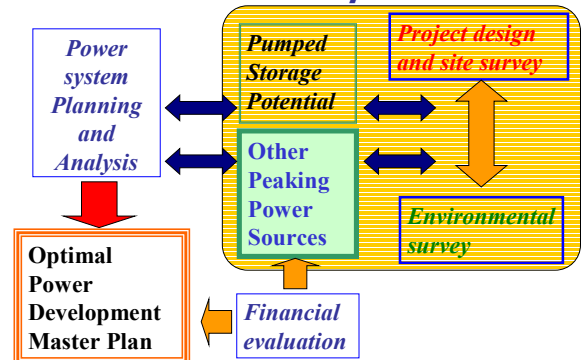


[6] Optimization study on conventional Hydropower Plants

Japan International Cooperation Agency (JICA)

1

Overall Study flow



Contents

Conventional HPP for peaking supply

- **1) Introduction**
- 2) Extension of Existing HPP
- 3) Development of HPP
- 4) Conclusion

3

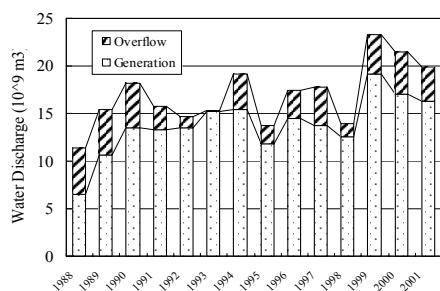
Peaking Power Supply development

Target of this Study

- **Extension of Existing HPP**
 - [Thac Mo Extension : F/S finished]
 - Extension of Tri An HPP
 - < Dong Nai River system >
- **Development of HPP**
 - Optimization of Huoi Quang and Ban Chat HPP
 - < Da River system >

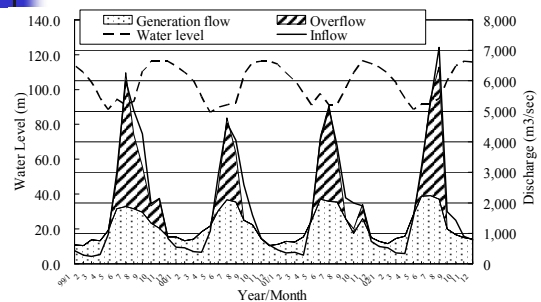
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Ineffective discharges at Tri An HPP



5

Ineffective discharges at Hoa Binh HPP



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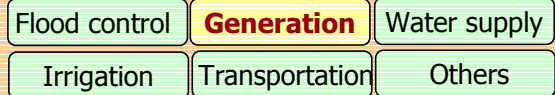
Utilization of ineffective discharge

- HPP for peaking supply
 - Renewable energy
 - Reduce consumption of fossil fuel
 - Prevention of global warming

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Concerning issues

- the use of river flow



Integrated Water Resources Management
Such as consecutive river system operation

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Contents

Conventional HPP for peaking supply

- 1) Introduction
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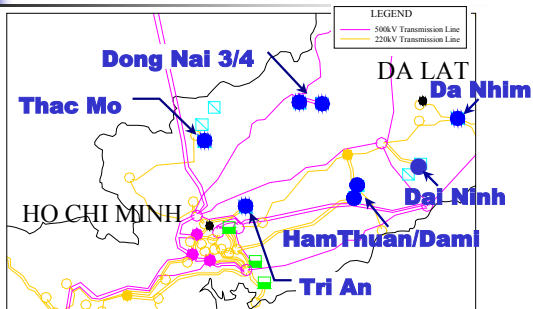
9

Thac Mo Extension Project



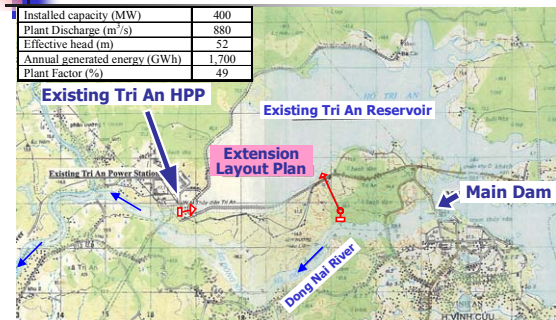
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HPPs in Dong Nai/Be River

