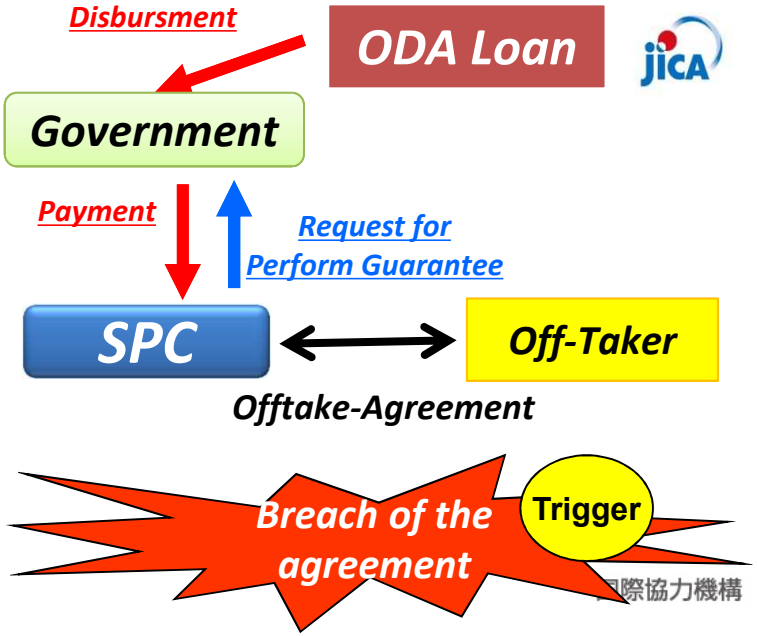
(1) Case 1:

Responding to requests from the off-taker to provide short-term financial support



(2) Case 2:

Responding to requests from the project company to perform guarantee obligation



5. JICA's approach to support infrastructure development through PPP

- *To promote infrastructure development through PPP, JICA can provide full fledge support from Institution building to project realization.*

Institution Building

Objective:

- *Assist Developing Countries to develop policy, regulatory and institutional framework to facilitate the development of PPP.*

Available JICA resources:

Technical Assistance (TA)

- *Expert Advisory*
- *Master Plan Study*
- *Training*

Project Formulation & Development

Objective:

- *Assist Developing Countries to identify potential PPP Projects*
- *Provide support to structure the project so as to attract private investors.*

Available JICA resources:

TA

- *Master Plan Study*
- *Technical F/S*
- *PDF*

Project Realization

Objective:

- *Provide long-term debts and equities to the project companies through PSIF*
- *Provide ODA loan to support public sector financial support such as VGF and Guarantee.*

Available JICA resources:

ODA Yen Loan

Private Sector Investment Finance (PSIF)

TA

Muito Obrigado!

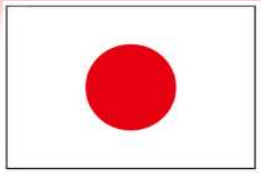
Mr. Akio SAITO,
Mr. Yoshihiro Miyamoto (Senior Representative for Cooperation)

TEL: 61-3321-6465
E-MAIL : saito.akio@jica.go.jp / miyamoto.yoshihiro@jica.go.jp
Endereço : SCN Quadra 02, Bloco A, Sala 402
– Ed.Corporate Financial Center, Brasília

JETRO
Japan External Trade Organization

JETRO's Activities for Plant and Infrastructure Planning in Brazil

1st
Brazil - Japan



Meeting for Cooperation on Infrastructure Improvements

August 31, 2017

Atsushi Okubo
Director-President
JETRO-Sao Paulo

Our mission

Our strengths

Quickly connecting Japanese companies to the world

by making full use of our global network!

JETRO: The Japan External Trade Organization

A government-affiliated organization, established in 1958,

funded by the Japanese government

Network includes Tokyo & Osaka Headquarters,

45 offices in Japan and 74 offices worldwide

Our main activities

Promoting foreign direct investment into Japan

★ Supporting the overseas businesses of Japanese companies

★ Facilitating world trade, the global economy and growth in developing countries

Our local network in Japan

Hokkaido Region	
	Hokkaido
Tohoku region	
	Aomori
	Morioka
	Sendai
	Akita
	Yamagata
	Fukushima
Kanto/Koshin'etsu Region	
	Tokyo Headquarters
	Kanto
	Tochigi
	Ibaraki
	Chiba
	Yokohama
	Niigata
	Yamanashi
	Nagano
	Suwa
Chubu/Hokuriku Region	
	Fukui
	Toyama
	Kanazawa
	Gifu
	Shizuoka
	Hamamatsu
	Nagoya
	Mie

Kinki Region	
	Osaka Headquarters
	Kobe
	Kyoto
	Shiga
Chugoku Region	
	Tottori
	Matsue
	Okayama
	Hiroshima
	Yamaguchi
Shikoku Region	
	Tokushima
	Kagawa
	Ehime
	Kochi
Kyushu/Okinawa Region	
	Fukuoka
	Kitakyushu
	Saga
	Nagasaki
	Kumamoto
	Oita
	Miyazaki
	Kagoshima
	Okinawa

Our global network

74 offices worldwide

Quickly connecting Japanese companies to the world by making full use of our network!

Role of JETRO in collaboration between Brazil and Japan

- Providing accurate information on Brazilian politics, economy, industry, infrastructure and regulations to the Japanese government and companies based on actual business conditions in Brazil.
- Encouraging Japanese companies to do business in Brazil and conducting successful business matching.
- Facilitating globalization of Brazilian firms by helping them enter the Asian market through locating in Japan.
- Assisting in solving business-related problems in Brazil through activities toward improving the business environment.
- Through these efforts, JETRO will support Japanese companies aspiring to establish business sites in Brazil, and will focus on contributing to strengthening Brazil's industrial foundation and international competitiveness.

Talk to JETRO First!

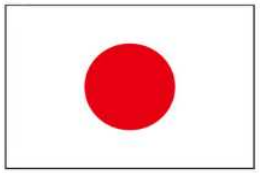
JETRO
Sao Paulo

62 anos no Brasil!
Desde 1955

Our mission in Brazil toward the future

Forging win-win relations through industrial cooperation

JETRO
Japan External Trade Organization



INDUSTRY
INFRASTRUCTURE

I&I

INNOVATION
INTELIGENCE

Rapid connectivity between
Brazilian & Japanese companies

Collaborative R&D, international supply chain building,
quality infrastructure, Industry 4.0, energy efficiency

JETRO Our solutions in Brazil toward the future

INDUSTRY
INFRASTRUCTURE

I&I

INNOVATION
INTELIGENCE

Cooperation in business environment improvement

- Studies & consultation on regulations
- Cooperation in accelerating IPP procedures (PPH etc.)
- Cooperation in food and drug review efficiency (with ANVISA)
- Cooperation in the business environment with AGIR
  (of Japanese chamber of Commerce in Brazil)

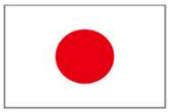
JETRO

Creating opportunities for trade and investment

- Business missions, seminars, trade fairs
- Dispatch of personnel (experts, trainees)
- Inviting key people (procurement managers, trainees)
- Investment & technology transfer networking
- Surveys & information provision

Forging win-win relations through industrial cooperation

Focusing on strengthening industrial and infrastructure foundation to improve international competitiveness



Focusing on developing new business & technology in South America, primarily Brazil

JETRO Our contributions to infrastructure improvement

MoC for the Promotion of Investment and Economic Cooperation in the Infrastructure Sector

Business matching support JETRO
for initial stage

- **Inviting key persons** (policy makers/projects organizers)
- **Dispatch of personnel** (experts, trainees)
- **Holding investment seminars**
- **Technology transfer networking**
- Dispatching business missions
- Introduction of the latest technology at the exhibition

BNDES, FIEP, other agencies
JICA, JBIC, JOIN, NEXI,
HIDA, etc.
Investment, financing, credit insurance for promising infrastructure projects
Human resource development support

JETRO will contribute in the follow-up stage toward project formation!!

Infrastructure sector & its supply industries

Forging win-win relations through industrial cooperation

- Creating stronger and higher quality infrastructure
- Construction of infrastructure to support global supply chains
- Introduction of new technology to improve management efficiency

- Expansion of infrastructure business in/from Brazil through show cases
- Focusing on developing new business & technology in Brazil
- Investment in supply industries of Latin American market

Our support tools for infrastructure

Official invitation programs

Inviting key persons of foreign governments to deepen their understanding of Japanese technology and to enlarge their network with Japanese stakeholders.

Invitation program for Kiev Metro project 2016

Dispatch of business missions

Dispatching Japanese business missions aiming at gathering information on local investment environments and exchanging views with overseas stakeholders.

Mission to Argentina 2016

Mission to Romania 2016

Business matching

Organizing business matching events between Japanese companies and prospective overseas private partners.

Water Business Matching Program in Japan 2015

Trade fairs and seminars

Promoting Japanese technology and industry through participating in trade fairs and seminars overseas.

Singapore International Water Week (SIWW) 2016

China International Industry Fair CIIF 2016

JETRO Examples of support schemes on infrastructure

Public offering

Investigation of infrastructure projects and marketability survey

Target field

Water, waste, energy, railway, urban develop-ment, etc.

Applicants

Registered Japanese corporations

Budget

US $165,000 per case (FY2016 achievements)

JETRO

Strategic planning support (field survey, etc.)

Basic project plan
Business development plan

Proposal recruitment:
May 17 (in 2017)
Implementation:
From July to Dec. (in 2017)

JETRO is waiting for applications for Brazilian infrastructure projects.
(These support schemes are to be provided for and used by Japanese companies.)

Helping Japanese companies enter the PPP infrastructure market

JETRO Examples of support schemes on infrastructure

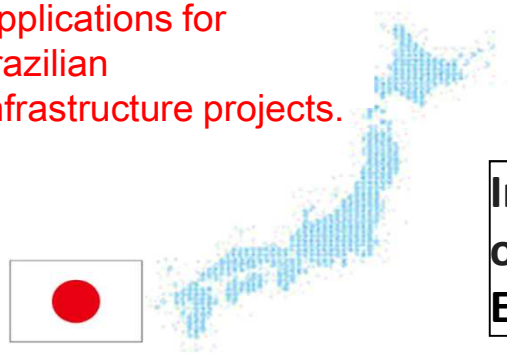
Public offering

Dispatch of experts and invitation program for promotion of infrastructure System and Japanese-style city development

Invitation of infrastructure stakeholders

Key government-related persons
Procurement managers
Infrastructure development engineers
System operators

JETRO is waiting for applications for Brazilian infrastructure projects.



Introduction of advantages of introducing new technology
Exchange of opinions

Invitation
Provision of technical Information
Tour of technical operation site

Experts
Advice to customers
Public relations activities

Applicants: Registered Japanese corporations
Target fields: **Water, waste, energy, railway, urban development, etc.**
Proposal recruitment: Late Jun. to mid Aug. (2017)
Implementation: From mid-Oct. to the end of Jan. (2017)

日本の力を、世界のために。
Supporting Your Global Challenges

Introduction of JBIC and its Financing for Infrastructure Projects

August, 2017

Tomoo Kushibiki
Chief Representative in Rio de Janeiro Office

JAPAN BANK FOR INTERNATIONAL COOPERATION
JBIC

Overview of JBIC

JAPAN BANK FOR INTERNATIONAL COOPERATION

JBIC is a policy-based financial institution wholly owned by the Japanese government.

Name: Japan Bank for International Cooperation (JBIC)

Governor : Akira Kondo

Supervised by: Ministry of Finance of Japan

Overseas Rep Offices: 16

Capital (100% Government - owned)***:**

JPY 1,683bil (USD 14.9bil)

Total Assets*: JPY 18,572bil (USD 164.8bil)

Net Assets*: JPY 2,508bil (USD 22.3bil)

Number of employees: 575

* Figures as of March 31, 2017

※Assuming JPY112.68/USD

※JFY: From April 1 to March 31

Importance of Infrastructure Development

JAPAN BANK FOR INTERNATIONAL COOPERATION

Both Japan and Brazil recognize the importance of developing infrastructure in Brazil.

