# 3.2a. The Strategic Environmental Assessment of Power Development Plan VII

Section 1: Approach and Methodology

# Background

- An SEA is a compulsory part of any strategic plan preparation in Viet Nam
- The SEA preparation is the responsibility of the agency preparing the plan: in this case the Ministry of Industry and Trade, and is reviewed by MoNRE
- The SEA has been prepared by the Institute for Energy with technical support provided by the ADB

# Objectives of the SEA

- Calculate and internalize the full range of social and environmental costs and benefits into the PDP VII.
- Ensure that key GoV policies on issues such as the promotion of renewable energy, climate change, environmental flows and benefit sharing are reflected in PDP VII.
- Where necessary, identify mitigation and compensation measures to reduce negative impacts or compensate people negatively affected by power development.

# SEA Methodology: 6 Stages

- Stage 1: Define the Analytical Framework
- Stage 2: Data Collection and Definition of the Baseline Analysis
- Stage 3: Initial Consultations
- Stage 4: Impact Analysis and Weighting
- Stage 5: Identification of Areas and Options for Mitigation and Compensation
- Stage 6: Final Consultation and Recommendations

# Section 2: Assessment of Impacts

- Key stage in the SEA
- Assessing and balancing full range of impacts from the different power generation options and other investments included in the PDP VII base case scenario
- Where possible, do a valuation of the impacts to allow them to be compared and assessed against economic benefits

# Impacts of Thermal Power Generation

- By far the largest area of impacts from PDP VII
- Most serious impacts from coal-fired generation: most impacts per kwh electricity generated
- In PDP VII base case, impacts progressively increase up to 2030 & affect all parts of the country
- Concentration of impacts in major clusters in North (coastal area) and South (HCMC)

# Impacts of Thermal Power Generation

- Main impacts from atmospheric pollution
- 3 categories of atmospheric pollution impacts:
  - Greenhouse Gas Emissions
  - Acidification
  - Health Impacts
- Additional impacts from thermal power include on water resources, people and ecosystems in vicinity of power stations, solid waste disposal from power stations

# Impacts of Thermal Power Generation

- **Greenhouse Gas Emissions**: $CO_2$ & other gases: by 2030 $CO_2$ emissions increase to over 440 million tons/year
- Viet Nam one of countries most vulnerable to climate change impacts
- Valuation of $CO_2$ impacts $1.2 billion in 2011, increasing to over $9 billion by 2030
- Reduction of GHG emissions a key GoV policy priority

# Impacts of Thermal Power Generation

- **Acidification**, mainly caused by $SO_2$ widespread and increasing problem in Viet Nam and throughout the Mekong Region
- Impacts on soil and water quality and can threaten sensitive ecosystems & affect agricultural productivity
- $SO_2$ impacts valued at $94 million in 2011, increasing to over $728 million by 2030

# Impacts of Thermal Power Generation

- **Human Health Impacts** from both gaseous pollutant and particulate matter (PM) are a major an increasing risk
- Severity of impact depends upon background pollution levels
- Major concerns where clusters of power stations built close to major cities – especially around HCMN
- Valuation of PM & $NO_x$ impacts increases from $330 million in 2011 to $1.35 billion in 2030

# Impacts of Thermal Power Generation

- Additional thermal power generation costs depend on specific characteristics of power station site
- Effects of cooling waters on local ecosystems a major concern in sensitive sites
- Solid waste disposal a challenge throughout the country
- Impacts on local community: severe but numbers small and can be easily compensated

# Hydropower Impacts

- The second largest source of power generation and also impacts is hydropower
- Impacts most severe in area close to dam & reservoir site, but wider impacts can be found
- Results based on update of detailed SEA of hydropower master plan

# Hydropower Impacts

- **Reservoir Area:** over 25,000 ha to be submerged & 61,500 people displaced
- Forests lost valued at $74 million & loss of agricultural production $2.9 million/year