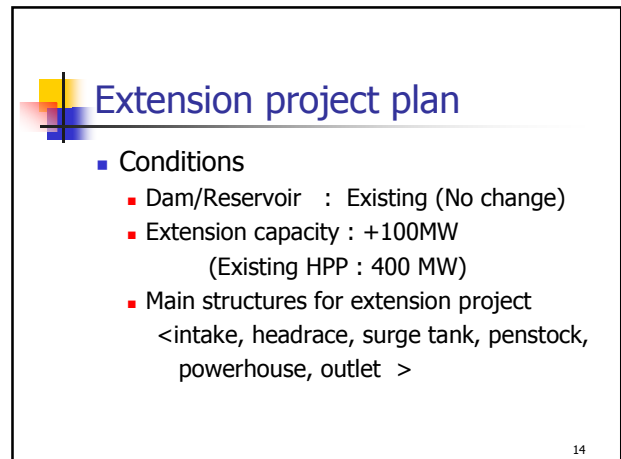
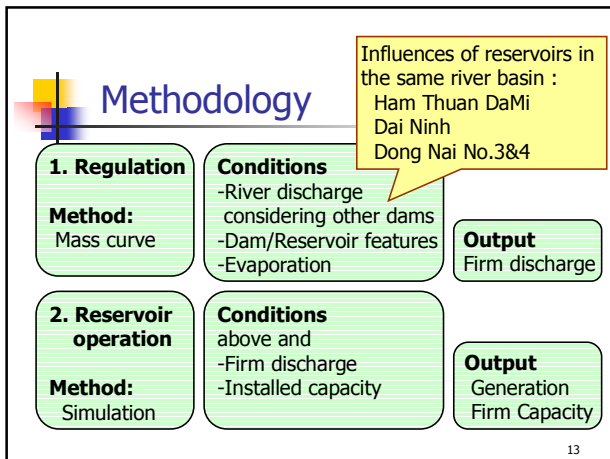


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Tri An extension project



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Results of reservoir operation

	Without Extension	With Extension	Extension Project
Installed capacity (MW)	400	500	100
90% firm peak power (MW)	354	441	87
Generated energy (GWh/year)	1,863	1,952	89
Capacity factor (%)	53	45	45
Rate of spillway discharge (%)	9.4	3.4	3.4

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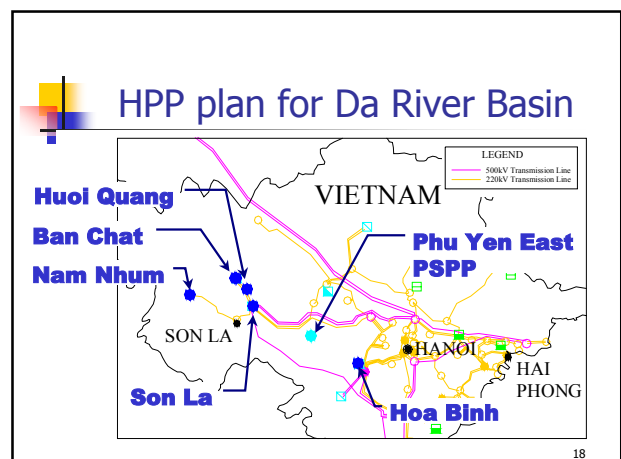
Economic Evaluation

Installed capacity (MW)	100
B/C	1.42
FIRR at consumer's end (%)	9.1

- >> High Economical efficiency

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- ## Contents
- ### Conventional HPP for peaking supply
- 1) Introduction
 - 2) Extension of Existing HPP
 - 3) Development of HPP**
 - 4) Conclusion
- 17



Current project plan

	Unit	Ban Chat	Huoi Quang
Installed Capacity	MW	200 (100MW x2)	540 (180MW x3)
Catchment Area	km ²	2,017	2,930
Dam type	-	Concrete gravity	Concrete gravity
Dam height	m	127	151
Total water head	m	82	149
Effective Storage	10 ⁶ m ³	1,380	173

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Methodology

- Simulation method :
 - Same as Tri An extension
- Considering
 - Regulation of Ban Chat in case of cascade development

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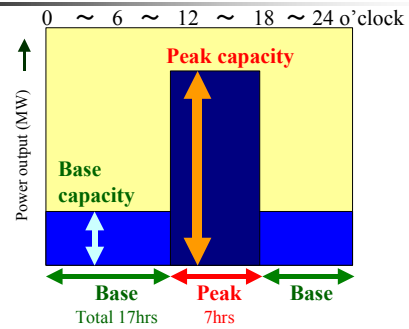
Case of simulation