- **Brazil - Japan Summit Meeting (Oct.2016)**:

Background

Brazil:
Increasing opportunity in PPI

Japan:
Initiatives for "Expanded Partnership for Quality Infrastructure"

MoC between Brazil and Japan strengthen bilateral cooperation in:

Transportation and Logistics

ICT

Energy

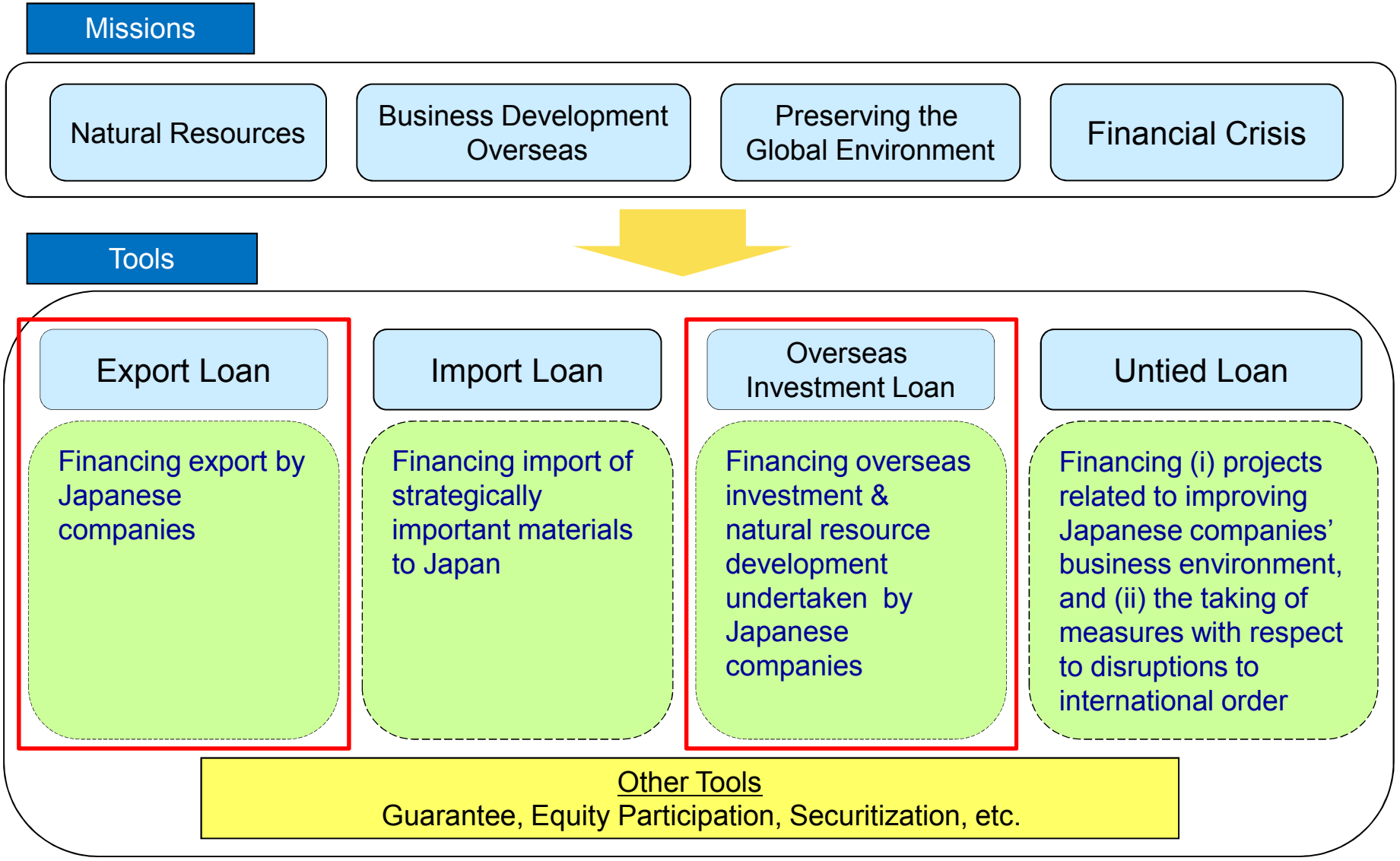
Expected Infrastructure Sectors

JAPAN BANK FOR INTERNATIONAL COOPERATION

Sector	Issues
Urban Railway	• Heavy traffic jam and air pollution in urban areas due to cars being the main means of transportation • Lack of the capacity of public transportation
Cargo Railway	• Grain transportation is mainly by track which is more expensive than other means of transportation such as railway or river. • Lack of low-cost transportation routes between the grain production areas (Mato Grosso, MATOPIBA) and the ports for export in the northern Brazil.
Energy	• Electricity demand is expected to increase as Brazilian economy recovers. • Stable electricity supply is required while availability of water resources can fluctuate. • LNG related infrastructure is needed to enable gas fired projects.

JBIC Operations

JAPAN BANK FOR INTERNATIONAL COOPERATION

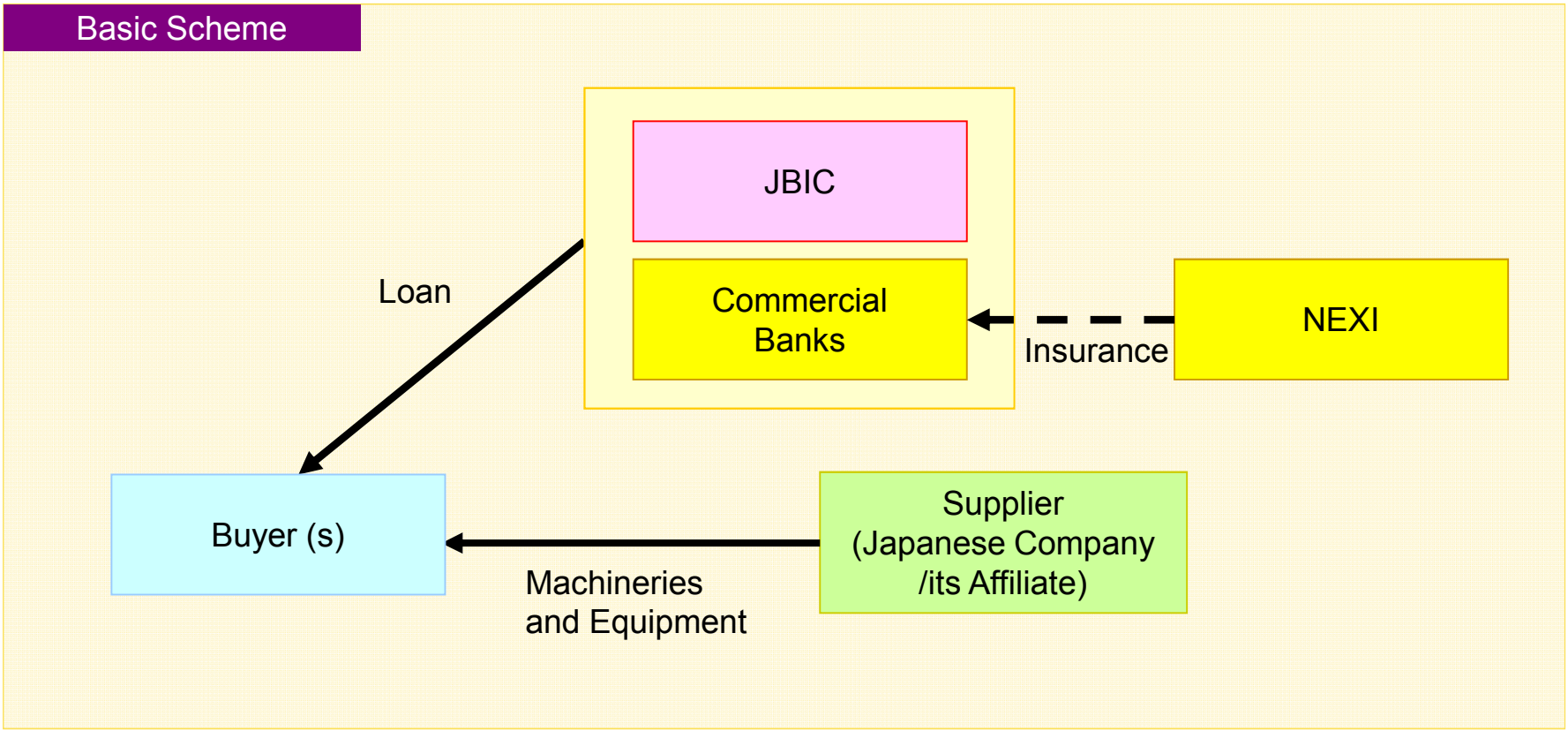


Export Loan (Buyers Credit/Local Buyers Credit)

JAPAN BANK FOR INTERNATIONAL COOPERATION

Requirement:
- Supply of machineries and equipment manufactured by Japanese company or its affiliate

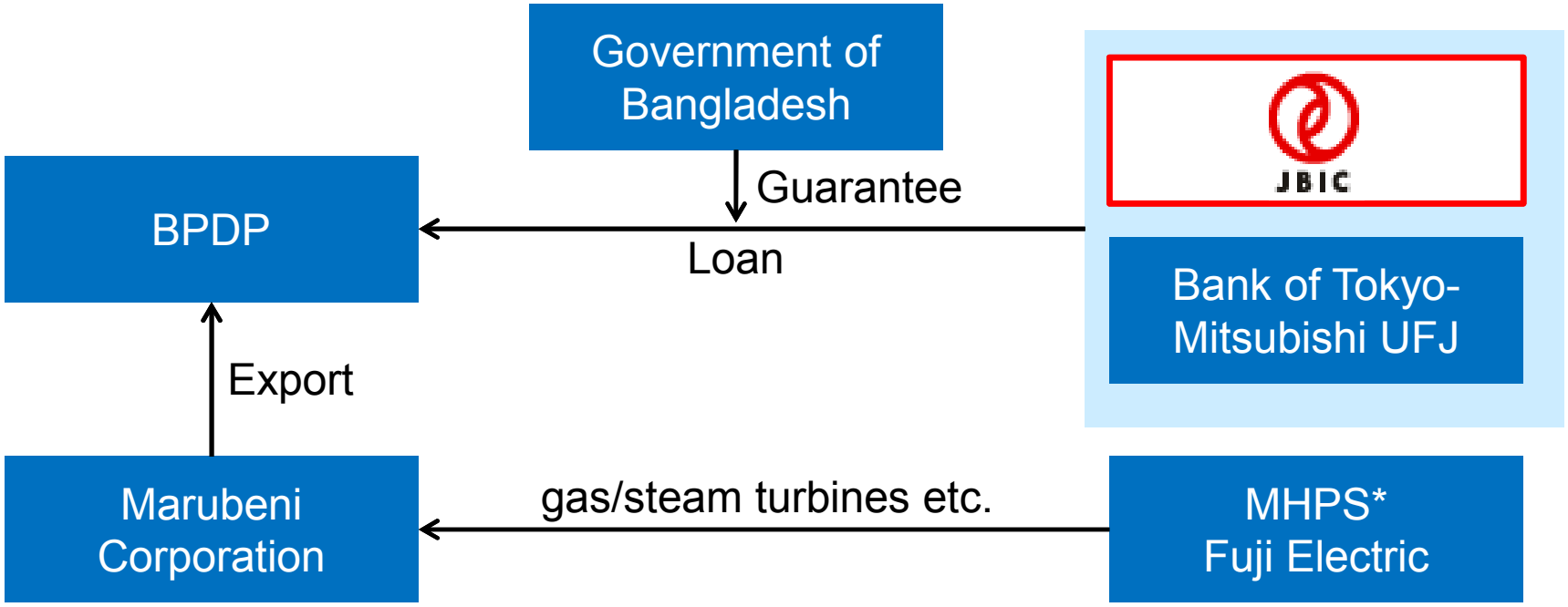
Basic Scheme



Project: Financing for construction of Gas-Fired Combined Cycle Power Plant (400MW) in Bangladesh(2016)

Scope: Export of equipment including Japanese gas turbines and steam turbines for the Bangladesh Power Development Board (BPDB), a national power development entity in Bangladesh.