# Hydropower Impacts

- Surrounding **Zone of Influence** where largest impacts felt:
  - Possible serious biodiversity impacts in 10 sites: especially risky in 2 schemes Dak Mi1 & Dong Nai 5
  - Major risk of forest degradation: total forest value in ZoI high at $8.4 billion, but not all will be lost
  - Serious degradation of river ecosystems in vicinity of dams – upstream & downstream
  - Further social impacts on local communities
  - Balanced against these negative impacts are likely increases in agricultural incomes

# Hydropower Impacts

- **Wider Impacts**: changes to flows in river basins, affecting downstream ecosystems & human uses
- Potential for improvements to dry season water availability if reservoirs managed for multipurpose benefits, valued at $92 million/year
- Some GHG releases – methane especially

# Nuclear Power Potential Impacts

- Nuclear not developed yet so no existing impacts to assess
- Nuclear power characterised by low probability but very high danger risks
- Essential to develop effective system for management of all stages in use of radiological materials before nuclear power stations constructed

# Nuclear Power Potential Impacts

- **Non-radiological risks** also exist
- Most serious potential impact is from high levels of cooling water use: possible severe ecosystems impacts – selection of site with low risk is essential
- Nuclear waste disposal a key issue & system needs to be developed
- Disaster vulnerability – siteing of stations in low risk sites essential

# Renewable Energy

- Low level of renewable energy development included in the PDP VII base case
- Proposals in the base case will have little or no adverse social or environmental impacts
- Rather renewable energy is a means to reduce adverse impacts from other types of power generation

# Transmission Lines

- PDP VII contains a major expansion of the power transmission system – essential
- Potential significant impacts on forests and on areas of biodiversity value
- Impacts in other areas mostly aesthetic
- Forests: over 14,000 ha will be cleared, valued at $218 million
- Risks of ecosystems fragmentation in key 39 biodiversity & 59 protected areas: some very serious – fragmentation into 5 or more segments

# Section 3: Mitigation Measures & Recommendations

- The analysis of the impacts of PDP VII identified several areas of concern where possible mitigation measures need to be assessed
- Some risks can be significantly reduced by effective mitigation measures, others harder to mitigate

# Mitigation of Impacts from Thermal Power Generation

- Largest impacts, highest need for mitigation measures, especially for atmospheric pollution
- Coal-fired generation especially important for mitigation measures
- Improved energy efficiency: sustained but achievable efficiency measures could reduce demand for coal by over 56 million tons/year by 2030, with major reduction in 4 major atmospheric pollutants with a value of around $4 billion per year.

# Mitigation of Impacts from Thermal Power Generation

- Replacement of coal with enhanced renewable energy generation (more than double rates in PDP VII base case) potential to save over $10 million tone/year by 2030
- Reduction of impacts from enhanced renewable energy valued at $1.7 billion/year by 2030
- Need further analysis to assess feasibility & economic viability of an integrated strategy for increased energy efficiency and expansion of renewable energy for power generation

# Hydropower Mitigation Measures

- Multiple impacts requires a range of mitigation measures
- Water resources: manage for multipurpose benefits within a river basin context
- Social costs: implementation of improved compensation & development package for displaced persons
- Extend support to ‘host’ populations in areas where people are resettled to

# Hydropower Mitigation Measures

- Implement PFES decree to all hydropower schemes to benefit watershed communities
- Mitigation of impacts on forests through community forest programmes & enforcement of protected area regulations
- Biodiversity impacts: introduce strict management controls in biodiversity risk areas
- Cancel 2 highest biodiversity risk schemes: Dok Mi 1 & Dong Nai 5

# Nuclear Power Mitigation Measures

- Develop regulatory framework and institutional capacities for the management of radiological materials
- Select power station sites to ensure minimum impacts from cooling waters on sensitive ecosystems

# Transmission Line Impacts Mitigation Measures

- Re-route transmission lines where they create high risk of fragmentation of high value ecosystems
- Where possible, introduce 1,000 kV transmission lines to reduce the number of lines needed