

添付資料 3.A

SEA のグッドプラクティス

添付資料 3.A : SEAのグッドプラクティス

JICA

JICA は 2010 年 4 月に新しい環境社会配慮ガイドラインを公布し、その中で以下の通りマスタープラン等における SEA の適用を求めている。

“JICA は、マスタープラン等においては、戦略的環境アセスメントを適用する。早期段階からモニタリング段階まで、環境社会配慮が確実に実施されるよう相手国等に働きかける。”

また、2005 年に「戦略的環境アセスメントの導入に関する基礎的研究」を実施し、その中で下表に示す SEA 評価基準に基づき事例分析を行っている。

表 3.A-1: 「戦略的環境アセスメントの導入に関する基礎的研究」(JICA, 2005) における SEA 評価基準

評価項目	評価の観点	評価基準 (5 : 良 ~ 1 : 悪) ※評価値 3 は「どちらともいえない」を意味する。
1.1 事業/計画の記述	提案行為の目的は、国家目標などの上位政策/計画と整合しているかどうか。主要な目的は簡潔に記述されているかどうか。	5 : 提案行為は上位政策/計画と整合している、または、背景説明が妥当なものである。提案行為の目的は明確に記述されている。 4 : 上記 (評価値=5) で挙げた項目のいずれかが欠けている。 2 : 目的の記載はあるが不明確であり、背景説明や上位政策との整合性などの記述もない。 1 : 提案行為の目的が記述されていない。
1.2 環境影響の範囲	提案行為によって生じる可能性のある自然/社会環境への影響範囲が明確に定義されている。	5 : 提案行為による影響について、自然・社会・公害面ともにもれなく記述されている。影響の空間的・時間的範囲についても記述されている。 4 : 上記 (評価値=5) で挙げた項目のいずれかが欠けている。 2 : 影響範囲についての記述はあるが、限られた項目のみである。 1 : 影響範囲についての記述はない。
1.3 環境状態	現状の環境状態、および提案行為が実施されなかった場合の将来の環境状態が記述されている。	5 : 現状の環境状態 (自然・社会・公害面すべて) が記載されている。提案行為が実施されなかった場合の環境状態について記述がある。 4 : 上記 (評価値=5) で挙げた項目のいずれかが欠けている。 2 : 環境状態についての記述はあるが、限られた項目のみである。 1 : 環境状態についての記述はない。
2.1 影響のスクーピング	影響は総合的かつ適切な方法でスクープされており懸案点は網羅されている。	5 : 影響項目は客観的に検証可能な方法で特定されている。自然・社会・公害のいずれについても検討されており、絞り込まれた過程が適切である。 4 : 上記 (評価値=5) で挙げた項目のいずれかが欠けて

		<p>いる。</p> <p>2 : 影響は特定されているが、検討対象は限られた項目のみである。</p> <p>1 : スコーピングは実施されていない。</p>
2.2 主要な影響	提案行為のステージに応じて、予想される影響はできるだけ正確に記述されている。	<p>5 : 自然・社会・公害面について幅広く記述されている。M/P なら IEE レベル、F/S なら EIA レベルの検討がされている。</p> <p>4 : 上記（評価値=5）で挙げた項目のいずれかが欠けている。</p> <p>2 : 影響についての記述はあるが、項目が限定的である。</p> <p>1 : 影響についての記述はない。</p>
2.3 影響評価	予想される影響は適切かつ定量的に記述されている。予測・評価の方法は妥当である。	<p>5 : 定量的な測定が確立している影響項目については、定量的に記述されている。分析方法（サンプリング、測定方法、評価モデルの使用など）といった影響評価の方法が記述されている。データの記載があり、検証可能である。</p> <p>4 : 上記（評価値=5）で挙げた項目のいずれかが欠けている。</p> <p>2 : 影響評価方法についての記述はあるが、項目や分析方法が限定的である。</p> <p>1 : 影響評価方法についての記述はない。</p>
3.1 代替案	計画や事業の代替案は検討されている。代替案選択の根拠が明確である。	<p>5 : 提案行為のステージに応じた代替案が検討されている。代替案の選択は環境・社会・公害面から検討し、影響が小さい案が提案されている。</p> <p>4 : 上記（評価値=5）で挙げた項目のいずれかが欠けている。</p> <p>2 : 代替案は検討されているが、選択基準が限定的である。</p> <p>1 : 代替案検討はしていない。</p>
3.2 ミティゲーション	ミティゲーションは検討されている。	<p>5 : 予見される各影響項目に対応したミティゲーションが検討されている。コストや期間、方法が検討されている。</p> <p>4 : 上記（評価値=5）で挙げた項目のいずれかが欠けている。</p> <p>2 : ミティゲーションは検討されているが、実現のための方策が検討されていない。</p> <p>1 : ミティゲーションは検討されていない。</p>
3.3 モニタリング	モニタリングの実施体制は検討されている。	<p>5 : 予見される各影響項目に対するモニタリングが検討されている。スケジュールや資金など運営計画が検討され、実施可能な案となっている。M / P の場合は、現実的な運営計画についての提言がある。</p> <p>4 : 上記（評価値=5）で挙げた項目のいずれかが欠けている。</p> <p>2 : モニタリングは検討されているが、具体的な運営計画はない。</p> <p>1 : モニタリングは検討されていない。</p>
3.4 提言	環境社会面の懸案について、意思決定に反映されるよう提言がある。	<p>5 : 環境・社会・公害面に関する懸案事項への対処が提言されている。</p> <p>4 : 上記（評価値=5）で挙げた懸案事項のいずれかが欠けている。</p> <p>2 : 提言はあるが、限られた項目のみである。</p> <p>1 : 環境・社会・公害面での提言はない。</p>
4.1 体裁	レイアウトは必要な情報がすばやく探せるような工夫がされている。関連するデータが検索できるようになっている。	<p>5 : 目次、略語・用語解説、参考文献リスト、図表など、読み手に配慮した工夫がされている。</p> <p>4 : 上記（評価値=5）で挙げた項目のいずれかが欠けている。</p> <p>2 : 目次や略語・用語解説などの記述はあるが、限定的である。</p> <p>1 : 目次や略語・用語解説などの記述はない。</p>
4.2 公開性	専門外の人間にも理解可能な内容となっている。関連する情報が完備されている。プ	<p>5 : 一般住民に対し情報が公開されており、一般向けの説明資料などが用意されている。</p> <p>4 : 一般住民に情報公開は実施されているが、物理的・内</p>

	プロセスは一般人に公開されている。	容的にアクセスの制限がある。 2 : 情報提供の対象が関係省庁のみなど、限定的である。 1 : 情報提供は事業者のみである。
4.4 コンサルテーション	情報は偏りなく公開されており、レポート中で強調されている。関心をもつ人々の意見は配慮されており、結果に反映されている。	5 : 関心のある人にも対話を求めるなど、透明性の高い手続きで進められた。 4 : 代表者のみの間接的参加など、事業者サイドで設定した関係者のみ関与する手続きをとった。 2 : 協議の場は設けず、情報提供のみを行った。 1 : 情報公開や協議は実施しなかった。
4.5 要約	非専門的な要約が添付されている。	5 : 現地語の要約が用意されている。要約は一般向けの非専門的な内容となっている。 4 : 上記（評価値=5）で挙げた項目のいずれかが欠けている。 2 : 要約はあるが、言語や内容に関して一般人が理解できる内容になっていない。 1 : 要約はない。

(出所) 戦略的環境アセスメントの導入に関する基礎的研究 (JICA, 2005)

世界銀行

SEAに関するポリシー

世界銀行は 1990 年代初期より SEA 的な手法を導入しており、2001 年に制定された World Bank Environment Policy にて、SEA は環境を早期の意志決定や計画策定プロセスに統合する有力な手段であり、持続可能な発展のためのツールとしての SEA の利用を促進することをコミットしている。

2004 年に承認された Operational Policy 8.60（以下、「OP8.60」）において、環境に重大な影響を及ぼす可能性のある Development Policy Loan 対象の国家政策については、世界銀行が借入国の負の影響を削減し正の影響を強化するシステムについて評価を行うとしており、SEA は OP 8.60 を遵守するための重要なツールと考えられるとしている。

2005 年に Paris Declaration on Aid Effectiveness にてドナー間でセクターや国家レベルでの SEA のコモンアプローチの開発と適用が合意されたことを受け、2006 年に経済協力開発機構（Organisation for Economic Co-operation and Development、以下「OECD」）により「Applying Strategic Environmental Assessment - Good Practice Guidance for Development Co-Operation」が策定された。

SEA パフォーマンスクライテリア

世界銀行は国際影響評価学会（International Association for Impact Assessment (IAIA)）のクライテリアに基づき、以下に示す SEA パフォーマンスクライテリアを策定している。

表 3. A-2: 世界銀行の SEA パフォーマンスクライテリア

統合されている。	<ul style="list-style-type: none">■ 生物学的、社会的、経済的側面の相互関係について言及する。■ 関連セクターおよび（境界を越えた）地域における政策、また適切な場合には、プロジェクト EIA および意思決定に対して階層になっている。
持続可能型である。	<ul style="list-style-type: none">■ より持続可能な開発のオプションと代替案の特定を促進する
焦点が絞られている。	<ul style="list-style-type: none">■ 開発計画および政策決定のための、十分で、信頼できる、かつ有用な情報を提供する。■ 持続可能な開発の主要課題に集中する。■ ステークホルダー間の主要なトレードオフを含む、意思決定プロセスの特徴に合わせる。■ 費用や時間の面で効率的である。
反復的である。	<ul style="list-style-type: none">■ 意思決定プロセスや将来の計画に影響を与えることができるように、十分早い段階で評価結果を入手可能にする。■ 決定事項を修正すべきかどうか判断するために、また、将来の決定に対しての根拠を提供するために、戦略的決定事項を実施することによる実際の影響につ

	いて十分な情報を提供する。
説明責任を果たすことができる。	<ul style="list-style-type: none"> ■ 戦略的決定を行う先導的機関としての責任を有する。 ■ プロフェッショナリズム、厳密な公正さ、公平性、バランス感覚をもって実行される。 ■ 独立した審査と検証を受ける。 ■ 意思決定において持続可能性の問題がどのように考慮されているか記録し、正当化する。
参加型である。	<ul style="list-style-type: none"> ■ 意思決定プロセスのすべてにわたって、利害関係や影響を受ける一般市民および政府機関に情報を提供する。 ■ 文章作成や政策決定において、提供された情報と問題点について明確に述べる。 ■ ステークホルダー間の合意形成に役立つ ■ 明確で、容易に理解できる情報となっており、またすべての関連する情報に対して十分にアクセスできることを保証する。
影響を及ぼす。	<ul style="list-style-type: none"> ■ 最終的に適用される戦略的決定やその実施に影響を及ぼす。 ■ 社会環境的持続可能性の問題に対して、政府機関の総合的な姿勢や組織構成に影響を及ぼす。 ■ 機会が生じたら、政府機関に類似のプロセスに組み込まれたいと希望させる
統合されている。	<ul style="list-style-type: none"> ■ 生物学的、社会的、経済的側面の相互関係について言及する。 ■ 関連セクターおよび（境界を越えた）地域における政策、また適切な場合には、プロジェクト EIA および意思決定に対して階層になっている。
持続可能型である。	<ul style="list-style-type: none"> ■ より持続可能な開発のオプションと代替案の特定を促進する

(出所) 世界銀行ウェブサイト

OECD

”Applying Strategic Environmental Assessment - Good Practice Guidance for Development Co-Operation”は実施主体や政策、計画及びプログラムの種類に応じた SEA を実施するためのチェックリストならびに SEA をレビューするためのチェックリストを提示している。以下に主要なチェックリストを示す。

表 3.A-3: SEA 実施のためのチェックリスト：一般的なチェックリスト－全ての SEA に対する質問

<p>原則と範囲</p> <ul style="list-style-type: none">■ SEA の適切な原則、クライテリアおよび指標は定義されているか。■ SEA の空間的、時間的範囲は適切に定義されているか。■ SEA の実施にあたり、ドナー間協調の必要性・機会はあるか。■ 提案される PPPs に対して代替案は特定または検討されているか。 <p>他の戦略、政策および計画との関連性</p> <ul style="list-style-type: none">■ 全ての関連する戦略、政策および計画（国もしくはは地方レベル）がレビューされており（貧困削減戦略、ミレニアム開発目標ベースの戦略、地区計画など）、評価される PPPs はそれらの目標をサポートするものであり、また整合がとれているか。対立や齟齬は提案の策定において考慮されているか。 <p>影響</p> <ul style="list-style-type: none">■ 提案される PPPs の潜在的な直接的、間接的および累積的な正負の影響（短、中、長期、環境ならびに社会）は予測・評価されているか。■ 影響を防ぎ、緩和するための具体的な方法が特定されているか。もしくは、どのように他の国家政策・プログラムが潜在的な負の影響を緩和するかが明確にされているか。■ 正の影響を強化する可能性はあるか。それらの機会は最大化されるか。■ アセスメントの品質は独立したレビューを受けるか。 <p>ステークホルダーの関与</p> <ul style="list-style-type: none">■ 全ての関連するステークホルダーは、SEA プロセスに関与し、潜在的な影響ならびに管理手法を特定する機会を有するか。■ 特に、市民社会（特に影響を受ける共同体）の見解は含まれるか。提案される PPPs 策定への影響はどのようなものか。 <p>能力</p> <ul style="list-style-type: none">■ 具体的な PPPs を実施し、または自然資源の使用を管理・規制し、それらに対する責任を有する機関（国、またはそれに準じるレベル）は十分な能力を有しているか。どのようにそれらの機関の能力は強化されるか。■ 環境影響、主要な環境資源政策および制度上の失敗を管理するための組織的な枠組みはあるか。■ 環境政策枠組みならびに立法府は発生する問題に対処できるか。 <p>SEA の影響</p> <ul style="list-style-type: none">■ PPPs の策定過程において、SEA が決定や設計に影響を及ぼしうるポイントがあるか。 <p>データ、情報およびモニタリング</p> <ul style="list-style-type: none">■ 重大なデータや情報の欠如・格差はあるか。それらはどのように対応されるか。■ モニタリングの方法は提案されているか。それらは明確かつ、実行可能であり、SEA で用いられた指標や目標とリンクしているか。責任主体は明確か。
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（出所） OECD (2006)、Applying Strategic Environmental Assessment - Good Practice Guidance for Development Co-Operation

表 3.A-4: SEA 実施のためのチェックリスト：ガイダンスノート・チェックリスト4－インフラ投資計画・プログラム

<p>一般的な質問、決定／活動</p> <ul style="list-style-type: none"> ■ 提案される投資プログラムは当該国のインフラならびに投資に関する政策／枠組みの目的、原則および優先順位と整合がとれているか。 ■ 提案される投資の狙いと目標は明確か。 ■ 適切な場合には、指標や目標が定義されているか。 ■ 地方などの土地利用計画がレビューされ、適切な場合には、投資計画にて考慮されているか。 ■ 投資計画の過程で、様々なレベル（国際的、国家、地方など）で設定された環境目標が考慮されているか。 ■ 投資が階層的なプロジェクトの一部を構成する場合、評価の重複が回避されているか。 ■ 戦略的かつ上流の代替案（投資対象となるセクター以外も含む）が分析・比較されているか。ベストな代替案が合理的かつ透明性のある、また、適切な情報に基づいた手法で選択されているか。その代替案が投資計画の基礎をなしているか。 <p>リンクエージ／影響</p> <ul style="list-style-type: none"> ■ 提案される投資の開発目標と環境の関連性は特定されているか。それらはよく把握されているか、もしくは更なる解析を必要とするか。 ■ 投資による潜在的な間接的ならびに累積的（短、中、長期）な環境社会影響が評価され、関連する緩和策が特定され、投資計画ならびに関連プログラムに含まれているか。 ■ 投資により、プロジェクトサイト周辺以外に重大な環境影響を及ぼすリスクはあるか。 ■ インフラやネットワークは気候変動の影響を受ける可能性があるか。プロジェクト計画の基礎を成す主要な前提は、適切なプロジェクト計画期間における、気候変動の影響という観点からの検証が行われているか。このような評価を可能にする科学的知見は十分か。 ■ 潜在的な越境影響は特定されているか。特定されている場合、投資のための主要な戦略的意志決定の前に、通知や情報交換が実施されているか。 ■ 地方開発による便益が達成される機会があるか。 <p>機関／実施</p> <ul style="list-style-type: none"> ■ 投資実施機関に対するキャパシティビルディングや環境規制の強化（被影響住民の司法アクセスを含む）の必要性はあるか。 ■ インフラ投資計画や個別の大規模インフラプロジェクトにおいて、社会的弱者にあたるステークホルダーの意味ある参加のための計画はあるか。 ■ 市民社会の見解はどのように含まれるか。投資計画におけるそれらの影響はどのようなものか。 ■ インフラ投資は地方・地域レベルの生産的なパートナーシップを促進するか。
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(出所) OECD (2006)、Applying Strategic Environmental Assessment - Good Practice Guidance for Development Co-Operation

表 3.A-5: SEA レビューのためのチェックリスト 6.1: PPPs の想定される成果の評価のための重要な質問

<p>SEA における仮定</p> <ul style="list-style-type: none"> ■ SEA は将来の結果を正確に予測しているか。SEA において設定された仮定は適切か。 <p>PPP 策定に対する SEA の影響</p> <ul style="list-style-type: none"> ■ SEA は PPPs の策定責任者に有用な情報を提供したか。 ■ SEA は持続可能な成果のために最も重要な問題を特定したか。 ■ SEA は当初 PPPs に含まれていなかった問題や懸案を反映させたか。 ■ SEA の結論は意志決定者に効果的に伝達されたか。 ■ 意志決定者は意志決定に提供された情報を反映・包含する意志があるか。 ■ SEA は実際に PPPs を変更したり、PPPs をより環境保全型にすることに成功したか。 ■ PPPs 策定プロセスは SEA の結論を十分に参照したか。 <p>実施プロセスへの影響</p> <ul style="list-style-type: none"> ■ SEA は実際に PPPs の実施・予算計画ならびに他の事後措置を変更したり、PPPs をより環境保全型にすることに成功したか。 ■ PPPs を持続可能な開発／環境の目標を反映した実施方法や成果に導いたか。より環境保全型のオプションが実施されたか。 ■ SEA の提言は、PPPs 実施中の持続可能な開発と環境の統合をサポートする制度的背景（環境顧問団、セクター間協調、後続く EIA の要求など）や管理（司法へのアクセス、環境管理のための社会的弱者への権限付与）の変化を導いたか。 ■ ステークホルダーは PPPs 実施中に SEA の提言に従ったか。 <p>持続可能な開発／環境に関連した直接的ならびに間接的な目標への影響</p> <ul style="list-style-type: none"> ■ SEA が貢献した何らかの兆候はあるか。 ■ ミレニアム開発目標 No.7 もしくは他の関連目標の達成状況（特定ケースの場合）。 ■ 関連地域での環境や自然資源の状況の改善 ■ 透明性、説明責任、改善された管理 ■ SEA の持続可能な開発の便益が関連費用を上回っているか。 <p>キャパシティビルディングの結果ならびに説明責任への影響</p> <ul style="list-style-type: none"> ■ SEA は意志決定者や実施者をトレーニングすることによってキャパシティビルディングの助けとなったか。 ■ SEA は社会的弱者に該当するステークホルダーに力を与えたか。 ■ SEA は意志決定過程の透明性や PPPs の環境側面に関する意志決定者の説明責任を強化したか。 ■ 意志決定者は SEA の結論やモニタリングに基づき決定を正当化・補正したか。 ■ SEA の適用はこのアプローチの可能性のよりよい理解を導き、今後の SEA 適用を促進したか。
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(出所) OECD (2006)、Applying Strategic Environmental Assessment - Good Practice Guidance for

Development Co-Operation

表 3.A-6: SEA レビューのためのチェックリスト 6.2: 品質管理チェックの評価のための
重要な質問

<p>情報のプレゼンテーションならびに品質</p> <ul style="list-style-type: none"> ■ SEA プロセスから提供された情報は PPPs 実施責任者の視点から見て適切か。不足はあるか。 ■ SEA プロセスから提供された情報はステークホルダーの視点から見て適切か。不足はあるか。 <p>協調ならびにステークホルダーの参加</p> <ul style="list-style-type: none"> ■ SEA チームと PPPs 実施機関との間で効果的な協調がなされているか。（協調がなされていない場合）その理由は、どのように改善されるか。 ■ 効果的な公衆参加が行われるか。（参加が行われていない場合）その理由は、どのように改善されるか。 ■ 社会的弱者に該当するステークホルダーの協議参加への努力がなされたか。どのように成功させたか。 <p>レポートにおける SEA 手続きの記述</p> <ul style="list-style-type: none"> ■ SEA の目的は、関連規制に言及しつつ記述されているか。 ■ SEA の範囲は議論されているか。 <p>SEA に用いられた目的</p> <ul style="list-style-type: none"> ■ SEA に用いられた本質的な目標が記述・定義され、適切な場合は定量化されているか。 ■ SEA レポートは目標と PPPs または他の PPPs との対立や齟齬を特定・記述しているか。 <p>代替案</p> <ul style="list-style-type: none"> ■ PPPs の潜在的な代替案が、SEA の目的の観点から記述・検討されているか。PPPs を実施しない代替案が含まれているか。 ■ 代替案が除外された場合、その理由が説明されているか。 <p>環境影響評価</p> <ul style="list-style-type: none"> ■ 重大な環境影響が発生すると考えられる場合、それらは明確に記述されているか。 ■ 持続可能性に最も作用する環境影響を優先順位付けする努力がなされたか。 ■ 環境影響評価手法は記述されたか。 ■ 全ての正負の影響が取り扱われたか。 ■ 影響評価における不確実性がある場合や、仮定が用いられた場合は、それらが正当化され、ワーストケースシナリオが用いられたか。 ■ 緩和策が明確に記述され、また PPPs の実施による重大な負の環境影響を予防、低減および代償することがコミットされたか。 <p>フォローアップの計画ならびに実施</p> <ul style="list-style-type: none"> ■ モニタリング指標は明確に定義されているか。また指標はベースライン情報や PPPs や SEA の目的に基づいているか。 ■ 他の潜在的なフォローアップ手法（プロジェクト EIA、設計ガイドラインなど）との関連が明記されているか。 ■ 実施プロセスへの提言が明確に策定されているか。 ■ 成果測定指標が定義されているか。計画段階以降の SEA の継続性に焦点をあてた評価計画（適切な予算、明確に定められた責任）が策定されているか。 <p>SEA プロセスに関する全体的なコメント</p> <ul style="list-style-type: none"> ■ SEA の異なる要素に対する主要なステークホルダー（特に社会的弱者）と PPPs 実施者の見解は何か ■ 将来的に見解の相違はどのように改善されるか。 <p>制約と機会</p> <ul style="list-style-type: none"> ■ 効果的な SEA を達成するにあたってのもっとも重大な制約は何か。 ■ SEA の成功を確実にする最も重大な正の要因は何か。
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(出所) OECD (2006)、Applying Strategic Environmental Assessment - Good Practice Guidance for Development Co-Operation

アジア開発銀行

SEA に関するポリシー

2009年に制定された Safeguard Policy Statement にて、以下の通り SEA の実施を求めている。

“プロジェクトが地域、セクターでの環境への重大な影響を及ぼす可能性がある、ポリシー、プラン、プログラムの開発・変更を伴う場合、SEA の実施が要求される。SEA レポートには、①シナリオの分析、②長期ならびに間接的影響の評価、③コンサルテーションプロセスの記述、④オプション選択の説明が含まれる。”

2010年に制定された Safeguard Policy Statement の実施手続きを定めた Operation Manual においても、以下の通り SEA の実施を求めている。

“政策、計画及びプログラムとそれらの代替案の社会環境影響の系統的な評価を促進する SEA はプログラムローンの準備に有効に適用され、適切な場合には ADB は借入国等に SEA の利用を促す。カテゴリーA のプログラムローンプロジェクトで SEA が準備されている場合は、ドラフト SEA を ADB のウェブサイト上でボードでの検討の前 120 日間公開する”

ベトナムにおけるパイロット SEA

アジア開発銀行はベトナムにおいて以下の pilot SEA を実施している。

- Capacity Building in the Strategic Environmental Assessment of the Hydropower Project (Technical Assistance)
- Strategic environmental assessment of the hydropower masterplan in the context of the power development plan VI (supported by the ADB's Greater Mekong Subregion Core Environmental Program)

欧州連合

2001年に採択されたSEA指令（SEA Directive 2001/42/EC）により、以下に示す環境に重大な影響を及ぼすと考えられる計画及びプログラムに対して、SEAの実施が義務付けられた。

農業、林業、漁業、エネルギー、工業、交通、廃棄物処理、水管理、電気通信、観光、都市及び農村計画等

SEAに関する様々なガイダンスやスタディ、レポートがあり、例えば、“Handbook on SEA for Cohesion Policy 2007-2013”（February 2006, Green Regional Development Programmes Network）では下表に示すSEA指令の要求事項を充たすためのチェックリストを提示している。

表 3.A-7: Handbook on SEA for Cohesion Policy 2007-2013 におけるSEAレビューチェックリスト

<p>目的と背景</p> <ul style="list-style-type: none">■ プログラムの目的が明確になっている。■ 他の計画、プログラム及び政策との関連性が把握・説明されている。■ SEA Directive や関連する欧州の政策において指摘されている環境問題が考慮されている。■ 関連する環境目標が明確に設定され、SEA が焦点をあてる指標や具体的な問題とリンクしている。■ 関連する環境目標やプログラムの目的との摩擦が把握・記述されている。 <p>SEA の範囲決定</p> <ul style="list-style-type: none">■ SEA レポートの内容ならびに範囲について、関連する環境機関と適切な方法・時期にて協議が行われている。■ 評価は重大な問題に焦点をあてている。■ 発生した技術的、手続的な問題が協議されている。仮定や不確実性が明確にされている。■ 更なる検討が不要とされた項目について理由が説明されている。 <p>ベースライン情報</p> <ul style="list-style-type: none">■ 環境の現状ならびに PPPs が実施されない場合の環境状況の推移が記述されている。■ プログラムによって重大な環境影響を受けると考えられる地域の環境特性が記述されている。■ 情報や手法の欠如といった困難が説明されている。 <p>オプションの評価</p> <ul style="list-style-type: none">■ 実行の優先順位、手法及び状況を加味した現実的な代替案が検討されている。■ 各代替案の環境影響（正負の双方を含む）が把握・比較され、それらの影響が選択された理由が記述されている。■ 代替案の取捨選択の理由が説明されている。■ 情報や手法の欠如といった困難が説明されている。 <p>緩和策</p> <ul style="list-style-type: none">■ 計画の実施による重大な負の影響を予防、低減および相殺するための方策が示唆されている。■ 合意形成における留意事項が特定されている。 <p>レポート</p> <ul style="list-style-type: none">■ レイアウトや表現が明確である。■ シンプルかつ明瞭な用語を用い、専門用語は使用を避けるか、説明を行う。■ 地図やイラストを適切に用いる。■ 使用した方法論を説明している。

- 協議の相手、方法を説明している。
- 情報源、専門家の判断及び意見が分かれた点を説明している。
- 非専門的な要約が含まれている。

関連する環境機関ならびに公衆との協議

- SEA に関する協議は手続きの欠くことが出来ない部分である。
- 関連する機関や公衆との協議が、プログラムのドラフトレポートや SEA レポートに対して意見が表明出来るような適切なタイミングで実施されている。

政策決定ならびに決定に関する情報

- SEA レポートや協議におけるステークホルダーの意見がプログラム文書の完成・採用にあたり考慮されている。
- どのようにそれらが考慮されたかが説明されている。
- 他の合理的なオプションの比較検討を踏まえ、プログラムが採用された理由が説明されている。

(出所) Green Regional Development Programmes Network (2006): Handbook on SEA for Cohesion

Policy 2007-2013

添付資料 3.B

Draft SEA Report

REPORT

STRATEGIC ENVIRONMENTAL ASSESSMENT – PDPVII

INTRODUCTION

1. Basis of National Power Development Mater Plan

Electricity is one of the most important energy sources for the development of socio-economy and national security at present and in the future.

