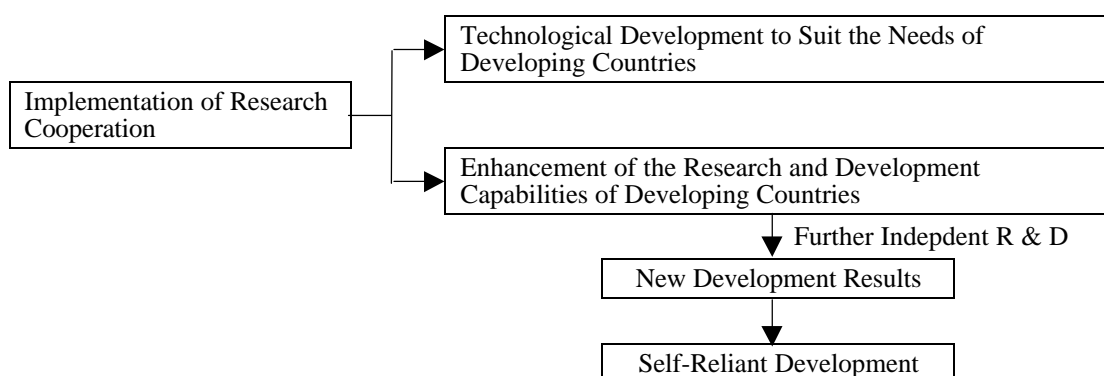


4. Research Cooperation (NEDO: New Energy and Industrial Technology Development Organization)

1) Outline

Unlike technical cooperation which aims at transferring existing technologies, research and development is jointly conducted under the research cooperation scheme by research organizations in Japan and developing countries to suit the specific technical development issues (technological needs) of developing countries. In reality, joint research is conducted by means of the dispatch of Japanese researchers and engineers and the acceptance of researchers of the subject countries to Japan together with the manufacture of machinery and equipment required for research cooperation, installation of this machinery and equipment in the subject countries and comprehensive operational research.

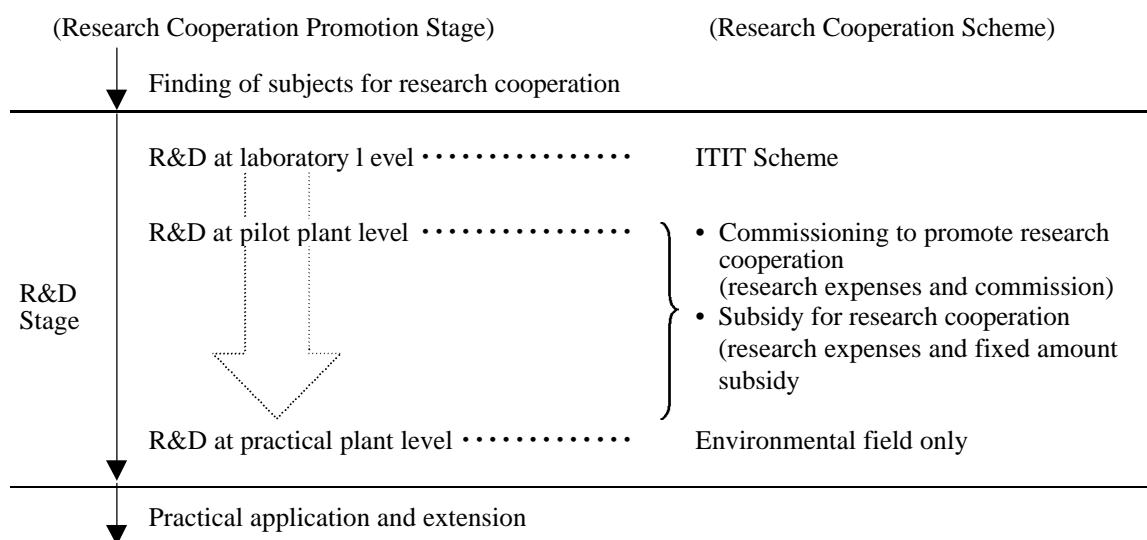
[Significance of the Scheme]



