

Milestones in Development of a National Infrastructure: Human Resource Development

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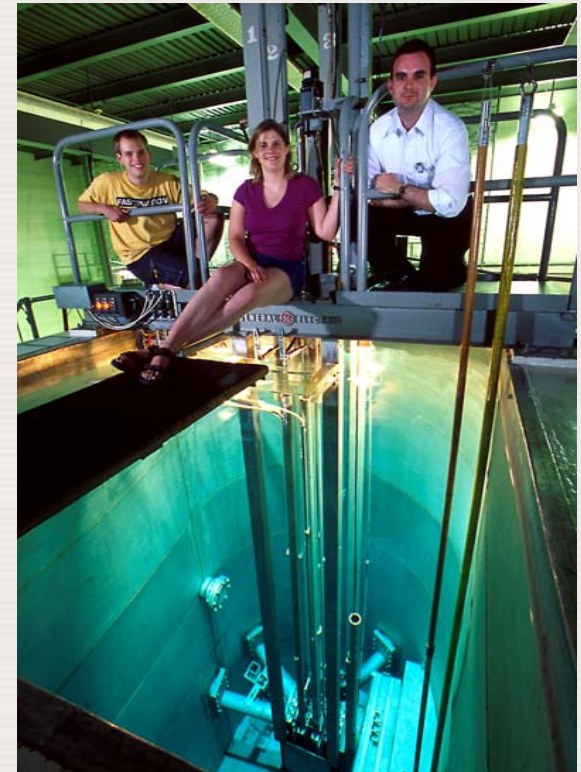


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Human Resource Development-Phase 1: Outputs

- Knowledge and skills needed to support a nuclear programme identified by NEPIO
- A HR Development Plan



A Common Question re Human Resources?

- How many people do we need in order to consider having a nuclear power programme?



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Better Questions?

1. What are the primary objectives for introduction of nuclear power?
 - Energy security?
 - Price stability?
 - Economic development?
2. What are the HR development needs related to these objectives?
3. What are the related risks?
4. Are these risks justified?



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Example of a HR Objective:

- To improve (Country X) personnel's competency in development of NPP, it is essential that the user country be involved in: reactor design, design of major equipment, plant engineering design, component manufacturing, project management, operation and maintenance, fuel supply and refueling, and R&D support for design and operation

Question: What risks does the user country accept through establishing this objective?

Human Resource Development-Phase 2: Outputs

- Sufficient human resources are in place to be an intelligent customer
- Training of human resources needed for plant operation is initiated

Operations and
Intelligent Customer

Owner / Operator

Major Projects

Contractors

Minor Projects

Consultants

Component
Supply

Suppliers /
General Industry

SUPPLY 'PYRAMID'



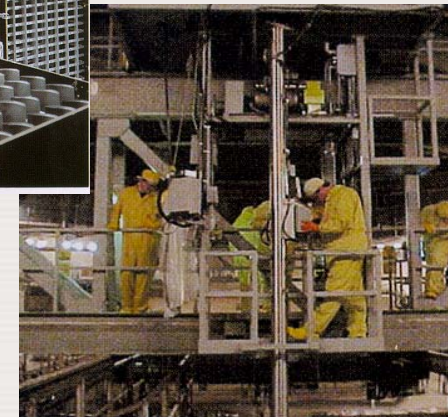
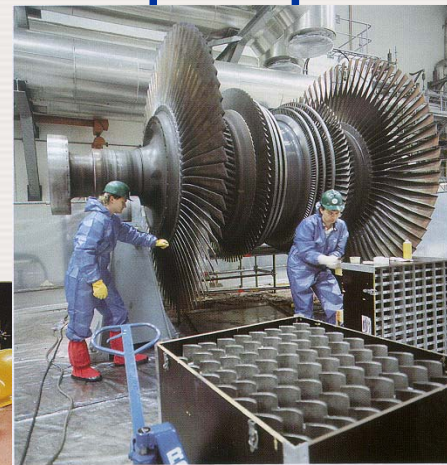
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Human Resource Development- Phase 3: Outputs