Finance: JPY30.8 bil (JBIC portion: JPY18.5 bil)

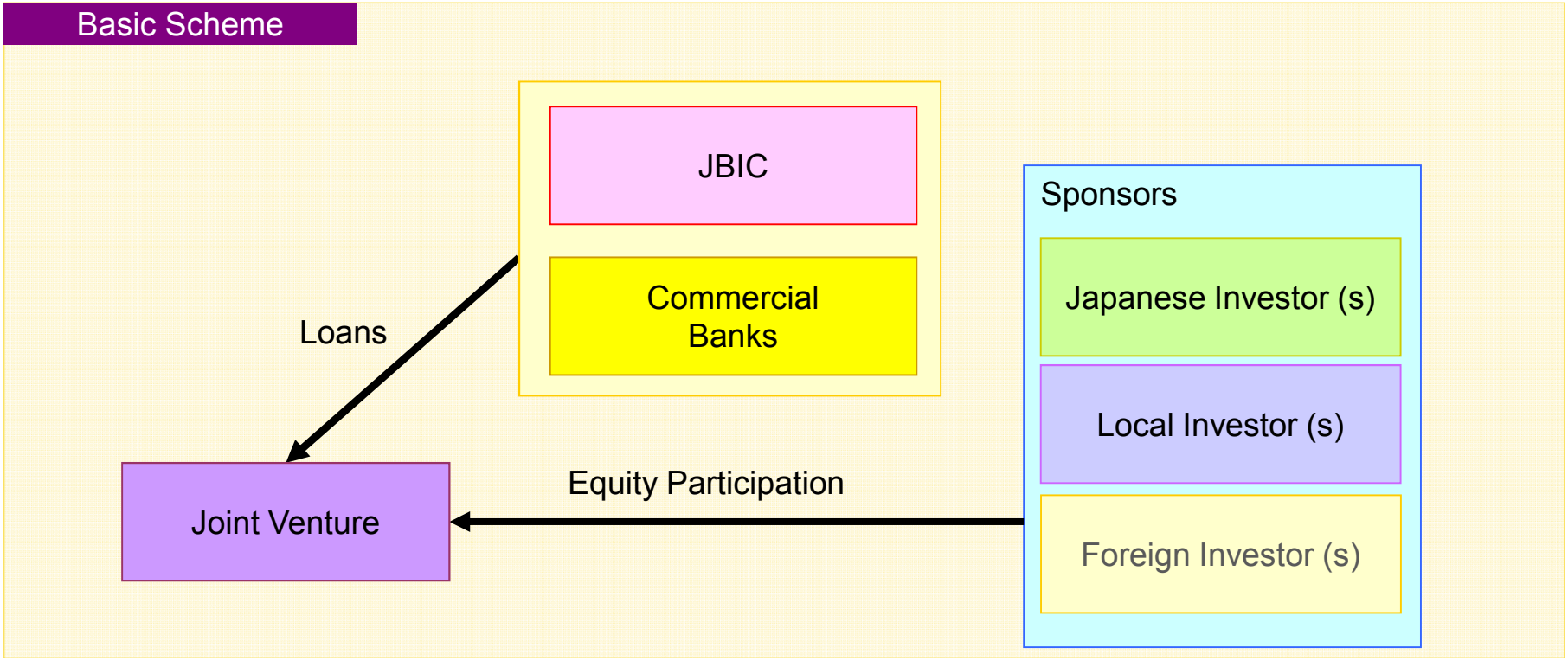


* Mitsubishi Hitachi Power Systems

Overseas Investment Loan (OIL)

JAPAN BANK FOR INTERNATIONAL COOPERATION

Requirement:
- Equity participation of Japanese investor (s)
- Operation and/or maintenance (O&M) of the project by Japanese investor (s)



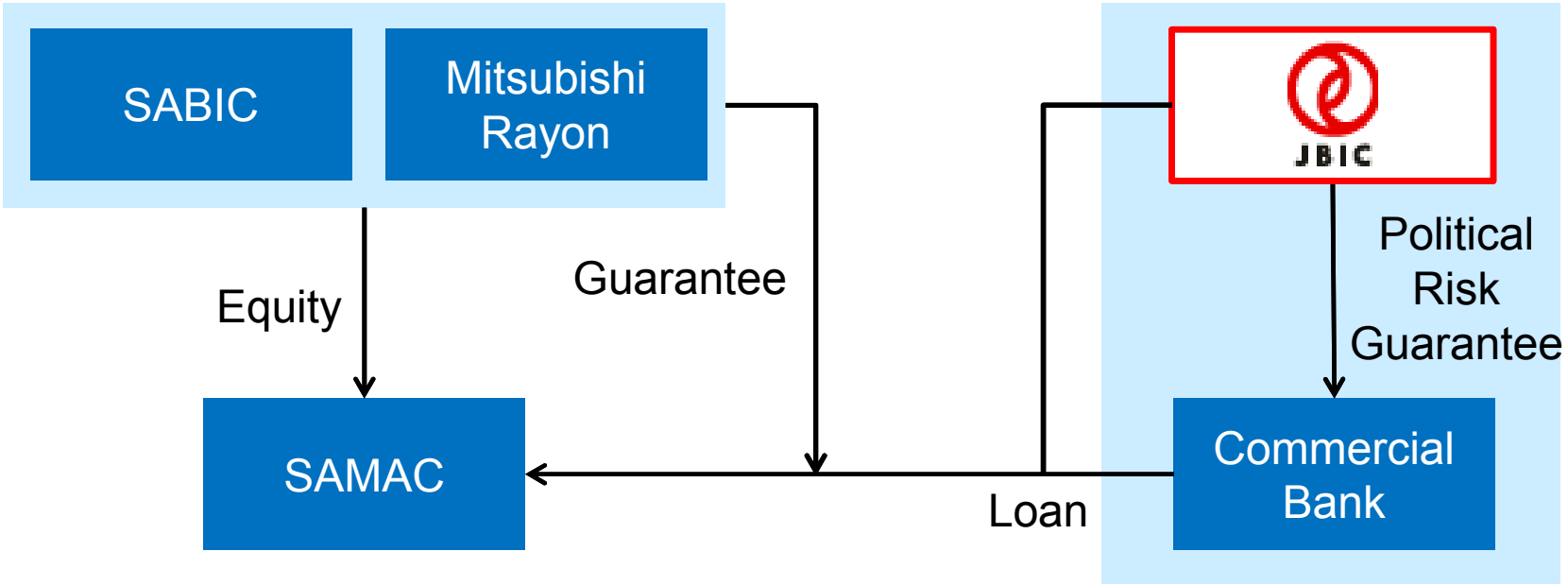
Case Study: OIL for manufacturing and sales business of synthetic resin

JAPAN BANK FOR INTERNATIONAL COOPERATION

Project: Financing for Saudi Methacrylates Company(SAMAC), in which Saudi Basic Industries Corporation (SABIC) and MITSUBISHI RAYON CO., LTD. jointly invested in Saudi Arabia (2015)

Scope: The manufacturing and sales business of methyl methacrylate monomer and poly methyl methacrylate molding materials

Finance: USD490 mil (JBIC portion)



Appropriate risk sharing among project participants (Government, investors and lenders etc.) is important to make the infrastructure development project bankable, which is key to attracting foreign investors.

Major issues in risk sharing for infrastructure development include:

1. Currency devaluation risk:

- Required risk mitigation mechanism:
  Ex. Payments in foreign currency or adjusted in proportion to currency fluctuation, currency risk guarantee by BNDES

2. Demand risk:

- Sufficient Government supports to mitigate difficulties in predicting demand
  Ex. Availability Payment, Minimum Revenue Guarantee etc.

3. Other risks:

- Interface risk in railway sector etc.

Requirements for bankable project structuring

JAPAN BANK FOR INTERNATIONAL COOPERATION

Achieving low Life Cycle Cost (LCC) will contribute to mobilization of private funds and sustainable project operation, especially in infrastructure projects with huge costs and long operation periods.

Installing the qualified equipment and service

Achieving low LCC

- **Reduce repair cost for malfunctions**
- **Enhance operational efficiency**

Securing sufficient cash to pay Debt Service / Dividend

Private capital mobilization (both of sponsors and lenders)

Thank you!

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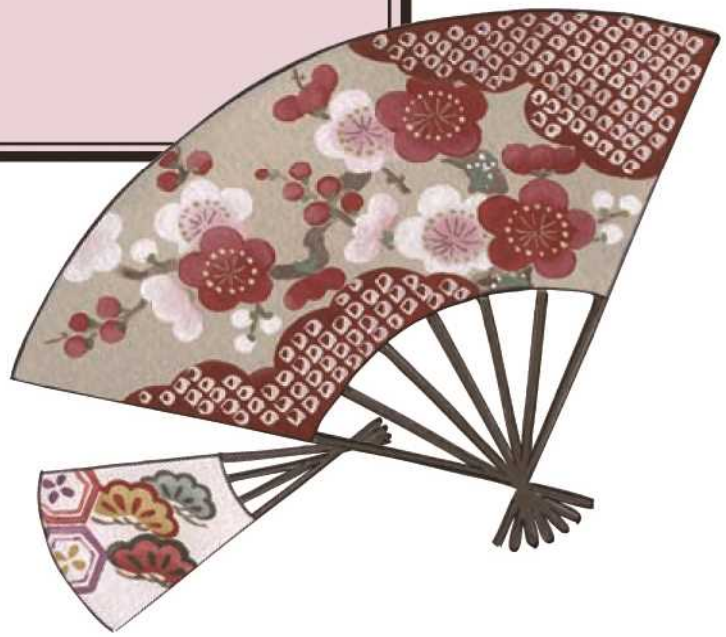
NEXI's Support for Business in Brazil

31st August, 2017



NEXI
Nippon Export and Investment Insurance

Contents:

NEXI
Nippon Export and Investment Insurance

1. Introduction

- NEXI is the national Export Credit Agency of Japan and wholly owned by the Japanese Government.

- NEXI supports Japanese exports and investments by providing insurance for Japanese exporters, investors and commercial banks.

- NEXI insurance covers both political risks (war, natural disasters, transfer / convertibility restriction, etc.) and commercial risks.

- Our outstanding commitment is the largest among G7 ECAs, approx. US$ 150 billion (at the end of FY2016).

- Without NEXI's cover, it is difficult for commercial banks to finance large-scale and long-term overseas infrastructure projects, especially in developing countries.

2.NEXI Overview

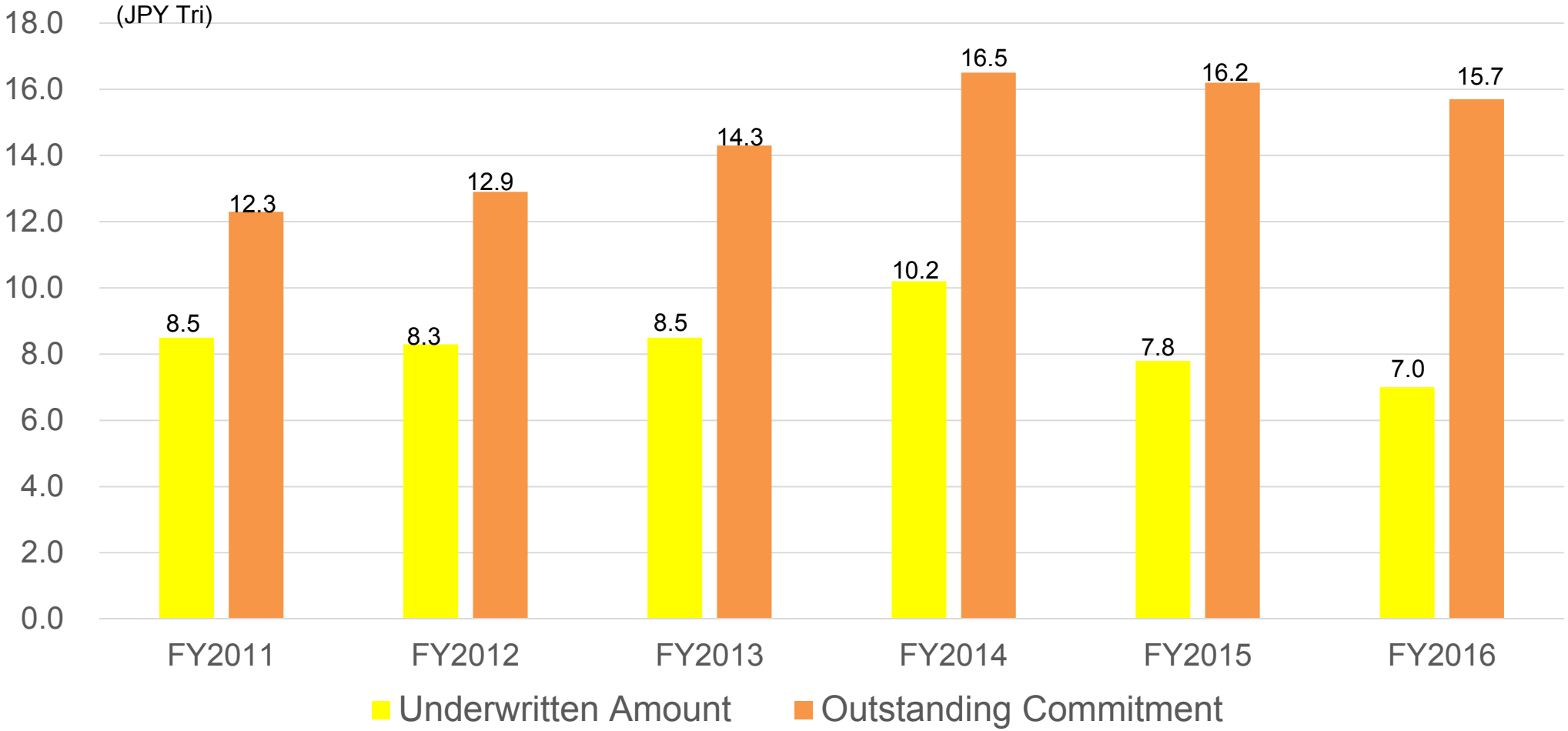
2-1.Profile of NEXI

- Nippon Export and Investment Insurance (“NEXI“)
  株式会社日本貿易保険

- Date of Establishment:
  - March 1950, as a part Ministry of International Trade and Industry. (former METI)
  - April 2001, NEXI was established as an incorporated administrative agency.
  - April 2017, NEXI became a stock company wholly owned by Japanese Government.