Huoi Quang \ Ban Chat	No development	1 unit, 180MW	2 units, 360MW	3 units, 540MW	4 units, 720MW
NO development	-	-	-	○	-
1 unit, 100MW	-	-	-	○	-
2 units, 200MW	○	○	○	⊗	○
3 units, 300MW	-	-	-	○	-
4 units, 400MW	-	- </tr			

Legend ○ : simulation case, ⊗ : current plan

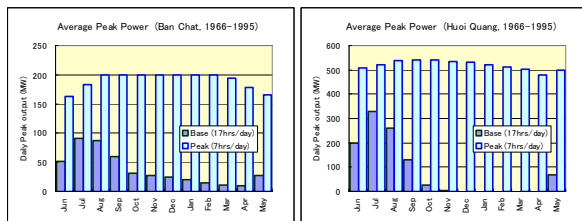
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Peak / Base capacity



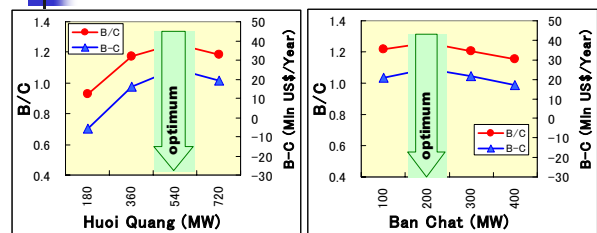
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Average Peak / Base



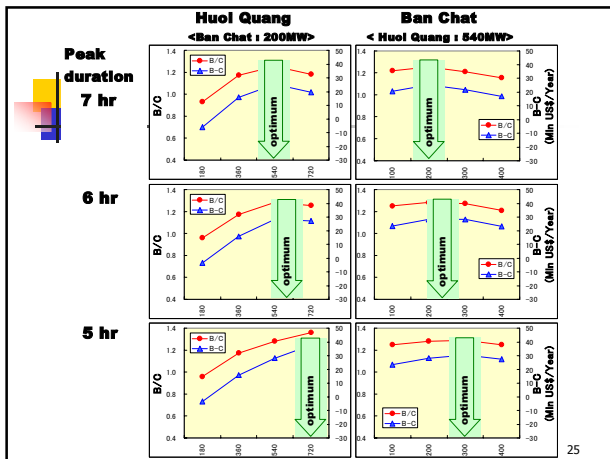
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Optimum installed capacity

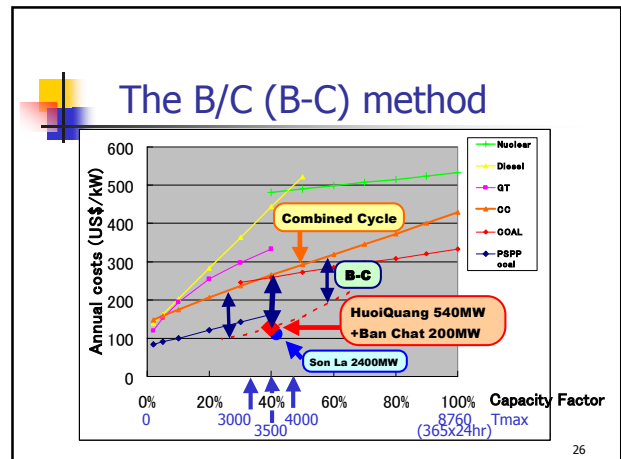


< Peak duration : 7hrs >

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- ### Optimum installed capacity
- Current plan
 - Ban Chat : 200 MW, Huoi Quang : 540 MW
 - Optimum
 - The Current plan : Best Choice considering future profile of power demand
 - Capacity Factor 40% : Tmax=3500 hr

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- ### Contents
- #### Conventional HPP for peaking supply
- 1) Introduction
 - 2) Extension of Existing HPP
 - 3) Development of HPP
 - 4) **Conclusion**

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- ### Conclusion
- Extension of Existing HPP
 - Tri An Extension : High economic efficiency
 - Development of HPP in the North
 - Installed capacity planned currently : optimal <Ban Chat 200MW, Huoi Quang 540MW>
 - Cascade development : Requisite

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END of session

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[7] Possibility of Installation of Coal Thermal Power Plant in the South

Japan International Cooperation Agency (JICA)