The importance of this energy is mentioned in Law on Electricity and item no 2 stipulating Content, processing, procedure and appraising Power Development Plan attached in Decision no 42/2005/QĐ-BCN dated 30/12/2005: ” Power Development Plan (PDP) is target, orientation, solution and institution of power development, power sources and transmission improving in order to supply electricity sufficiently, safely and continuously to industries, public benefits, livelihood and national defence based on national energy resource saving”. Each 5 years, master plan will be adjusted. PDP in the period 2011-2020 and with the look up to 2030 (PDP VII) is being implemented by Institute of Energy (IE), it is expected to complete and submit to Government in the end of 2010.

Vietnam electricity system is now supplied by 3 energy sources, namely hydropower, coal-fired thermal power and gas-fired thermal power that is transmitted by high voltage transmission line along country from the North to South. It is expected that in 2025, the percentage of power generation types will be equal, the rate of thermal power and renewable energy will increase and the rate of hydropower will reduce.

Power production and transmission bring economic benefits for national economy in the period of industrialization and modernization. Moreover, power production and transmission also cause negative impacts to environment that can not be avoided during production as other industries.

Pursuant to Law on Environmental protection, Decree no 80/2006/CP dated 09/08/2006 and Decree no 21/2008/NĐ-CP dated 28/02/2008 by Government for Implementation Law on Environmental protection in Socio-economic development, Circulation no 05/2008/TT-BTNMT dated 08/12/2008 by Ministry of Natural Resources and Environment on guideline for Strategic Environmental assessment, environmental impact assessment and environmental protection, Institute of Energy make a report of SEA for PDP VII. Content and procedure obey environment regulations and guideline of MONRE.

2. Legal and technical basis for SEA

2.1. Legal basis

SEA of PDP VII is executed based on legal basis below:

- Law on Environmental Protection, 2005
- Law on Electricity, 2004
- Law on Nuclear Energy, 2008
- Law on Land, 2003

- Law on Water resources, 1998
- Law on Biodiversity, 2009
- Law on Minerals, 1996
- Law on Cultural Heritage, 2001
- Law on Forest Development and Protection, 2004
- Decree on Detail Regulations and Guidelines for Implementation of Some Articles of Law on Environmental Protection No. 80/2006/NĐ-CP dated 09/08/2006 by the Government
- Decree No. 21/2008/NĐ-CP dated 28/02/2008 by the Government on adjustment and supplement some articles of Decree No. 80/2006/NĐ-CP dated 09/08/2006 by the Government for Implementation of Some Articles of Law on Environmental protection.
- Decree No 140/2006/NĐ-CP dated 22/11/2006 by Government stipulating the Regulation of Environmental Protection in Planning, Appraisal, Approving Master Plans, Programmes and Plans.
- Decree No 109/2003/NĐ-CP dated 23/09/2003 by Government stipulating the Wetland Preservation and Development.
- Decree No 50/1998/NĐ-CP dated 16/07/1998 by Government stipulating the execution of Ordinance of radiation safety and controlling .
- Decree No 179/1999/NĐ-CP dated 30/12/1999 by Government stipulating the execution of Law on Water Resources.
- Decree No 149/2004/NĐ-CP dated 25/06/2004 by Government stipulating the licensing of exploratory, exploitation and using water resources and water discharging to water sources.
- Decree No 23/2006/NĐ-CP dated 03/03/2006 by Government stipulating the execution of Forest Development and Protection.
- Decree No 32/2006/NĐ-CP stipulating the management of forestal floral, rare and valuable forestal animal.
- Decree No.59/2007/NĐ-CP dated 09/4/2007 by Government stipulating the solid and hazardous waste management.
- Circular on guideline for Strategic Environmental assessment, environmental impact assessment and environmental protection No. 05/2008/TT-BTNMT dated 08/12/2008 by Ministry of Natural Resource and Environment.
- Circular No 06/2007/TT-BKH dated 27/08/2007 by Ministry of Planning and Investment on guiding for implementing Decree No. 140/2006/NĐ-CP dated 22/11/2006 regulating on environmental protection in making, appraise, approval and implement organization for strategies, planning, plans, programs and development projects.
- Resolution no 41-NQ/TW dated 15/11/2004 by Political Bureau, Center Committee of Vietnamese Community Party of Environmental Protection in period of Industrialization and modernization.
- Instruction of Scretariat of implementing resolution no 41-NQ/TW ngày 15/11/2004 dated 15/11/2004 by Political Bureau, Center Committee of Vietnamese Community Party of Environmental Protection in period of Industrialization and modernization.

- Decision no 192/2003/QĐ-TTg dated 17/09/2003 by Government on approving Strategy of Vietnamese natural reserves until 2010.
- Decision no 22/2006/QĐ-BTNMT dated 18/12/2006 by Ministry of Natural Resource and Environment of obligatory of applying Vietnamese environmental standard.
- Decision no 1855/QĐ-TTg dated 27/12/2007 by Government of approving National Energy Development Strategy to 2020 and with the look up to 2050. In this document, orientation of power development is presented detailed.
- Decision no 16/2008/QĐ-BTNMT dated 31/12/2008 by Ministry of Natural Resource and Environment of enforcing National Environmental Regulations.
- Circular no 25/2009/TT-BTNMT dated 16/11/2009 by Ministry of Natural Resource and Environment on enforcing National Environmental Regulations.
- Document no 10982/BCT-ATMT dated 17/11/2008 by Ministry of Industry and Trade on implementing SEA report for master plan. This document stipulates units commissioned to build Programme, Plan and Project must make SEA report mentioned in item no of Law on Environmental Protection and submit to authorities to appraisal as legal regulation.

Functional departments submit to Minister to approve Master Plan in case of report from Ministry's environmental units on SEA appraisal results.

- Decision no 6385/QĐ-BCT dated 21/12/2009 on approving Draft and Estimate report for Strategic Environmental Assessment for Power Development Plan in period of 2011-2020 and with the look up to 2030“.

2.2. Technical basis

SEA of PDP VII is executed based on technical basis below:

- PDP VI document established by IE, EVN, 2005
- PDP VII established by IE, MOIT, 2010
- General technical guideline on SEA completed by Department of Appraisal and EIA under MONRE in January 2008 and established in October 2008 with the assistance of SEMLA sponsored by SIDA.

3. Objectives, approaches and organization

3.1. Objectives

Objectives of SEA under PDP VII:

- Electricity development: to ensure the effectivity and stability of national socio-economy.
- Calculate and analyze all economic, environmental and social cost and benefits of PDP VII's scenarios.
- Ensure all Governmental policies of renewable energy, climate changes and energy saving mentioned in PDP VII.
- Identify and suggest mitigation measures and satisfactory compensation for negative impacts.

SEA is executed with the time of PDP VII. Scenarios of socio-economic development, current status and potentiality of primary energy, energy consumption and electricity transferring with other countries in the region... are used to be set up and calculate power demand scenarios and

power development scenarios. All these scenarios are used to assess related economic, social and environment effects, show general view of main strategic impacts and suggest suitable development scenarios. It is good for authorities and managers to make a decision and have the most effective methods.

SEA of PDP VII can suggest reason for changes and adjustment in plan and implementation, including: (i) mitigation measures in industries and large scale (for example number of power plants, scale, site, river basin), (ii) new trial on related parties' function and responsibility) and (iii) Adjustment of plan and management process.

During assessing cumulative impacts, issues related to other industries' plans at strategy level, SEA will specify the disadvantages of informations and suggest more detailed studies (if any). At general level, it can find out and orient EIA for projects in the next phases.

3.2. Approach method

From the SEA objects above, approach method is based on cooperation between 2 processes that impact each other. SEA is set up based on socio-economic scenarios, forecasted power demand and power source and transmission line to assess and then reflect to Power Development Scenarios. This process is shown in figure no 1.1.

Assessment and cooperation between socio and environment cost and benefit calculation for scenarios of selected power sources and transmission line based on indicators that can be defined objectively and quantitatively (a) national policies and development target (b) overview and opinion of related parties. The implementation is divided into 5 phases.

Phase 1: Define scope of study

Define main environmental indicators to assess 5 power development types including hydropower, thermal power, nuclear power and new and renewable energy, transmission line (500 kV and 200 kV grid). These indicators will be assessed quantitatively based on available data.

Set up policy background related to policies and national targets on energy efficiency, renewable energy and green house gas emission reducing and environmental sustain and reserve, minimum flow in river and public benefit sharing.

Set up and select demand-supply scenarios and select scenarios to be analyzed.

Define role and scope of GIS in SEA

Phase 2: Data collection and analyze basic line

For each environmental indicators, it can be quantified (a) consider available data and international consultants (b) data from other sources (c) national experts will collect data from the assistance of MOIT and IE.

Set up structure and necessary indicators used in GIS, identify and integrate indicators that can be analyzed by GIS based on the spatial location of potential power projects, new transmission line and areas impacted by thermal power plants (areas impacted by cooling water and air pollution) and hydropower plants (in the radius of 20 km). Especially for hydropower plants, in 2008 SEA for hydropower plants in the context of PDP VI therefore it only needs to

add new projects outside PDP VI and for nuclear power plants, SEA for Nuclear power plant sites in Vietnam was also set up in 2009.

Phase 3: Collect data from related parties

The first workshop to collect ideas from related parties will be held for SEA team to present scope of study and methodology and help related parties, governors understand about SEA of PDP VII.

Send impact matrixes to environmental management units and provinces where there will be power projects to receive their knowledge and attention of potential impacts caused by other power development types.

Phase 4: Impact analyzing and scoring

Quantitative analyzing by GIS (if any) different positive and negative impacts of power supplement scenarios based on demand analyzing in SEA.

Economically assess environmental indicators that can be assessed. For the impacts that can not assessed need to defined the scope of impacts.

Give economic, technical and environmental grades that can reflect priorities of Governmental policies.

Put general economic analyzing in impact assessment for each power supplying scenarios.

Rank projects and power supplying scenarios based on economic calculation as a boundary factor.

Phase 5: Define impacted areas and select mitigation measures and proper compensation.

For residents and areas impacted by power development plan, it needs to have suitable compensation and mitigation measures based on National regulations and experiences in Vietnam and others.

Assess financially mitigation measures and compensations and benefit sharing based on draft National decree.

Phase 6: Last consultation of related parties and commitment

Interview national related parties, especially governmental agencies that are responsible in different fields to consider practicability of commitment suggested in SEA.

Organize workshop to present and receive ideas about analyzed results and commitments for SEA.

Complete SEA team and commitment for PDP VII.

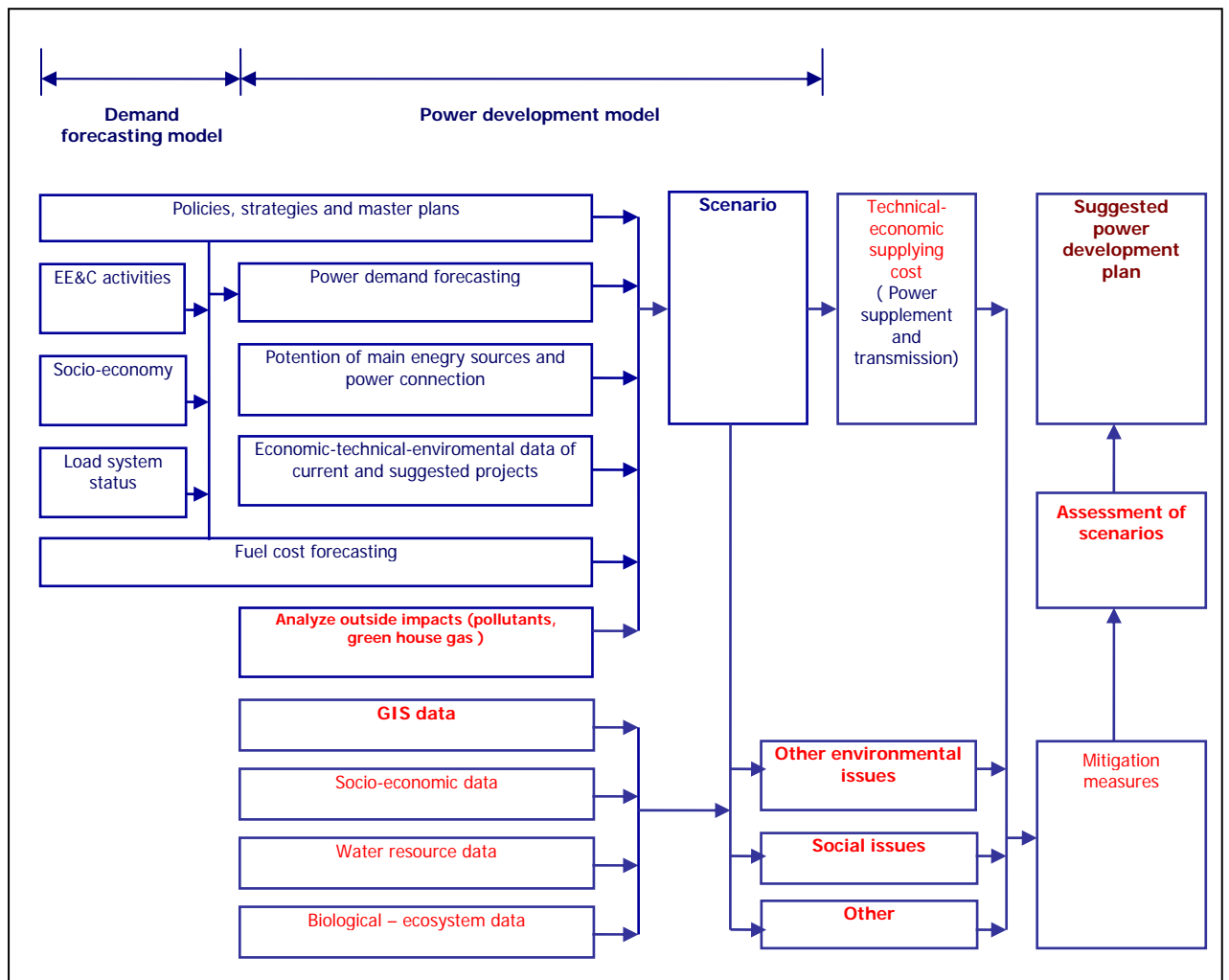


Figure 1.1. Coordination process between SEA and PDP VI

3.3. Implementation and discussion

On behalf of PDP VII implementor, IE has carried out step below:

Step 1: Set up SEA team (12 experts in environmental field, electricity field... including 4 experts in PDP VII team and Deputy Director of IE – PDP VII project manager)

Moreover, there are SEA experts from other units, environmental experts in environmental, environmental economy and ecosystem field...and international experts from Stockhom Environmental Institute, GIS experts and Energy Economists who are sponsored by ADB.

Step 2: Define scope of study, methodology, define main environmental components, environmental impact and environmental indicators that need to be assessed, power development scenarios based on power demand scenarios and power scenarios based on national target.

Main environmental impacts to be analyzed and assessed related to 5 development types in PDP VII

(1) Number of displaced households

- Number of displaced households
- Percentage of ethnic minorities

(2) Impacts to livelihood

- Lost of agricultural area
- Lost of aquacultural/forestrial products
- New occasions of occupation and incomes
- Area for resettlement and planting
- Tourism benefits from hydropower, wind power, large-scale PV solar power development

(3) Cultural impacts

- Impacts to cultural and religious sites
- Lost of cultural lands
- Lack of public awaranness and participation in planning

(4) Impacts to biodiversity

- Hectares of High Value Biodiversity Area Likely to be Impacted
- Hectares of Protected Area Likely to be Impacted
- Lost of wetland and/or coastal environment when constructing power plants
- Hydropower: Impact basin area
- Thermal power: Impacts to marine ecosystem due to discharging cooling water, reduce in water quality and quantity

(5) Impacts to natural resources

- Total of forest area can be lost or impacted
- Total of fossil fuel, limestone, leveling soil can be exploited and consumed
- Area of forest, wetlend and protected areas can be impacted
- Production of fish catching
- Rise in erosion and siltation

(6) Impacts to hydropower regime

- Change in flow in flood season and dry season
- Reduce risk of food demand
- Impacts to water quality
- Environmental flow and risk of downstream siltation and erosion
- Benefits from multi-propose water using

(7) Impacts to climate change

- CO2 emission from reservoir and fuel burning

- CH₄ emission from reservoir
- CO₂ emission from geothermic flow
- CO₂ emission from sugarcane bagasse burning

(8) Air pollution

- Impacts from PM₁₀, SO₂, NO_x to human health and disease
- Impacts from PM, SO₂, NO_x, N, S, cause acid accumulation in water ecosystem, harvest and residential constructions
- Toxic and hazardous materials used for PV production
- Emissions of toxic substances due to incineration during decommissioning
- H₂S and other gases (NH₃, H₂, N₂ and Ra) release from geothermal fluids
- NO, CO and particulate release from Bagasse Combustion

(9) Solid waste

- Water pollution due to leakage or improper management of ash pond
- Large area for ash pond
- Contamination of soil and ground water due to improper disposal of batteries
- Contamination of soil and ground water due to decommissioning of PV systems

(10) Impacts/ risks from radiation

- Radiological Release in Cooling Waters
- Radiological Release in Air Emissions
- Disposal of Radioactive Waste Materials

(10) Landscape and environmental pollution

- Change of natural landscape
- Disease related to water sources
- Impact to human health due to electro magnetic field
- Light pollution from aircraft warning lights
- Noise impacts of wind turbine generators
- Impacts of shadow flickering
- Impact of leaking turbine lubricating oil or hydraulic fluid
- Visual impacts of large scale solar systems and building integrated systems

(11) Impacts to geology

- Surface rupture, ground shaking, ground failure, slope stability failure, ground subsidence

· Impacts on Soil and Geology of Water Impoundment

Each environmental impacts and indicators are analyzed and forecasted changing based on available and collected data during monitoring and implementing.

- Consider institution and laws on SEA.

Phase 3: by collecting data from documents in the locality where there are large-scale power projects. Then select environmental issues that need to be assessed based on ideas.

Organize workshop to collect ideas directly based on approach methodology and related environmental issues that will be assessed for power development scenarios.

Phase 4: Assess risks and impacts in company with cost-benefit calculation for each impacts and environmental indicators, define scope and main impacts related to project, namely:

Apply to calculate cost and impacted scale for environmental indicators.

Indicator	Applied methodology	Note
Investment cost for power development and supplement	Based on investment rate of current power plants	
Cost of lost bio-diversity: marine ecosystem and forest ecosystem	Apply GIS to specific scope and coefficient in the document "Changes in Nature's Balance sheet: Model-based Estimates of Future World wide Ecosystem Services" and the economic of ecosystem and biodiversity" supplied by Dr.John Soussan	
Reduce in water quality	Apply GIS to specific scope and coefficient in the document "Changes in Nature's Balance sheet: Model-based Estimates of Future World wide Ecosystem Services". Other reference documents	
Air pollution and green house gas	Apply GIS to specific scope and coefficient in the document "Changes in Nature's Balance sheet: Model-based Estimates of Future World wide Ecosystem Services". Other reference documents	
Cost for damage caused by climate change	Refer to Development and Climate change, WB	
Cost for environmental mitigation measures	Apply investment cost and mitigation cost from current power projects	

Apply calculation for cost and define scope of impacts for social environmental indicators

Indicator	Applied methodology	Note
Number of displaced household	Apply GIS or monitoring Besides statistical figures in PDP VII, it needs to add number of displaced households in PDP VII.	
Cost for land using impacts - Impacts to income due to loss of agricultural area	Apply GIS to specific scope and coefficient in the document "Changes in Nature's Balance sheet: Model-based	

<p>- Forest</p>	<p>Estimates of Future World wide Ecosystem Services” and the economic of ecosystem and biodiversity” supplied by Dr.John Soussan</p> <p>Moreover, refer to analyzing methods in pilot SEA of hydropower development in the context of PDP VI.</p> <p>- Poverty and remote areas: evidence from new data and questions for the future, WB.</p> <p>- Benefit sharing for people impacted from power development project in Vietnam, ADB.</p> <p>- Refer to analyzing methods in the document of Sustainable development, WB and Current reserved areas master plan in Vietnam.</p>	
<p>Cost of change in water using purposes</p>	<p>Apply analyzing methods in pilot SEA of hydropower development in the context of PDP VI.</p> <p>Refer to ”Changes in Nature’s Balance sheet: Model-based Estimates of Future World wide Ecosystem Services” for other fields.</p> <p>Find and add new related documents</p>	
<p>Not ensure food safety</p>	<p>Refer to ”Changes in Nature’s Balance sheet: Model-based Estimates of Future World wide Ecosystem Services” for other fields.</p> <p>Find and add new related documents</p>	
<p>Lost of income from resources</p>	<p>Find and add new related documents</p>	
<p>Rise in poverty rate</p>	<p>Apply analyzing methods in pilot SEA of hydropower development in the context of PDP VI.</p> <p>Refer to ”Changes in Nature’s Balance sheet: Model-based Estimates of Future World wide Ecosystem Services” for other fields.</p> <p>Find and add new related documents</p>	
<p>Change in income from agriculture and industry (reduce/increase)</p>	<p>Apply analyzing methods in pilot SEA of hydropower development in the context of PDP VI.</p> <p>Refer to ”Changes in Nature’s Balance sheet: Model-based Estimates of Future World wide Ecosystem Services” for other fields.</p> <p>Find and add new related documents</p>	
<p>Aquacultural value in river and sea (upstream and downstream)</p>	<p>Apply analyzing methods in pilot SEA of hydropower development in the context of PDP VI.</p> <p>Refer to ”Changes in Nature’s Balance</p>	

	sheet: Model-based Estimates of Future World wide Ecosystem Services” for other fields. Find and add new related documents	
Impact to human health caused by air quality	Find and add new related documents	
Occupations and incomes	Apply analyzing methods in pilot SEA of hydropower development in the context of PDP VI. Refer to ”Changes in Nature’s Balance sheet: Model-based Estimates of Future World wide Ecosystem Services” for other fields. Find and add new related documents	

- Rank project by priority order based on environmental indicators caused by projects in PDP VII. This work will be done by weighting matrix method called multi-purposed methods for environmental issues above.

It is very important to define weighting for each environmental issues that can reflect environmental impacts from projects in PDP VII. This work is executed very carefully based on the principle of high score for significant impacts. This score will reduce according to impact level. The ranking is:

3 = Major direct negative impacts where mitigation measures are not possible

2 = Major direct negative impacts where mitigation measures are possible

1 = small, indirect negative impacts

0 = No impacts

-1 = Possible positive benefits

Based on weighting value, it is used to calculate for each projects. The results will be ranked in the order of high to low scores in all 3 scenarios.

List of projects and criteria will be selected and will be inputs to model that can rank in the order of project that has least impacts and high economic efficiency. Expert Choice software is a very useful tool for project ranking. After inputting data, software will calculate and rank projects based on the priority order above.

