

Costs and Benefits of a Greener Alternative for the Development of Vietnam's power sector

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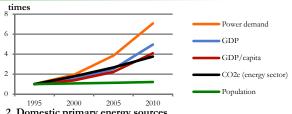


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Abstract— In this study, BAU (a scenario based on current trends) and ALT (a greener alternative with more renewables, higher energy efficiency) are developed. The external costs of CO₂, NOx, SO₂ and PM₁₀ in the Vietnamese power sector are estimated at 20, 1328, 2047 and 1460 US\$/ton, respectively. The authors find that the electricity price and the domestic trade balance in ALT are less sensitive to fluctuations in the international price of coal than in BAU. The total costs accumulated between period 2010-2040 would be lower in ALT: 632 billion US\$ compared with 974 billion US\$. This difference arises from several factors: lower investment in new capacity (226 vs 306 billion US\$); lower local pollution costs (73 vs 137 billion US\$); and lower expenditures on imported fuels (57 vs 115 billion US\$). The outcomes of ALT are in accord with the targets in the most recent Green Growth Strategy of Vietnam.

Key words: energy planning, energy efficiency, dynamic modelling, LEAP, Vietnam

1. Power consumption increase 1.5 times higher than GPD growth



2. Domestic primary energy sources

| | Potential / Reserve | Depletion at 2010 rate |
|------------|-------------------------------|------------------------|
| Coal | 3,390 Mil.tons (91.5 Bil. GJ) | 2087 |
| Gas | 610 Bil. m3 (21.1 Bil. GJ) | 2086 |
| Oil | 460 Mil.tons (2.6 Bil. GJ) | 2038 |
| | Potential capacity | 2012 capacity |
| Hydro | 21,000 -24,000 MW | 13,000 MW |
| Wind | 400,000 MW | 40 MW grid-connected |
| Solar | 20,000 MW | (mostly not connected) |
| Bio-energy | 5,000 MW | (mostly not connected) |
| Geothermal | 2,000 MW | |

3. Assumptions of the two scenarios

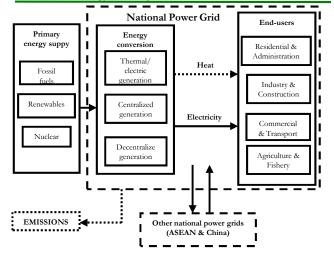
Scenarios

| | | | 11.7 |
|----------------------------------|-----|--|--|
| Business As Usual scenario | BAU | Medium demand forecast by the PDP VII | Continuation of Current Policies for power development in Vietnam |
| Alternative scenario | ALT | Reduce power intensity (based on low-demand forecast of PDP VII) | No electricity generation from nuclear, less coal import and more renewables as compared to BAU |

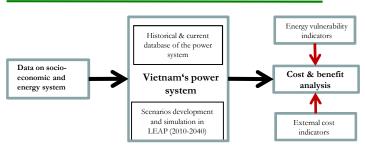
Supply side

Demand side

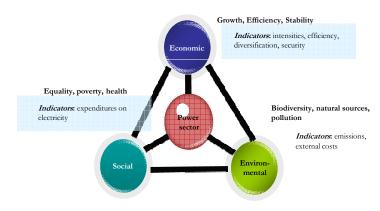
4. National energy planning: LEAP Model



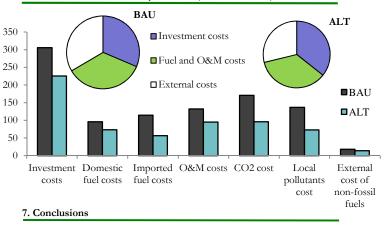
5. Method to assess the total costs of electricity



6. Sustainability and Extendlity analysis



6. Breakdown of total cost by scenario (billion US\$2008)



✓Vietnam's power system would be more vulnerable to fluctuations of imported fuel price, depletion and scarcity of fossil energy in next 2030 ✓Under the proposed alternative scenario, the sector would be less vulnerable with its less costs ✓External costs of electricity generation are as important as their production