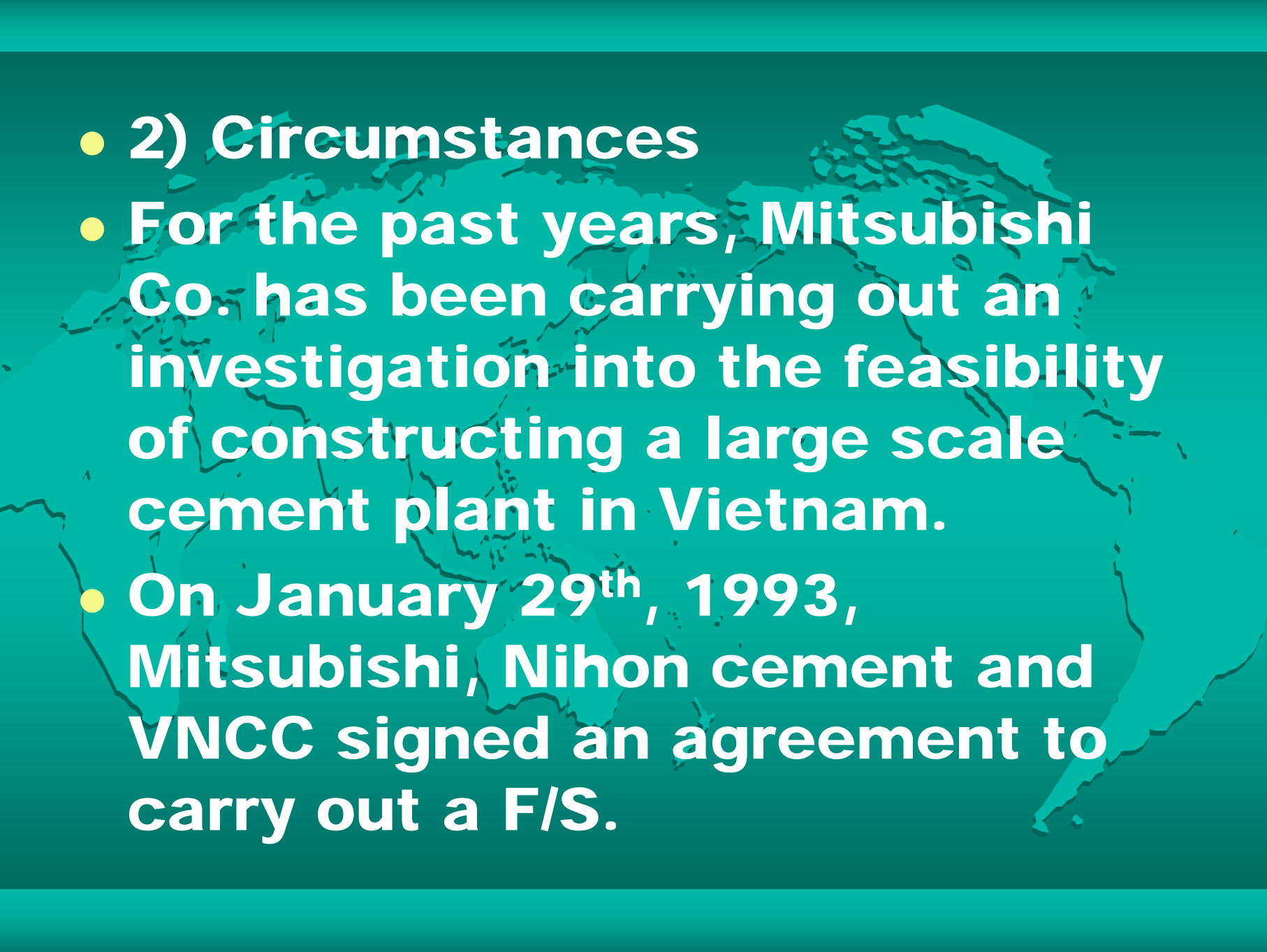


# **Feasibility Study for Construction of Nghi Son Cement Plant**


Socialist Republic of Vietnam

# Summary

- 1. Summary
- 1 : Background and circumstances of project
- 1) Promotors
- Vietnam National Cement Cooperation (VNCC)
- Mitsubishi material Cooperation
- Nihon Cement cooperation

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- 2) Circumstances
  - For the past years, Mitsubishi Co. has been carrying out an investigation into the feasibility of constructing a large scale cement plant in Vietnam.
  - On January 29<sup>th</sup>, 1993, Mitsubishi, Nihon cement and VNCC signed an agreement to carry out a F/S.

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- 3) Background
  - Nghi Son is blessed with abundant limestone resources in vicinity and has a bay deep enough to construct a port.
  - The economy of Vietnam is growing. The domestic demand for cement is expanding.
  - ベトナムの国家計画の一環

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- Vietnam is located in the center of Southeast Asia. This places Vietnam in an advantageous position to export.
  - The Vietnamese government will provide various favorable measures with foreign investors.