- Compare scenario: (1) Base scenario and (2) High scenario

Selected scenario: (1) Scenario that consider national targets of energy efficiency, renewable energy and green house gas reducing.

Phase 5: Define and suggest mitigation measures, solutions and commitment.

Organize workshop to collect ideas from related parties of assessment results and practicality of suggested solutions.

During implementing, SEA team has meetings in each phase to understand results and discuss works for next phase.

By doing like this, it ensures the unification between SEA team and PDP VII team.

Experts participating in SEA implementing:

No	Name	Speciality	Position
I	National expert		
1	Associate professor. Dr. Nguyen Thi Ha	Environmental technology	Deputy manager of Environment Faculty – Natural Science University – Hanoi national Unviversity
2	Dr. Le Thu Hoa	Environmental economy	Dean of Environmental Faculty – Hanoi National economy university
3	Dr. Ho Thanh Hai	Ecology and Environmental Protection	Institute of Ecology and Resources
4	Dr. Bach Tan Sinh	Social environment	Institute of Strategy - MOST
5	MSc. Pham Quang Tu		Vietnam institute of society
6	Dr. Pham Quang Lam		Institute of Public Health
7			
8	MSc. Nguyen Anh Tuan	Electricity system	Deputy Director of IE, PDP project manager
9	Dr. Hoang Tien Dung	Thermal Power Plant	Deputy Director of IE
10	MSc. Doan Ngoc Duong	Thermal Power Plant	Director of Consultation Center of Thermal power – Nuclear power and Environment, IE
11	BSc. Nguyen Thi Thu Huyen	Environmental technology	Deputy manager of Department of Technology and Environment - Consultation Center of Thermal power – Nuclear power and Environment, IE, Leader of SEA group
12	MSc. To Thi Ngoc	Environmental technology	Department of Technology and Environment - Consultation Center of Thermal power – Nuclear power and Environment, IE
13	Engineer Le Hoang Anh	Hydrology and Environment	Department of Technology and Environment - Consultation Center of Thermal power – Nuclear power and Environment, IE
14	MSc. Nguyen The Bac	Electricity system	Department of Electricity system - IE
15	Engineer Nguyen Khoa	Energy economy	Department of Economic

	Dieu Ha		forecasting and Energy demand management - IE
16	Engineer Phan Thi Thanh Thuy	Energy economy	Center of Renewable energy and CDM - IE
17	BSc. Dang Huong Giang	Environmental chemical	Center of Renewable energy and CDM - IE
18	Engineer Ngo Thi Truc Ha	Hydrology and Environment	Department of Hydropower, IE
19	Enginner Nguyen Trong Luong		Department of Power transmision line planning, IE
II	International expert		
1	Pr. Dr. John Soussan	SEA expert – Team leader	Stockholm Environmental Institute, Asia Center
2	Dr. Romeo Pacudan	Energy economy	
3	Mr. Lothar Linde	GIS expert	

Chapter 1: BRIEF SUMMARY AND RELATED MAIN ENVIRONMENTAL ISSUES IN PDP VII

1.1. OWNER

- Owner of PDP VII: Ministry of Industry and Trade (MOIT)
- Address: 54 – Hai Ba Trung street, Hanoi, Vietnam
- Điện thoại:
- Fax:
- Email:
- Name of header
- Position: Minister of MOIT

1.2. BRIEF SUMMARY

1.2.1. Brief summary of PDP VII

- Target of PDP VII
- Content of PDP VII
- Overview and orientation of PDP VII

1.2.2. Assess the suitability of policies and national development

Vietnam socio-economic master plan in the period of 2011 – 2020 and with the look up to 2030

a. Policies and institutions affecting to socio-economic development

Law on budget

Law on bid

Socio-economic master plan

Strategy and national target programe on poverty alleviation

Policies and regulation of compensation and resettlement

b. Socio-economic issues related to PDP VII

Master plan of national infrastructure development

a. Energy

Vietnam national energy development master plan to 2020 and with the look up to 2050. The orientation of power sector is mentioned:

b. Water supplying and using

c. Transportation

d. Communication

e. Health care, culture and education

f. Land use master plan

Related institutions and policies

Law on land

Industry development master plan

Master plan of forest development

Other socio-economic institutions related to land use

Issues related to land use in PDP VII

Master plans of national parks, natural reserves, special forest, khu dự trữ sinh quyển, tourism area and wetland

a. Related institutions

Law on biodiversity

Law on forest protection

Master plans of national parks, forest development, wetland, protected coastal area

Activities on bio-diversity

b. Other issues in PDP VII related to bio-diversity

1.2.3. Significant and priority programs and projects in PDP VII

1.2.4. Data on environmental protection

1.2.5. Solutions on institution and policies

1.2.6. Methodology of PDP VII

1.3. SCOPE OF SEA STUDY

1.3.2. Scope of SEA study

1.3.2.1. Spatial scope

National power development plan (PDP) is to develop and improve power sources (thermal power, hydropower, nuclear power and new and renewable energy), transmission lines to supply power sufficiently, safely and continuously for industries, public benefits, living and national defense.

Spatial scope of SEA under PDP VII is districts, communes where there are potential power source and transmission line projects in the list of PDP VII and international transmission line projects. These districts and communes are shown in the table below:

Figure 1.1. Map of thermal power plant sites

Figure 1.2. Map of hydropower plant sites

Figure 1.3. Map of nuclear power plant and new energy sites

Figure 1.4. Map of transmission line projects

1.3.2.2. *Schedule*: period of 2011 -2020 and with the look up to 2030

1.3.3. Main environmental issues related to PDP VII

Here are some development types in PDP below:

- Power production with different fuels and technologies: thermal power, hydropower, nuclear power, new and renewable energy.
- Power distribution and transmission with other voltage loads whole countries

Main environmental issues impacted by projects which are selected to analyzed and assessed in this SEA report include natural environmental issues and social environmental issues:

a. Social issues

- Distribution of PDP VII to economic development
- National energy safety
- Local emigration for development
- Structure of residents and economic structure
- Living standard and income gap among regions
- Poverty alleviation and social equity among economic regions
- Water resources benefits sharing

- Food safety
- Environmental conflict
- National security

b. Natural environmental issues

- Structure of land use
- Environmental impacts to policies and plans
- Primitiveness of ecosystem
- National resources saving: coal, oil and limestone
- Climate change
- Water quality degradation
- Air quality degradation
- Diseases related to water and air pollution

d. Environmental risks

- Vấn đề môi trường liên quốc gia

Impacts from unusual climatic phenomena seem to be environmental risks

- Climate change causing drought, flood, rise in air temperature
- Erosion and landslide
- Acid rain
- Salty
- Change in downstream hydrological regime
- International environmental issues

Chapter 2: MOVEMENT OF ENVIRONMENTAL ISSUES RELATED TO PDP VII

2.1. CURRENT STATUS OF NATURAL, ENVIRONMENTAL AND SOCIO-ECONOMIC CONDITIONS

2.1.1. Natural conditions

According to general socio-economic master plan, there are 11 economic sub-regions in Vietnam based on master plan of agricultural ecosystem regions:

Region 1: Northwestern region

Region 2: Northeastern region

Region 3: Red river delta region

Region 4: North economic region

Region 5: North of Central region

Region 6: Central economic region

Region 7: South central coastal region

Region 8: Highland region

Region 9: Mekong river delta region

Region 10: South coastal region

Region 11: South economic region

Current status of natural, socio-economic and environmental condition in Vietnam will be analyzed based on the economic regions above.

2.1.1.1. Contion of geography and geology

- Geography conditions (topography, geomorphology)
- Geology condtions

2.1.1.2. Meteorological and hydrological condition

- Meteorological condition
- Hydrological condition
- Oceanological condition

2.1.2. Current status of environmental components

2.1.2.1. Natural environment

- Soil quality
- Water quality
- Air quality
- Current status of ecosystem and national reserves

Forest and biodiversity

Water ecosystem

Marine ecosystem

Agricultural land

2.1.3. Current status of socio-economic development

2.1.3.1. Current status of economy

a. Current status of Vietnam industries

Structure of economy, labour and occupation:

- Industry
- Agriculture
- Transportation
- Mining
- Tourism
- Trade
- Service

Infrastructure

Living standard and poverty

b. Problem and challenge

2.1.3.2. Current status of society

- Population and demography: nationality, sex, religion, education and labour
- Emigrant and resettlement: expected scale, land for resettlement and production
- Structure of economy, labour and occupation: occupation (agriculture, aquaculture, water using and others), infrastructure, living standard and poverty.
- Religion, belief, historical monument and related structures in PDP VII area and vicinities
- Living standard and income gap among regions
- Emigration and resettlement
- Environmental conflict
- National defence security
- Environmental impacts to policies and master plans

2.1.4. Primary energies and mineral resources

2.1.4.1. Potentiation of primary energies

2.1.4.2. Mineral resources

2.1.4.3. Water resources

2.1.4.4. Other resources

2.2. FORECASTING CHANGE IN ENVIRONMENTAL COMPONENTS

2.2.1. Change in natural contion

2.2.2. Change in environmental components

2.2.3. Environmental change under impact of climate change

- Sea level rise
- Change in climate conditions
- Natural calamity
- Disease

2.2.4. Socio-economic change

Analyze and assess impacts from

Master plans of industries

Projects approved in PDP VII but not deployed and project not under PDP VII.

Market force

Chapter 3: ENVIRONMENTAL IMPACT FORCASTING IN THE CONTEXT OF PDP VII

3.1. ASSESS THE SUITABILITY OF PDP WITH THE OBJECTIVES OF ENVIRONMENTAL PROTECTION AND SOCIO-ECONOMIC DEVELOPMENT

The selection of scenarios to be assessed has to ensure all the objectives below:

- Objectives of PDP VII with environmental protection opinion
- Objectives of socio-economic development
- Object of energy saving and preservation
- Objectives of green house gases reducing and adaptation with climate change
- Objectives of new and renewable energies development
- Forecast impacts and affects of implemeting all objectives in PDP VII and all objectives of environmental proection and stable developement.

3.2. ASSESS SCENARIOS OF PDP VII

3.2.1. Assess environmental, economic, social impacts of each scenario suggested in PDP VII

Analyze and assess all environmental issues based on items below:

3.2.1.1. Impacts to natural environment

- Structure of land use
- Primitiveness of ecosystem
- National resources saving: coal, oil and limestone
- Climate change due to
 - CO₂ emission from reservoir and fuel burning
 - CH₄ emission from reservoir
 - CO₂ emission from geothermic flow
 - CO₂ emission from sugarcane bagasse burning
- Water quality degradation
- Air quality degradation
- Diseases related to water and air pollution
- Impact from policies and plans to environmental issuee

3.2.2.2. Impacts to social environment

- Contribution of PDP VII to economy development
- National energy safety

- Local resident emigrating for development plan.
- Structure of resident and economy
- Living standard and income gap among regions
- Poverty alleviation and social equity among economic regions
- Water resources benefits sharing
- Food safety
- Environmental conflict
- National security

3.2.2.3. Pollution and emission

Based on specific characteristics of power development types, it can be found out:

- Environmental issues from thermal power plants
 - Air pollution due to PM₁₀, SO₂, NO_x
 - Water pollution due to cooling water
 - Soil pollution due to ash discharging
 - Solid waste and hazardous waste
- Environmental issues from hydropower plants
 - Climate conditions and downstream flow
 - CO₂, CH₄ emission
- Environmental issues from nuclear power plants: cooling water and radiological waste
- Environmental issues from new and renewable energy development
 - Toxic and hazardous materials used for PV production, emissions of toxic substances due to incineration during decommissioning
 - H₂S and other gases (NH₃, H₂, N₂ and Ra) release from geothermal fluids, Surface rupture, ground shaking, ground failure, slope stability failure, ground subsidence
 - NO, CO and particulate release from Bagasse Combustion
 - Noise impacts of wind turbine generators, leaking turbine lubricating oil or hydraulic fluid
- Environmental issues from transmission line: Electric and Magnetic Field

3.2.2.4. Environmental risks

Impacts from unusual climatic phenomena seem to be environmental risks

- Climate change causing drought, flood, rise in air temperature
- Erosion and landslide
- Acid rain
- Salty

- Change in downstream hydrological regime
- International environmental issues

3.2.2.5. Environmental economy cost analyzing

Describe weighting process for each scenario.

Synthesis results of each scenario and compare scenarios based on target of national food safety, economic cost (PDP VII scenario) and environmental protection scenario in the context of energy saving and effective consumption, new and renewable and green house gas reducing.

3.2.2. Some commitments for best development scenario based on environmental protection view

a. Technical

- Planning phase
- Construction phase
- Operation phase

b. Resettlement and compensation programe

c. Significant impact area

d. Forest protection

e. Biodiversity protection

f. International and inter-regional environmental issues

e. Cost and budget

3.2.3. Select optimal and sustainable scenarios

3.3. FORECAST ENVIRONMENTAL ISSUES BASED ON SUGGESTED SCENARIOS

Assess cumulative impacts from PDP VII based on related environmental issues

3.3.1. Impacts from PDP VII

- Planning components
- Projects
- Other activities in PDP VII

3.3.2. Analyze and assess objects impacted by PDP VII

3.2.1.1. Natural environmental impacts

- Landusing structure
- Impacts to policies and master plans
- Ecosystem in natural reserves and national parks
- National resources: coal, oil and limestone
- Living standard: water quality, air quality and soil quality

Based on specific characteristics of power development types, it can be found out:

(1) Environmental issues from thermal power plants

Air pollution due to PM₁₀, SO₂, NO_x

Water pollution due to cooling water

Soil pollution due to ash discharging

Solid waste and hazardous waste

(2) Environmental issues from hydropower plants

Climate conditions and downstream flow

CO₂, CH₄ release

(3) Environmental issues from nuclear power plants: cooling water and radiological waste

(4) Environmental issues from new and renewable energy development

Toxic and hazardous materials used for PV production, emissions of toxic substances due to incineration during decommissioning

H₂S and other gases (NH₃, H₂, N₂ and Ra) release from geothermal fluids, Surface rupture, ground shaking, ground failure, slope stability failure, ground subsidence

NO, CO and particulate release from Bagasse Combustion

Noise impacts of wind turbine generators, leaking turbine lubricating oil or hydraulic fluid

(5) Environmental issues from transmission line: Electric and Magnetic Field

- Human health

3.2.2.2. Social impacts

- Contribution of PDP VII to economic development

- National energy security

- Local residents

- Change in residential and economic structure

- Poverty alleviation and social equity among economic regions

- Water resources benefits sharing

- Food safety

- Environmental conflict

3.3.3. Cumulative impacts and environmental trend due to cumulative impacts from PDP VII

(Impact matrixes based on technical – environmental and socio-economic rate and core environmental issues identified in PDP VII)

3.3.4. Environmental risk

Impacts from unusual climatic phenomena seem to be environmental risks

- Climate change causing drought, flood, rise in air temperature
- Erosion and landslide
- Acid rain
- Salty
- Change in downstream hydrological regime
- International environmental issues
 - a. Hydropower development
 - Reservoir development
 - Erosion and siltation
 - Impacted area
 - Wild life
 - Socio-economy and mitigation cost
 - Resources: soil, forest, ecosystem and biodiversity
 - b. Thermal power development
 - International environmental issues
 - CO₂ emission and climate change
 - Resources: soil, fossil fuel
 - c. Nuclear power development
 - Radiological dumping ground
 - Radiological safety in nuclear power development
 - d. New and renewable energy development
 - Investment cost

Chapter 4: CONSULTATION OF RELATED PARTIES

4.1. CONSULTATION ORGANIZATION

4.1.1. Consultation objectives

Based on project phases, consultation of related parties will be done in both 2 phases (phase 2 and last phase).

The object of consultation is to report information of SEA of PDP VII and collect all ideas about:

- (1) Main environmental issues and representative environmental indicators to be assessed
- (2) Approach and assessment method
- (3) Assessment and analysed results of electricity development scenarios
- (4) Practicality of suggested mitigation measures

4.1.2. Consultation type and objects

There are 3 consultation types:

- (1) Send impact matrixes to provinces where there will be big power projects. Here are selected provinces.

Province	Plant	Capacity (MW)
Lai Chau	Lai Chau Hydropower Plant	1200
	Nam Na Hydropower Plant	35
Lào Cai	Ngoi Phat Hydropower Plant	57
	Bac Ha Hydropower Plant	90
	Nam Pang Hydropower Plant	36
	Coc San Hydropower Plant	40
	Chu Linh Hydropower Plant	30
	Song Bac Hydropower Plant	34
	Su Pan small HPP (14MW), Nam Tong (20MW), Ban Xeo (20MW), Bac Na (16MW), Nam Khanh (11MW), Minh Luong (22.5MW)	
Son La	Son La Hydropower Plant	
	Ban Chat Hydropower Plant	220
	Nam Mo Hydropower Plant	38
	Huoi Quang Hydropower Plant	560
	Nam Chien 1& 2 Hydropower Plant	196 and 34
	Nam Tau	34
	Nam Tha	35
	Wind power	50
	Pumped-storage hydropower plant	1500
	Nam Chien 2 small HPP, Nam Phia, Nam Chim, Nam Dong 1, 2 &4, Nam Gion, Nam Mo, Khau Mang, Suoi Sap	
Ha Giang	Nho Que 1, 2 & 3 small hydropower plant	40, 70 and 140

	Thai An hydropower plant	44
	Ba Me hydropower plant	70
	Bac Quang hydropower plant	(expect)
	Phuong Do small HPP, Mien river	
Tuyen Quang	Na Hang hydropower plant	342
	Tuyen Quang hydropower plant	
Hai Duong	Hai Duong Thermal Power Plant	1200
	Pha Lai 1 and 2 Thermal Power Plant	440 and 600
Hai Phong	Hai Phong 1, 2 & 3 Thermal Power Plant	1200 and 2400
	Nomura Thermal Power Plant	30
Lang Son	Na Duong Thermal Power Plant	110
Quang Ninh	Mong Duong Thermal Power Plant	2200
	Quang Ninh Thermal Power Plant	1200
	Cam Pha Thermal Power Plant	600
	Uong Bi Thermal Power Plant	105 + 600
	Mao Ke Thermal Power Plant	440
	Thang Long Thermal Power Plant	600
Hoa Binh	Hoa Binh hydropower plant	1920
	Trung Son hydropower plant	250
	Ban Uon hydropower plant	80
	Hoi Xuan hydropower plant	96
	Thai Binh Thermal Power Plant	1800
Thanh Hoa	Nghi Son Thermal Power Plant	1800
	Cua Dat hydropower plant	97
	Hua Na hydropower plant	180
	Ban Mong hydropower plant	54
Nghe An	Ban Ve hydropower plant	320
	Khe Bo hydropower plant	100
	Thac Muoi hydropower plant	53
Ha Tinh	Vung Ang 1,2,3 thermal power plant	4800
Quang Binh	Quang Trach thermal power plant	2400
Quang Tri	Rao Quan hydropower plant	
Hue	Huong Dien hydropower plant	48
	A Luoi hydropower plant	170
	Binh Dien hydropower plant	44
Quảng Nam	Nong Son thermal power plant	30
	Tra My hydropower plant	210
	Dak My 1& 4 hydropower plant	210 and 210
	Song Tranh 1&2 hydropower plant	25 and 160
	Song Giang hydropower plant	32
	Song Bung 2, 5 & 4 hydropower plant	185, 85 and 100
	Song Con 2 hydropower plant	53
Quang Ngai	A Vuong 1 hydropower plant	210
	Dak Rinh hydropower plant	100
Kontum	Kontum upstream hydropower plant	220
	Ba Vi hydropower plant	30

	Pleikrong hydropower plant	100
	Dak Re small hydropower plant, Dal Doa	28 and 12.6
Gia Lai	Se San 1 hydropower plant	90
	Y A Ly hydropower plant	
	Se san hydropower plant	260
	Se San 3a hydropower plant	108
	Se San 4 hydropower plant	360
	Se San 4a hydropower plant	63
	An Khe hydropower plant	163
	Sre Pok 3 and 4 hydropower plant	220 and 70
	Ayun Thuong 1A, 2, H'Mun, Đăk Srong small Hydropwer plant	19, 18, 14.4, 18
	Phuong Mai wind power	36
Dac Lac	Buôn Tsrach hydropower plant	85
	Buôn Kuop hydropower plant	280
	Yan Tann Sien small hydropower plant	19,5
Binh Dinh	Vinh Son hydropower plant	66
	Binh Dinh Thermal Power Plant	2400
	Tra Xom hydropower plant	20
Phu Yen	Song Hinh hydropower plant	70
	Ba Ha river hydropower plant	
	Dong Cam hydropower plant	130
	EAK H Nang hydropower plant	65
	Van Tho and Van Thanh wind power	50 + 112
Khanh Hoa	Van Phong Thermal Power Plant	1320
	Cam Ranh Thermal Power Plant	2400
	Pumped-storage HPP	1200
Dong Nai	Dong Nai 1, 2, 3, 4, 5 hydropower plant	140, 78, 240, 180
	Dak R'Tih hydropower plant	141
	Da Dang hydropower plant	34
Da Lat	Da Nhim and Thac Mo hydropower plant	
Lam Dong	Dai Ninh hydropower plant	300
	Ham Thuan hydropower plant	300
	Da My hydropower plant	177
	Bac Binh hydropower plant	35
	Srok Phu Mieng hydropower plant	51
Ho Chi Minh city	Thu Duc thermal power plant	153+119
	Son My thermal power plant	4400
	Formosa thermal power plant	150
	Nhon Trach thermal power plant	1950
Ba Ria – Vung Tau	Phu My thermal power plant	3952
	Ba Ria thermal power plant	370
Kien Giang	Kien Luong thermal power plant	4400
Long An	Long An thermal power plant	600
Can Tho	Can Tho thermal power plant	
	O Mon thermal power plant	4100

Soc Trang	Soc Trang thermal power plant	4400
Tra Vinh	Tra Vinh thermal power plant	4000
Ninh Than	Ninh Thuan 1 & 2 nuclear power plant	8000
	Vinh Tan thermal power plant	4400

And provinces where there are big transmission line and transformer station

(2) The first workshop

Objective of the first workshop is to collect related parties' ideas of scope of study, methodology and introduction of PDP VII.

Participants: representatives of related ministries, industries, representatives of governmental offices, environmental units, power companies, power production companies and provinces where there are big power projects (detail mentioned in annex)

(3) The second workshop: after completing scenario assessment and comparison results, suggest mitigation measures, satisfied compensation to receive ideas of suggestions or commitments.

Participants: same as the first workshop

In the workshop, some environmental and energy managers will be interviewed.

4.2. CONSULTATION RESULTS

4.2.1. Consultation results

4.2.2. SEA team's ideas of commitment from related parties

Chapter 5: SUGGEST PREVENTIVE, MITIGATION MEASURES AND ENVIRONMENTAL MONITORING PROGRAMES

5.1. SUGGEST ENVIRONMENTAL PREVENTIVE, MITIGATION MEASURES

5.1.1. Brief summary of selecting and adjusting development scenarios in PDP VII

5.1.2. Suggested adjustment and optimum

- Scenarios of socio-economic master plans
- Scenarios of infrastructure
- Master plan of land use
- Master plans of national parks, natural reserves, special forest, khu dự trữ sinh quyển, tourist area and ecosystem area.
- For PDP VII (if any): suggest alternative to change power sources and lines

Change in sites, scale, implementing scheme of projects

Suggest plans to implementing development activities

5.1.3. Management solutions and implementing alternative of PDP VII

After assessing and analysing socio-economic and environmental issues, here are some issues that need to be paid attention during implementing PDP VII:

SEA suggests that projects and scales of power sources or lines in PDP VII are not environmentally sustainable

Therefore it needs to have basic principle to implement PDP VII. These principles, if complied will ensure the stability and equity in National power development. These principles include:

5.1.4. Mitigation measures

- Natural environmental components
- Socio-economic issues
- Landscape, natural resources and tourism
- National forest, ecosystem and biodiversity
- Other business
- Climate change ...

5.1.5. Analyze and orient to implement EIA for projects in PDP VII

Analyze and orient core environmental issues, impacts during implementing projects

- Thermal power plant projects
- Hydropower plant projects

- Nuclearpower plant project
- Power transmission line plan
- New and renewable energy projects

5.1.6. Suggest to PDP VII and other related plans (if any)

5.2. ENVIRONMENTAL MANAGEMNET AND MONITORING PROGRAME

5.2.1. Environmental management programe

5.2.2. Environmental monotoring programe

- Environmental objectives and components
- Monitoring criteria and indicators
- Sites
- Monitoring responsibilities
- Execution process
- Labor sources
- Cooperation method between units during implementation.
- Reporting mode

Chapter 6: DATA SOURCES – DATA AND METHODOLOGIES

6.1. DATA SOURCES AND DATA

6.1.1. Data sources and references

- SEA on Master Plan of Nuclear power plant sites in Vietnam
- Pilot SEA of Hydropower Master Plan in the context of PDP VI done by Stockholm Environmental Institute under the assistance of Greater Mekong Subregion sponsored by ADB.
- SEA of Hydropower master plan in Vu Gia – Thu Bon basin, Quang Nam province prepared by ICEM for ADB, MONRE, MOIT and EVN.
- SEA of PDP VII prepared by JICA, Japan in 2007.
- SEA of Vietnam Energy Development Master Plan prepared by JICA in 2008.
- National target programme on Coping with Climate change based on Decision no 158/2008/QĐ-TTg dated 02/12/2008 and National Action Plan of Climate change.
- Specific report of “ Current and future status of socio-economic to 2020 and to 2030 - 2050 supplied by experts from Institute of Strategy and Policies – Ministry of Planning and Investment, 2009-2010.
- Special report: Vietnamese industrial zone development to 2020 (draft version)
- Special report: Current status of natural reserves, national forest and wetland that suggested in the future.
- Action Plan on Environmental Protection in the period of 2010-2020.
- National environmental protection strategy to 2020.
- Report of National Environmental status in 2005, 2006, 2007 and 2008.
- Development strategy of national energy to 2020 and perspective to 2050 approved in Decision no 1855/QĐ-TTg ngày 27/12/2007 by Government.
- Strategy and Master plan of new and renewable energy development in the period of 2011-2020.
- Master Plan of water using in river basin
- Statistical data of Vietnamese forest area in 2007, 2008 and 2009 supplied by Head Department of Forestry, Ministry of Agriculture and Rural development.
- Master plan of coal sector
- Master plan of petroleum sector

And other documents

6.1.2. Data supplied by the Owner

6.1.3. Comments of reliability, updating of data sources

6.2. METHODOLOGIES APPLIED IN SEA

6.2.1. List of methodologies

Methodologies applied in SEA of PDP VII is to combine SEA process and power development plans, master plans of economic sectors and natural process. SEA is executed in the limitation of finance, labour and time. In fact, there is lack of information. Therefore it needs to have solutions and depends on experts' comments.