- Capital:
  JPY169bn (approx. US$1.5bn, fully contributed by the Japanese Government)

2-2. Recent Performance

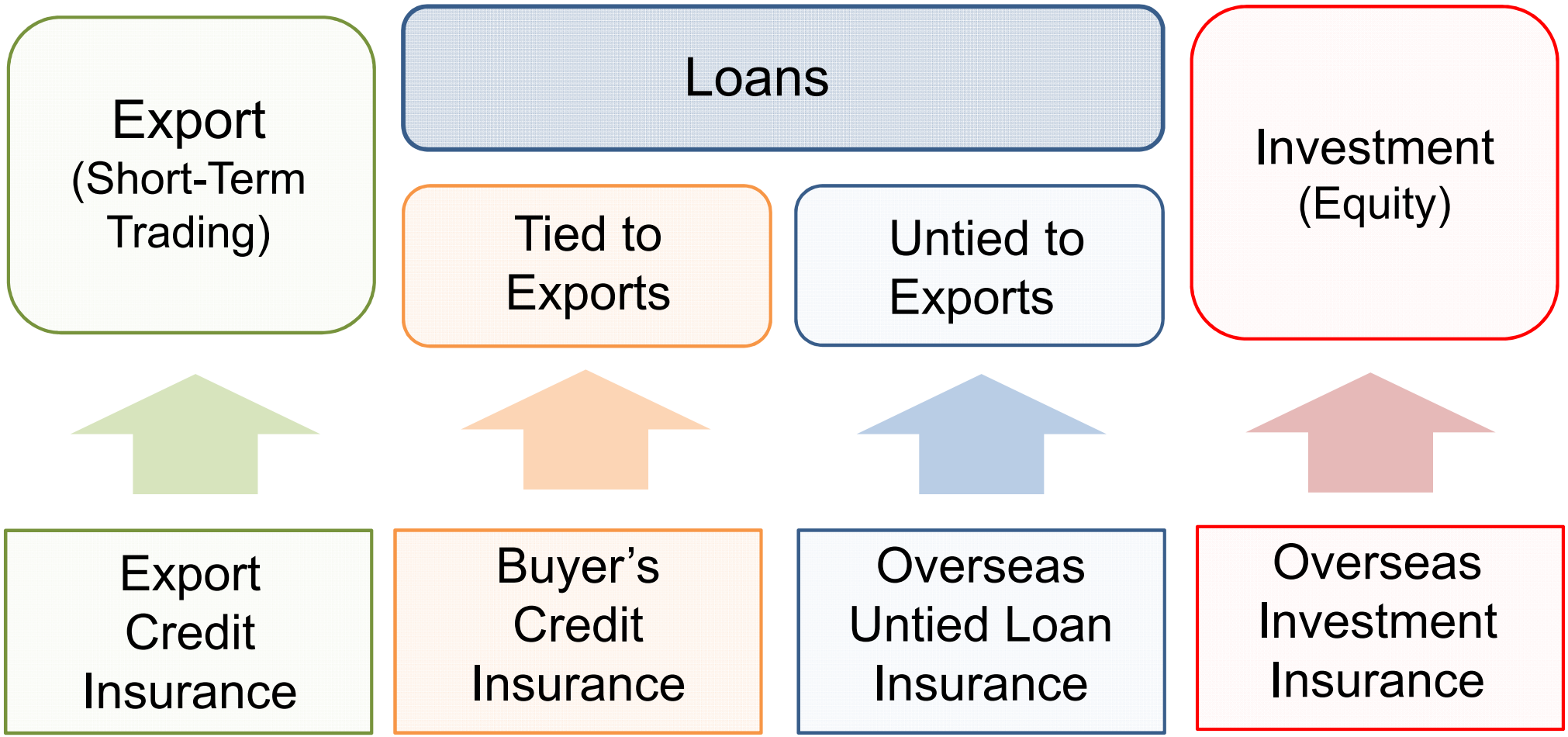


- MOUs with Brazilian Entities:
  - VALE（2008）
  - PETROBRAS(2008)
  - BNDES(2009)
  - SBCE(→ABGF)(2011)

NEXI
Nippon Export and Investment Insurance

2-3. Insurance Product Line

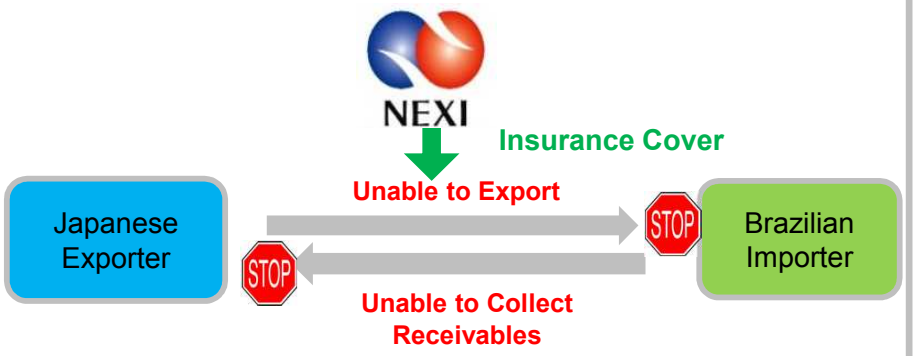
NEXI provides cover for all types of external activities as follows;



2-3. Insurance Product Line (Cont.)

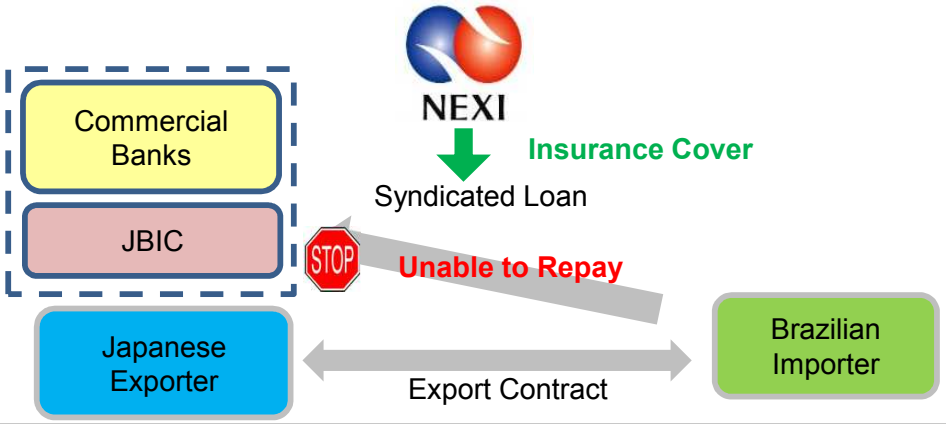
➢ Export Credit Insurance

- Insurance for export and construction, etc



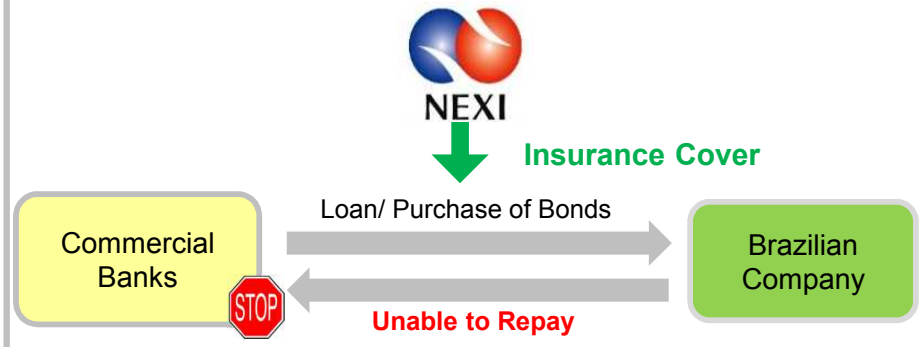
➢ Buyer's Credit Insurance

- Insurance for export-tied loan



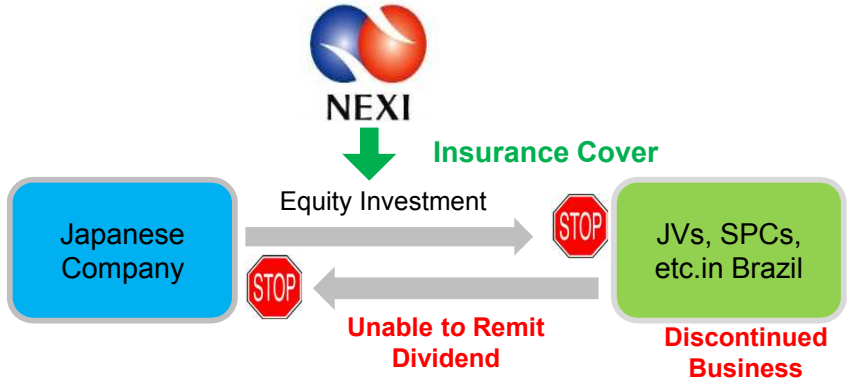
➢ Overseas Untied Loan Insurance

- Insurance for un-tied Loan
- "Japan Interest" required



➢ Overseas Investment Insurance

- Insurance for Equity Investment



NEXI
Nippon Export and Investment Insurance

2-4. The Advantage of the Transactions with NEXI's Cover

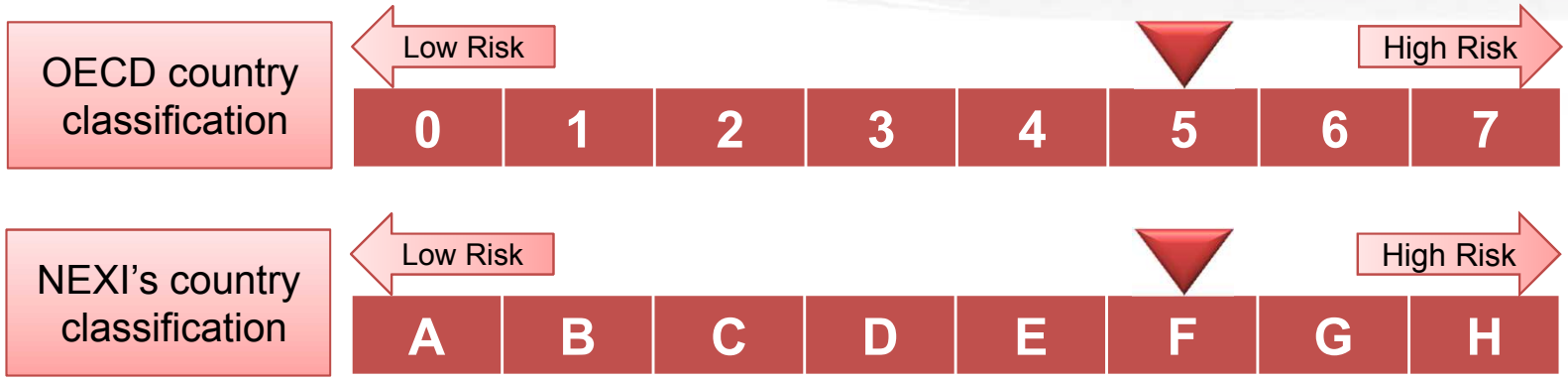
If your Japanese partners use NEXI's insurance for your transactions, your benefit will be…

Lowering the project financing costs in which you are involved with Japanese partners (companies/banks).

- The project financing costs with your Japanese partners (companies/banks) are lower with NEXI involvement which mitigates political/commercial risks.