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- 4) Location
    - The plant is located 210km south of Hanoi.
    - The limestone, clay and silica sand quarries are located near by (20 minutes by car)
  - 5) Joint Venture period 50 years

## 2. Market and production capacity

- 1) Demand and supply
  - a. Domestic demand in Vietnam
  - Demand was between 1.5 and 2 million tons per year in the 80's and has been increasing 20 % per year in the 90's.
  - Demand: 1990:2.4 million, 91:2.95, 92:3.8, 93:5.5

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- The consumption by district stands at 35% for the northern area, 15% for central, 50% for the southern area.

b. Domestic production and project to increase cement in Vietnam

60,000tons have recently been imported to fulfill the shortage.



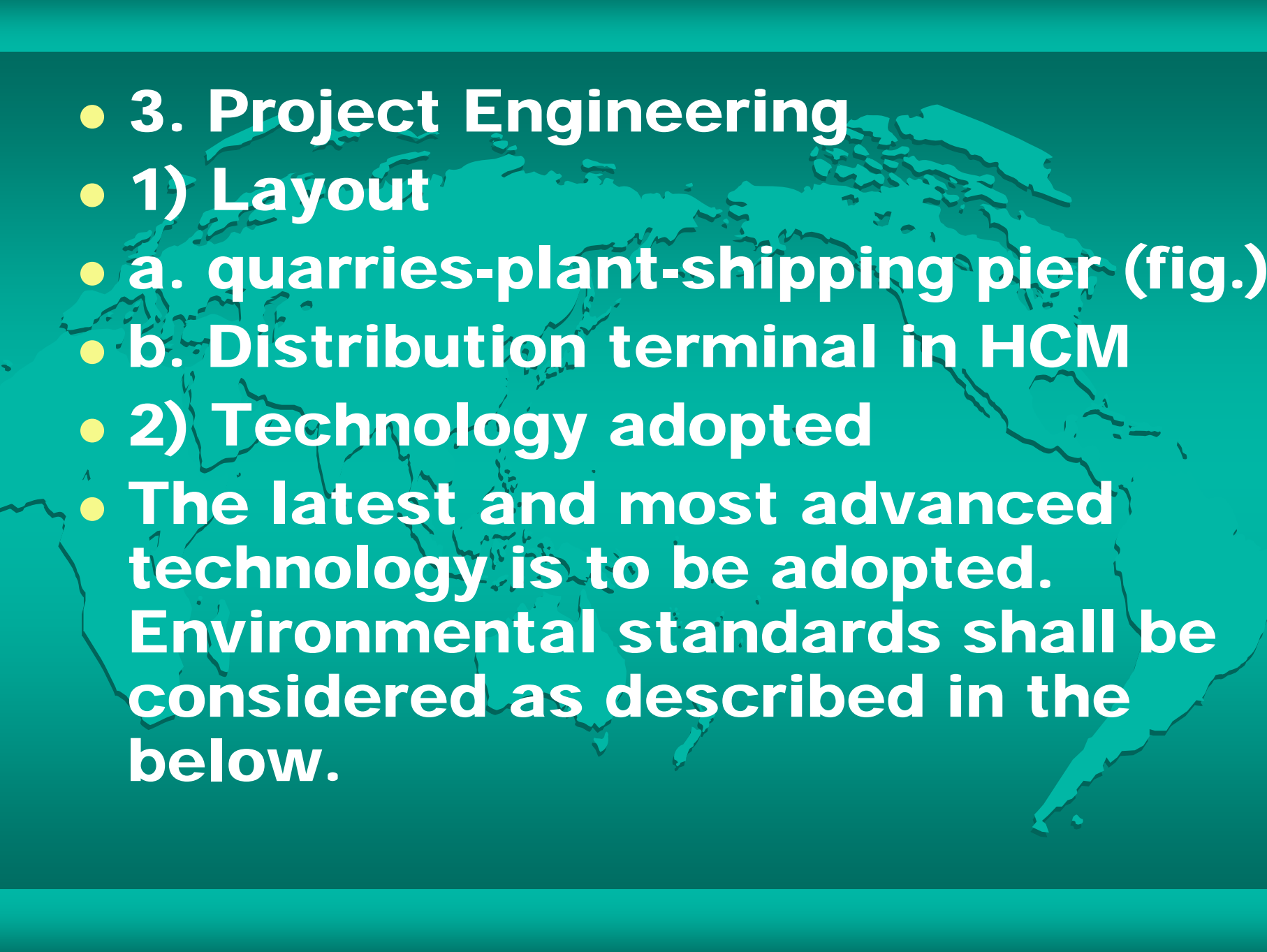
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- Project for new construction are being realized. If projects proceed as planned, capacity is expected to be doubled by 1997.
  - C. Southeast Asian market
  - Southeast Asian countries have made rapid progress since the 80's, and the trend is continuing.
  - Accordingly, cement is expected to meet increasing market demand.