- Trending analyzation method: Trending analyzation is used as main tool. Trending analyzation is the most important components of Strategic assessment. In the context of SEA in Vietnam, it seems to be analyzation of main environmental, socio and economic issues at the same time.

Trending analyzation in SEA is to focus on main issues that Government and private sector defined. It helps to find out the trend in project area during last 10 years and forecast trend in next 20 years. This trend is descibled:

Quantitive description of main trends, motivation, spatial scale and main issues in power development;

Methodolies below are applied in SEA of PDP VII:

- Matrix: main environmental issues are selected and put in tables with comments of impact level therefore SEA team can have overview of impacts from PDP.

- GIS: is a tool to integrate maps that present spatial impacts of environmental and socio-economic issues.

- Risk assessment

- Assessment based on plan: Basic graphs using current data to describe the trend of main issues according to time (if any).

- Muti-purposed analyzation and project ranking in PDP VII by Expert choice.

Methodologies above are applied according to implementing steps presented in the beginning of report.

6.2.2. Comments on reliability of applied methodologies

6.3. COMMENTS ON DETAIL AND RELIBILITY OF REPORT

6.3.1. Comments on detai of assessments

- In the context of PDP VII

- Not in the context of PDP VII

6.3.2. Comments of issues that are lack of rebility and reasons (Subjective and objective)

CONCLUSIONS AND COMMITMENTS

1. The effect of SEA to PDP VII process

- Adjustments and additions to contents and development scenarios of PDP VII,
- Some suggestions are not adjusted in PDP VII.

2. Negative environmental impacts

- Environmental issues.
- Negative impacts in PDP VII and solutions
- Level of negative environmental impacts of PDP VII and mitigation measures.
- Negative environmental impacts of PDP VII and mitigation measures
- Negative impacts that can not be mitigated.

Reasons

Suggested mitigation measures.

3. PDP VI approving

- Some items that need to be paid attention when approving PDP VII.

4. Other conclusions and commitments

Note

Report preparing and completing: Huyen, Hoang Anh, Ngoc

Map and Picture: Nghia

添付資料 3.C

Impact Matrix

Impact Matrices

1. Environmental and Social Impact Indicators for Hydropower Schemes

Type of Impact	Indicators	Objectives	Impact Risk Assessment*					Comments, Additional Data and Information from Province
			3	2	1	0	-1	
Displaced Persons	Number Displaced	Ensure proper resettlement						
	% Ethnic Minority	Ensure social & cultural equity						
Livelihood Impacts	Agricultural Land Lost	Provide proper compensation: benefits transfer schemes						
	Fisheries/Forest Products Lost	Provide proper compensation: benefits transfer schemes						
	New Job/Income Opportunities	Support employment & enterprise development						
	Limitation of reserved land area for resettlement and cultivation	Ensure proper site for resettlement is available						
Social/Cultural Impacts	Impact on Cultural or Religious Sites	Avoid or compensate for damage						
	Loss of Areas of Cultural Importance	Avoid or compensate for damage						
	Lack of Public Awareness and Participation in Planning							
Biodiversity Impacts	Hectares of High Value Biodiversity Area Likely to be Impacted	Implement biodiversity protection programme						
	Hectares of Protected Area Likely to be Impacted	Ensure enforcement of protected area regulations						
	Length of River Upstream and	Mitigate through compensation and restocking where feasible:						

	Downstream Affected	benefits transfer schemes						
Natural Resource Impacts	Hectares of Forest Lost or Impacted	Institute community forestry programme						
	Reduction in fish catches	Provide proper compensation						
	Change of natural landscape	Avoid or compensate for damage: benefits transfer schemes						
	Increased Soil Erosion/Siltation	Avoid or compensate for damage: benefits transfer schemes						
Hydrological Impacts	Changes to Wet & Dry Season Flows	Monitor flows & adjust reservoir management where necessary						
	Reduction of Flood Risks	Integrate into river basin and flood management systems						
	Impacts on Water Quality	Monitor and take remedial actions where necessary						
	Environmental Flow and Erosion and Sedimentation Downstream							
Climate Change Impacts	CO ₂ Release from Reservoirs							
	Methane Release from Reservoirs	Ensure biomass cleared from reservoir area before flooding						

Impact Risk Assessment Scale: 3 = Major direct negative impacts where mitigation measures **are not** possible; 2 = Major direct negative impacts where mitigation measures **are** possible; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits.

2. Environmental and Social Impact Indicators for Thermal Power Plants

Type of Impact	Indicators	Objectives	Impact Risk Assessment*					Comments, Additional Data and Information from Province
			3	2	1	0	-1	
Social Impacts Livelihood Impacts	People displaced by construction or access roads/rail links for fuel	Ensure proper resettlement						
	% Ethnic Minority	Ensure social & cultural equity						
	Agricultural Land Lost	Provide proper compensation						
	Fisheries catch lost by ecosystems changes or plant construction	Provide proper compensation						
	Impact on Cultural or Religious Sites	Avoid or compensate for damage						
	Change of natural landscape	Avoid or compensate for damage: benefits transfer schemes						
	New Job/Income Opportunities	Support employment & enterprise development						
	Lack of Public Awareness and Participation in Planning	Information and awareness campaign & consultations during planning						
	limitation of reserved land area for resettlement and cultivation	Identify appropriate site for resettlement						
Biodiversity Impacts	Loss of wetlands and/or coastal habitat in plant construction	Avoid or compensate for damage						
Hydrological Impacts	Ecosystem impacts from cooling water emissions	Avoid or compensate for damage						
	Reduced Water	Manage water intakes to minimize						

	Flows	impacts or compensate where it impacts on downstream users						
	Impacts on Water Quality	Implement remedial measures						
Atmospheric Pollution	Impacts of PM ₁₀ , SO ₂ , NOx on Human Health & Morbidity	Instigate benefits transfer measures						
	Impacts of PM, SO ₂ , NOx, N, S, Acid Deposition on Water Ecosystems and Crop Production	Instigate benefits transfer measures						
	SO ₂ , PM, Acid Deposition Impacts on Buildings	Instigate benefits transfer measures						
Solid waste	Slag and fly ash, gypsum from coal fire thermal power plant	Instigate benefits transfer measures						
Climate Change Impacts	CO ₂ , Other GHG Release from Power Plants	Instigate benefits transfer measures						

Impact Risk Assessment Scale: 3 = Major direct negative impacts where mitigation measures **are not** possible; 2 = Major direct negative impacts where mitigation measures **are** possible; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits.

3. Environmental and Social Impact Indicators for Nuclear Power Plants

Type of Impact	Indicators	Objectives		Impact Risk Assessment*					Comments, Additional Data and Information
				3	2	1	0	-1	
	% Ethnic Minority	Ensure social & cultural equity							
	Agricultural Land Lost	Provide proper compensation							
	Fisheries catch lost by ecosystems changes or plant construction	Provide proper compensation							
	Social Impacts Livelihood Impacts	People displaced by construction or access roads/rail links for fuel	Ensure proper resettlement						
	Change of natural landscape	Avoid or compensate for damage: benefits transfer schemes							
	New Job/Income Opportunities	Support employment & enterprise development							
	Lack of Public Awareness and Participation in Planning	Information and awareness campaign & consultations during planning							
	limitation of reserved land area for resettlement and cultivation	Identify appropriate site for resettlement							
Biodiversity Impacts	Hectares of High Value Biodiversity Area Likely to be Impacted	Implement biodiversity protection programme							
	Hectares of Protected Area Likely	Ensure enforcement of protected area							

	to be Impacted	regulations							
Hydrological Impacts	Ecosystem impacts from cooling water emissions	Avoid or compensate for damage							
	Reduced Water Flows	Manage water intakes to minimize impacts or compensate where it impacts on downstream users							
	Impacts on Water Quality	Implement remedial measures							
Radiological Risks/Impacts	Radiological Release in Cooling Waters								
	Radiological Release in Air Emissions								
	Disposal of Radioactive Waste Materials								

Impact Risk Assessment Scale: 3 = Major direct negative impacts where mitigation measures **are not** possible; 2 = Major direct negative impacts where mitigation measures **are** possible; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits

4. Environmental and Social Impact Indicators for Transmissions Systems

Type of Impact	Indicators	Objectives	Impact Risk Assessment*					Comments, Additional Data and Information from Province
			3	2	1	0	-1	
Displaced Persons	Number Displaced	Ensure proper resettlement						
	% Ethnic Minority	Ensure social & cultural equity						
Livelihood Impacts	Impacts of Stray Voltage on Agricultural Production	Avoid or compensate for damage						
	Lack of Public Awareness and Participation in Planning	Information and awareness campaign & consultations during planning						
	limitation of reserved land area for resettlement and cultivation	Identify appropriate site for resettlement						
	New Job/Income Opportunities	Support employment & enterprise development						
Social/ Economic/ Cultural Impacts	Impact on Cultural or Religious Sites and landscape	Avoid or compensate for damage						
	Impact on the Value of Properties	Avoid or compensate for damage						
Biodiversity Impacts	Hectares of Key Biodiversity Area in ROW (right of way)	Implement biodiversity protection programme						
	Hectares of Protected Area in ROW (right of way)	Ensure enforcement of protected area regulations						
Natural Resource Impacts	Hectares of Forest Lost or Impacted in ROW (right of way)	Institute community forestry programme						
Hydrological Impacts	Impairment or limiting wetland functions	Ensure implementation of mitigation measures						

Aesthetics and Pollution	Obstruction to natural landscapes							
	Impacts of Electric and Magnetic Field on Human Health	Provide proper compensation:						

Impact Risk Assessment Scale: 3 = Large and long-term negative impacts; 2 = Medium direct negative impacts; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits.

5. Environmental and Social Impact Indicators for Wind Power Plants

Type of Impact	Indicators	Objectives	Impact Risk Assessment*					Comments, Additional Data and Information from Province
			3	2	1	0	-1	
Social and Livelihood Impacts	People displaced by plant construction and/or construction of access roads	Ensure proper resettlement						
	% Ethnic Minority	Ensure social & cultural equity						
	Agricultural land lost	Provide proper compensation						
	New job/income Opportunities	Support employment & enterprise development						
	Tourism benefits of wind farms	Development of tourist attractions						
Natural Resource Impacts	Impacts on migratory birds and bats	Ensure measures to mitigate birds and bats collisions with turbines						
Aesthetic Impacts and Pollution	Obstruction to natural landscapes	Regulate wind farm siting						
	Light pollution from aircraft warning lights	Regulate warning light						
	Noise impacts of wind turbine generators	Regulate turbine noise generation						
	Impacts of shadow flickering	Provide technical guidelines						
	Impact of leaking turbine lubricating oil or hydraulic fluid	Avoid or compensate for damage						

Impact Risk Assessment Scale: 3 = Large and long-term negative impacts; 2 = Medium direct negative impacts; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits.

6. Environmental and Social Impact Indicators for large-scale and off-grid solar PV systems

Type of Impact	Indicators	Objectives	Impact Risk Assessment*					Comments, Additional Data and Information from Province
			3	2	1	0	-1	
Livelihood Impacts	Agricultural land lost to large-scale PV systems	Provide proper compensation: benefits transfer schemes						
	New Job/Income Opportunities	Support employment & enterprise development						
	Tourism benefits of large-scale solar PV development	Development of tourist attractions						
Air pollution	Impacts of toxic and hazardous materials used for PV production	Avoid or take remedial actions						
	Impacts of emissions of toxic substances due to incineration during decommissioning	Avoid or take remedial actions						
Solid waste	Contamination of soil and ground water due to improper disposal of batteries	Monitor and take remedial actions where necessary						
	Contamination of soil and ground water due to decommissioning of PV systems	Monitor and take remedial actions where necessary						
Aesthetics	Visual impacts of large scale systems and building integrated systems	Regulate or provide guidelines in PV systems siting and building integration						

Impact Risk Assessment Scale: 3 = Large and long-term negative impacts; 2 = Medium direct negative impacts; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits.

7. Environmental and Social Impact Indicators for Geothermal Power Plants

Type of Impact	Indicators	Measures	Impact Risk Assessment*					Comments, Additional Data and Information from Province
			3	2	1	0	-1	
Social and Livelihood Impacts	People displaced by plant construction and/or construction of access roads	Provide proper compensation: benefits transfer schemes						
	% Ethnic Minority	Ensure social & cultural equity						
	Agricultural land lost	Provide proper compensation: benefits transfer schemes						
	New job/income opportunities	Support employment & enterprise development						
	Impact on Cultural or Religious Sites and landscape	Avoid or compensate for damage						
	Tourism benefits of geothermal site development	Development of tourist attractions						
Hydrological impacts	Potable water contamination from drilling, surface run-offs and ground water discharges	Provide technical guidelines						
Atmospheric Air Pollution	H ₂ S release from geothermal fluids	Removal of H ₂ S from geothermal steam						
	Emissions of other gases such as ammonia, hydrogen, nitrogen, methane, radon	Removal of these gases from geothermal steam						
Climate Change Impacts	CO ₂ release from geothermal fluids	Reinjection of CO ₂ in the reservoir						
Geological Impacts	Surface rupture, ground shaking, ground failure, slope stability failure, ground subsidence	Fluid re-injection to avoid subsidence Technical guidelines						

Impact Risk Assessment Scale: 3 = Large and long-term negative impacts; 2 = Medium direct negative impacts; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits.

8. Environmental and Social Impact Indicators for Biomass Power Generation Plants (sugarcane bagasse and rice husks)

Type of Impact	Indicators	Objectives	Impact Risk Assessment*					Comments, Additional Data and Information from Province
			3	2	1	0	-1	
Social and Livelihood Impacts	New job/income opportunities	Support employment & enterprise development						
Hydrological Impacts	Ecosystem impacts from cooling water emissions	Avoid or compensate for damage						
	Impacts of Water Discharge BOD on Water Quality	Monitor and take remedial actions where necessary						
Climate Change Impacts	CO ₂ Release from Bagasse Combustion							
Air Pollution and Solid Waste	Impacts of NO _x , CO and PM emissions	Initiate benefits transfer measures						
	Impacts of Boiler Ash	Monitor and take remedial actions where necessary						

Impact Risk Assessment Scale: 3 = Large and long-term negative impacts; 2 = Medium direct negative impacts; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits.

9. Environmental and Social Impact Indicators for Small Hydropower Schemes (below 30 MW)

Type of Impact	Indicators	Objectives	Impact Risk Assessment*					Comments, Additional Data and Information from Province
			3	2	1	0	-1	
Displaced Persons	Number Displaced	Ensure proper resettlement						
	% Ethnic Minority	Ensure social & cultural equity						
Livelihood Impacts	Agricultural Land Lost	Provide proper compensation: benefits transfer schemes						
	New Job/Income Opportunities	Support employment & enterprise development						
	Impact on Cultural or Religious Sites and landscape	Avoid or compensate for damage						
	Tourism benefits of SHP site development	Development of tourist attractions						
Biodiversity Impacts	Biodiversity and protected Area Affected during Site Preparation	Implement biodiversity protection programme						
Natural Resource Impacts	Forest Area Lost or Impacted during Site Preparation	Reforest the impacted area						
	Increased Soil Erosion/Siltation	Avoid or compensate for damage: benefits transfer schemes						
Hydrological Impacts	Impacts on Water Quality	Monitor and take remedial actions where necessary						
	Micro climate impacts due to increased water evaporation	Monitor micro climate patterns						
Geology	Impacts on Soil and Geology of Water Impoundment	Monitor and take remedial actions where necessary						

Impact Risk Assessment Scale: 3 = Large and long-term negative impacts; 2 = Medium direct negative impacts; 1 = small, indirect negative impacts; 0 = No impacts; -1 = Possible positive benefits.

添付資料 3.D

List of Impact Matrix

		Hydro		Thermal		Nuclear		Transmissions Systems		Wind		Large-scale and off-grid solar		Geothermal		Biomass		Small Hydropower(below 30 MW)															
		Type of Impact	Indicators	Type of Impact	Indicators	Type of Impact	Indicators	Type of Impact	Indicators	Type of Impact	Indicators	Type of Impact	Indicators	Type of Impact	Indicators	Type of Impact	Indicators	Type of Impact	Indicators														
1. Social Environment	(1)Resettlement	Displaced Persons	Number Displaced	Social Impacts	People displaced by construction or access roads/rail links for fuel	Social Impacts	People displaced by construction or access roads/rail links for fuel	Displaced Persons	Number Displaced	Displaced Persons	People displaced by plant construction and/or construction of access roads		Displaced Persons	People displaced by plant construction and/or construction of access roads		Displaced Persons	Displaced Persons		Displaced Persons	Number Displaced													
			% Ethnic Minority		% Ethnic Minority		% Ethnic Minority		% Ethnic Minority		% Ethnic Minority																						
	(2)Living and Livelihood	Livelihood Impacts	Agricultural Land Lost	Agricultural Land Lost	Livelihood Impacts	Agricultural Land Lost	Livelihood Impacts	Agricultural Land Lost	Livelihood Impacts	Impacts of Stray Voltage on Agricultural Production	Livelihood Impacts	Agricultural land lost	Livelihood Impacts	Agricultural land lost to large-scale PV systems	Livelihood Impacts	Agricultural land lost	Livelihood Impacts	Social and Livelihood Impacts	Livelihood Impacts	New job/income opportunities	Livelihood Impacts	Agricultural Land Lost											
				Fisheries/Forest Products Lost		Fisheries catch lost by ecosystems changes or plant construction		Fisheries catch lost by ecosystems changes or plant construction		New Job/Income Opportunities		New job/income opportunities		New Job/Income Opportunities		New job/income opportunities															New Job/Income Opportunities		
				New Job/Income Opportunities		New Job/Income Opportunities		New Job/Income Opportunities		New Job/Income Opportunities		Tourism benefits of wind farms		Tourism benefits of large-scale solar PV development		Tourism benefits of geothermal site development																	Tourism benefits of SHP site development
				Limitation of reserved land area for resettlement and cultivation		limitation of reserved land area for resettlement and cultivation		limitation of reserved land area for resettlement and cultivation																									
	(3)Heritage	Social/Cultural Impacts	Impact on Cultural or Religious Sites	Social Impacts Livelihood Impacts	Impact on Cultural or Religious Sites	Social Impacts Livelihood Impacts	Impact on Cultural or Religious Sites	Social/Economic/Cultural Impacts	Impact on Cultural or Religious Sites													Impact on Cultural or Religious Sites and landscape											
			Loss of Areas of Cultural Importance						Impact on the Value of Properties														Impact on Cultural or Religious Sites and landscape										
	(4) Landscape	Natural Resource Impacts	Change of natural landscape	Social Impacts Livelihood Impacts	Change of natural landscape	Social Impacts Livelihood Impacts	Change of natural landscape	Aesthetics and Pollution	Obstruction to natural landscapes	Aesthetic Impacts and Pollution	Obstruction to natural landscapes	Aesthetics	Visual impacts of large scale systems and building integrated systems	Social and Livelihood Impacts	Impact on Cultural or Religious Sites and landscape							Livelihood Impacts	Impact on Cultural or Religious Sites and landscape										
																								Impacts of shadow flickering									
2. Natural Environment	(1) Protected Areas	Biodiversity Impacts	Hectares of Protected Area Likely to be Impacted				Biodiversity Impacts	Hectares of Protected Area in ROW (right of way)													Biodiversity Impacts	Biodiversity and protected Area Affected during Site Preparation											
			Hectares of High Value Biodiversity Area Likely to be Impacted	Biodiversity Impacts	Loss of wetlands and/or coastal habitat in plant construction	Biodiversity Impacts	Hectares of High Value Biodiversity Area Likely to be Impacted	Biodiversity Impacts	Hectares of Key Biodiversity Area in ROW (right of way)														Biodiversity Impacts	Biodiversity and protected Area Affected during Site Preparation									
	(2) Biodiversity	Natural Resource Impacts	Length of River Upstream and Downstream Affected					Natural Resource Impacts	Hectares of Forest Lost or Impacted in ROW (right of way)													Natural Resource Impacts	Forest Area Lost or Impacted during Site Preparation										
			Hectares of Forest Lost or Impacted							Natural Resource Impacts	Impacts on migratory birds and bats													Increased Soil Erosion/Siltation									
	(3) Hydrology	Hydrological Impacts	Changes to Wet & Dry Season Flows	Hydrological Impacts	Reduced Water Flows	Hydrological Impacts	Reduced Water Flows	Hydrological Impacts	Impairment or limiting wetland functions									Hydrological Impacts	Ecosystem impacts from cooling water emissions	Hydrological Impacts		Micro climate impacts due to increased water evaporation											
			Reduction of Flood Risks																														
	(4) Topography and Geology	Natural Resource Impacts	Increased Soil Erosion/Siltation																				Impacts on Soil and Geology of Water Impoundment										
															Geological Impacts	Surface rupture, ground shaking, ground failure, slope stability failure, ground subsidence					Geology												

添付資料 3.E

Proceedings of the First Workshop on SEA

**Proceedings of the First Workshop on
“Strategic Environmental Assessment in Power Development VII”**

Quy Nhon, 12-13 July 2010

Day 1 (Monday, 12 July 2010)

9:00 – 9:15:

Opening Section:

Introduction of the workshop and participants:

Mr. Bach Tan Sinh introduced participants

- Dr. Pham Khanh Toan, Director General of Institute of Energy, Mr. Nguyen Anh Tuan, Deputy Director General of Institute of Energy, and experts of Institute of Energy;
- Mr Sumit Pokhrel Representative of ADB;
- Prof. John Soussan, Team Leader of Consultant team, Dr. Romeo Pacudan, ADB;
- Representatives of co-organizing agencies;
- Representatives of MOIT;
- Representatives of MONRE;
- Representative of EVN ;
- Representatives of Provincial DOSTs, DONREs;
- Representatives of Universities;
- Representatives of PEECs;
- ...

(The list of participants is given as Attachment 1 in the Annex)

Then Mr. Sinh presented the Agenda of the workshop.

(The workshop agenda is given as Attachment 2 in the Annex)

- Opening speech:

The opening speech was delivered by Dr. Pham Khanh Toan, the Director General of Institute of Energy. In his speech, Dr Toan mentioned objectives and contents of the workshop. He emphasized importance of SEA in PDP VII, which is supported by ADB and carried out by IE. He welcomes and greets representatives and participants to the workshop. He looks forward to the active discussion and useful contribution of the participants and success of the workshop. He expresses thanks to ADB for great assistance to Vietnam in general and power sector in particular. He wishes good health and good time stay in Quy Nhon city to participants.

(The speech is given as Attachment 3 in the Annex).

9:15 – 10:00

Presentation on “Brief Introduction of Power Development Plan Period 2011-2020 with outlook to 2030 (PDP7)” by Mr. Nguyen Anh Tuan, Deputy Director General, Institute of Energy with main contents as follows:

- Current status of Vietnam power system
- Average capacity growth rate is 11.1%/year in 2006-2009: (including power imported from China).
- Volume of transmission network as of 2009
 - 500kV: 3438 km & 16/7500 MVA
 - 220kV: 8497 km & 119/19094 MVA
 - 110kV: 12145 km & 746/25862 MVA

Rate of rural electrification as of the end of 2009

100% districts have electricity from national grid or local power systems
97.6% communes (8880/9101 communes); and 95.1% rural households have electricity from grid (13.95/14.67 mill. households).

- Electricity production in 2001-2009: Average growth rate is 12.8%/year in 2006-2009 (included import from China).

- In year of 2009

Electricity sales (TWh):	76
Electricity production (TWh):	87
Pmax (MW):	13867
Growth rate in 2001-2009:	14.5%/year
2006-2009:	13.6%/year

- *Electricity growth rate by sector in 2001-2009:*

Total electricity sales: increase	14.5%
In which: -Industry- Construction:	17.6%
-Management & Residential:	11.6%
-Commercial & hotel, restaurants:	13.9%

GDP growth rate & electricity demand in 2001-2009

GDP	electricity sales	elasticity
7.3%	14.5%	1.8

Actual electricity consumption in 2006-2009 is lower than that forecast in scenarios. Growth rate of electricity sales in 2006-2009: 13.6%/year.