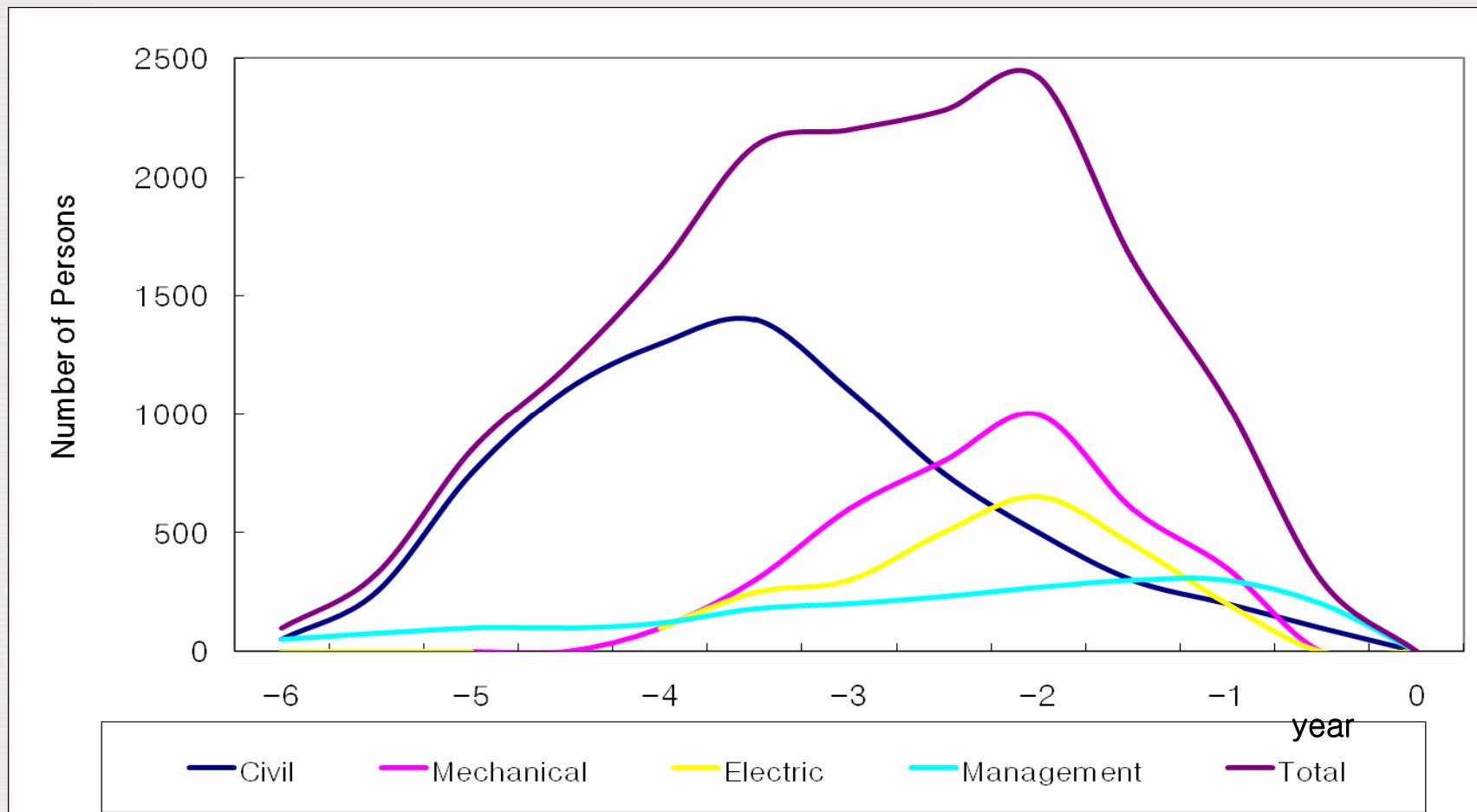
- All human resources to commission and operate the first NPP are in place
- Education and training programmes for continuing flow of qualified people are in place



Manpower Requirements at the Peak during NPP Project Construction and Commissioning

Activity	Manpower classification	High-grade Professionals	Professionals	Technicians	Craftsmen	Total
1. Pre-Project activities		1	27	2		30
2. Project Management	NEPIO	8	47	10		65
	Main-contractor	8	22	5		35
3. Project engineering		25	185	160		370
4. Procurement		8	12	10		30
5. Quality assurance / Quality control		8	32	60		100
6. Manufacturing of equipment & components		90	210	600	2100	3000
7. Plant construction		10	80	340	2270	2700
8. Plant commissioning		10	40	50	100	200
9. Operation & maintenance		25	25	140	30	220
10. Nuclear fuel cycle (fuel fabrication)		5	35	70	30	140
11. Nuclear Licensing & Regulation		45	5			50
Total		243	720	1447	4530	6940

Manpower Loading during an NPP Project: Construction and Commissioning



Thanks for your attention!



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