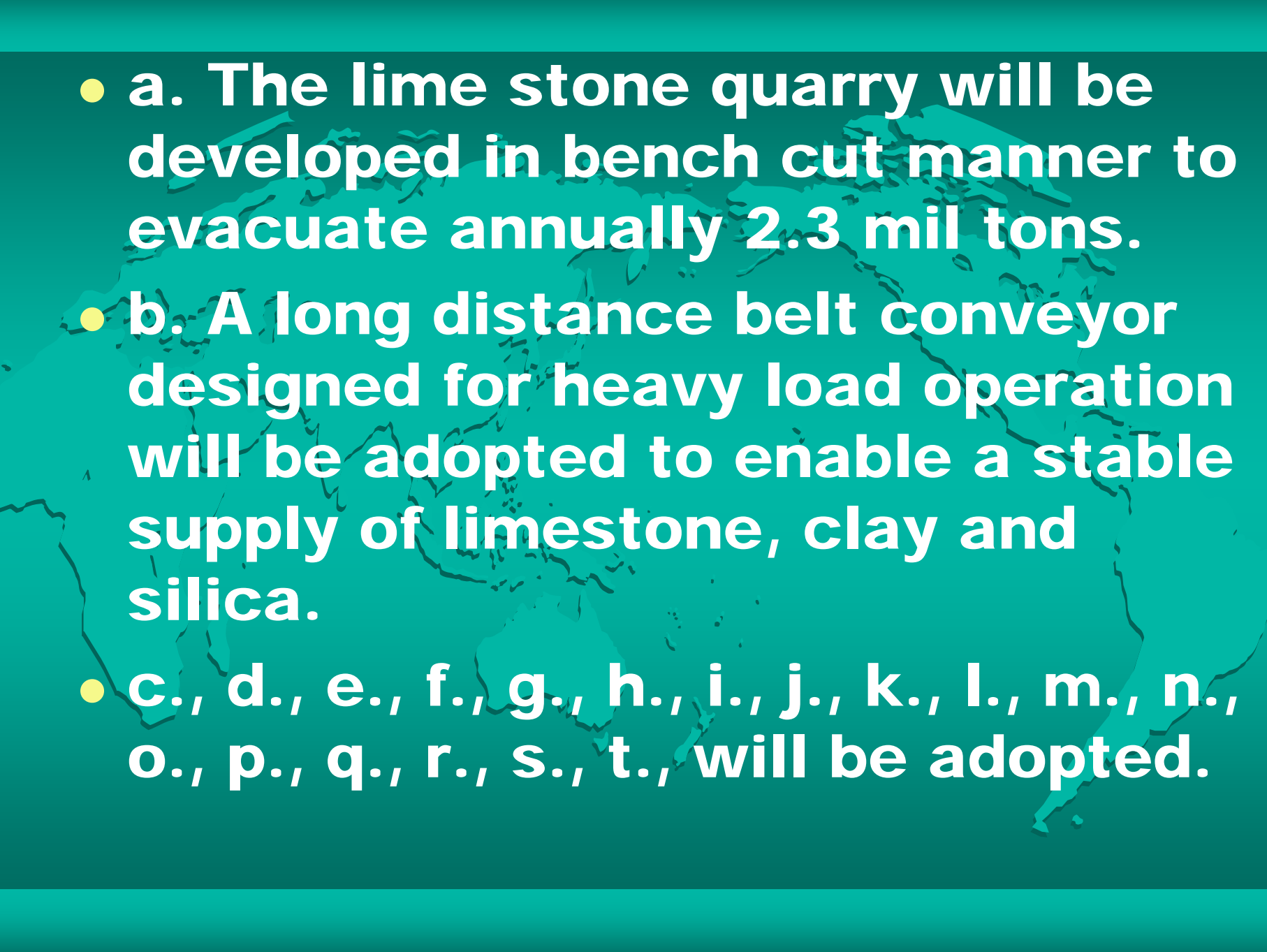
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- On the whole, the region continues to rely on imports to meet the increased demand.
  - 2) Production and market plans
    - a. This project aims to supply high quality cement at low cost throughout Vietnam.
    - A distribution terminal shall be constructed in Ho Chi Ming and Da Nang.