NEXI
Nippon Export and Investment Insurance

3. NEXI's Underwriting Policy towards Brazil



Short-term insurance (Insurance for Exports from Japan)

- Open for cover

Long-term insurance
(Insurance for loans and investment from Japan)

- Case-by-case basis
  (NEXI takes into account total amount and commercial viability of each project)

Visit http://www.nexi.go.jp/cover/en/index for more details

NEXI
Nippon Export and Investment Insurance

4. NEXI's Support for Business in Brazil

NEXI has long been supporting Brazilian Business, mainly in Oil & Gas sector, Mining Sector, and Petrochemical Sector

Support to Oil and Gas Sector	
2015	Lula Central Oil field FPSO Charter Project(US$400M)
2014	FPSO Hulls Project (US$500M)
2014	Ultra-Deepwater FPSO Project (US$339M)
2013	Credit Lines for Buyers Credit(US$400M) and Local Buyer's Credit(US$400M)
2010	Braskem Petrochemical Plant Project (US$200M)
2008	REVAP Refinery Project (US$752M)
2005	Pegaso Project (US$300)
2005	Campos PDET Project (US$327M)
2003	Gas Pipeline Project (US$300M)
2002	Espirito Santo LNG Project(US$200M)
2001	REFAP Refinery Project(US$106M)

4. NEXI's Support for Business in Brazil (Cont.)

Support to Mining Sector and Petrochemical Sector	
2017	Braskem Petrochemical Plant Project (US$135M)
2012	Samarco Mineracao Pellet Plant Project Expansion (US$450)
2012	Support for Japanese Trade Company's Iron Ore Interest (US$1,143)
2011	Support for Nacional Minerios S. A. (NAMISA) Additional Investment
2010	Samarco Mineracao Pellet Plant (US$231M)
2010	Braskem Petrochemical Plant Project (US$200M)
2008	Support for Nacional Minerios S. A. (NAMISA) Investment
2005	Finance to Gerdau Acominas S. A. (US$240M) & (US$267M)
2005	Finance to Votorantim Group (US$130M) & (US$109M)
2004	VALE Sossego Copper Mine Project(US$300M)

4. NEXI's Support for Business in Brazil (Cont.)

Notable Projects signed in front of the President of Brazil

Agricultural Development Project	NEXI provided Overseas Untied Loan Insurance for Sumitomo Mitsui Banking Corporation's loan to AMAGGI EXPORTAÇÃO E IMPORTAÇÃO LTDA (Amaggi), Brazil's largest trader of grain, which are important to Japan's Food Security. The agreement on NEXI's support was signed between Amaggi, SMBC, and NEXI on August 1, 2014.
Underwritten in:	2014
Underwritten Amount:	US$200M

Pegaso Project	The project was to invest in Petrobras' existing facilities in order to improve the operational safety and ensure environmental preservation. A Memorandum of Understanding was singed among PETROBRAS, Sumitomo Mitsui Banking Corporation and NEXI.
Underwritten in:	2005
Underwritten Amount:	US$300M

5. Examples of NEXI's support for Infrastructure Projects

Highway	Panama	Construction of a 42 km toll highway between Madden and Colón, which forms part of the highway between Panama City and Colón Free Trade Zone. Part of a PPP project to improve transport efficiency between Panama City and Colón City.
Port	Russia	Project by SUEK, the largest coal production and export company in Russia, to expand and renovate the facilities of its Tsugunui mine, construct and renovate coal washing facilities, and develop the bulk terminal at the Vanino port, which is the main port for shipments between Russia and Asia.
Water	Singapore	Support for Singapore's largest membrane-based seawater desalination plant, in which Japan's Toray Industries Inc supplied reverse osmosis (RO) membrane elements, and Torishima Pump Mfg. Co., Ltd supplied high pressure pumps.
Airport	Myanmar	Investment and Loans by Mitsubishi Corporation and JALUX Inc. and Yoma Development Group Limited of Myanmar, to establish a joint venture to operate Mandalay International Airport based on a 30-year concession agreement with Myanmar's Department of Civil Aviation.

Obrigado pela vossa atenção!

Nippon Export and Investment Insurance

NEXI
Nippon Export and Investment Insurance

Orchestrating a brighter world NEC

NEC's Contributions for the Brazilian Society

August 31st, 2017
NEC Corporation

NEC Corporate Snapshot

- Our Strengths
- Contribution for the Brazilian Society
- Further Contributions

Who we are

Your Interactions with NEC...

At the Airport

On Departure...

Flight information display system

On Arrival...

Thermography

Fingerprint Identification

At the Train Station

Automated fare collection & IC card with e-Money

At the Hotel

Telephony

Information display

Communication

Submarine cable network

At the Store

Convenience store management 24 x 365 non-stop system

Corporate Overview

118 years of Innovations

108,000 Employees

Business in **160 countries**

238 Group Companies

About NEC

Nobuhiro Endo
Chairman of the Board

Takashi Niino
President

Takayuki Morita
CGO
(Chief Global Officer)

Solution for Society Businesses that utilize the strengths of ICT to create the social value of **Safety**, **Security**, **Efficiency** and **Equality**

Safety

Security

Efficiency

Equality

NEC's Global Expansion

Business activities in over **168** Countries and territories

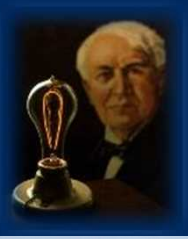
History of Economy stages

"**Data is the new oil**" in Digital Economy

1700 1800 1900 2000 2010

Coal



Oil

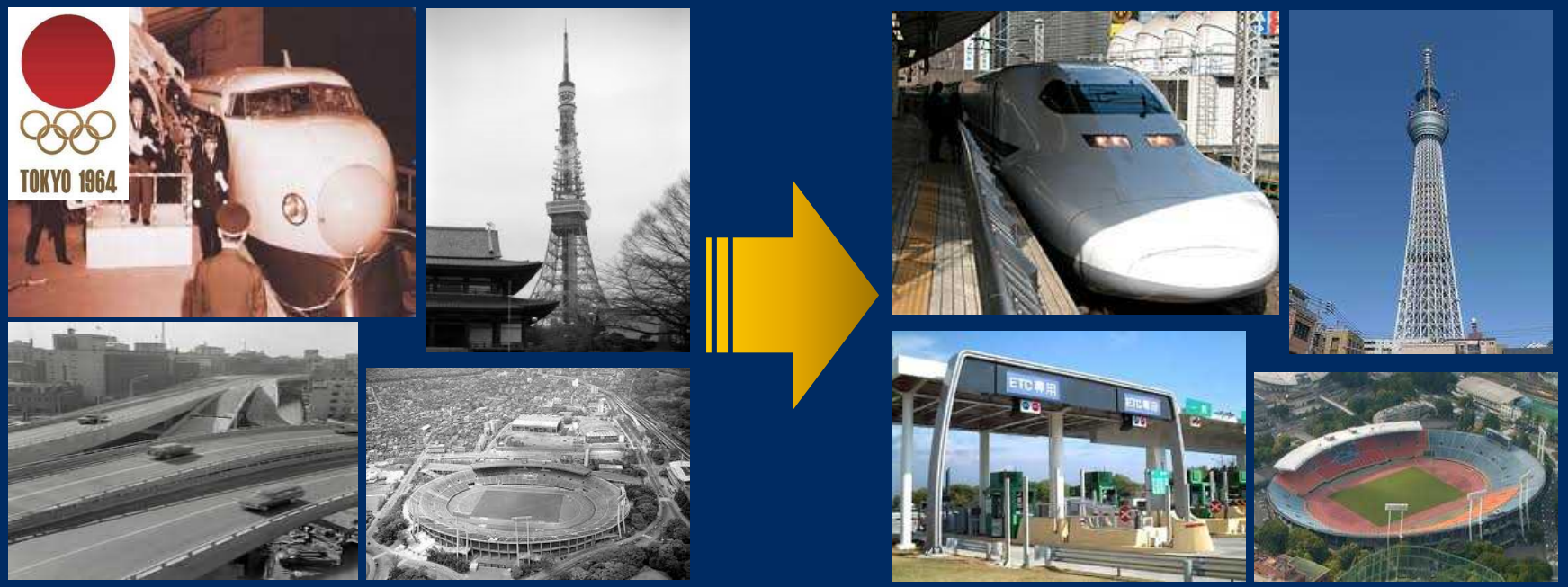


Digital Economy

Tokyo City ~Olympic legacy~

Hard infrastructure is an essential foundation

The infrastructure constructed at the Olympic Games is still active even 50 years later

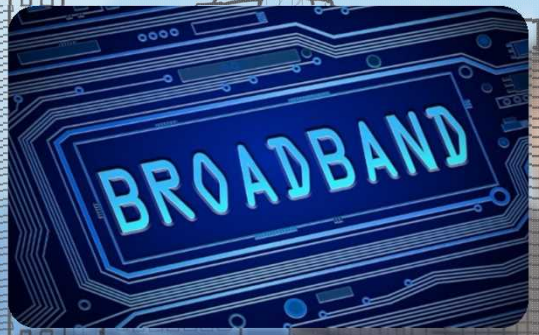


1964 **2017**

ICT brings added value to the existing infrastructure

NEC believes that software (ICT) will play a key role for further development adding new value to the existing infrastructure

Power of ICT



Existing Infrastructure

NEC Corporate Snapshot

Our Strengths

Contribution for the Brazilian Society

Further Contributions

Our Core Technologies

NEC Solutions for Safer, Smarter Cities

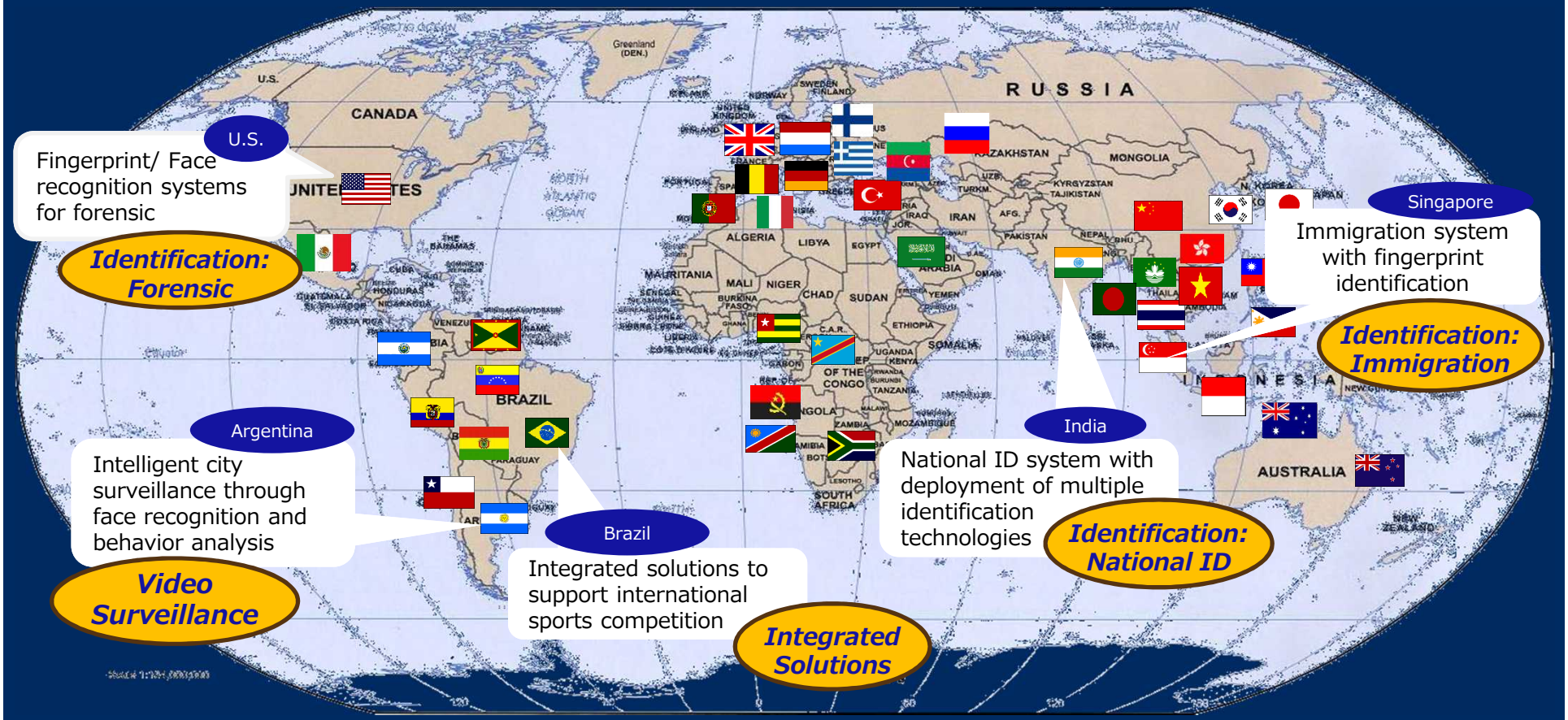
World No.1 Accuracy and Speed of both Finger and Facial Recognition