- Electricity growth rate in some provinces in 2001-2009

	<u>2001-2005</u>	<u>2006-2009</u>	<u>2008-2009</u>
<i>HCM CT</i>	12,2%/year	7,8%	6,95%
<i>DONG Nai</i>	19,3%/ year	14,9%	9,4%

<i>Binh Duong</i>	<i>37%/ year</i>	<i>17,2%</i>	<i>11,3%</i>
<i>Vung Tau</i>	<i>21,6%/ year</i>	<i>20,4%</i>	<i>15,5%</i>
<i>Long An</i>	<i>20,6%/ year</i>	<i>17,3%</i>	<i>19,9%</i>
<i>Ha Noi</i>	<i>12,0%/ year</i>	<i>18,6%*</i>	<i>15,6%</i>
<i>Hai Phong</i>	<i>10,4%/ year</i>	<i>20,1%</i>	<i>15,0%</i>
<i>Hai Duong</i>	<i>12,4%/ year</i>	<i>14,0%</i>	<i>8,3%</i>
<i>Ninh Binh</i>	<i>24,6%/ year</i>	<i>21,0%</i>	<i>17,4%</i>
<i>Quang Ninh</i>	<i>17,3%/ year</i>	<i>18,9%</i>	<i>26,8%</i>

Assessment of PDP VI implementation .- delayed construction of power plants

Reasons

- Many projects are implemented at the same time. Some investors have not enough finance

=> lack of capital, borrow procedures needing long time

=> Weakness and lack of experience in :

- bidding procedures,
- Bidders, consultants
- Project management units

Impacts of global economic crisis =. Demand increase of 14%/year in comparison to anticipated 17%/year (~82%)

High prices of equipment, fuels

Not yet importing coal for TPPs in the South

Project area clearance, compensation works are not consistent with local plans ...

Delay construction of TPPs will be continuous

1. Power forecasting methods

Similar to methods applied in PDP-VI:

+ Direct method: demand forecast for whole country, each region, power companies, provinces in period to 2015 and 2020

+Indirect method:

- Main method: multi-regression analysis (Simple-E)

- Other methods (for checking forecast results):

+ Electricity intensity/GDP

+ Elasticity

+ Comparison to international practices

Based on the National Economic development scenarios

10:15 – 11:00

Presentation on “Introduction to Strategic Environmental Assessment” by Prof. John Soussan:

1. Introduction to SEA

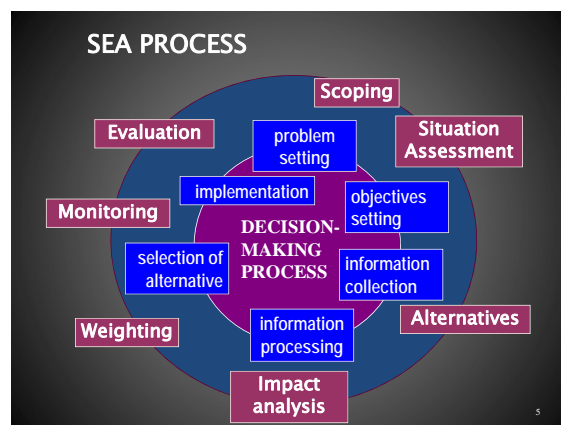
John Soussan presented a general introduction to Strategic Environmental Assessment in relation to its use in the preparation of PDP VII. He emphasizes that SEA is relatively new to Viet Nam but is now a mandatory requirement in all plan preparation. MoNRE has provided national SEA guidelines but these need interpretation when applied to the preparation of any particular plan. He gave the following definition of SEA:

”The formalised, systematic and comprehensive process of evaluating effects of a policy, plan or programme and its alternatives, including the preparation of a written report of its findings, and using the findings in publicly accountable decision-making.” (Therivel and Partidario, 1996)

The character of SEA as a tool for strategic planning are:

- SEA is a process of evidence-based analysis of social and environmental issues
- Balanced analysis to build consensus, including recognising trade-offs and linking sector goals to national development
- Decision-oriented: not just about identifying problems, but also about agreeing on solutions

The presentation discussed the different stages in an SEA, based on the following diagram:



The presentation then discussed the differences between an SEA and an EIA, with the following points emphasized:

- SEA: Policies, plans, programs: EIA: ⇒ Projects
- SEA: Integration throughout the decision-making: EIA: ⇒ Evaluation of results
- SEA: Formulation of problem, goals, alternatives: EIA: ⇒ Only impact prediction
- SEA: Focus on indirect and systems effects, including development effects: EIA: ⇒ Focus on direct and local environmental impacts
- SEA: Flexible applications: EIA: ⇒ Strongly regulated
- SEA: Less information available: EIA: ⇒ More information available
- SEA: Usually more solution or action space: EIA: ⇒ Less solution space

Finally, the presentation discussed lessons learnt from international experience and the success factors necessary for an effective SEA in relation to political, institutional, methodological and communicational considerations.

The presentation is given as the Attachment 4 in the Annex

11:00 – 11:30

Presentation on Law and Law Implementation on Strategic Environmental Assessment in Vietnam, by Dr. Nguyen Khac Kinh, the Former Director of Review and Assessment of Environmental Impacts Department, MONRE

Contents

1. Regulation on SEA according to environmental law 2005

Subjects to have SEA report preparation: Article 14:

- a) Socio-economic development strategy/planning/plan at national level.
- b) Sector development strategy, plan, for the whole country.
- c) Provincial socio-economic development strategy, plan of province, city under management of Central Government, region (herein after referred as provincial level).
- d) Land use planning: forest protection development; exploitation and use of other natural resources on inter-provincial, inter- regional areas.
- f) Important economic area development plan.
- e) River basin plan on inter-provincial areas.

Carrying out SEA and SEA report preparation: Article 15 of Environment Law 2005:

- Organization which is entrusted to prepare strategy, planning and plan as

mentioned in Article 14 of this Law is responsible for carrying out SEA and preparing SEA report.

- SEA report is one content of the project and shall be prepared at the same time with project report that means in parallel with development of strategy, planning and plan.

Contents of SEA report: Article 16 of Environment Law 2005 stipulates contents of SEA report as follows:

- Outlines of objectives, scale and features of project related to environment.
- Overall description of natural, socio-economic, environmental conditions related to project.

- Forecasting environmental negative impacts which may occur when implementation of the project.

- Indicating data and assessment method resources.

- Proposing overall directions, solutions for solving environmental issues during implementation of the project.

Stipulate on members of Reviewing Council:

Stipulate on responsibilities of reviewing council:

Legal value of the review results of SEA report: According to the point 6, Article 7, Review results of SEA report are one of background for approval of projects (that means, approval shall not be done before review results of SEA report are available).

Some notices:

- Environmental law 2005 does not specify procedure for approval of SEA reports.

(After reviewing SEA report, reviewing organization shall report results to the competent organization which approves strategy, planning or plan)

- Organization, individuals have rights to send requirements, recommendations on environmental protection to the organization which organizes review council and organization which approves strategy, planning or plan; Review council and approving organization are responsible for considering requirements, recommendations before making conclusions, decisions (point 5 Article 17).

2. Regulation on SEA according to Decree no. 80/2006/ND-CP with the following provisions.

- Dossier requesting for review of SEA report

- Time for reviewing SEA report

- Authority for establishment of review council:

- Review results and review report

3. Regulation on SEA according to circular 05/2008/TT-TNMT
- Structure and contents of SEA report that SEA of PDP 7 should be as followed:

Preface

1. Project rationale
2. Legal and technical bases for implementation of SEA
3. Organization of SEA implementation

Chapter 1: brief description of the project and key environmental issues

- 1.1. Project Owner.
- 1.2. Brief description of the project.
- 1.3. Scope of SEA and key environmental issues related to the project.

Chapter 2: description of key environmental issues progress related to the project

- 2.1. Description of natural, environmental, socio-economic conditions of studied area.
- 2.2. Forecasting tendency (change) of environmental issues related to the project in case without project implementation (Alternative 0).

Chapter 3: forecasting environmental impacts when project implementation takes place

- 3.1. Assessment of consistency between viewpoints, objectives of the project and environmental protection viewpoint and objectives.
- 3.2. Assessment, comparison between proposed alternatives.
- 3.3. Forecasting tendency (change) of (key) environmental issues related to the project in case of project implementation.

Chapter 4: consultation to project stakeholder during sea

- 4.1. Organizing consultation to stakeholders during SEA process.
- 4.2. Results of consultation to stakeholders.

Chapter 5: proposing preventive, mitigation measures, and environmental monitoring, management program

- 5.1. Proposing preventive, mitigation measures and improvement of the project.
- 5.2. Environmental monitoring, management program.

Chapter 6: indication on data, information resources and assessment methods

- 6.1. Data, information sources.
- 6.2. Methods applied in SEA process.
- 6.3. Comments on detail, reliability of assessments.

Conclusions and recommendations

1. On effectiveness of SEA for preparation of the project.

2. On level of negative environmental impacts.
3. On approval of the project
4. Other conclusions and recommendations

- Sending dossier for reviewing SEA report:

Project owner sends dossier to the responsible organization for reviewing SEA report in accordance with point 7, Article 17 of environment law 2005.

Quantity of dossiers:

- a) 01 paper of request in format specified in Annex 2;
- b) 09 sets of SEA reports as specified in Annex 3;
- c) 09 draft strategy, planning or plans with signature, name, title of project owner and stamped at the first page.

(In case number of council members is more than 9 or in case of other necessary, project owner shall provide more sets of SEA reports and draft strategy/planning/plan in accordance with requirements of the reviewing organization).

- Reviewing SEA report:

Competent organization will appoint one of its agencies as the duty member at the reviewing council.

Organization and operation of reviewing council, duties of the duty agency shall be complied with regulation of MONRE.

Number of reviewing council members is 09 people at least..

Time of reviewing is specified in point 1 Article 12 of decree 80/2006/ND-CP (45 and 30 days).

- Responsibilities of reviewing agency

Issuing announcement to the project owner on results of review within 05 working days after ending meeting of the reviewing council;

Reviewing contents of SEA report after amended by project owner;

Send written report to competent organization which is responsible for approval of strategy/planning/plan the review results within 10 working days from the date of receiving sufficient dossier from the project owner. The review report shall:

- + Present assessments and recommendations;
- + Attach copies of minutes of council's meetings.
- + Attach paper of project owner on revisions, supplementations.

- Responsibilities of the project owner:

Finalize SEA report according to the requirements of reviewing agency (in case of passed with supplement and revision);

Adjustment of strategy/planning/plan based on the consideration, recommendations of reviewing agency (in case project and SEA report are

carried out in parallel);

Resending to the reviewing agency the complete dossier consisting of:

- + 01 draft strategy/planning/plan;
- + 02 SEA reports attached with electronic file in CD; and
- + Document for explanation on revision, supplementation.

Notes: Time for project owner to revise, finalize SEA report is not included in the review time as specified in point 1 and point 2 of Decree No. 80/2006/ND-CP (45 and 30 days)

4. Some implementation activities

Development of sea implementation roadmap.

4.2. Development of capacity building program.

4.3. Development of general technical guideline on sea.

4.4. Carrying out some training courses on sea:

- training of trainers;
- training of implementers.

4.5. Carrying out some pilot SEA, aiming to:

- facilitate learning ‘through practice’;
- preparation of guidelines on sea;
- development of manual for pilot areas.

4.6. Development of overall training program, increasing awareness of sea.

4.7. Development of new decree on sea, EIA, environmental mitigation policy, environmental planning

(Replacement of contents on SEA, EIA, Environmental mitigation policy in Decrees No. 80/2006/ND-CP dated 09/8/2006, No. 21/2008/ND-CP dated 28/02/2008, and No. 140/2006/ND-CP dated 22/11/2006)

The presentation is given as the Attachment 4 in the Annex

11:30 – 12:00

Questions & Answers

- **Q:** Mr. Tran Viet Hoa, Department of Science & Technology, MOIT: Question to Dr. Kinh: The regulation stipulates that the SEA report is not approved by Reviewing Council, but Reviewing Council sends their review results to the approving agency, so how to monitor and assess compliance to the comments of SEA report Reviewing Council?
- **A:** Dr. Nguyen Khac Kinh: According to the Law, reviewing work shall follow Circular No. 80 and review results shall be reported to the

Prime Minister. However, the Circular 05 amended that after review, the SEA report shall be revised according to the comments of the Reviewing Council then the report is submitted to MONRE. If some contents of the report are impossible to revise, this needs explanation of the reasons before MONRE submission of the report to the Prime Minister

- **Q:** Mr. Phu, Government Office: Comments to Dr. Kinh: Example of construction of power plant in Cuu Long river delta which will makes serious pollution and negative impacts to environment in this area, therefore, it needs decisions and measures through project for protection of environment but not only reporting the review results to the Prime Minister.
- **A:** Dr. Kinh: The mentioned example is correct to the practice, if the area has environmental plan and project causes serious environmental pollution, it shall be rejected at the SEA stage, therefore, SEA shall be more effectively carried out in Vietnam in order to protect environment and avoid economic damages. In case the investment project is accepted at the SEA stage, the impact extent shall be assessed and mitigation measures shall be proposed and the project owner shall make commitment on implementing suitable pollution treatment measures in order to ensure carbon discharge standards in compliance with the receiving resource and environmental protection. However, it is not sufficient legal rationale to stop investment process.
- **Comments:** Prof. John: I have not much information of SEA and EIA activities in Vietnam for the project mentioned by Mr. Phu, however, when serious social and environmental impacts of the project have been identified, the project shall be immediately rejected at the stage of SEA and this is the meaning of SEA. Because if the project has been approved but not implemented, there will be huge economic damage.
- **Q:** Mr. Luong Van Ngu, Lam Dong province: for Prof. John: Could you explain more clear on evidence in SEA?
- **A:** Prof. John: The evidence here is the groups, because SEA is the initial stage of the development planning, therefore, there is not

sufficient information of development and it is difficult to define and have exact evidences and it needs time. Therefore, it needs to develop methodology for defining core environmental issues and one of evidences is the people health even though this is the information difficult to be sufficient, therefore, it needs to collect information and data from all available sources for most sufficient evaluation.

13:30 – 14:05

Presentation on “*SEA in PDP VII: Overview of Approach and Objectives*” by Mrs. Nguyen Thi Thu Huyen, Deputy Manager, Environment and Technology Department, Center for Thermal and Nuclear Power and Environment, Institute of Energy

1. Context

It is one of the first fully integrated SEAs in the preparation of a national sector strategic plan in Viet Nam

The current SEA is the first time that social and environmental issues have been fully integrated into the preparation of the PDP.

It is based on international best practice, adapted to a Vietnamese context and to reflect the national SEA Guidelines as prepared by MONRE.

It builds in the lessons learnt in the pilot SEA for hydropower in PDP VI.

2. 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.

3. Approach

The valuation and internalization into the overall cost calculations for supply options of all measurable costs and benefits from different proposed sources of power generation.

Based on quantitative and objectively verifiable indicators

Weightings of valuations made to reflect (a) key national policy and development objectives and (b) the opinions and knowledge of key stakeholders.

4. Stages in the SEA

Stage 1: Define the Analytical Framework

Define the key indicators to measure impacts

Establish the policy context in relation to national policies and targets

Establish the supply and demand options and alternatives

Define the role of GIS analysis in the overall SEA approach

Stage 2: Data Collection and Definition of the Baseline Analysis

Identify data availability

Establish the parameters of the GIS analysis

Acquire the PDP VII demand scenarios and baseline supply options

For hydropower, identify where the analysis undertaken in the PDP VI Pilot

SEA needs extension and/or amendment

Stage 3: Initial Consultations

First stakeholder workshop and national consultation

Distribute and collect the Impact Matrices to relevant provincial authorities

Stage 4: Impact Analysis and Weighting

Quantitative analysis of the physical quantities of different impacts

Economic valuation and development of indicators where valuation is not possible

Weighting of values to reflect priorities of key GOV policies

Integration of the impact valuations into the overall economic analysis

Ranking of the power supply options, based on the internalization of impacts previously treated as externalities

Stage 5: Identification of Areas and Options for Mitigation and Compensation

For areas and people affected negatively by power plant and transmission line development, identify appropriate compensation and mitigation approaches

Assess the financial implications and financing options for mitigation and compensation measures

Stage 6: Final Consultation and Recommendations

Interviews with key national stakeholders, to review possible recommendations for the SEA

Final national stakeholder workshop

Preparation of the SEA report, including the final recommendations.

5. KEY ISSUES IN SEA OF PDP VII

The group of Social – economic issues

1. Importance of PDP VII in Vietnam's social – economic development.

Assurance of the national energy security.

3. Moving and resettlement for impacted people by power development projects.

4. Change of people and economic structure

5. Division of living standards and income between regions in Vietnam.

6. Contribution into poverty-alleviation movement and social fairness.

7. Issues of water use.

8. Food security.

9. Environmental conflict

The group of natural environmental issues

1. Change of land use structure

2. Maintenance of ecosystem and biodiversity.

3. Save utilization for national resource consists of coal, oil, limestone.

4. Issues on climate change

5. Issues of air, water, soil pollution.

6. TOOLS

Expert choice is used to rank of the power supply options, based on the new economic calculations that internalize impacts previously treated as externalities.

IPCC method is used to calculate GHG emission.

GIS is used to analyze quantitative, where this is possible, of the physical quantities of different impacts, positive and negative. And map feedback from the impact matrices at different aggregation levels (individual indicator, type of impact, total impact) by mixing layers.

7. UTILITY PERSPECTIVE

Ensure the sustainable national power development plan: to obtain economic effect and environmental harmonization.

Calculate the cost for damage and benefit from environmental and social economic indicators quantitatively and integrate the impact valuations into the overall economic analysis of each power supply option.

Ensure that the national target and policies of climate change, environmental protection and promoting renewable energy to reflect into SEA and PDP VII.

Suggest recommendations and feedback to PDP VII feasibly.

The presentation is given as the Attachment 4 in the Annex

14:05 – 14:30

Discussion: Questions and Answers

- **Q:** Mr. Nguyen Cong Thang, DOIT Binh Dinh: I agree with indicators and core issues presented in the presentation of Mrs. Huyen, however, using fossil fuels is not optimal in terms of climate change. It needs to consider and make recommendations to the Government for enhancing using renewable energies.
- **A:** Mrs. Nguyen Thi Thu Huyen: We agree and will consider this issue in implementation of SEA in PDP VII.
- **Q:** Mr. Cao Ngoc Lan, MPI: for Prof. John: Based on the available studies and experience, please let us know successful and failure cases in other countries.
- **A:** Prof. John: This is a huge question. In two the last slides of my presentation in this morning, there is summary of experience of other countries. It is difficult to say which SEA is successful or failed, good or bad, because, SEA is developed with technical assistance of experts and it is the important step and meaningful when approving side makes correct decision and decides on its implementation. SEA report shall be simply understood that it ensures balance between economic development and environmental protection and the important thing is to get consultation of all project stakeholders.
- **Q:** Mrs. Kim Thi Thuy Ngoc, Environmental Strategy and Policy Institute: How to define SEA scope of PDP VII in order to collect data, information and which approach shall be used to select core environmental issues? What are the backgrounds for their selection?
- **A:** Mrs. Nguyen Thi Thu Huyen: The issues I have presented are the core issues. The following presentations of experts, consultants shall present specific assessment criteria and indicators. The scope of SEA is the nationwide, covering all provinces of the country. However, we shall focus on areas which have big power complexes and big load centers.
- **Q:** Mr. Luong Van Ngu: The calculation of costs and benefits is only theoretical but it is very difficult to apply in practice. For example, for hydropower projects, there are aspects which cannot be compensated such as cultural and social. Scope of impacts may be beyond one country? Method of weighting is difficult to carry out in SEA. Even for

hydropower plants in operation it is also difficult to assess and introduce weighting rates.

- **A:** Mrs. Nguyen Thi Thu Huyen: Details of weightings will be shown in the next presentations. Regarding geographical boundary, the areas outside the border line may be also considered. Assessment of social damage will be done by analyzing quantifiable and non-quantifiable factors.

Prof. John supplemented 3 points:

- The impact consequences can be variously assessed and quantified. For example, impacts to biodiversity are very difficult to quantify. Defining mitigation measures for biodiversity impacts and costs of these measures is also indirect way to calculate costs.
- Regarding trans-country impacts: It is difficult because Vietnam Government cannot require Governments of the neighboring countries to implement proposed measures in Vietnam SEA, however, by modeling tool, impact level can be forecast and Vietnam is also suffered from development in the neighboring countries.
- Social damages are very big. The leading countries in the world have experience in this aspect such as in China. We can propose core issues related to this aspect based on the collected data and information as much as possible in order to assess more accurately and making base for decision makers.
- **Q:** Mrs. Pham Huong Giang, MOIT: The SEA implementation steps presented by Mrs. Huyen regarding social and natural issues I think these are issues but not indicators. Some objectives may be beyond the scope of SEA such as social equality, food security, living level harmonization. It needs to calculate the environmental costs in electricity price and assess environmental load bearing level of power generation centers.
- **A:** Mrs. Nguyen Thi Thu Huyen: The issues raised by Mrs. Pham Huong Giang are the objectives which study team would like to consultate the participants at this workshop. The core environmental issues can be adjusted based on the feedback, comments from participants. The indicators will be presented in the next presentations.
- **Q:** Comments by Mr. Pham Anh Dung, MONRE: In SEA report of

Mekong river, electricity import from Laos and Cambodia accounts for 16% of total electricity production in Vietnam. Therefore, it needs to refer to the environmental indicators in the SEA of Mekong river. This project held 4 workshops, in Vietnam, Laos, Cambodia and Thailand. Through this workshop the core issues shall be supplemented and adjusted suitably.

- **A:** Mrs. Nguyen Thi Thu Huyen: We will refer to that information and finalize core environmental issues.
- **A:** Mr. Nguyen Anh Tuan: The information of electricity import is presented in slides 25 – 26 of my presentation. Development of power projects on Mekong river is still controversial and there will be many further discussions. In principle, it is not necessary to develop power at any price and with criterion that share of imported electricity shall be <10%. Hydropower projects on Mekong River are considered to be developed after 2020 based on the analysis of economic and environmental factors.

14:30 – 15:05

“Social, Livelihood and Biodiversity Indicators and Mitigation Actions for Power Sector Development” presented by Mr. Tran Quang Lam with the main contents as follows:

Why doing social, livelihoods and biodiversity impacts analysis

The focus of the Vietnam development is on balancing economic development with social equity and environmental sustainability (Agenda 21).

All development has social, livelihoods, environment, biodiversity benefits and costs.

There is a necessary to internalize and find solution for social and biodiversity mitigation in development (power plant) projects.

Overall Approach/Rationale

Different types of power generation have a wide variety of impacts on people and the environment.

These need to be measured as accurately and objectively as possible.

If possible, use quantitative measures.

Where not possible, use scales to measure or estimate the severity of the impacts.

Social and livelihoods mitigation has to be seen and implement as a long-term development assistant, including the non-material aspects– not just

compensation

For social, livelihood and biodiversity impacts, most (but not all) are more local in their effects: impacting on people and ecosystems in the environs of the plant.

Impoverishment Risks and Reconstruction: A Model for Displacement and Resettlement (IRR model)

Risk Factors: Increased morbidity, Food insecurity, Social disarticulation, Displaced People, Social/Cultural Impacts, Impact on Livelihoods, Loss of Biodiversity Value, Declining Access to Natural Resources.

Suggested type of Mitigation Action: Land-based resettlement, reemployment, House reconstruction, Social inclusion, Improved health care, Adequate nutrition, Networks and community rebuilding, Restoration of community assets and services,

Indicators: Number Displaced & % Ethnic Minority, Impacts on Cultural & Religious Sites; Loss of Areas of Cultural Importance; Impact on local social institutions and culture; Changes in access to external markets and institutions; Lack of Public Awareness & Participation in Planning; Increased social problems, crime; Changes in pattern of local communities access to natural resource Agricultural Land Lost, Fisheries/Forest Products Lost; Job/Income Opportunities, Limitation of Reserved Land Area for Resettlement and Cultivation, Hectares of High Biodiversity Value Area Likely to be Impacted, Hectares of Protected Areas Likely to be Impacted, Length of River Upstream & Downstream Likely to be Impacted, Loss of Wetland and/or Coastal Habitat, Ecosystems Impacts from Cooling Waters, Impacts on Migratory Birds or Bats, Hectares of Forest Lost or Impacted, Reduction in Fish Catches, Increased Soil Erosion/Siltation, Obstruction to Natural Landscape/Loss of Amenity Values.

The presentation is given as the Attachment 4 in the Annex

15:20 – 16:00

“Hydrological, Atmospheric and Climate Change Indicators and Mitigation Actions for Power Sector Development” presented by Mr. Pham Quang Tu

Overall Approach/Rationale:

- Different types of power generation can have wide-ranging and far-reaching impacts.
- These can be hard to measure but are often of great significance in their impact.
- Can be trans-boundary, or even global in their effects.
- Often represent a ‘risk’ rather than a universal impact.
- Often not possible to directly ‘target’ mitigation or compensation measures.