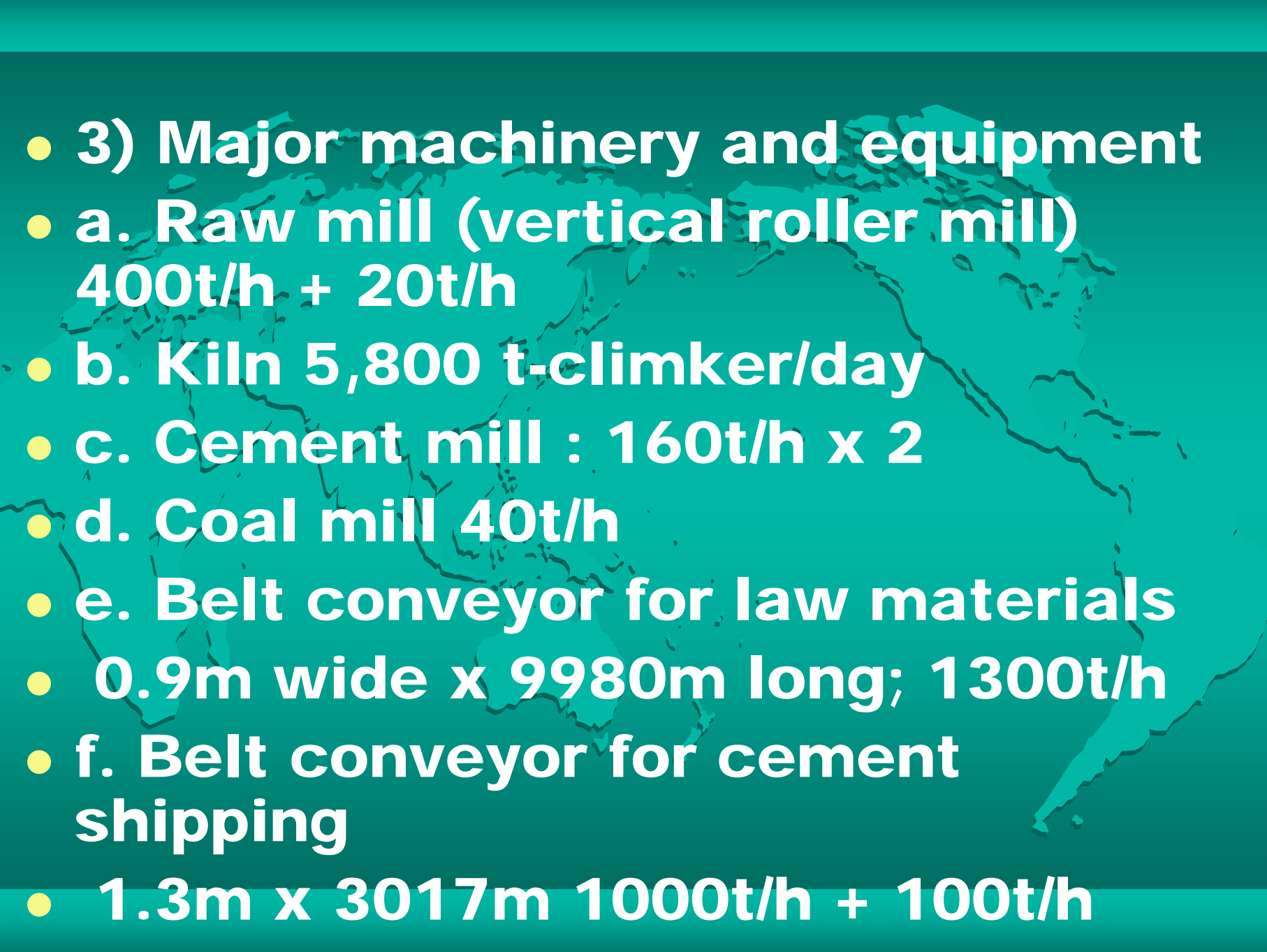
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- Sales volume by area:
  - Northern: 299,000tons, Central: 374,000, Southern: 687,000, Total per year: 1,360,000
  - Sales price
  - Sales prices vary by district. Prices are currently set by the government. Therefore existing prices were used in this F/S.
  - FOB price: US65\$/ton

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- b. Export
  - The cement to be exported will be equivalent in quality to that exported from Japan to SEA.
  - Total per year: 910,000 tons
  - Export price: the present price level will be maintained in the long run. FOB Nghi Son:\$35/ton
  - c. Total sales volume (domestic +export: 2,270,000 tons/year

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- d. Clinker production
  - $5,800 \text{ tons/day} \times 315 \text{ days/year} = 1,827,000 \text{ tons clinker/year}$
  - e. Cement production:
  - PC-40(Vietnamese standard):  
1,360,000 tons/year
  - OPC 910,000 tons/year
  - f. Production cost
  - Domestic: \$38.4, Export: \$28.5

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- 3. Project Engineering
  - 1) Layout
    - a. quarries-plant-shipping pier (fig.)
    - b. Distribution terminal in HCM
  - 2) Technology adopted
  - The latest and most advanced technology is to be adopted. Environmental standards shall be considered as described in the below.

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- a. The lime stone quarry will be developed in bench cut manner to evacuate annually 2.3 mil tons.
  - b. A long distance belt conveyor designed for heavy load operation will be adopted to enable a stable supply of limestone, clay and silica.
  - c., d., e., f., g., h., i., j., k., l., m., n., o., p., q., r., s., t., will be adopted.