World 1st Crowd Behavior Analytics

Wide variety of Video Analytics Technologies

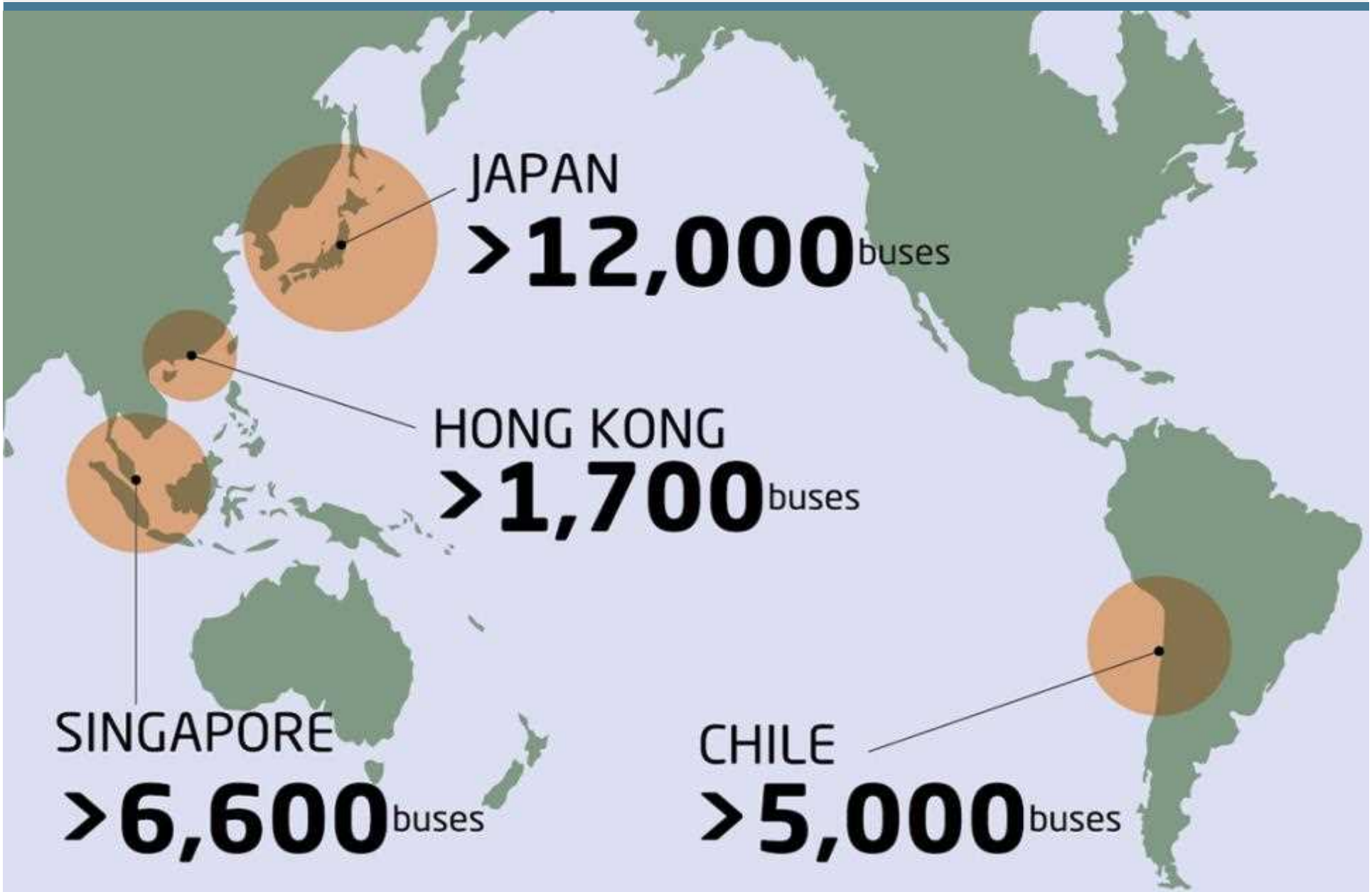
Global Footprint of Biometrics Solutions

***700+ systems** deployment in **70+ countries** worldwide through **40 years** of business development*



NEC Biometric Customers in North America

Smooth and Efficient Operation by Visualization



NEC Corporate Snapshot

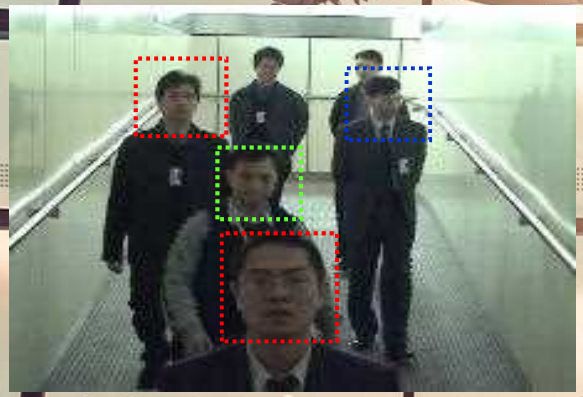
Our Strengths

Contribution for the Brazilian Society

Further Contributions

Security for Critical Facility - Airport

Airport Security with Face Recognition



NEC to provide facial recognition systems for 14 international airports in Brazil

Security for Critical Facility - Airport

Security for Critical Facility - Port

Security Solutions for Port

The Porto do Açu Industrial Complex

NEC has deployed integrated systems that simultaneously manage a video monitoring system.

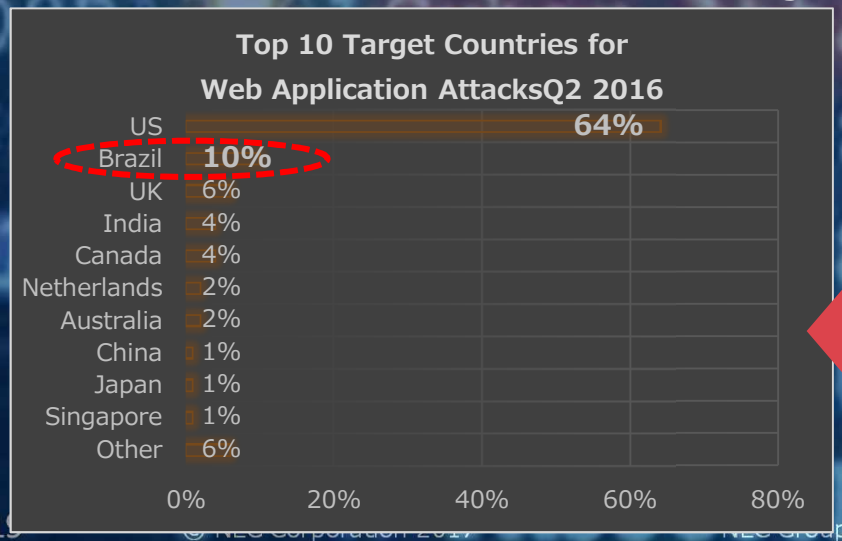
Results

The Porto do Açu has been consolidating **as one of the safest and most efficient port-industry complexes in Brazil.**

Cyber Security for Critical Facility

NEC provides Cyber Security for Critical Facilities

An extreme cyber attack could cause more than $120bn of economic damage.



2nd place

Brazil is a target country in all over the world

NEC Corporate Snapshot

Our Strengths

Contribution for the Brazilian Society

Further Contributions

How can NEC contribute more to Brazilian Society

Orchestrating a brighter world

NEC brings together and integrates technology and expertise to create the ICT-enabled society of tomorrow.
We collaborate closely with partners and customers around the world, orchestrating each project to ensure all its parts are fine-tuned to local needs.

Every day, our innovative solutions for society contribute to greater safety, security, efficiency and equality, and enable people to live brighter lives.


Orchestrating a brighter world
NEC

Brazil-Japan cooperation in the Brazilian energy sector

Ultra Super Critical (USC) Power Plant F/S result and further possibilities

IHI Corporation

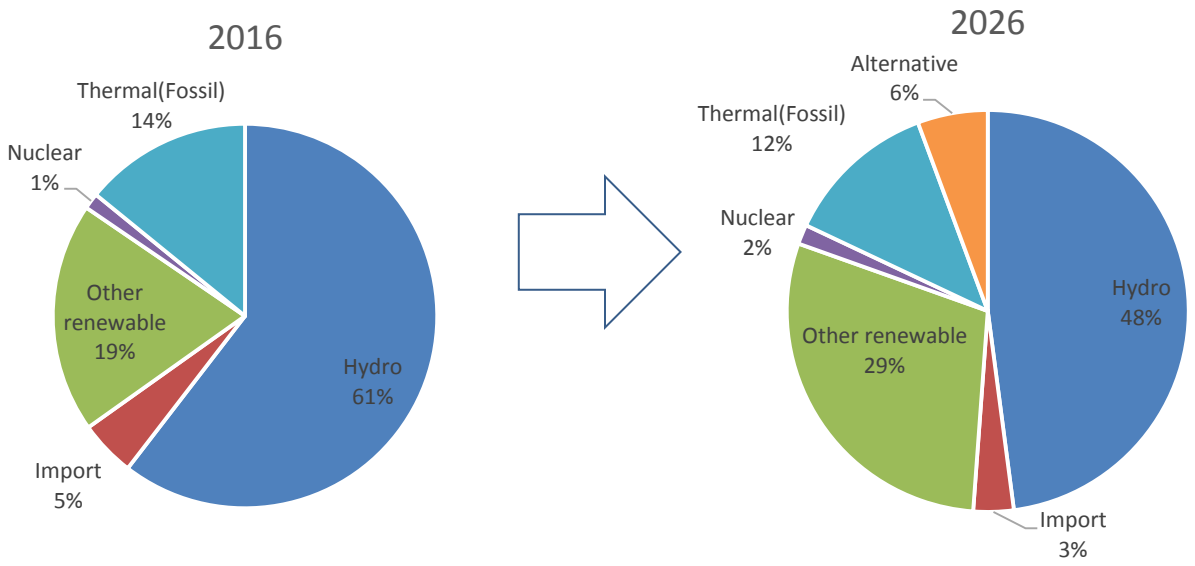
1. Shift in Brazilian power sector

Brazilian Power Sector

Diversification of power source is growing in importance

- Electricity consumption is expected to grow average 3.7% per year from 2016 to 2026
- Brazilian authority is planning to develop 67.5GW new generation units in 10 years
- Share of hydro will shrink from 61% (2016) to 48% (2026), and that of other renewables (wind, solar, small hydro, biomass) will increase from 19% to 29% instead
- Composition of generation types for each load (base-load to peak-load) to be revised
- Action to stabilize the grid, which is getting unstable due to drastic increase of renewable power, is required to be taken promptly

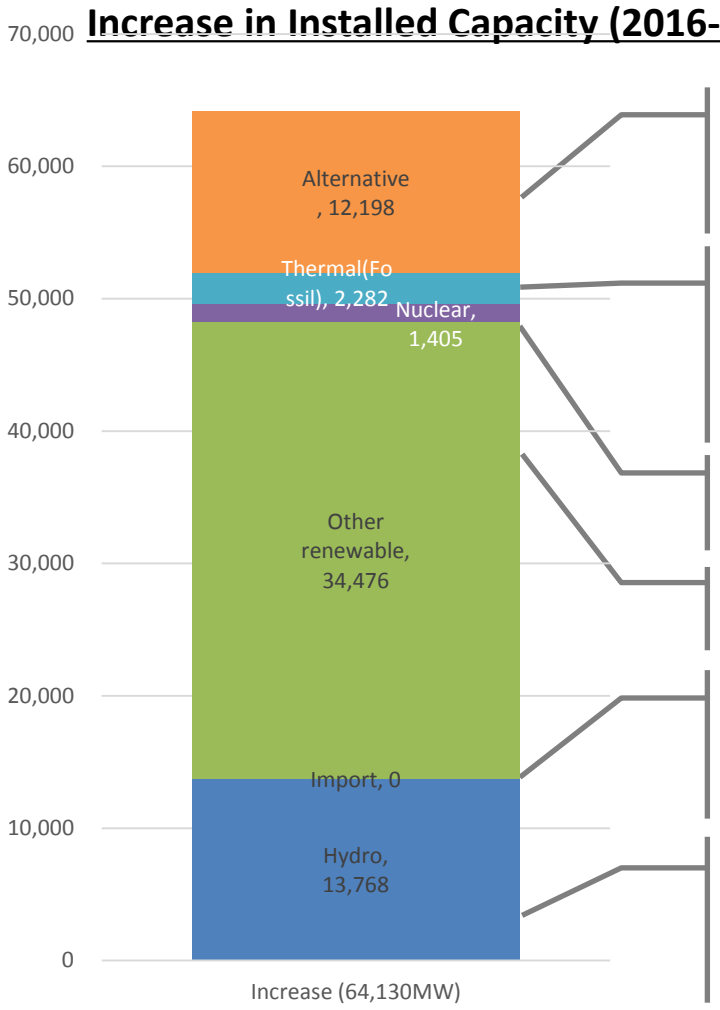
Proportion of Generation Typeby Installed Capacity (2016 and 2026)