1

Contents

- Geographical Study
- Coal Price Transported from the North
- Economical Evaluation

2

Geographical Study

Assumptions

- Kinds of Coal
 - Anthracite (Quang Ninh), Subbituminous (Red River Delta)
- Installed Capacity
 - 1,200MW for one plant (with premise for an additional plant)
 - ✓ 4 units of 300MW for Anthracite
 - ✓ 2 units of 600MW for Subbituminous coal
- Specifications of the private harbor
 - Navigation Channel, Turning Basin and Berth length were intended for 45,000DWT tanker

3

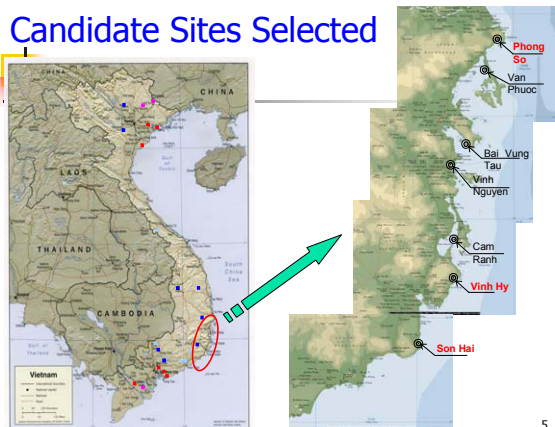
Geographical Study

Evaluation and selection of candidate sites

- Selection Area :
 - ✓ Seacoast from lat. 13°N to the South
- Selection Points :
 - ✓ To secure the sufficient water depth without dredging
 - ✓ Unnecessary to build Seabreak by leveraging peninsula or island
 - ✓ To be equipped with access road

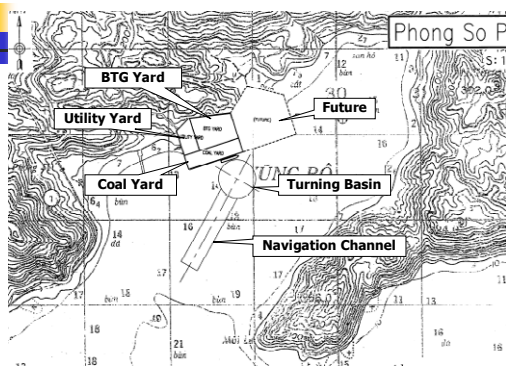
4

Candidate Sites Selected



5

Outline Design of Phong So



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Construction Cost

Items / project site name		Phong So	Vinh Hy	Son Hai
Anthracite	Plant	850 US\$/kW		
	Civil & Arch.	153 mil.US\$		
Subbituminous	Plant	722 US\$/kW		
	Civil & Arch.	130 mil.US\$		
Harbor (mil.US\$)	Total	90.6	201.3	156.6
	Break Water	31.1	181.1	135.6
	Reclamation	36.6	11.6	12.4
	Ash disposal	22.9	8.6	8.6
Construction Cost (USD/kW)	Anthracite	1,053	1,145	1,108
	Subbituminous	906	998	961

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Contents

- Geographical Study
- Coal Price Transported from the North
- Economical Evaluation

8

Coal Price Transported from the North

■ Coal Price (FOB)

Coal		Heat value kcal/kg	Coal price FOB(VND/t)
Anchracite	Hon Gai #3	7,100	431,000
	Hon Gai #4	6,050	332,000
	Hon Gai #5	5,500	305,000
Subbituminous	Red River V3	5,100	305,000*

*:assumed price (same as Hon Gai #5)

■ Transportation Fee from Haiphong to the site

- ✓ Based on that from Haiphong to HCMC of **7 US\$/ton** as stated by Vinacoal

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Contents

- Geographical Study
- Coal Price Transported from the North
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Economic Evaluation (as of 2003)

Unit Generation Cost (UScents/kWh)

Coal		Phong So	Vinh Hy	Son Hai
Anchracite	Hon Gai #3	3.54	3.74	3.67
	Hon Gai #4	3.49	3.69	3.62
	Hon Gai #5	3.53	3.72	3.65
Subbituminous	Red River V3	3.28	3.47	3.40

- 1) Capacity factor = 75%
- 2) Including station service (7%)
- 3) Coal transportation fee = 7 US\$/ton

Every unit generation cost is **cheaper** than GTCC's 3.75 UScents/kWh.

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The End of Session

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