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- 3) Major machinery and equipment
    - a. Raw mill (vertical roller mill) 400t/h + 20t/h
    - b. Kiln 5,800 t-clinker/day
    - c. Cement mill : 160t/h x 2
    - d. Coal mill 40t/h
    - e. Belt conveyor for raw materials
      - 0.9m wide x 9980m long; 1300t/h
    - f. Belt conveyor for cement shipping
      - 1.3m x 3017m 1000t/h + 100t/h























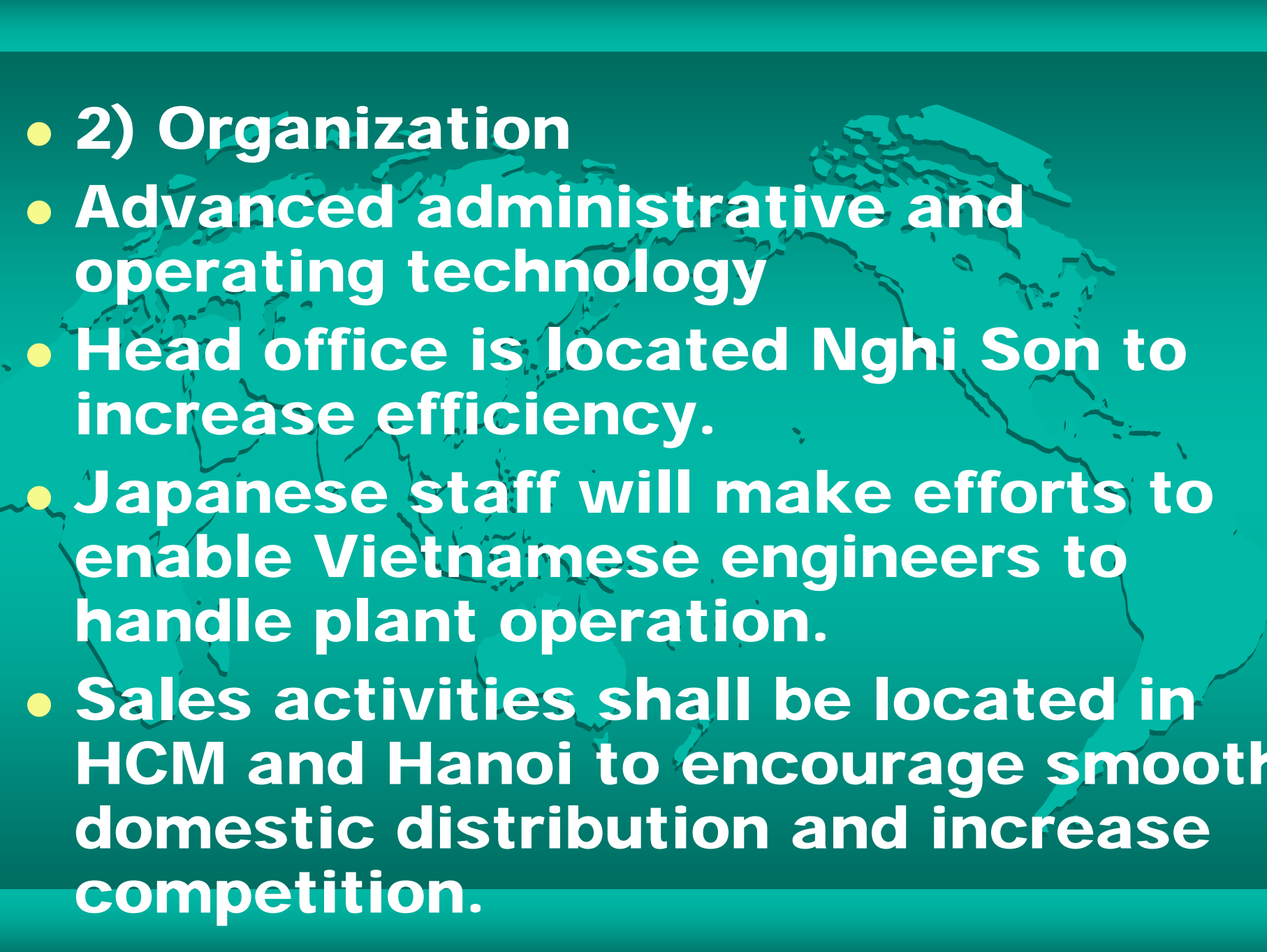







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- 4) Construction
    - a. Ground leveling
    - b. Foundation Work
    - c. Belt conveyor tunnel
    - d. Quarries
    - e. Shipping pier
    - f. HCM distribution terminal
    - g. Company house, guest house, etc.

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- 4. Organization and operation
  - 1) Employees
  - Production 106
  - Engineering 87
  - Purchasing 54
  - Mining 98
  - Administration 106
  - Sales 21
  - Total 472

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- 2) Organization
  - Advanced administrative and operating technology
  - Head office is located Nghi Son to increase efficiency.
  - Japanese staff will make efforts to enable Vietnamese engineers to handle plant operation.
  - Sales activities shall be located in HCM and Hanoi to encourage smooth domestic distribution and increase competition.