Hydrological Impact Indicators:

1. Alterations to the Hydrological Cycle:

type of Impact Hydrological Cycle

indicators:

- Changes to Wet/Dry Season River Flows.
- Reduction of flood risks
- Impacts on Water Quality, BOD
- Effects on Minimum Environmental Flows
- Downstream Erosion/Sedimentation
- Radiological releases into water bodies

2. Climate Change Impacts

type of Impact Climate Change Impact

indicators:

- CO2 Release from Reservoirs.
- Methane Release from Reservoirs
- CO2 , Other GHG Release from Thermal Power Plants
- CO2 release from geothermal fluids
- CO2 release from Bagasse combustion

3. Atmospheric Pollution

type of Impact Human and Environmental Health Impacts of Atmospheric Pollution

indicators:

- Impacts of PM10, SO2, NOx on Human Health & Morbidity.
- Impacts of PM, SO2, NOx, N, S, Acid Deposition on Water Ecosystems and Crop Production.
- SO2, PM, Acid Deposition Impacts on Buildings, other structures & on water bodies, ecosystems.
- Impacts of Electric and Magnetic Field of Transmission Lines on Human Health.
- Impacts of NOx, CO and PM emissions from Bagasse combustion.

H2S and other gases release from geothermal fluids.

The presentation is given as the Attachment 4 in the Annex

Group discussions on core environmental issues. Participants are divided into 5 discussion groups.

16:00 – 17:30

Day 2 (Tuesday, 13 July 2010)

9:00 – 9:30

“Scenarios Analysis: Basic Concepts and Approach in PDP VII SEA”

presented by Mr. Bach Tan Sinh:

Bach Tan Sinh presented a general introduction to context: SEA and power sector in VN; Basic concepts of Scenarios and approaches applied for PDP VII.

He emphasizes that SEA relatively new to Viet Nam but now a mandatory requirement for national planning processes. Some SEA experience, including for hydropower, but not at a strategic planning level. SEA Guidelines under evolution: this study should contribute to their development. Concerns over environmental & social impacts of hydropower. Aiming to the goal optimize the potential contribution of power sector to national development through a strategic planning approach that balances economic development, social equity and environmental sustainability.

For scenario analysis: he introduced What is a scenario?

“Scenarios are stories... tools for ordering one’s perceptions about alternative future environments in which today’s decisions might be played out. Ron Johnston” Scenarios are not.... science fiction...about predicting the future; rather they are about perceiving the future in the present (*Peter Schwartz*).

A scenario helps to determine opportunities and risks

Forecast + Scenario
1995 2010

<ul style="list-style-type: none">• extrapolation of historical data• linear pattern of thought• primarily quantitative results	<ul style="list-style-type: none">• correlations and interrelations in the system• alternative projections of the future• qualitative results
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- basis for decision making
- alternative options to react to changing market conditions
- qualitative approach to future market definition
- minimization of corporate risk

And the Value of Scenarios

- 1) learning by putting knowledge to use
- 2) challenging mind-sets by developing plausible alternatives
- 3) learning through discussion and dialogue

Scenarios are descriptive narratives of plausible alternative projections of a part of the future, methodically researched and developed in sets of 3,4 or more to study how an organization would fare in each future.....Fahey and Randall 1998

Direct the Ron Johnston’s concept in 1999 “Scenarios improve the quality of decision-making by:

- questioning assumptions

- developing fresh insights
- getting the ‘measure’ of problems
- developing shared understanding
- rehearsing responses
- developing robust strategies, effective if circumstances change

He also expressed the desire by question “What do we want the SEA Scenarios to tell us?”:

- Define a range of sustainable power sector development futures
- Sustainable: take account of full range of economic, social and environmental issues
- Goal is to maximize the contribution of sustainable power sector to Viet Nam’s development
- Give policy choices to assess the implications of different key strategic issues for power sector development
- Provide clarity, transparency and objectivity in decision making

Definition of Foresight is explained as following:

Foresight involves systematic attempts to look into the future of science, technology, society and economy, and their interactions, in order to promote social, economic and environmental benefits

Why use foresight –a summary:

- to anticipate change and shape the future
- to prioritize effort and funds
- to integrate S&T with social, economic and environmental needs
- to change mind-sets

Essentials of foresight:

- a framework for thinking FROM the future
- a range of plausible futures instead of a single one
- consultative –involve all stakeholders
- systematic and analytic –but also creative
- process is at least as important as product

Key Issues:

- What are the most important problems and opportunities relevant to power sector in Vietnam in the future?
- Defined from the current scoping exercise

Key Drivers: Key drivers are drivers of change influencing the key issues including:

- Society
- Technology
- Economics

- Environment
- Politics

And example: Rapid urbanization changes patterns of consumption and demand for electricity

Concept of Uncertainty

- Uncertainty is discontinuity which dramatically alters the outcome
- Each of them has different degree of impact and different degree of uncertainty
- Uncertainty is NOT PROBABILITY

Degree of Uncertainty

- If you believe that an event is likely to occur OR is unlikely to occur, the uncertainty is LOW
- If you have no view of likelihood of occurrence, the uncertainty is HIGH

Example of uncertainty

- Climate change impacts severely disrupt weather patterns and rainfall variability

He is presented on Outputs of Scenarios

The Approach to the SEA

- The SEA undertaken in close collaboration with national partners: working group
 - Replicable: no expensive collection of new data, rather use of existing data in new forms
 - Sustainable: develop capacities to implement SEA for power sector in PDP VII
 - Evidence: as far as possible, develop quantitative analysis, with economic valuation where possible
 - Strategic: assessment of potential impacts risks and of mitigation actions/costs
 - Costs internalized into overall economic assessment of hydropower schemes
- SEA as a tool for Strategic Planning
- SEA is a process of evidence-based analysis of social and environmental issues
 - Balanced analysis to build consensus, including recognizing trade-offs and linking sector goals to national development
 - Decision-oriented: not just about identifying problems, but also about agreeing on solutions

Phases of the SEA Scoping Baseline Scenarios Impact Analysis Weighting and Trade-Offs Reporting

Scoping Exercise: The Top 5 Strategic Issues are: Sustainable water resources management; Mitigating impacts on project affected people; Maintaining ecosystems integrity in power sector development; The power sector planning system

Scenarios –a Framework for Envisioning Futures • Stories of the future told to inform current decision-making. • What are Scenarios and what are they useful for? • Good scenarios are: Plausible, Consistent, Engaging, Compelling, Informative

Overview of the Process:

1. Set boundaries (time, space, themes)
2. Identify what drives the story of the present
3. Identify issues for the future
4. Identify the type of exercise
5. Construct a scenario framework
6. Begin drafting scenario narratives
7. Decide on the form for the quantitative analysis & begin carrying it out
8. Assess, learn, revise

How to Construct Scenarios:

1. Define number of scenarios
2. Define alternative generating sources
3. Identify power schemes in PDP VII
4. Assess total social and environmental risks and impacts for each scenario,
5. Define (where possible) economic valuation of social and environmental costs & benefits for each scenario
6. Internalize costs into overall economic assessment of each scheme & for each scenario
7. Assess weighting in relation to key strategic issues
8. Define actions to internalize cost & mitigate impacts

The presentation is given as the Attachment 4 in the Annex.

9:30 – 10:05

“Strategic Environmental Assessment of PDP VII: Approach to Economic Valuation” presented by Prof. John Soussan

John Soussan gave a presentation on approaches to economic valuation within an SEA framework. The economic valuation of the different social, environmental and economic impacts of power sector development allows the SEA to achieve 2 key objectives:

1. It allows the analysis to compare the relative significance of different types of impacts
2. It provides the means to internalize costs and benefits into the main economic analysis of the PDP that have previously been treated as externalities

Several points were made in relation to understanding valuation:

- Economic valuation is a relatively new field for many types of social and environmental values that are not conventionally priced or traded
- It is not perfect: doing valuation usually involves making assumptions and judgments
- Values are relative: what something is worth is very different for different types of people

- Not everything can be valued: some things that are very valuable to people cannot be given an economic price

The framework for valuation was presented, based on the concept of total economic value. This considers use values, sub-divided into direct values, indirect values and optional values, as well as non-use or existence values. The importance of selecting the right valuation method was emphasised, reflecting that there are many valuation techniques, each of which has advantages and disadvantages. Some require more data and more accurate data than others, some need large surveys or primary data collection and in some cases it is not the loss of inherent values that is measured but rather the cost of remedial measures. A series of potential measures in relation to different aspects of valuation for the PDP VII SEA were presented.

The overall objective of internalizing the externalities' was explained as the main reason for undertaking valuation. This allows a much more complete and effective process of calculation the full economic costs and benefits of different power generation options. Examples of successful valuation in the PDP VI Hydropower SEA were given:

- The SEA re-calculated the costs of a more comprehensive resettlement and development package for displaced communities, based on international best practice
- The SEA estimated the value of the changes to the annual distribution of river flows due to reservoir construction

The SEA calculated the air pollution and climate change costs of thermal (least cost) alternatives to the planned hydropower schemes

The presentation is given as the Attachment 4 in the Annex

10:05 – 10:45

“Approaches to Integrating International Fossil Fuel Prices Volatility into Power Sector Planning” presented by Dr. Romeo Pacudan, Consultant, ADB/GMS RETA 6289

Summary

The presentation discusses the approaches to integrate fossil fuel price volatility in electricity planning. It elaborates the following:

- Emerging global scarcity of fossil fuels. Since the late 1960s, no large oil fields have been discovered. Recent discoveries are in smaller oil

fields which mean that most of the global oil reserves have been discovered. Oil and gas proven reserves in most Southeast Asian countries have been declining. This indicates that Southeast Asian countries are increasingly becoming dependent on external sources of fossil fuels. This also implies competing with other countries in the world in securing energy supplies in the international electricity market.

- Energy prices in the international markets are highly unstable. This is the case for oil (Dubai Fateh), coal (Australian thermal coal), and natural gas (Japanese LNG). In financial terms, price volatility is translated into real financial risks.
- Power sector planning. The current approach used by utilities in electricity planning is the least-cost approach which determines the least-cost electricity supply in meeting demand. Supply alternatives are evaluated using levelized cost of electricity (LCOE). The choice of the discount rate is crucial in estimating LCOE. In least-cost planning, only one discount rate is used for fossil fuel-based supply options and renewable energies. This comparison is not correct since fossil fuels are associated with risks which should be reflected in the discount rate.
- Risk integration. Risks related to fossil fuel price volatility could be integrated in the discount rate and the levelized electricity costs could be recalculated using the risk-adjusted discount rate. A study in the EU region shows that without risk adjustment fossil fuel based power plants generate lower LCOE. When risk is adjusted in the discount rate, renewable energies become competitive with fossil fuel based power plants.
- Portfolio-based generation planning. In this planning approach, supply options are viewed as generation assets with associated risks. The first axiom in portfolio theory states that if there are 2 sets of risky generating assets (say coal-based and gas-based generation), investing in these two assets is less risky than in investing in each one of these assets. The second axiom is that with a combined investment in 2 risky assets, an additional investment in non risky asset (renewable energy for example) could increase investment returns at the same level of risks.

Portfolio-based planning is an alternative approach and extension to the

‘traditional’ least-cost electricity planning. Portfolio-based techniques can guide policy makers towards developing effectively diversified minimum-cost generating portfolios with minimum exposure to fossil fuel risk. It also promotes energy security and environmental protection by investing in generation portfolio which is less exposed to fuel cost risk and environmentally sustainable.

The presentation is given as the Attachment 4 in the Annex

11:00 – 11:25

“Mitigation Policy: Case study on SEA Pilot for Hydropower in PDP VI” presented by Mr. Tran Viet Hoa, MOIT.

Contents

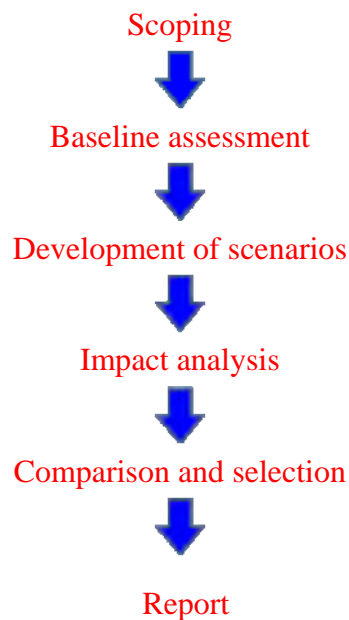
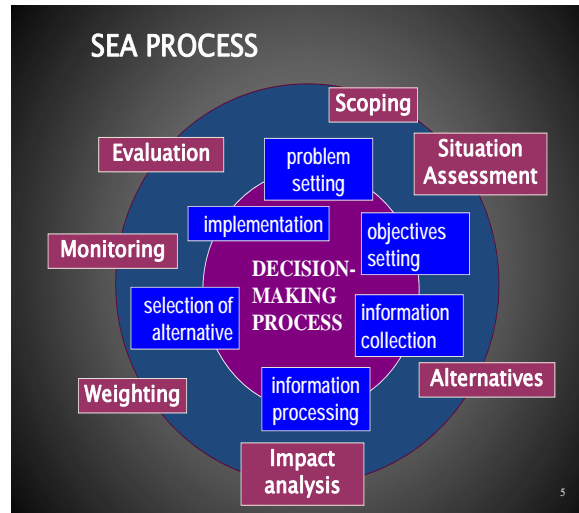
1. Introduction of SEA development project as cooperation between ADB & MOIT
2. Study on SEA in hydropower development within scope of PDP VI.
3. Some achieved results

This is SEA development cooperation project between ADB & MOIT in order to achieve objectives of capacity building for staffs of MOIT and power planning consulting units on power development planning so that they can implement SEA for PDP 7.

That SEA was implemented in the context that PDP 6 has been prepared and approved, therefore, component of hydropower plan was selected for carrying out pilot SEA.

The objective of the study is to maximize contribution of hydropower in national socio-economic development by approach of strategic planning for balancing economic development, social equality and environmental sustainability.

Process of SEA study and implementation helped Vietnam in understanding implementation procedures.



Power generation development scenarios which have been assessed

- Base scenario: According to PDP 6 (by 2025, all hydropower projects in PDP)
- Scenario 1: 3 options for replacing hydropower projects by thermal power projects in plan.
- Scenario 2: All hydropower projects are replaced by thermal power projects
- Scenario 3: No development of either hydropower nor thermal power

Steps of scenario assessment:

Three following main items are assessed:

- Reservoirs: Land loss and people immigration
- Directly affected areas: Social and environmental impacts in the dam area and resettlement area.
- Wider impacts: Impacts beyond the above areas: air pollution and hydrological changes in main river basins.

Economic, social, environmental analyses are performed for each scenario.

CONCLUSIONS AND RECOMMENDATIONS:

The Results indicate that: One full package of environmental impact mitigation will not affect much on overall feasibility of hydropower development scenarios in PDP 6.

Environmental costs: of scenarios and alternatives with substitute thermal power are too high. Therefore, the most suitable scenario is maximal development of hydropower.

SEA provides tool for analysis and balancing and building consensus of stakeholders based on the best evidence.

The presentation is given as the Attachment 4 in the Annex.

11:25 – 11:45

“Governmental Policies on Forestry Environment Services (PFES) in Vietnam” presented by Mr. Nguyen Tuan Phu, Director of Sector Economics Department, Government Office with main contents as follows:

- Necessity of PFES.
- Basic concepts.
- Governmental orientations on development of forestry environment services.

- Relation between PFES and EVN

- Proposed cooperation between MARD and EVN

1. Necessity of PFES

Need of jobs, created livelihood for people, social live for ethnic minority communities in mountainous, forestry areas.

Needs for environmental protection biodiversity preservation, natural disaster prevention of natural disasters, flood, typhoons, land slides, diseases.

Needs of forestry resources and lands.

2. Basic concepts.

Forestry environment: Consists of components of ecological forests; vegetables, animals, water, air, land, natural landscapes... which have value (**called as forestry environmental use values**) ...

Forest environmental services: Supply of forest environmental values (water for hydropower plants, water for production and life; air, natural landscapes, gene preservation, biodiversity).

Payment for forestry environmental services: It is the payment paid by users of forestry environmental services to providers.

3. Governmental orientations on development of forestry environment services.

Goods on forestry environmental services market are forestry environmental use values (Such as trees, animals, water, land, air and natural landscapes...).

The service providers are laborers in the forestry sector, direct investors, forest protectors and developers.

Buyers of forestry environmental services are: Hydropower plants, water producing plants, services companies... which use forestry environmental services for producing products such as electricity, clean water, tourist products... The end users are consumers of electricity, water, tourist products... who buy these products and pay money to providers of forestry environmental services.

Promoting socialization of forestry livelihood through application of policies on land, giving forestry lands to organizations, households, individuals and rural communities, facilitating access of people to the forestry environment services.

Establishment of financial mechanism system for activities in the forestry environmental services market:

. Mechanism of payment for forestry environmental services.

“Purchase - buy” takes place in society. Sellers and buyers need support from “the State”.

. Mechanism of sharing Forestry Protection and Development Fund.

Trust fund of PFES is shared by ratios: (10 + 10 + 80) in the pilot period, of which:

Mechanism of commissioning, assessment of quantity and quality of forests. The periodical payments for forestry environmental services shall base on contract of land delivery, forests assigned (long terms for organizations, households, individuals and communities in rural areas) as the legal background for evaluation of quality, quantities of forests; the inspecting team consists of 3 parties, forest owner, local government and party given forests.

. Mechanism for checking, inspecting, monitoring payments from trust fund.

In case of necessity, local governments shall establish supervising council for monitoring fund operation. This council consists of representative of paying party (for buying forestry environmental services); representative of local government (DARD, PPCs, DPCs); representative of paid party. Or from forestry protection and development fund to paid persons

4. Relation between PFES and EVN

According to Point 2, Article 4 of the Decree, there are 5 service types:

- a) Land protection, erosion prevention and prevention of reservoir, river, and stream sedimentation.
- b) Regulation and maintenance of water resource for production and life.
- c) Carbon absorption and capture by forests, GHG emission reduction by measures to prevent depreciation and reduction of forest areas

Article 7 of the Decree stipulates payers for forestry environmental services:

- Hydropower producers.
- Clean water producers and distributors.
- Industrial producing facilities using water from water resources.
- Organizations, individuals who do tourist business, and are beneficiaries from forestry environmental services.

The particulars are as follows:

- Hydropower producers shall pay for land protection – water regulation.
- Clean water producers and distributors shall pay for maintenance – regulation of water.
- Tourist service suppliers pay for landscapes protection.
- Profits from carbon sales shall pay for activities of MONRE →

Government

5. Proposed cooperation between MARD and EVN

Formulation of Project “IEA in development of power sector” for thermal power and hydropower projects.

Product: Project reports approved by the Government.

Cost estimates, personnel plan, engineering plan, time schedule

Implementer: EVN in charge + Forestry General Department under MONRE

Formulation of Project “Study on impacts of hydropower plants on reduction of forest area, biodiversity and lifetime of hydropower projects”

Products: Project report defining work contents.

Cost estimates, personnel plan, engineering plan, time schedule

Implementers: EVN + Forestry General Department + Provincial People Committee

Formulation of Project “Study on environmental impacts of GHG emission from thermal power plants”

Product: Project report defining work contents.

Cost estimates, personnel plan, engineering plan, time schedule

Implementers: EVN + Forestry General Department + Provincial People Committee

Implementation steps:

Getting permission from Prime Minister for formulation of Project

Establishment of working group for each task.

Formulation of Project, defining work contents, assignment of persons responsible for implementation.

Consulting experts for each task

Holding workshop on project outlines

Submission to the Prime Minister for approval and carrying out implementation works.

Procedures for getting budget for project implementation

Holding workshops for each project

Submission to competent authorities for approval of projects.

The presentation is given as the Attachment 4 in the Annex

11:45 – 12:25

Discussion: Questions and Answers

- **Q:** Mr. Pham Anh Dung: What is relation between scenarios of SEA team and SEA scenarios in PDP VII of IE?
- **A:** Mr. Nguyen Anh Tuan: From the beginning of preparation of PDP VII the selected approach is least cost approach and multi-scenarios with different inputs and emission reduction, however, this is not reaching to each locality. The draft PDPVII will be given to SEA team in order to integrate them into scenarios prepared by SEA team and this activity will be continued in the next stages.
- **A:** Ms. Nguyen Thi Thu Huyen: Institute of Energy has established SEA team which consists of member from PDP VII team. We agree to consider this issue in preparation of SEA in PDPVII.
- **A:** Prof. John: The answer is available in presentation of Mr. Sinh on scenarios and application PDP VII will be based on these scenarios. PDP VII is rather well developed, therefore, SEA team can base on this

information and the overall national targets on environment in order to introduce suitable scenarios and analysis.

- **Q:** Mr. Quang: PDP VII will be submitted to the Government at the end of this year, however, is MOIT's pilot SEA study on hydropower, with sufficient information and data for both PDP VII and SEA?
Hydropower generation will be maintained as in the PDP VI, reduction of thermal power generation is meaningful for climate change, hydropower exploitation is nearly maximal and water flow is reduced about 20% and flood is increased about 10%. Are all these changes taken into account in PDP VII?
- **Q:** Mr. Thanh, MOIT: According to the presentation we completed stages 1 and 2 and this workshop is at the stage 3 and the first consultation workshop. Are necessary information, criteria, and indicators available? We don't see this information today.
- **A:** Prof. John: I don't have sufficient information of climate change in Vietnam; however, this is also the reason why for using hydropower resources. Baseline analysis shall base on the actual information and continuous in the next steps of analysis of SEA in order to assess impacts of hydropower to environment. Use of renewable energies has many advantages in terms of natural resource preservation, however, their design, technologies shall be also sufficiently assessed in terms of economic, environmental aspects and other impacts before making decisions.
- **A:** by Mr. Hoa: The presentation presents the results of pilot study on SEA of hydropower plants which are not much different, therefore, some results, conclusions can be applied for PDP VII.
- **A:** by Prof. John: Relationships between presentations by Institute of Energy and SEA study team: Study of IE proposed the core environmental issues, meanwhile SEA team assists in methodologies and how to determine criteria, indicators related to each core issue of SEA. For example, biodiversity, social impacts of resettlement and power plant sites such as sites for nuclear power plants as presented by Mr. Hoa, or nuclear power impacts on public health. This workshop focuses on general issues in terms of approaches and methodologies in SEA of PDP VII. This workshop is not focus on specific details.

- **Comments:** by Mr. Smith: I am impressed on exciting discussion of the representatives from various related organizations exchanging experience. This is not a technical workshop and discussions will help study team to find out the suitable solutions.

13:30 – 14.30

Discussion results presented by discussion groups.

The summary of comments of groups is as follows:

Group 1

■ Comments on core environmental issues and indicators

1. The specific environmental indicators shall be categorized in groups and match core environmental issues.
2. Specific environmental indicators can be divided into types of environmental issues (e.g. environmental pollutions, land procurement...) for all types or different indicators for different energy types (hydropower, thermal power...).
3. The indicators shall be also clarified on which are quantifiable and which cannot be quantifiable? And how to calculate indicators?
4. In order to ensure feasible scope of SEA, some core environmental issues should be reconsidered such as:
 - Social equality
 - Food security
5. The indicators shall be not be too detailed because they are assessed in SEA.
6. The terminologies shall be consistently used in various reports (such as indicators, criteria...)
7. The results of previous SEA (for hydropower master plan, Vu Gia river basin, nuclear development plan)

■ Specific environmental indicators

Hydropower:

1. Land, forest loss.
2. Immigration, compensation, resettlement – cultivation stability, food security.
3. Environmental water flow in downstream (change of ecological flow, water demand in terms of quantity and quality in downstream).
4. Affects on people health due to epidemic disease.

Thermal power:

1. Air pollution due to dusts, SO₂ emissions
2. Water pollution (hot discharged water)

3. Land environment pollution
4. Compensation, resettlement
5. Food security due to use of paddy field, agricultural land.

Nuclear power

1. Radioactive discharge (waste radioactive materials, leakage...)
2. Other issues are similar for thermal power

Power network

1. Electromagnetic field
2. Compensation, resettlement in power line corridor areas.
3. Hazardous materials

Group 2

Discussion content

I. Issues to be interested in

- Radiation safety (radiative concentration)
- manage of solid waste and hazardous waste (in particular nuclear waste)
- It should be assessed in case of no attain to objectives in the selected scenarios, how impact can raise?
- Water resource
- Socio-economic issues in downstream area
- It should be made clear on environmental conflicts

II. Specific indicators

1. Socio-economy
3. Biodiversity: the number of species in conservation list
2. Environmental
 - Water resource quantity and quality, change of flow rate etc.
 - Radiative particular

Group 3

■ Comments on core environmental issues and indicators

1. Besides the core environmental issues as presented by SEA implement experts, some others should be included as:
 - Environmental pollutions by noise.
 - Erosion and simentation.
 - Interboudary environmental polution.
2. It is difficult to consider and evaluate some issues of food security, poverty alleviation, environmental conflicts, social equality so they

- should be removed.
3. The indicators should be addressed in detail to assess in SEA.
 4. The terminologies shall be consistently used in various reports (such as indicators, criteria...)

Group 4

Concerning Key Environmental Issues

- Add the Content of Risk Assessment (in the parallel with the Natural and Social environment sections). The types of power plants and their capacity/size should be taken into account when analysis and assessment.
- For sustainable development in terms of fossil fuel consumption, renewable energy should be considered as alternatives. For more effective, the policies to encourage or support for renewable energy usage should be promulgated.
- Progress of PDP VI implementation has not yet met the targets. Therefore, it caused adverse impacts to Socio-economic development (slow down). This issue should be carefully considered and evaluated in PDP VII
- Some Social issues such as Living Standard Harmonization, Social Equalization, etc. should be reviewed if feasibility to assess and evaluate?
- Concerning Natural Grid System: the technical aspects should be put in to account to reduce the used area/ space, therefore eliminate the impacts

Concerning Key Environmental Indicators

- The Indicators should be clarified for each type of Power Plants
- Integrated evaluation in the presence of other socio-economic development projects
- Adding The assessment of soil environment pollution (esp. for thermal power and Nuclear power plants)
- The indicators should be clarified for each environmental components and Public health as clearly separated
- In some type of activities, noise and thermal pollution should be considered?
- The location of power plants should be selected in the consideration of capacity, size, type, and existing investments
- Correct and be consistent in terms; parameters; concepts using e.g." Molecular dust"?