Source: PDE2026 draft

Increase in Installed Capacity towards 2026 (67,524MW)

Various tasks are identified for development of each type of generation systems



Source: PDE2026 draft

Issues for development

Alternative:

- Pumped-sorage hydro, Storage battery, Open-cycle etc.are indicative alternatives

Thermal (incl. Oil and Diesel ▲2,800MW)

- Energy security (especially gas pipelines)
- Use of local natural resource (Presal, coal, etc.)
- Modernization of old coal-fired TPPs

Nuclear:

- Technical difficulties

Other renewables:

- Unstable generation pattern and its impact to the grid

Import:

- Currency exchange for imported electricity
- Expiring importation contract from Paraguay (Itaipu) in 2024

Hydro:

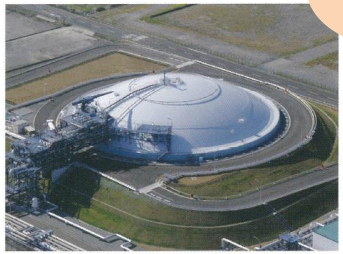
- Decreasing reserved water capacity
- Environmental concern
- Long transmission line from upper Amazon area

2. Japanese Clean Energy Technology

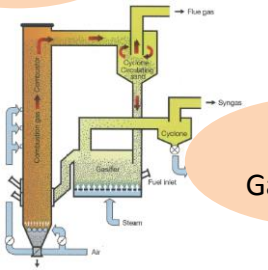
Potential of Japanese technologies

Potential for contribution

With long-term efforts to improve efficiency and save energy, Japan has many tools to contribute to the sustainable development of Brazilian energy sector


In-ground LNG storage tank

LNG Storage



Coal Gasification

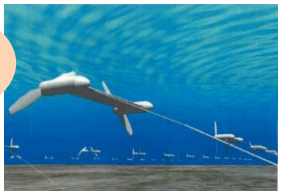
Upper stream

Supply chain

Lower stream

Algae Biofuel

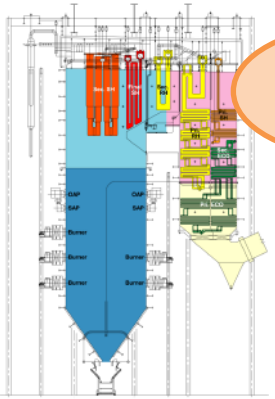
Current Flow



Proven

Technical maturity

New technology



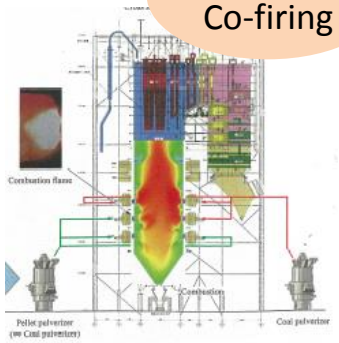
USC

IGCC

A-USC

OTEC

Biomass Co-firing



Smart Grid

Power Storage

Recent progress of New technology

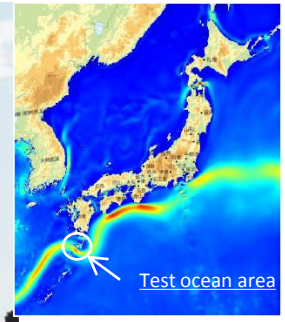
1) Current flow power generator

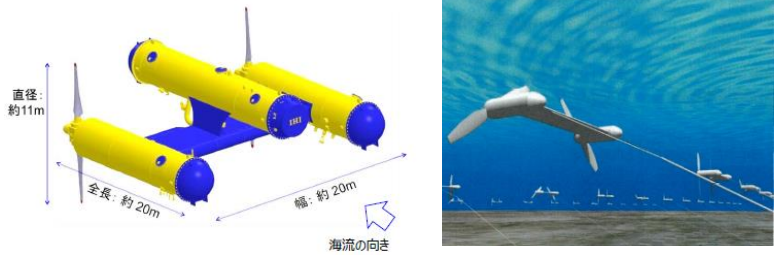
100kW demonstration model was completed (July 7th)

2) Ocean Thermal Energy Conversion (OTEC)

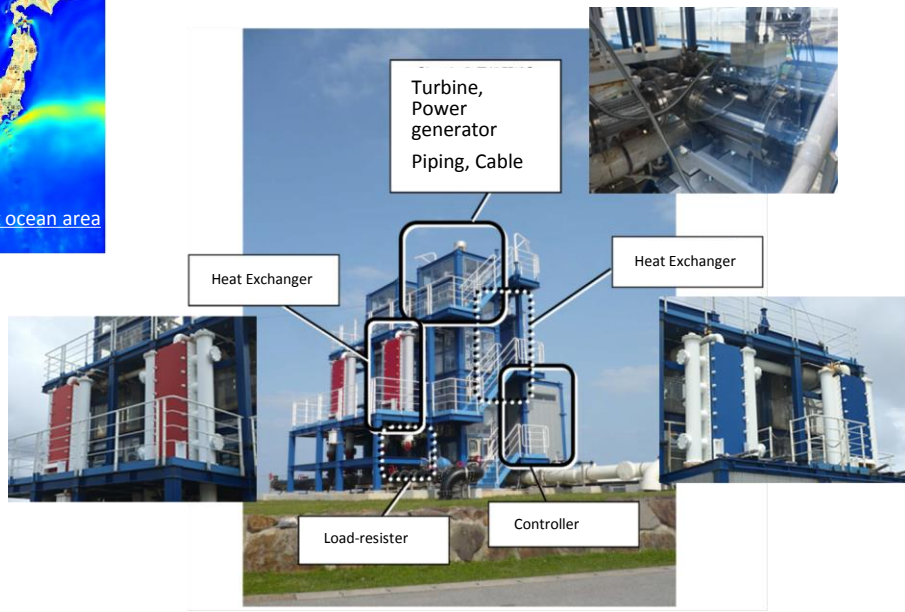
2 stage rankine cycle high efficiency HX (heat exchanger) research test was finished (June 30)

100kW demonstration model





Current flow power generator



OTEC at Kumejima Island

3. USC Coal-fired Thermal Power

As one of possibilities for future collaboration

View on coal-fired thermal power in PDE 2026

Higher efficiency is key to implement the modernization of old existing power plants and to obtain finance for development of coal-fired TPPs from green field

Modernization

- *By replacing old power plants with modern and highly efficient technology, it is estimated that installed capacity can be* ***increase to 1,735 MW (+340MW) by maintaining the same volume of emission***

⇒ ***USC could be a practical options for replacement in middle terms***

Finance

- *New coal-fired TPPs face difficulties in obtaining long term financing.*
- *For new technologies, such as* ***CCS and IGCC****, could be an option for future development* ***after 2026, due to its technical immaturity***

⇒ ***ECA finance is applicable for USC Technology under OECD guideline: Possibility of bringing Japanese public finance to Brazil***

List of candidate plants for Modernization

Usinas	Potência (MW)	Eficiência (%)	Idade (anos)
Charqueadas (1)	72	20,5	54
São Jerônimo (2)	20	14,3	63
J.Lacerda I e II	232	25	51
J.Lacerda III	262	28	37
J.Lacerda IV	363	34,7	19
P. Medici A	126	24,5	42
P. Medici B	320	25	30
Total	1.395	24,57	42,28

Notas: (1) UTE desativada em
(2) UTE desativada em

1735MW

Source: PDE2026 draft p.63

2-year Feasibility Study funded by NEDO

Introduction of Clean Coal Technology to Brazil using Japanese high-efficient USC plant and Brazilian domestic coal

Study in FY2015 (TEPCO, PwC Japan)

- *Identified potential for USC Plant, in Baixo Jacui area of Rio Grande do Sul State*

Study in FY2016 (IHI, TEPCO, PwC Japan)

- *Specific feasibility study of the USC Project at the Baixo Jacui mine mouth*

Assumed Project Summary（F/S Basis）

Plant type	USC coal-fired thermal power
Capacity	1,000MW（net）
Fuel	Coal from Baixo Jacui, RS state
Site	At Baixo Jacui Mine mouth
Auction	Participate in A-5 Auction to be hold by MME
Business type	IPP
Contract	Long term PPA
Finance	ECA finance

High potential of USC as a base load in Brazil

Important Findings of Feasibility Study –

MAIN FINDINGS

A) Policy

- Concept of the project fits to the **modernization policy** of Brazilian coal-fired TPPs.

B) Technical and Environment Aspects

- **Boiler design** needs to consider lower heating value, high ash content, and high erosion/abrasion impact of Baixo Jacui coal
- Considerably **low level of emission gas** (Sox, Nox, dust) concentration, and reduction of **1.1million ton/year of CO2 emission** in Brazil

C) Economy of the Project

USC would be **competitive**, but need a careful study of project scheme, including debt/equity

A) MODERNIZATION POLICY

USC Project with Japanese proven technology and O&M expertise has a great potential to contribute to the Modernization Policy

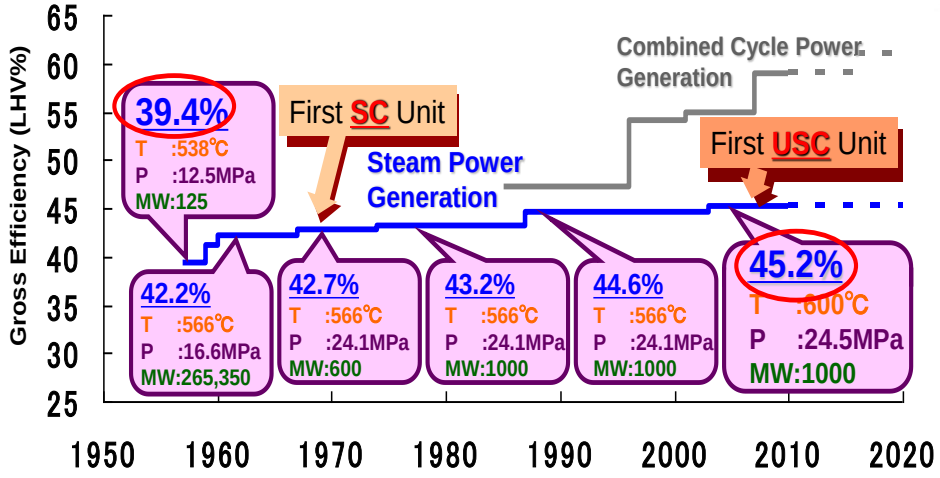
Modernization Policy in Brazil

- *Seven candidates (total 1,395MW) with **average efficiency 24.57%** and operating 42.28 year (ave) are subject to the Modernization Programme*

Japan Technology and O&M

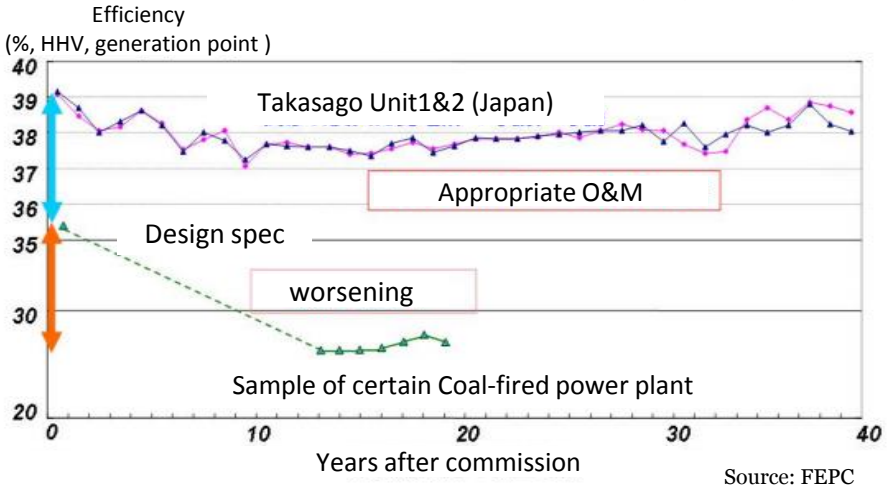
- *Japan has developed technology for higher **thermal efficiency (>40%) since 1960's**, and **USC has 10 years of track record***
- *Appropriate **O&M** by Japanese operators helps power plants to **maintain high efficiency***