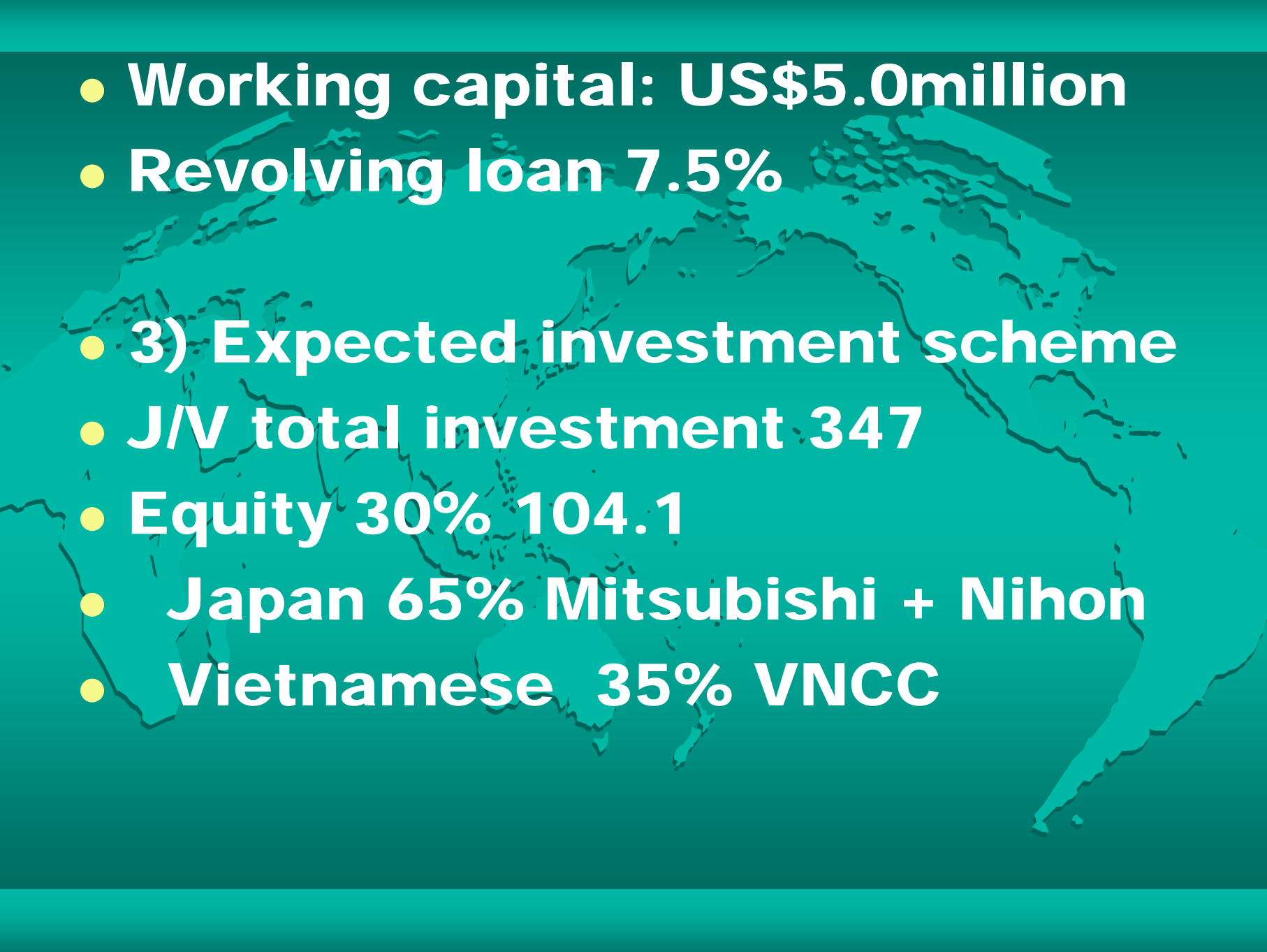
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- 5. Schedule
  - 1) Construction period:
  - Plant will be completed 3 years and 10 months after setting up joint venture. Commercial production will start after a 6 month period of trial operation.
  - 2) HCM terminal construction will be ready at the time of plant start up.