Group 5

1. Approach and Objectives

- Learn from international experience in related fields
- Need to review the causes (policy, environmental and socio-economic ones) of delay construction of PDP VI when assessing the feasibility of PDP VII. In other words, these environmental and socio-economic issues should be carefully assessed and evaluated in PDP VII.
- Environmental assessment should be taken for different types of power plants/ different sources of power generation
- For Hydropower Plants, approach of integrated basin management should be utilized when assessing environmental impacts
- The idea of valuation and internalization the full range of social and environmental costs and benefits into the PDP VII is very useful. However, it would be better to figure out the scope of quantitative assessment since many environmental values/ costs (such as biodiversity degradation, loss of environmental amenities or other obstruction of natural existence values...) are not easy valued, especially in the context of Vietnam.
- Define the tools used for economic analysis (Cost – Benefit Analysis or Cost – Effectiveness Analysis, or other...)

2. Key Environmental Indicators

- Environmental indicators for impact assessment should be defined for each environmental component/ amenity (land, soil, air, water, forest...)
- Add more indicators for assessment of:
 - a) Impacts on migratory fishes in the breeding season (biodiversity)
 - b) Impacts on natural and built landscapes
 - c) Impacts on resettlement areas (such as land use, water

supply and other socio-economic infrastructure....)

d) Impacts of noise, heat, radioactivity

- Check the indicator “*Impacts on Water Quality, BOD*” (Slide 3, Hydrological Impact Indicators). There are other indicators for assessing water quality, not only BOD.
- There should be the objective of radioactivity mitigation

14:30 – 15:00

Meeting discussion

- **Comments:** by Mr. Phu: It needs next plan, steps for SEA with more effective coordination with related organizations.
- **Comments:** by Mr. Tien from Mekong River Council: It needs clearer objectives so that the comments are more concentrated. Regarding hydropower development, it needs larger scope of SEA to assess hydropower projects outside Vietnam, for example on Mekong river, contribution of small hydropower in PDP VII.
- **Comments:** by Prof. John: The comments by groups shall be divided into groups of criteria which are being developed by us but not presented at this workshop. The assessment of power plants shall take into account water use and water discharge to the water resources. The land pollution issue shall be supplemented because this is an important issue. Issue of Mekong river will be considered, however, it is not easy to assess HPPS beyond borders. Thanks for useful comments which help us in continuing preparation of SEA report for PDP VII.

15.00 – 15.30

Workshop Conclusion and closing by Mr. Nguyen Anh Tuan, the Deputy Director General of Institute of Energy

Mr. Tuan makes conclusions and closing of the workshop: This is the first time Institute of Energy was entrusted with the task to prepare the SEA report for PDP VII. We don't have much experience; therefore, discussions at the workshop will significantly help the study team in preparation of SEA. Further cooperation and suggestions shall be very useful for us in implementing next steps. The workshop was successful. On behalf of Institute of Energy I would like to thank all participants, speakers, organizers and wish

you good health. I would like to thank ADB expert team for technical assistance and ADB's financial assistance for the organizing of this workshop.

No	Name	Date arrive	Date checkout	Position	Organization	Confirm	Tel/mobi	Male/Female	
Institute of energy									
1	Nguyễn Thị Thu Huyền	2010/11/7	14/07/2010			1		F	1
2	Tô Thị Ngọc	2010/11/7	14/07/2010			1		F	1
3	Nguyễn Tuấn Nghĩa	2010/11/7	14/07/2010			1		M	0
4	Nguyễn Khoa Diệu Hà	2010/11/7	14/07/2010			1		F	1
5	Nguyễn Văn Thông	2010/11/7	14/07/2010			1		M	0
6	Phan Thị Thanh Thủy	2010/11/7	14/07/2010			1		F	1
7	Đặng Hương Giang	2010/11/7	14/07/2010			1		F	1
8	Phạm Khánh Toàn	2010/11/7	14/07/2010	Director		1		M	0
9	Nguyễn Anh Tuấn	2010/11/7	14/07/2010	Vice Director		1		M	0
Ministry of Industry and Trade									
1	Phạm Hương Giang	2010/12/7	14/07/2010	Expert	Energy department	1		F	1
2	Phạm Sinh Thành	2010/11/7	14/07/2010	Manager	Safety Technical and Environment Bureau	1		M	0
3	Trần Việt Hoà	2010/11/7	14/07/2010	Chuyên viên	Science and Technology department	1	0936183373	M	0
4	Dương Khắc Hiền	2010/11/7	14/07/2010	Chuyên viên	ditto	1		M	0
5	Đỗ Thanh Long	2010/11/7	14/07/2010	Chuyên viên	ditto	1		M	0
6	Trần Anh Tấn	2010/11/7	14/07/2010	Chuyên viên	Safety Technical and Environment Bureau	1		M	0
Ministry of Natural resource and Environment									
1	Phạm Anh Dũng	2010/11/7	14/07/2010	Manager of SEA department	Apraisal and EIA bureau	1	0903289845	M	0
2	Trương Mai Hoa	2010/11/7	14/07/2010	expert	Water resource management Bureau	1	0986775557	F	1
3	Nguyễn Khắc Kinh	2010/11/7	14/07/2010		Apraisal and EIA bureau	1		M	0
4	Quách Tất Quang	2010/11/7	14/07/2010	Director of climate change Center	Hydro-Meteorological and Climate change Bureau	1	0989098299	M	0
5	Nguyễn Thế Đồng	2010/11/7	14/07/2010	Vice general director	Environmental General Office	1	0913229041	M	0
Institute of Natural Resource and Environmental Policy and Strategy									
1	Kim Thị Thuý Ngọc	2010/11/7	14/07/2010	deputy manager	International corperation department	1	0912021606	F	1
2	Lê Thị Lệ Quyên	2010/11/7	14/07/2010	Expert		1	0949912492	F	1
Ministry of Investment and Planning									
1	Cao Ngọc Lân	2010/11/7	14/07/2010	Deputy director of sustainable development department	Institute of strategy and sustainable development	1	0912085566	M	0
EVN									
1	Đào Thị Hiền	2010/11/7	14/07/2010	Expert	EVN - Science Technology and Environmental department	1	01666579256	F	1
2	Nguyễn Trung	2010/11/7	14/07/2010	Vice manager of station design and telecommun	PECC 1	1	0912087356	M	0
3	Nguyễn Thuý Hà	2010/11/7	14/07/2010	Header of environmental group	PECC 2	1	0903937977	F	1
4	Nguyễn Thái Vũ	2010/11/7	14/07/2010	Vice manager of computer and environmental	PECC 3	1	0973308132	M	0
5	Trần Văn Luyện	2010/11/7	14/07/2010	Manager of environmental department	PECC 4	1	0963112368	M	0
6	Nguyễn Ngọc Tân	2010/11/7	14/07/2010	Vice director of plan department	EVN	1	042220968	M	0
NPT									
1	Trần Trí Dũng	2010/11/7	14/07/2010	Expert	Technical department	1	0989882069	M	0
PVN									
1	Trần Xuân Phương	2010/11/7	14/07/2010	Expert	Health- safety and environmental department	1	0983165196	M	0
2	Trần Toàn Thắng	2010/11/7	14/07/2010	Vice manager of power thermal projects	Power department	1	0913553733	M	0 Tự thanh toán

No	Name	Date arrive	Date checkout	Position	Organization	Confirm	Tel/mobi	Male/Female	
Lào Cai province									
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Hải Dương province									
1	Nguyễn Thanh Bình	2010/11/7	14/07/2010	Vice director	Department of Industry and Trade	1	0913255447	M	0
Hải Phòng Province									
1	Vũ Văn Tàng	2010/11/7	14/07/2010	Manager of Energy division	Department of Industry and Trade	1	0904554714	M	0
Quảng Ninh province									
1	Bùi Quang Sơn	2010/11/7	14/07/2010	Expert	Department of Industry and Trade	1	0903437966	M	0
Quảng Bình province									
1	Nguyễn Văn Chung	2010/11/7	14/07/2010	Vice director	Department of Natural Resource and Environment	1	0912037757	M	0
Quảng Ngãi province									
1	Trần Phước Hiền	2010/11/7	14/07/2010	Vice manager	Department of Industry and Trade	1	0914076039	M	0
Gia Lai province									
1	Trần Đức Hưng	2010/11/7	14/07/2010	Vice director	Department of Industry and Trade	1	0914021450	M	0
2	Đinh Thị Yến Nga	2010/11/7	14/07/2010	Expert	Department of Natural Resource and Environment	1	0167777679	F	1
Bình Định province									
1	Nguyễn Việt Cường			Vice director	Department of Natural Resource and Environment	1	0983555027	M	ko ở KS
2	Nguyễn Văn Thắng			Vice director	Department of Industry and Trade	1	0914031974	M	ko ở KS
3	Đinh Thị Minh Hà			Manager of electricity management department	Department of Industry and Trade	1	0989982852	F	ko ở KS
Khánh Hoà province									
1	Nguyễn Thị Nguyệt Hà	2010/11/7	14/07/2010	Vice director	Environmental Protection branch Office	1	0905166977	F	1
Lâm Đồng Province									
1	Lê Phước Long	2010/11/7	14/07/2010	Manager of electricity management department	Department of Industry and Trade	1	0918810919	M	0
2	Lương Văn Ngự	2010/11/7	14/07/2010	Vice director	Department of Natural Resource and Environment	1	0918260102	M	0
TP Hồ Chí Minh city									
1	Nguyễn Phương Duy	2010/11/7	14/07/2010	Expert	Department of Industry and Trade	1	0933013559	M	0
2	Nguyễn Thị Thủy	2010/12/7	14/07/2010	Expert	Department of Natural Resource and Environment	1	0977179879	F	1
Cần Thơ city									
1	Ngô Kim Long	2010/12/7	14/07/2010	Expert	Department of Natural Resource and Environment	1	0918026125	F	1
Ninh Thuận province									
1	Trương Thị Hồng Thủy	2010/11/7	14/07/2010	Expert	Environmental Protection branch Office	1	0988806342	F	1
Hanoi University									
1	Nguyễn Thị Hà	2010/11/7	14/07/2010	Professor	Environmental Faculty	1		F	1
Economic university									
1	Lê Thu Hoa	2010/11/7	14/07/2010	Chief of Urban Environment faculty	Urban Environmental Faculty	1	0913043585	F	1

No	Name	Date arrive	Date checkout	Position	Organization	Confirm	Tel/mobi	Male/Female
NoGO-Institute of Stainable Development and Envir								
1	Nguyễn Đức Tùng	2010/11/7	14/07/2010	manager		1	0913389860	M 0
NoGO: Center for Water Resources conservation and Development								
1	Lê Sỹ Thắng	2010/11/7	14/07/2010	Coordinator	Center for Water Resources conservation and Developme	1	0989530698	M 0
Interpreter								
1	Nguyễn Văn Tường	2010/11/7	14/07/2010			1		M 0
Vietnam National Mekong committee								
1	Vũ Minh Tiến	2010/11/7	14/07/2010			1	0912266154	M 0
The government office								
1	Nguyễn Tuấn Phú	2010/11/7	14/07/2010	Director of Sector economic department	Sector economic Department	1	0913206114	M 0
Huế province								
1	Nguyễn Hoàng Phước	2010/11/7	14/07/2010	chi cục phó Chi cục BVMT	Department of Natural Resource and Environment	1	0914145212	M 0
WWF								
1	Thắm Thị Ngọc Diệp	2010/11/7	14/07/2010	Coordinator	Wetlands unions	1	0988525494	F 1
Quảng Nam province								
1	Hoàng Thị Kim Chung	2010/11/7	14/07/2010	Expert	Department of Natural Resource and Environment	1	0905527421	F 1

Phòng đơn		Ngày đi	Ngày về	Số phòng
1	Phạm Khánh Toàn	2010/11/7	14/07/2010	
2	Nguyễn Anh Tuấn	2010/11/7	14/07/2010	
3	Nguyễn Tuấn Phú	2010/11/7	14/07/2010	
4	Nguyễn Thế Đông	2010/11/7	14/07/2010	
5	Nguyễn Thị Thu Huyền	2010/11/7	14/07/2010	

Phòng đôi		Ngày đi	Ngày về	Số phòng
1	Tô Thị Ngọc	2010/11/7	14/07/2010	
2	Nguyễn Khoa Diệu Hà	2010/11/7	14/07/2010	
3	Phan Thị Thanh Thủy	2010/11/7	14/07/2010	
4	Đặng Hương Giang	2010/11/7	14/07/2010	
5	Phạm Hương Giang	2010/12/7	14/07/2010	
6	Đào Thị Hiền	2010/11/7	14/07/2010	
7	Nguyễn Văn Thông	2010/11/7	14/07/2010	
8	Nguyễn Văn Tường	2010/11/7	14/07/2010	
9	Phạm Sinh Thành	2010/11/7	14/07/2010	
10	Trần Anh Tân	2010/11/7	14/07/2010	
11	Đỗ Thanh Long	2010/11/7	14/07/2010	
12	Dương Khắc Hiền	2010/11/7	14/07/2010	
13	Nguyễn Khắc Kinh	2010/11/7	14/07/2010	
14	Quách Tất Quang	2010/11/7	14/07/2010	
15	Cao Ngọc Lân	2010/11/7	14/07/2010	
16	Nguyễn Trung	2010/11/7	14/07/2010	
17	Nguyễn Thái Vũ	2010/11/7	14/07/2010	
18	Trần Văn Luyện	2010/11/7	14/07/2010	
19	Trần Xuân Phương	2010/11/7	14/07/2010	
20	Trần Toàn Thắng	2010/11/7	14/07/2010	
21	Trần Chí Dũng	2010/11/7	14/07/2010	
22	Lê Hồng Khanh	2010/11/7	14/07/2010	
23	Vũ Văn Tàng	2010/11/7	14/07/2010	
24	Đặng Thành Lê	2010/11/7	14/07/2010	
25	Nguyễn Thanh Bình	2010/11/7	14/07/2010	
26	Bùi Quang Sơn	2010/11/7	14/07/2010	
27	Đào Xuân Hào	2010/11/7	14/07/2010	
28	Trần Phước Hiền	2010/11/7	14/07/2010	
29	Đinh Thị Yên Nga	2010/11/7	14/07/2010	
30	Nguyễn Thị Nguyệt Hà	2010/11/7	14/07/2010	
31	Lương Văn Ngự	2010/11/7	14/07/2010	
32	Lê Phước Long	2010/11/7	14/07/2010	
33	Hoàng Dương Thanh	2010/11/7	14/07/2010	
34	Nguyễn Phương Duy	2010/11/7	14/07/2010	
35	Nguyễn Thị Thủy	2010/12/7	14/07/2010	
36	Ngô Kim Long	2010/12/7	14/07/2010	

	Ngày đi	Ngày về	Số phòng	
37	Trần Việt Hoà	2010/11/7	14/07/2010	
38	Phạm Anh Dũng	2010/11/7	14/07/2010	
39	Nguyễn Thị Hà	2010/11/7	14/07/2010	
40	Lê Thu Hoa	2010/11/7	14/07/2010	
41	Vũ Minh Tiên	2010/11/7	14/07/2010	
42	Lê Sỹ Thắng	2010/11/7	14/07/2010	
43	Nguyễn Tâm Hùng	2010/11/7	14/07/2010	
44	Nguyễn Ngọc Minh	2010/11/7	14/07/2010	
45	Trương Mai Hoa	2010/11/7	14/07/2010	
46	Nguyễn Thuý Hà	2010/11/7	14/07/2010	
47	Kim Thị Thuý Ngọc	2010/11/7	14/07/2010	
48	Lê Thị Lệ Quyên	2010/11/7	14/07/2010	
49	Hoàng Thị Kim Chung	2010/11/7	14/07/2010	
50	Bùi Phương Thảo	2010/11/7	14/07/2010	
51	Trần Đức Hưng	2010/11/7	14/07/2010	
52	Nguyễn Hoàng Phước	2010/11/7	14/07/2010	
53	Nguyễn Tuấn Nghĩa	2010/11/7	14/07/2010	
54	Nguyễn Ngọc Tân	2010/11/7	14/07/2010	
55	Nguyễn Đức Tùng	2010/11/7	14/07/2010	
56	Lê Trình	2010/11/7	14/07/2010	
57	Trương Thị Hồng Thuý	2010/11/7	14/07/2010	
58	Thắm Thị Ngọc Diệp	2010/11/7	14/07/2010	

Agenda		
Workshop on Methodology and identification of key environmental issues of Strategic Environmental Assessment in Power Development Plan VII		
Venue: Hai Au hotel – 489 An Duong Vuong – tp Qui Nhon		
Time	Topic	Speaker
Day 1: 12th July		
9.00 – 9.15	Opening Remarks and Introductions	Mr. Phạm Khánh Toàn - Director of IE
9.15 – 10.00	Brief introduction of power development plan period 2011-2020 with outlook to 2030 (PDP 7)	Mr. Nguyen Anh Tuan – Vice Director of IE
10.00 – 10.15	Coffee Break	
10:15 – 11.00	Introduction to Strategic Environmental Assessment	Mr. John Soussan
11.00 – 11:20	Law and law Implementation on strategic Environmental Assessment in VietNam	Dr. Nguyễn Khắc Kinh
11:20 – 12.00	SEA in PDP VII: Overview of the Approach and objectives	Huyen Nguyen Thi Thu
12:00-13:30	Lunch	
13:30 – 14.30	Q&A	
14.30 – 14.45	Coffee Break	
14.45 – 15.30	Social, Livelihoods & Biodiversity Indicators and Mitigation Actions for Power Sector Development	Mr. Tran Quang Lam
15.30 – 16.00	Defining the Key Indicators: Hydrological, Atmospheric, Climate Change and Others	Mr. Pham Quang Tu

16:00-17:30	Group Discussion on key indicators	
7.00	Dinner	
Day 2: 13th July		
9.00 – 09:45	Scenarios Analysis: Basic Concepts and Approach in PDP VII SEA	Mr. Bach Tan Sinh
09:45– 10.45	Strategic Environmental assesemtn of PDP VII: Approaches to Economic Valuation	Dr. John Soussan
10:45-11.00	Coffee Break	
11:00-12:00	Approaches to Integrating International Fossil fuel Price Volatility into Power Sector Planning	Dr. Romeo Pacudan
12.00 – 13:30	Lunch	
13:30-14:30	Mitigation: Policy Response - Case study on SEA Pilot for hydropower in context PDP 6 - Case study on payment for Ecosystem Services in Lam Dong Province (MARD)	Mr Trần Việt Hòa – MOIT Mr. Nguyen Tuan Phó – The government office
14.30 – 16.00	Small Group Discussions: SEA in Power Sector Planning from the Perspective of Different Participants	
16.00 – 16.30	Coffee Break	
16.30 – 17.30	Report Back from Group Discussions	
17.30 – 18.00	Closing Remarks	Director of IE

OPENING SPEECH AT THE FIRST WORKSHOP ON “STRATEGIC ENVIRONMENTAL ASSESSMENT IN POWER DEVELOPMENT PLAN VII”

(12-13 July 2010, Hai Au Hotel, Quy Nhon city, Vietnam)

*By Dr. Pham Khanh Toan
Director General, Institute of Energy*

Distinguished guest from ADB,
Ladies and Gentlemen,

Institute of Energy (IE) is entrusted by Ministry of Industry and Trade (MOIT) with the task to prepare the National Power Development Plan for period 2011 - 2020, outlook to 2030 (called as PDP VII). According to the State regulation, development plans at national level shall have Strategic Environmental Assessment report (SEA report) in order to ensure environmental sustainability. With technical assistance of Asian Development Bank (ADB), PDP VII team will carry out SEA in PDP VII.

To day, in beautiful city of Quy Nhon, Vietnam, Institute of Energy – MOIT, in coordination with Consultants of EOC-ADB, organizes the first Workshop on “Strategic Environmental Assessment in Power Development VII” which will be two day long.

Main contents of this workshop consist of Introduction of PDP VII, Overview of SEA activities in Vietnam, Introduction of objectives and methodology for SEA, Integration of SEA in power planning, EIA in economic analysis of scenarios, Applicable SEA tools ...

On behalf of organizers, I warmly greet representatives from MOIT, EVN, DOITs, PECC1,2,3,4, Hanoi power corporation, HCM city power Corporation, universities, NGOs, Consultants of OEC, ADB...

I hope that, reports to be presented by experts from ADB, IE and Environmental Team and discussions, suggestions, comments from participants at this workshop will contribute in increasing quality of SEA study in PDP VII and suitably for conditions of Vietnam.

Taking this opportunity, I would like to thank Experts of EOC, ADB for assistance to Vietnam in general and power sector in particular.

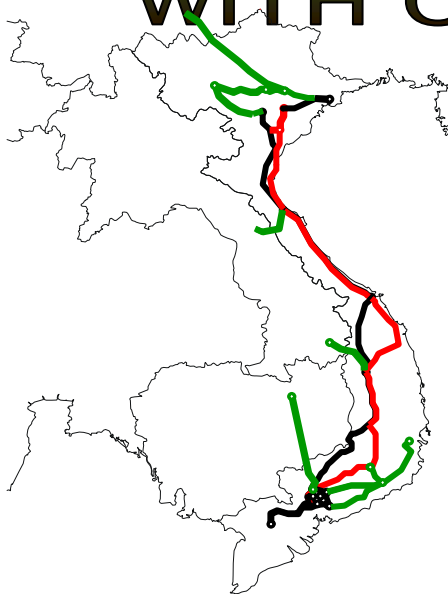
I would like to open the workshop and wish the workshop success.

Thank you for attention.