[Division of Cooperation Work]

	Japan	Subject Country
Research Theme	Discussed by the two parties	
Dispatch of Researcher	Covers the necessary expenses	Completes the necessary procedure, provides conveniences and secure good research facilities, etc.
Acceptance of Researcher	Secures (i) funds to cover the necessary expenses and (ii) good research facilities	Secures excellent researcher(s)
Machinery and Equipment	Conducts design, manufacture, transportation to a port of the subject country and guidance on installation, etc.	Completes the necessary procedure regarding the equipment to be imported, including (i) payment of tax, import duty, etc. and inland transportation cost and (ii) provision of a good installation site, if necessary
On-Site Research	Dispatches the researcher(s) and provides the information required for on-site research	Secures excellent researcher(s), engineers and research facilities
Operational Research at Pilot Plant	Dispatches the researcher(s) required and procures/provides special raw materials, etc.	Meets the necessary expenses (electricity, water, raw materials and others) and provides the necessary personnel
Others	Collects and studies the technical information required for research	Meets the necessary expenses for on-site research

[Flow to Achieve Practical Application]



2) Budget Size

¥2,847 million (Source: ECFA News Vol.34, No.11, February, 1998, p4)

3) Example of Research Cooperation Project

• Research Cooperation on Biological Treatment Technology for Mining Waste Water

Period of Cooperation : fiscal 1993 to fiscal 1998

Required Funding : total of some 800 million yen

Responsible Organization in Japan : Metal Mining Agency of Japan

Counterpart Organization : The State Nonferrous Metals Industry Administration of the People's Republic of China

Comparison of Plants

	Existing Plant in Japan	Target Plant for Development
<Oxidation Process> Bacteria Used	Iron oxidising bacteria	Iron oxidising bacteria
<Neutralisation Process> Agent Used	Calcium carbonate	Calcium carbonate (use of calcium hydroxide in the after-treatment process)
Treatment Volume	16,000 litres/min	20 litres/min (some one two-hundredths of the total treatment volume)
Construction Cost	Existing plant: 100	Approximately 3: equipment cost only (pilot plant size)
Characteristics	Steady operation for 14 years	- Recovery of copper in the pre-treatment process - High concentration of deposits