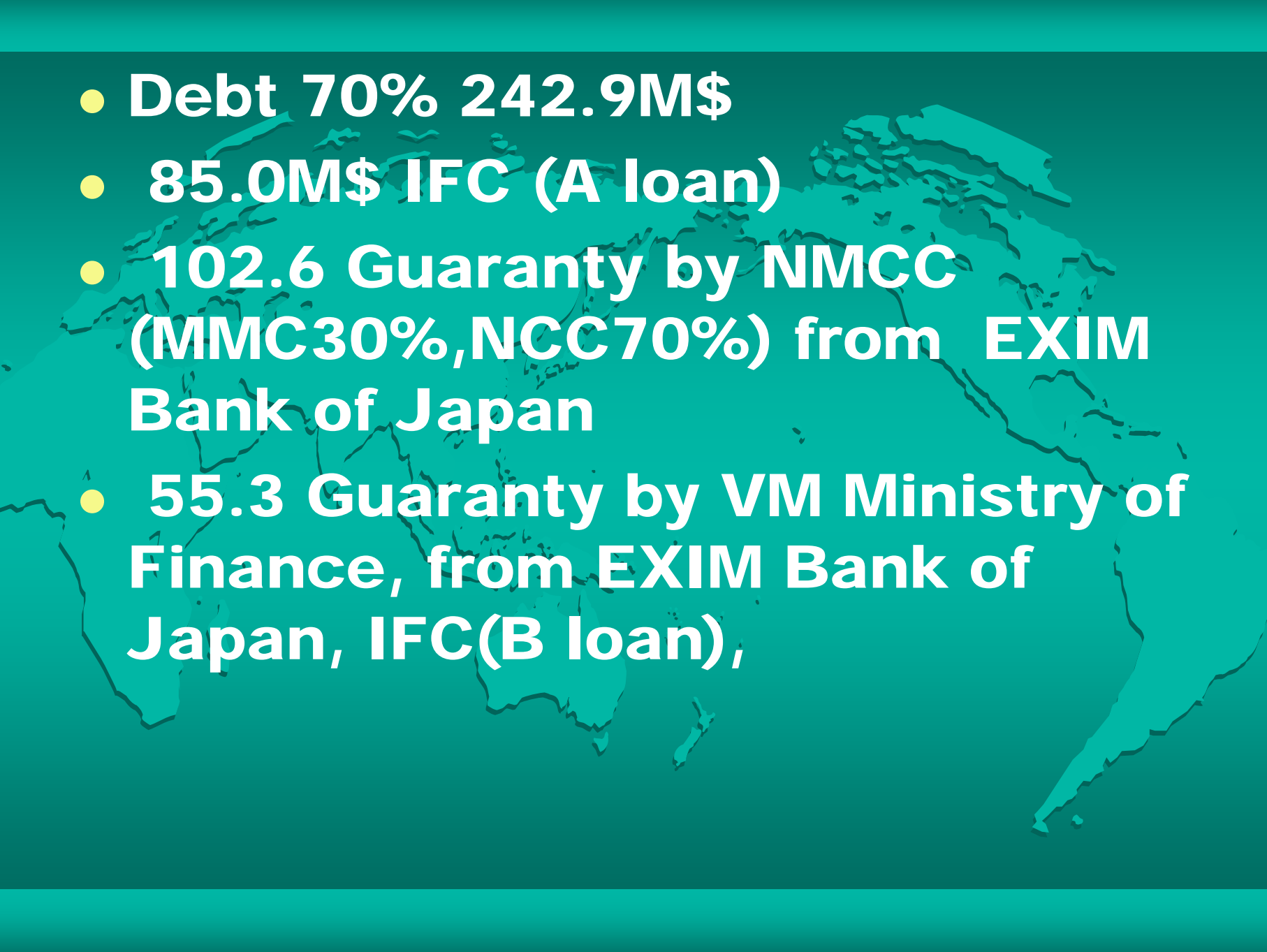


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- 6. Cost estimation
  - 1) Total investment (unit: US \$mil.)
  - Construction:274.6
  - Project management and organization:2.2, Detail raw material investigation:1.2, Basic engineering:1.4, Detail engineering:4.4, Supervision of construction and erection:5.4, Interest before operation:26.5, etc.,
  - Total: 347.0


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- 2) Fund raising
  - a. ratio of investment to loan 30:70
  - b. Ratio of equity ownership of Japanese and Vietnamese ownership 65:35
  - c. Loan
  - Construction capital
  - repayment of principal: 10 year semi-annual installment, interest rate 7.5% (including all fee)



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- Working capital: US\$5.0million
  - Revolving loan 7.5%
  - 3) Expected investment scheme
    - J/V total investment 347
    - Equity 30% 104.1
      - Japan 65% Mitsubishi + Nihon
      - Vietnamese 35% VNCC