Development of thermal efficiency (TEPCO)



Source: Tepco

Efficiency Trend After Commission in Takasago power plant



Source: FEPC

B) TECHNICAL AND ENVIRONMENT ASPECTS

USC technology enables Brazilian coal to achieve high level of thermal efficiency, with lower impact to the environment and competitive CAPEX

Boiler

- Test coal import BJ Coal CE5200 & CE4700
- Test in IHI Japan
- Design concept
  - •BJ Coal can be applied for USC Boiler
  - •Some coal characteristics need to be considered

Emission Control

	SOx mg/Nm3	NOx mg/Nm3	Dust mg/Nm3
Plant A, South region	950	600	65
Federal regulation	400	400	50
USC F/S IFC Standard	200	200	30

Overall engineering

Target thermal efficiency:
45% (Gross), LHV
From reference USC plant in Japan

ESTIMATION

RESULT 1

CO2 reduction : 1.1mln t/year (*)

= ▲15% from average CO2 emission (in 2015) among existing coal-fired TPPs

RESULT 2

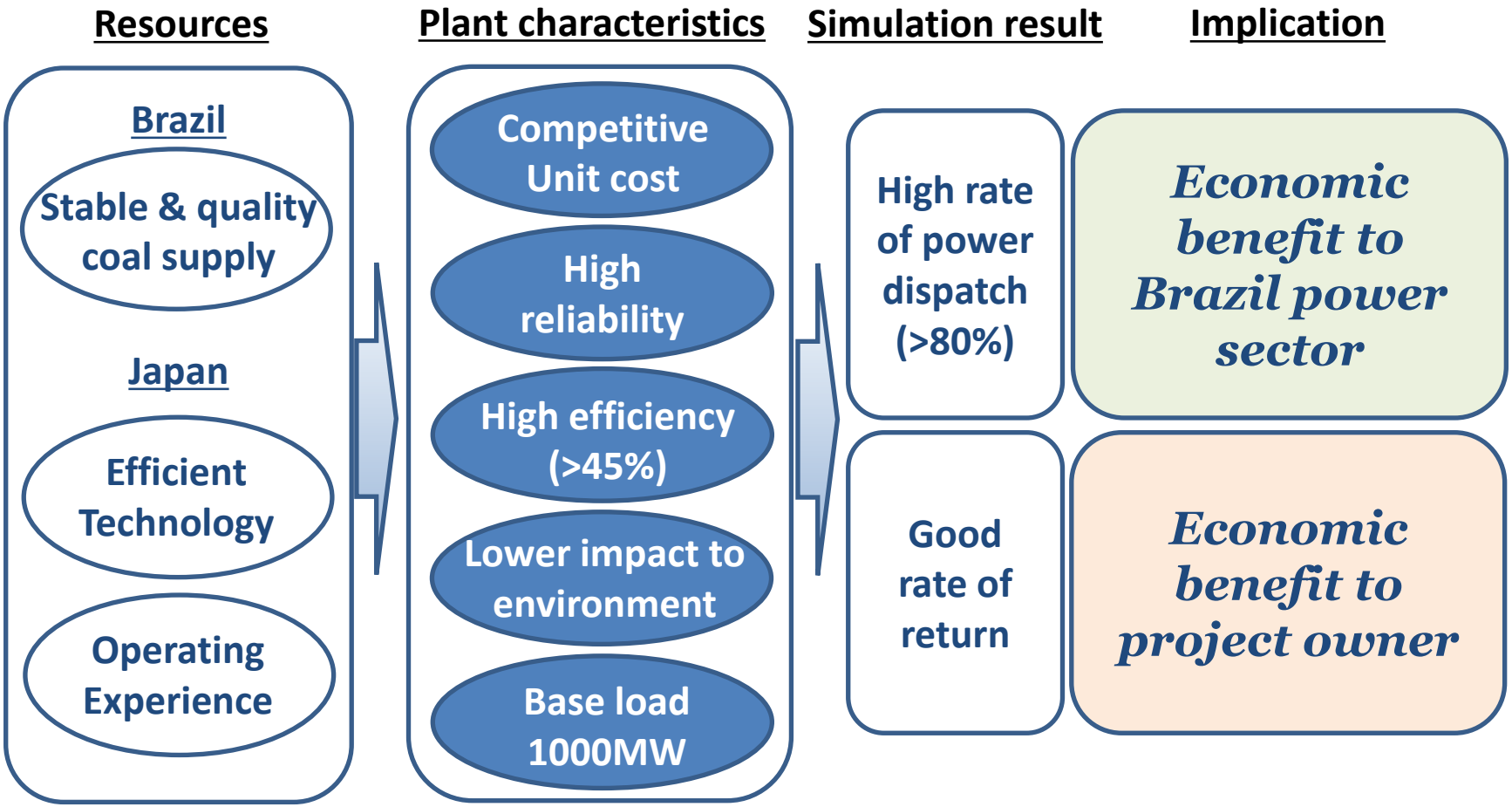
CAPEX: USD 2,000/kw (**)

= as competitive as EPE's assumption of CAPEX for a new subcritical coal-fired TPP (efficiency<40%)

(*) Simulation based on the average thermal efficiency η of all coal-fired TPPs in Brazil (in 2015), with certain assumptions of availability (85%), Net calorific value of coal (5,200 for USC, 4,225 for existing plants), carbon content (Brazilian standard), etc.
(**) Based on assumptions made for feasibility study purpose only. Ex-rate USD=R$3.26, USD=JPY114.69

C) ECONOMIC ANALYSIS

Stable power supply from "large scale base load USC Plant" has a big potential to bring benefit to both project owner and Brazil power sector/consumers



C) PROJECT SCHEME

Exchange risk control indispensable to attract Japanese investors and Public Finance for USC

Debt

- Japanese government supports the utilization of Ultra Super Critical (USC) and public finance can be provided

Equity

- Japanese investors, seek new international investment opportunities which utilizes standard technology already in use in Japan.

- Exchange rate risk mitigation indispensable for long term loan and investments.

- Other countries in Asia and in Latin America (ex. Mexico), provide hard currency linked tariff .

Foreign currency linked Tariff is one of key factors to realize USC project in Brazil

Project development efforts after F/S

To be ready to participate in the Auction in an appropriate timing…

1. Building firm relationship with R/S state

- *R/S mission to Tokyo*
  - *Exchanging opinion for the development of USC*
  - *Visit to IHI Headquarters and to Hitachinaka USC power plant (TEPCO/JERA(*))*

2. Study other possible finance schemes

3. Discussion among potential investors is ongoing

4. Prepare for environment assessment

etc.

Missão gaúcha ao Japão busca investimentos e promove o carvão do RS

Publicação: 31/05/2017 às 17h02min

Missão gaúcha ao Japão Cópia

Uma missão liderada pelo governador José Ivo Sartori estará no Japão, entre os dias 5 e 8 de junho, para apresentar as potencialidades do Rio Grande do Sul e atrair novos investimentos para o estado. Também faz parte da agenda, a promoção do carvão gaúcho, em encontros com o governo japonês e empresas do setor de energia. O roteiro inclui as províncias de Tóquio, Shizuoka (Hamamatsu e Iwata) e Shiga (Otsu). A comitiva parte de Porto

Source: www.sema.rs.gov

(*) JV of Tokyo Electric Power Group and the Chubu Electric Power Group

4. Future cooperation between Brazil and Japan

Further contribution in the energy sector

Strengthen Relationship Brazil & Japan

7th Meeting of the Wise Group for the Strategic Economic Partnership between Brazil and Japan, April 5th 2017 in Rio de Janeiro

Wise Group Meeting repot to President Michel Temer, April 6th 2017 in Brasilia

Governor and the Delegation of Rio Grande do Sul visiting to IHI, June 5th 2017 in Tokyo

Foto: Marcos Corrêa/Presidência da República

Co-firing with a high-ratio (33%) of woody biomass to make the most of existing boiler

New Energy Awards
Minister of Economy, Trade and Industry Prize

149 MW coal-fired thermal power plant at Kamaishi Works of Nippon Steel & Sumitomo Metal

1 Logging and collection

2 Transportation

3 Processing

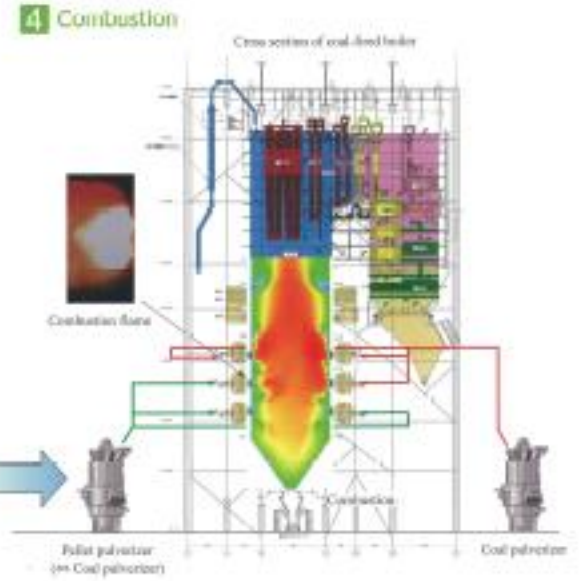
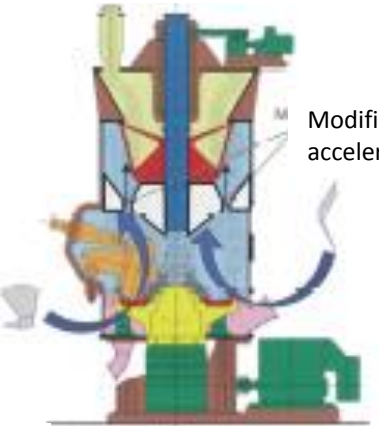


Illustration of the configuration of a high-ratio woody biomass co-firing system

Appearance of pulverizer



Cross section of pulverizer

Modified section (Flow-acceleration ring)

Introduction of IHI

IHI

Resources, Energy & Environment Business Area

Minimizing Environmental Impact

Social Infrastructure & Offshore Facilities Business Area

Underpinning the Essentials of Modern Living

Industrial Systems & General-Purpose Machinery Business Area

Transforming the World's Industrial Infrastructure

Aero Engine, Space & Defense Business Area

Opening New Horizons

Since 1959, IHI has been doing its activities in Brazil, and had a big shipyard in Rio de Janeiro, which was called ISHIBRAS.

History of Ishibras(1959~1994)

1959	Established ISHIBRAS in a joint venture in Brazil
1961	Delivered the first ship
1974	Inauguration of the Dock(400,000 t)
1976	Received order of Hot Sprit Mill for CSN with IHI
1978	Delivered the tanker (277,000 t)
1987	Delivered the Ore Oil Tanker (300,000 t)
1994	Merged to IVI(Industria Verolme-Ishibras)

Relationship between Paraná State and IHI

ITAIPU BINACIONAL

PENSTOCKS

CAPES CNPq

Graduação | Pós-Graduação e Pós-Doutorado | Atração de Cientistas para o Brasil | Educação Profissional e Tecnológica

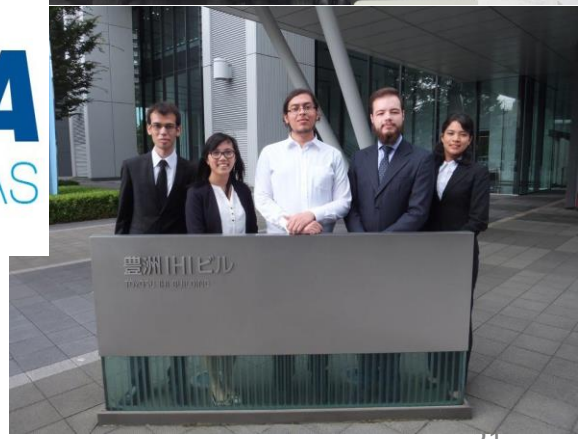
CIÊNCIA SEM FRONTEIRAS

Um programa especial da mobilidade internacional em ciência, tecnologia e inovação.

Ministério da Ciência, Tecnologia e Inovação

GOVERNO FEDERAL BRASIL PAÍS RICO É PAÍS SEM POBREZA

CIÊNCIA SEM FRONTEIRAS



Internship 2015 summer session

Internship 2016 summer session

IHI

Realize your dreams

Realize seus sonhos