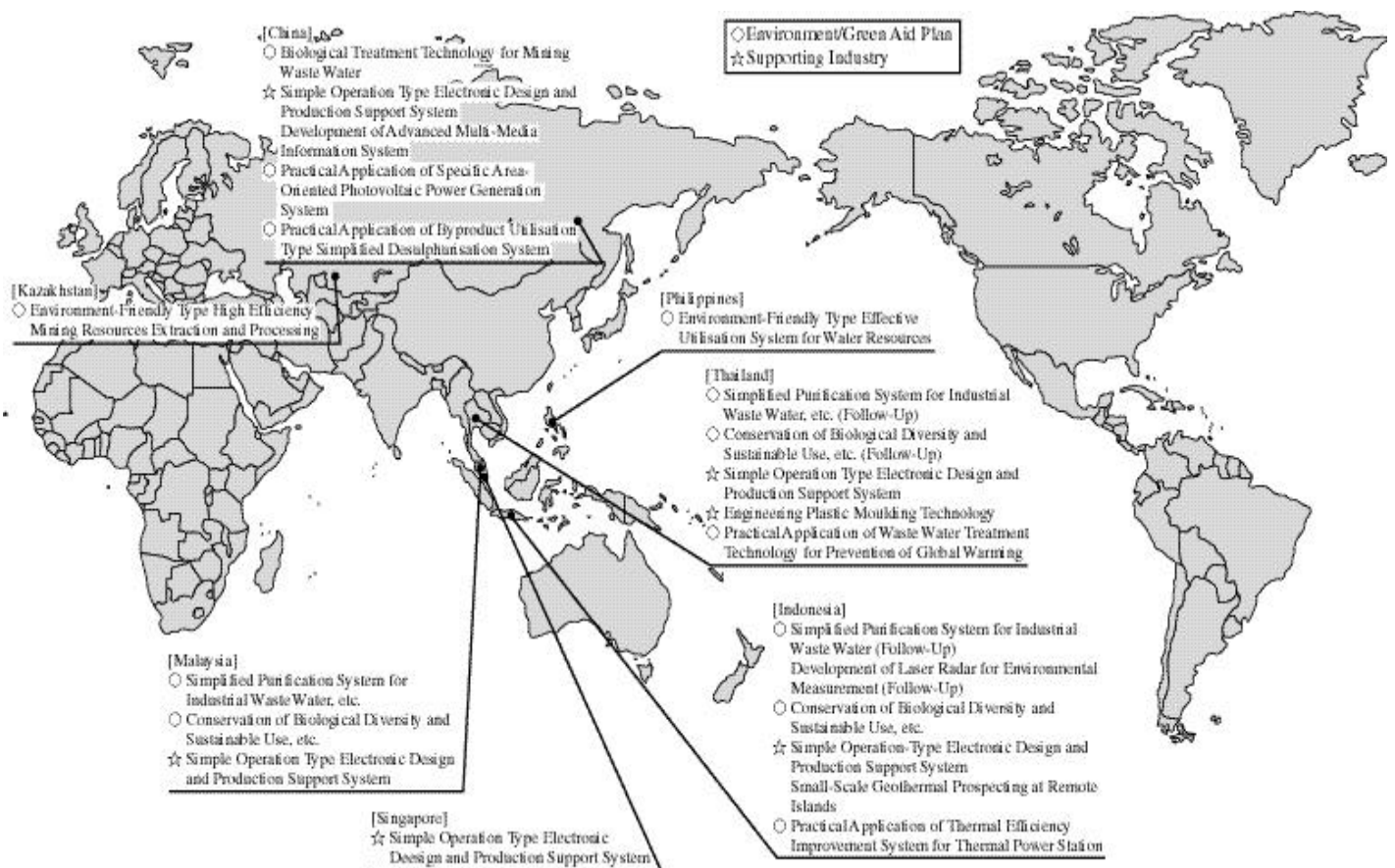
Positive Effects of the Project

The present waste water treatment at Chinese mines has caused contamination of the surrounding environment due to the inappropriate heavy metal removal technology.

- Development of a mining waste water treatment plant using iron oxidation bacteria
- Examination of the mining waste water treatment process in consideration of recovering copper and achieving a high concentration of deposits

Extension of the mining waste water treatment technology, strengthening of the economic basis of the mining industry and increased production volumes of fisheries and agriculture, etc. through the rehabilitation of the surrounding environment of Chinese mines.

Locations of Research Cooperation Projects in Fiscal 1998



List of Projects Under Research Cooperation Promotion Scheme

(Unit: ¥ million)

Budget Item		Phase	Research Cooperation Theme	Japanese Organization Involved	Period	Total Amount	Partner Country
Research Cooperation Promotion	Commissioning of Research Cooperation Promotion	Pilot Plant Level	- Manufacturing Technology for Physiological Activation Substances	Bioindustry Association	1983-1985	567	Malaysia
			- Medium-Size Photovoltaic Power Generation System for Rural Use	NEDO	1984-1985	226	Indonesia
			- Effective Use of Unused Rare Metal Resources	MMAJ	1984-1986	444	Thailand
			- Manufacturing Technology for Light Weight Building Material Using Ash of Rice Husks	ENAA	1985-1989	493	Malaysia
			- Manila Hemp Processing Technology	Hard and Bast Fibre Products Inspection Institute Foundation	1987-1990	241	Philippines
			- Rural Type Simple Continuous Manufacturing Technology for Unrefined Palm Oil	ENAA	1987-1991	393	Malaysia
			- Development of Water Retaining Agent for Application in Arid Areas	Desert Development Institute, Japan	1988-1993	782	Egypt
			- Local Power Generation System Using Fuel Cells	NEDO	1988-1993	559	Thailand
			- Integrated Utilisation System for Eucalyptus Constituents	Bioindustry Association	1989-1993	498	Indonesia
			- Development of Simple Desulphurisation System for Coal-Fired Boiler	Centre for Coal Utilisation, Japan	1990-1993	764	Indonesia
			- Effective Use of Unused Metal Resources	MMAJ	1990-1994	592	Mexico
			- Simple Purification System for Industrial Waste Water, etc.	NEDO	1992-1998	1,485	Thailand; Indonesia; Malaysia
		Integrated Level (Multiple)	- Mechanical Translation System Serving Neighbouring Countries	CICC (Commissioned) Electrotechnical Laboratory (In-House Budget)	1987-1994	5,950	China; Thailand; Malaysia; Indonesia
			- Recovery Technology for Valuable Resources in Brackish Water	NEDO (Commissioned) General Research Institute, Shikoku (In-House Budget)	1989-1994	395	Mexico; China