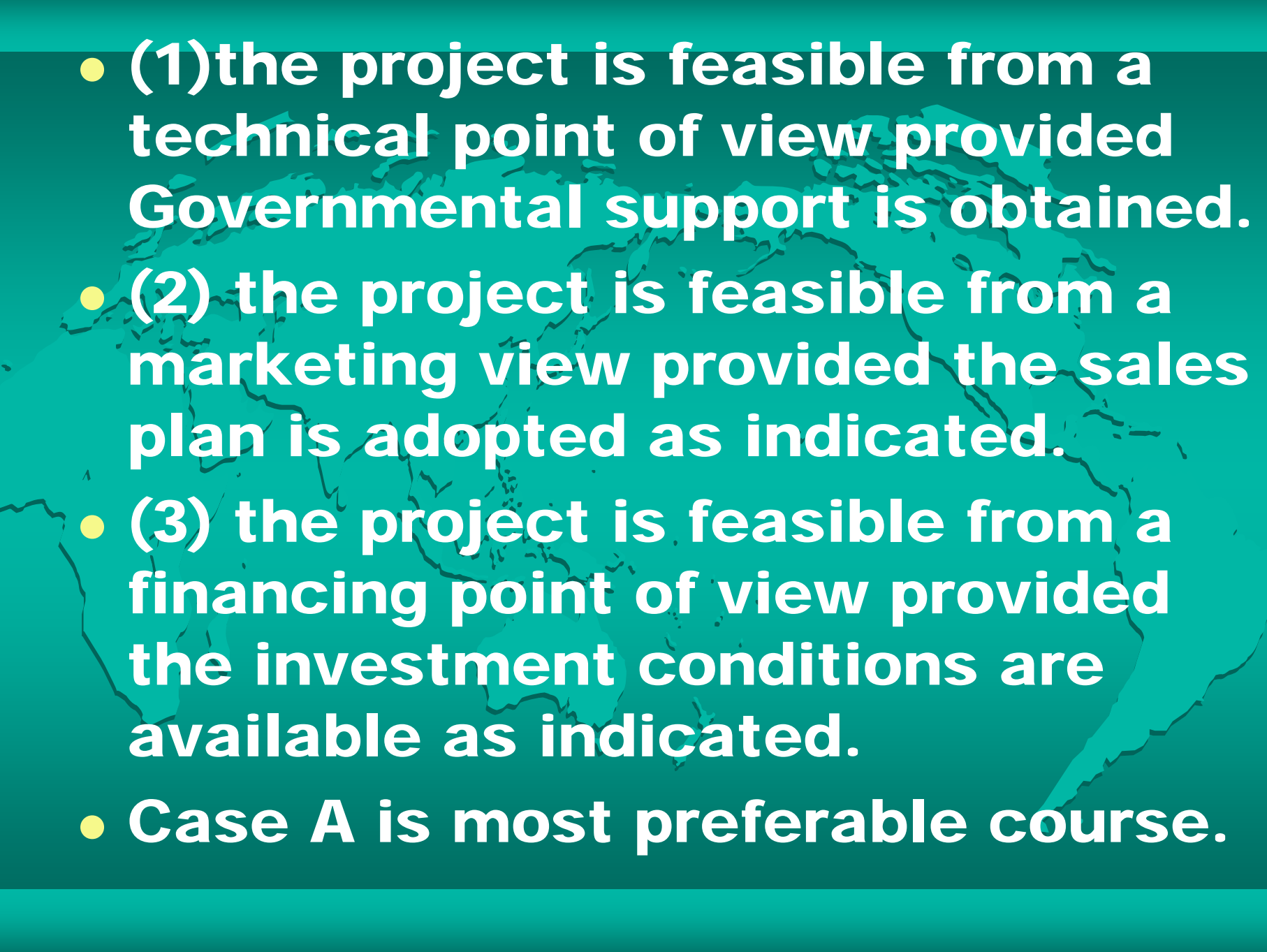
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- Debt 70% 242.9M\$
  - 85.0M\$ IFC (A loan)
  - 102.6 Guaranty by NMCC (MMC30%,NCC70%) from EXIM Bank of Japan
  - 55.3 Guaranty by VM Ministry of Finance, from EXIM Bank of Japan, IFC(B loan),

- 7. Economic evaluation
- 1) Prerequisites(前提条件)
- Sales domestic: export = 60:40
- Domestic: 1,360,000 tons, sales price\$65, production cost \$38.4  
export: 910,000 tons, sales price \$35, production cost \$ 28.5
- Depreciation (減価償却)償却
- Excavating machinery 5 years,  
Other assets 15 years, Civil 25 years

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- 2) Economic evaluation
  - Case A: turnover tax 10% ( domestic)
  - Income tax 15%,
  - Sales condition: domestic 60%, export 40%,
  - Total production volume: 2,270,000 t
  - Land lease (50 years): paid yearly
  - Case B
  - Domestic 40%: export 60%
  - Total production volume: 2,180,000 t

## 2. Conclusions

- 1. for case A: IRR 13.00%, pay back period 7.94 years,
- for case B: IRR 10.48%, 9.44 years
- The project will require a huge investment cost (347 M\$). Because of this, this is concluded :

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- (1) the project is feasible from a technical point of view provided Governmental support is obtained.
  - (2) the project is feasible from a marketing view provided the sales plan is adopted as indicated.
  - (3) the project is feasible from a financing point of view provided the investment conditions are available as indicated.
  - Case A is most preferable course.

## At present

- Cement sales: 2001 1,626,898
- 2002 2,029,760 ton
- case A: 2,270,000 t
- case B: 2,180,000 t
- The sales are a little less than expected. However, the sales in Vietnam are more than expected.
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