Budget Item		Phase	Research Cooperation Theme	Japanese Organization Involved	Period	Total Amount	Partner Country
Research Cooperation Promotion	Subsidized R&D Cooperation	Demonstration Plant Level	- Industrialisation of Tropical Resources for Multiple Applications	Japan Society of Industrial Machinery	1982-1986	336	Philippines
			- Development of File for Special Agricultural Application	Japan Society of Plastics Technology	1986-1989	418	China
			- High Efficiency Type Kiln Cement Manufacturing Technology	Cement Association of Japan	1988-1992	529	China
			- Intellectual CAI System for Fostering of Information Processing Engineers	NEDO Information Technology Promotion Agency, Japan	1989-1993	611	Singapore
			- Pyrolytic Gasification Technology for Woody Waste Materials and Utilisation Technology for Generated Gas	NEDO EAAJ	1990-1994	558	Philippines
	Subsidized Research Cooperation	Pilot Plant Level	- Development of Laser Radar for Environmental Measurement	NEDO (Optoelectronic Industry and Technology Development Association)	1993-1996	811	Indonesia
			- Development of Biological Mining Waste Water Treatment Technology	NEDO (MMAJ)	1993-1998	779	China
			- Conservation of Biological Diversity and Sustainable Use, etc.	NEDO (Bioindustry Association) (Commissioned) NIBHT (In-House Budget)	1993-1998	1,001	Thailand; Indonesia; Malaysia H8FY; China, Indonesia
			- Comprehensive Research Cooperation for Environmental Technologies	NEDO	1993-		
			- Environment-Friendly Type High Efficiency Extraction and Processing of Mining Resources	NEDO (MMAJ)	1994-2000	882	Kazakhstan
			- Simple Operation Type Electronic Design and Production Support System	NEDO (CICC)	1994-1998	1,414	China; Thailand; Indonesia; Malaysia; Singapore
			- Simple Setting of Engineering Plastics Moulding Conditions	NEDO (JHPC)	1996-1999	539	Thailand
			- Environment-Friendly Type Water Recycling System	NEDO	1997-2001	527	Philippines
			- Small-Scale Geothermal Prospecting at Remote Islands	NEDO	1997-2001	500	Indonesia

Budget Item		Phase	Research Cooperation Theme	Japanese Organization Involved	Period	Total Amount	Partner Country
Research Cooperation Promotion	Subsidized Research Cooperation	Pilot Plant Level	- Development of Advanced Multi-Media Information System	NEDO	1998-2002	1,500	China
			- Practical Application of Specific Area-Oriented Photovoltaic Power Generation System	NEDO	1998-2001	970	China
			- Practical Application of Byproduct Utilisation Type Simplified Desulphurisation System	NEDO	1998-2001	1,695	China
			- Practical Application of Thermal Efficiency Improvement System for Thermal Power Station	NEDO	1998-2001	1,000	Indonesia
			- Practical Application of Waste Water Treatment Technology for Prevention of Global Warming	NEDO	1998-2000	800	Thailand
		Human Resources Development	- Assistance for Capability Enhancement of Research Institutions	NEDO	1998-		Subject Countries of GAP

Note: The period and total amount of projects currently in progress are based on current plans and, therefore, should not be considered final.