WORKSHOP ON SEA IN POWER DEVELOPMENT PLAN VII

BRIEF INTRODUCTION OF POWER DEVELOPMENT PLAN PERIOD 2011 – 2020

WITH OUTLOOK TO 2030 (PDP7)

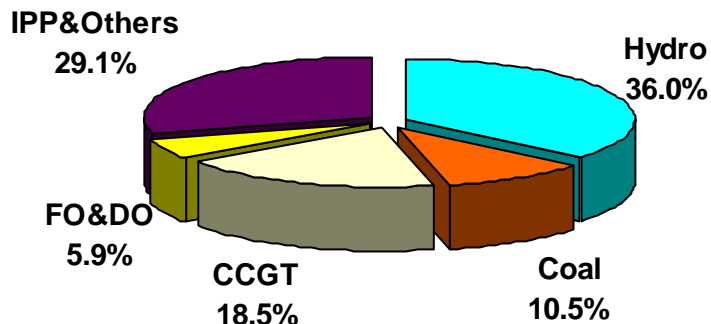


INSTITUTE OF ENERGY

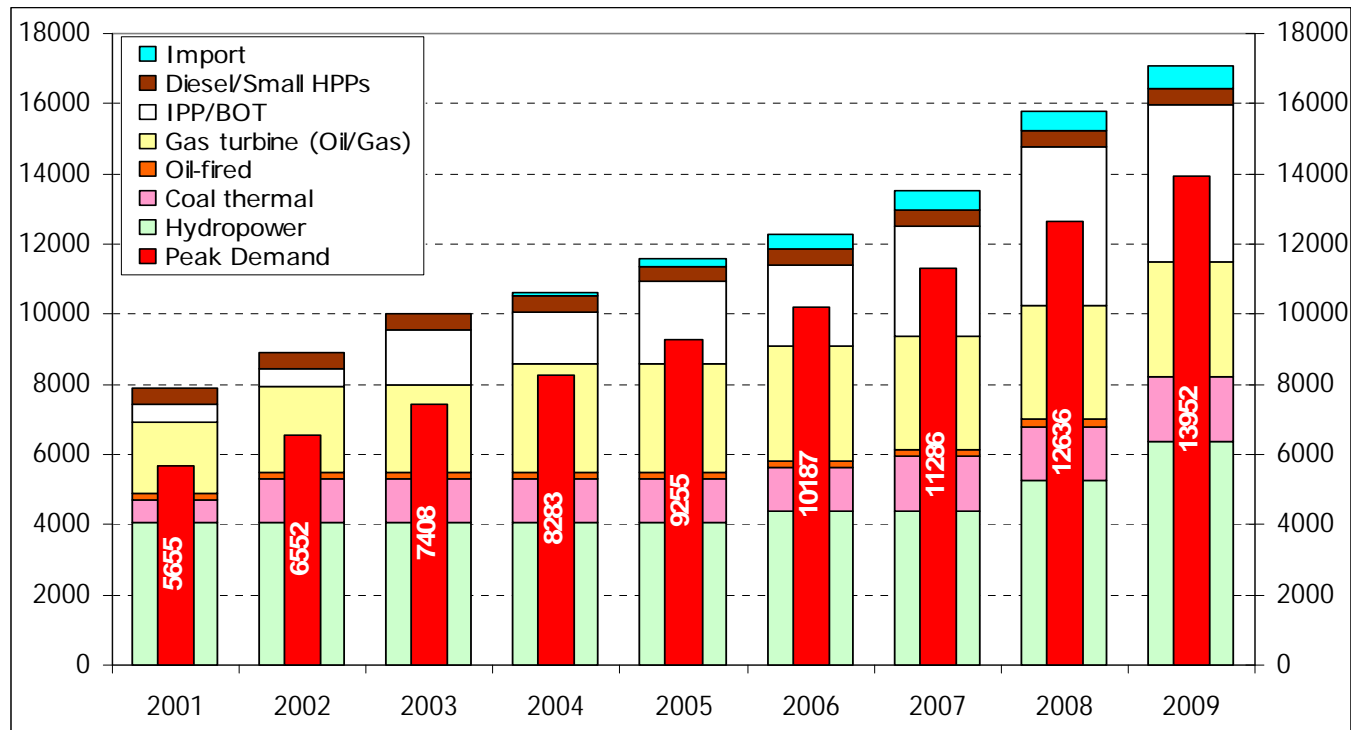
Quy Nh-n, July 2010

1. Current status of vietnam power system

Installed capacity - 2009

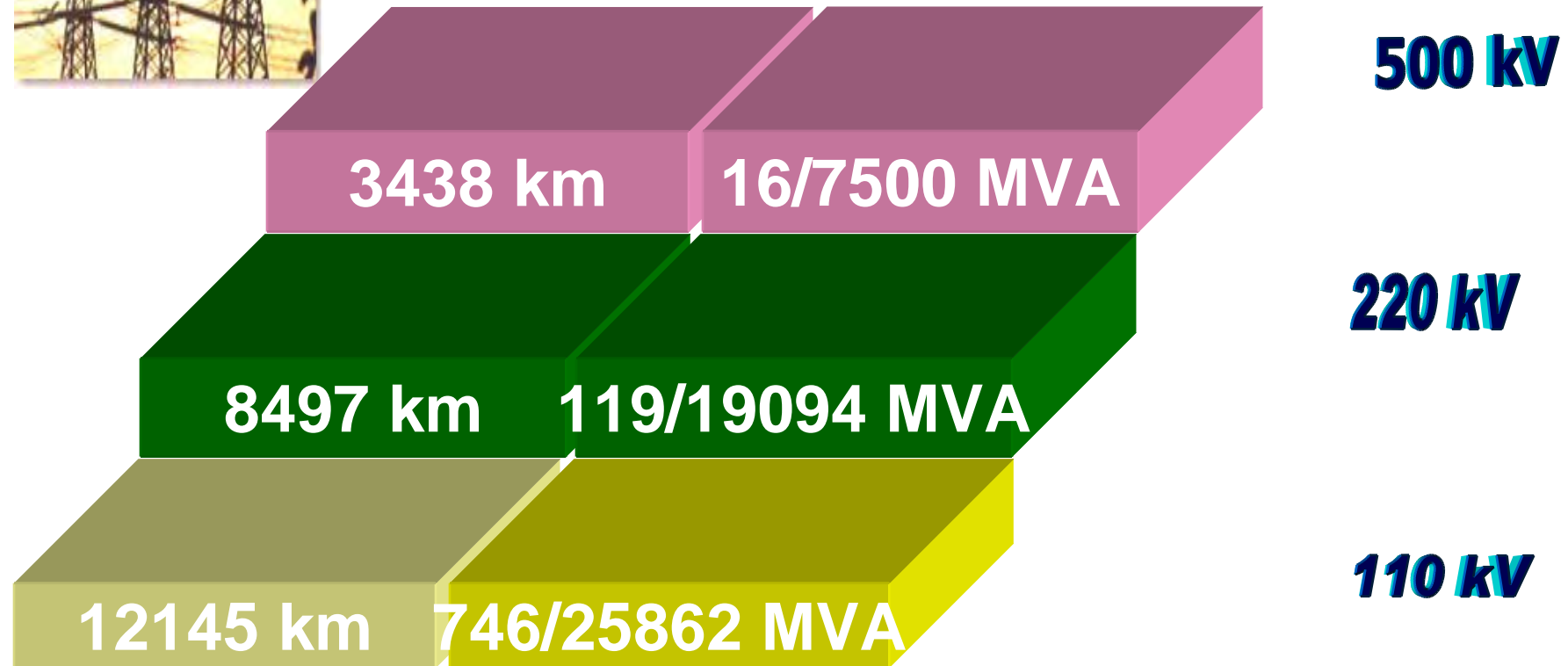


Installed capacity and electricity production in 2009



Average capacity growth rate is 11.1%/year in 2006-2009: (including power imported from China) 2

Volume of transmission network as of 2009

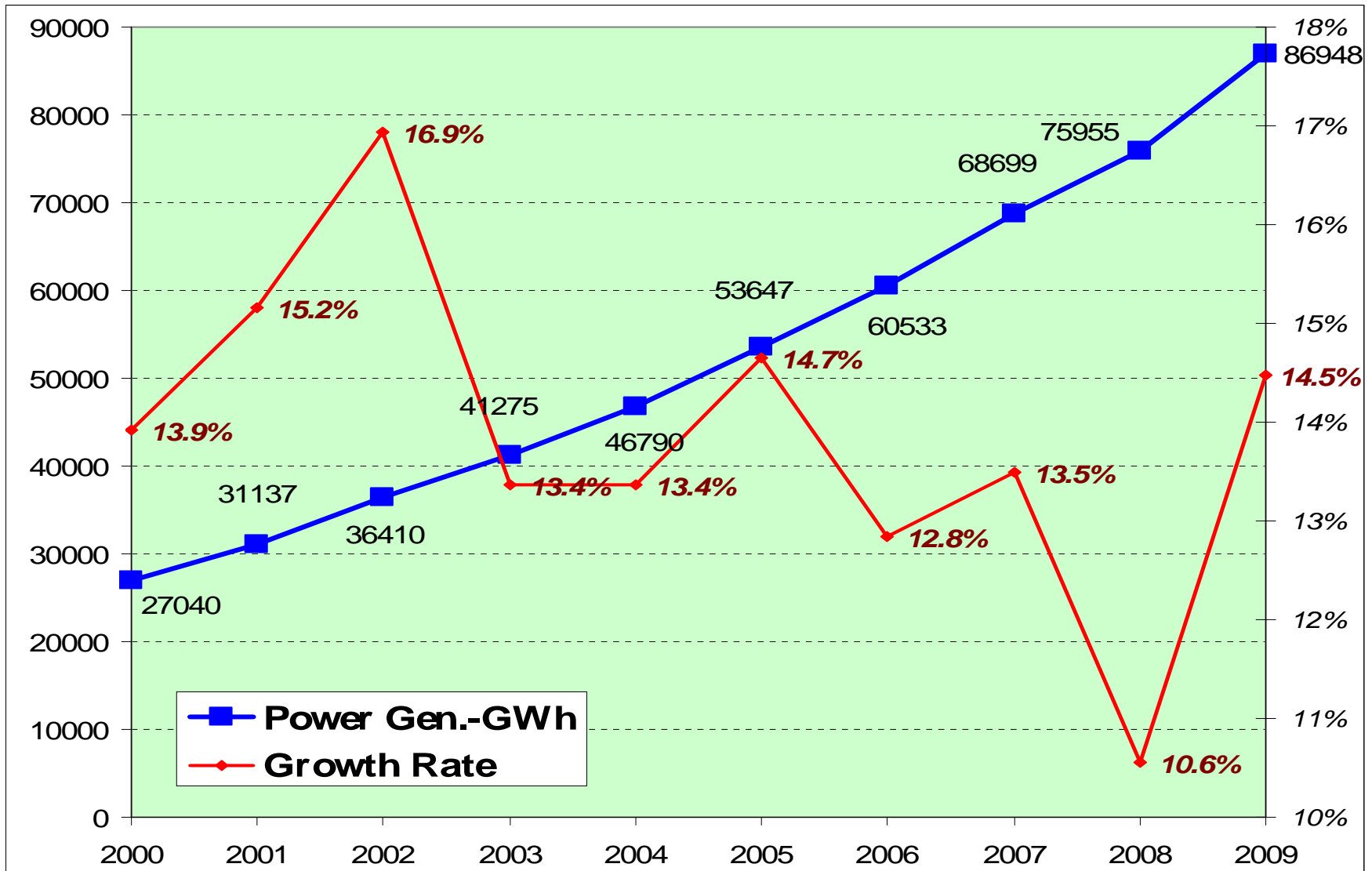


Rate of rural electrification as of end of 2009

- 100% districts have electricity from national grid or local system
- 97.6% communes (8880/9101 communes); and
- 95,1% rural households have electricity from grid (13.95/14.67 mill. households)



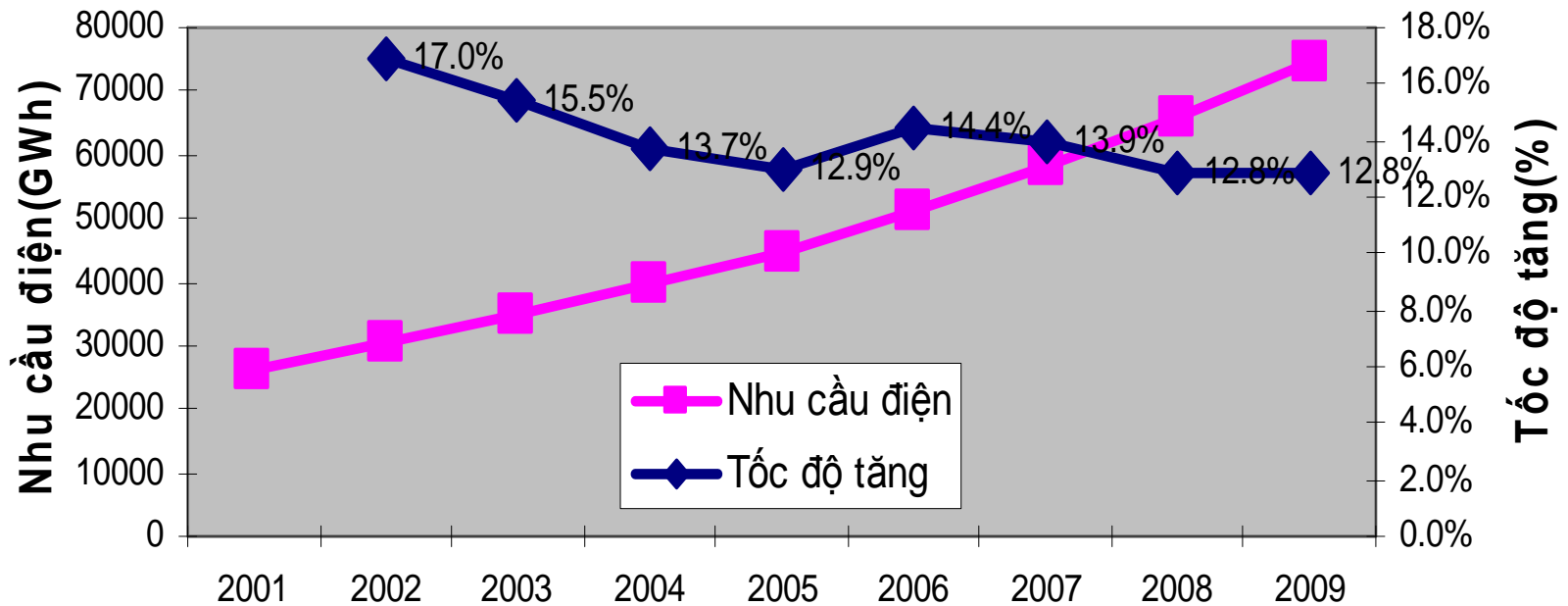
Electricity production in 2001–2009



Average growth rate of electricity is 12.8%/year in 2006–2009 (including electricity from China).

Assessment of pdp vi implementation

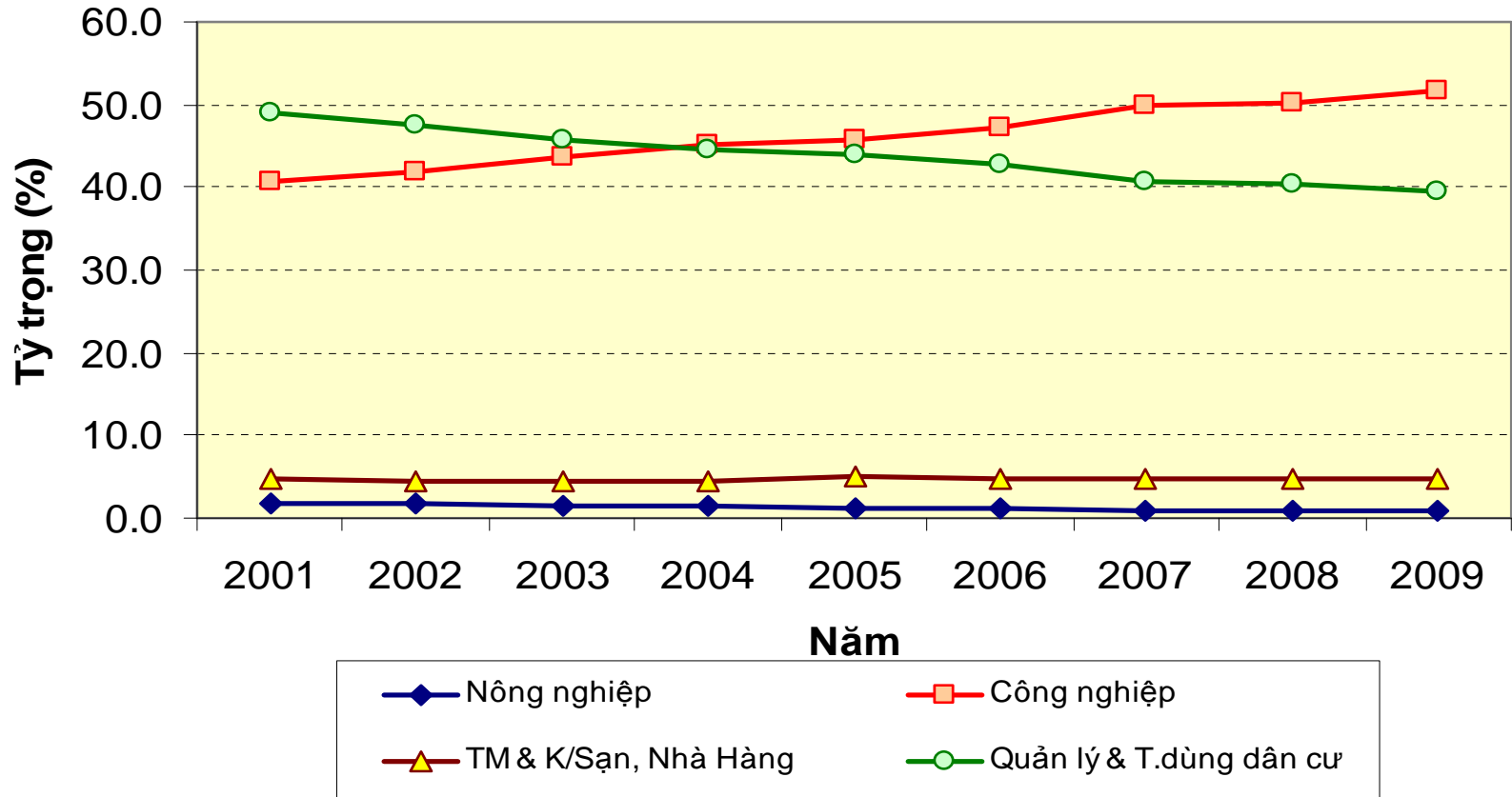
Nhu cầu điện 2001-2009



year 2009

Electricity sales (TWh): 76
Electricity production (TWh): 87
Pmax(MW): 13867
Growth rate in 2001-2009: 14.5%/year
2006-2009: 13.6%/year

Electricity consumption structure 2001 – 2009



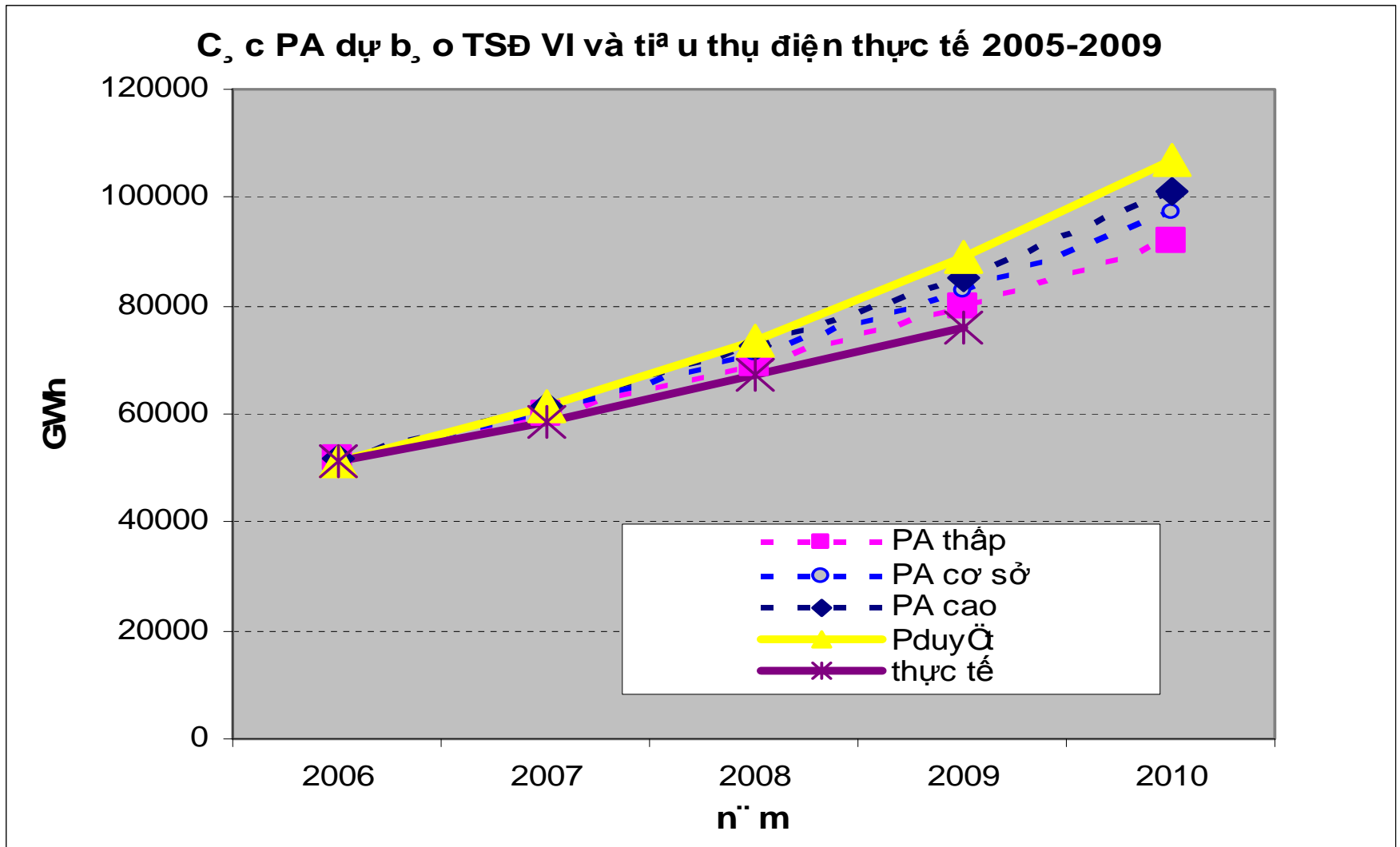
Electricity growth rate by sector in 2001-2009:

Total electricity sales: increase 14.5%
In which: -Industry- Construction: 17.6%
-Management & residential: 11.6%
-Commercial & hotel, restaurants: 13.9%

GDP growth rate & electricity demand in 2001-2009

GDP	electricity sales	elasticity
7.3%	14.5%	1,8

ASSESSMENT OF PDP VI IMPLEMENTATION



Actual electricity consumption in 2006-2009 is lower than forecast in alternatives . Growth rate of electricity sales in 2006-2009: 13.6%/year

Assessment of pdpvi implementation

Electricity growth rate in some provinces in 2001-2009

	<u>2001-2005</u>	<u>2006-2009</u>	<u>2008-2009</u>
<i>HCM CT</i>	12,2%/năm	7,8%	6,95%
<i>Şàng Nai</i>	19,3%/năm	14,9%	9,4%
<i>Bxnh D-ng</i>	37%/năm	17,2%	11,3%
<i>Vòng Tmu</i>	21,6%/năm	20,4%	15,5%
<i>Long An</i>	20,6%/năm	17,3%	19,9%
<i>Hµ Néi</i>	12,0%/năm	18,6%*	15,6%
<i>Hqi Phbng</i>	10,4%/năm	20,1%	15,0%
<i>Hqi D-ng</i>	12,4%/năm	14,0%	8,3%
<i>Ninh Bxnh</i>	24,6%/năm	21,0%	17,4%
<i>Qutng Ninh</i>	17,3%/năm	18,9%	26,8%

Construction of power plants in 2006-2009

	2006	2007	2008	2009	Est. 2010	2006- 2010
- Approved capacity MW	861	2096	3271	3393	4960	14,581
-Implemented - MW	756	1297	2251	1879	3416	9,599
- % Implemented	87.8%	61.9%	68.8%	55.4%	68.9%	65.8%

Transmission network

(2006 -:- -íc 2010)	Planned		Implemented		(%)	
	number	MVA-km	number	MVA-km	number	capacity
Substation 500kV						
New and expanded	16	8400	12	5850	75%	69.6%
lines 500kV						
New and upgraded	12	1339	6	593	50%	44.3%
Substation 220kV						
New and expanded	89	19326	63	13001	70.8%	66.8%
Lines 220kV						9
New and upgraded	121	4666	66	3238	54.5%	68.5%

Reasons

- *Many project are implemented at same time. Some investors have not enough finance*
- => *lack of capital, lborrow procedures neding long time*
- => *Weakness and lack of experience in :*
 - *bidding procedures,*
 - *Bidders, consultants*
 - *Project management units*
- *Impacts of global economic crisis =. Demand increase of 14%/year in comparision to anticipated 17%/year (~82%)*
- *high prices of equipment, fuels*
- *Not yet importing coal for TPPs in South*
- *Project area clearance, compensation works are not consistent with local plans ...*

Delay construction of TPPs will be continuous

2. Power demand forecast

Power forecasting methods

Siminar to methods applied in PDP-VI :

+ **Direct method**: demand forecast for whole country, each region, power companies, provinces in **period to 2015 and 2020**

+ **Indirect method**:

- **Main method**: multi-regretion analysis (Simple-E)

- **Other methods (for checking forecast results)**:

Ⓜ **Electricity intensity/GDP**

Ⓜ **ELasticity**

Ⓜ **Comparison to international practices**

National Economic development scenarios

GDP growth rate in 2000 – 2010(%)

	2000	2005	2006	2007	2008	2009	2010
GDP	6,79	8,4	8,2	8,48	6,23	5,3	6,5
Agriculture	4,63	4,0	3,7	3,4	3,79	1,8	2,8
Industry-Construction	10,07	10,6	10,4	10,6	6,33	5,5	7,0
Service	5,32	8,5	8,3	8,7	7,2	6,6	7,5

GDP growth rate forecast for 2011 – 2030 (%)

	2011 - 2015	2016 - 2020	2021 - 2030
High case	7.96	8.44	8.64
Base case	7.5	8.0	7.83
Low case	6.96	7.0	7.22

(according to directive 751 by PM, GDP growth rate in 2011 – 2015 shall be 7 – 8 %/year)

Scenarios prepared by economists team

input data

Population increase in 2009 – 2030

Year	2009	2010	2015	2020	2030
Population (mil.)	87093	88038	92499	97187	102421

Energy saving

Electricity saving rate: 1-3%/year, various by sector and period

Electricity tariff

- *Electricity tariff forecasting: was present, based on the oil price change ...*
- *Elasticity of electricity ptariff: -0.01->-0.02*

Electricity demand forecasting by power corporation

Electricity demand forecast by power corporation up to 2020

	Đơn vị	2010	2015	2020
Chỉ số tổng hợp	GWh	85932	159202	251763
<i>TC Ty 1</i>	GWh	24256	45970	69669
<i>TC Ty 2</i>	GWh	28506	57026	90270
<i>TC Ty 3</i>	GWh	8489	16451	27634
<i>TC Ty & L Hμ NéI</i>	GWh	9152	15566	26917
<i>TC Ty & L TPHCM</i>	GWh	14746	25413	40007
Pmax Tổng quốc	MW	15731	28876	45197
<i>TC Ty 1</i>	MW	5035	9416	14053
<i>TC Ty 2</i>	MW	5059	10154	16015
<i>TC Ty 3</i>	MW	1616	3060	4890
<i>TC Ty & L Hμ NéI</i>	MW	1850	3110	5080
<i>TC Ty & L TPHCM</i>	MW	2656	4496	6955

long term demand forecast in scenarios

Year	2010	2015	2020	2025	2030
<u>Base case</u>					
Production (GWh)	100.88 0	194.304	309.888	456.425	643.048
Pmax (MW)	16.048	30.803	48.956	71.857	101.955
Sales (GWh)	87.665	169.821	272.701	401.654	569.098
<u>High case</u>					
Production (GWh)	100.88 0	210.852	361.943	561.506	833.817
Pmax (MW)	16.048	33.426	57.180	88.401	132.201
Sales (GWh)	87.665	184.284	318.511	494.126	737.928

growth rates in scenarios

Growth rate of electricity sales in whole country

Growth rate/year	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030
High case		16.0%	11.6%	9.2%	8.4%
Base case	14.0%	14.1%	11.3%	8.2%	7.4%

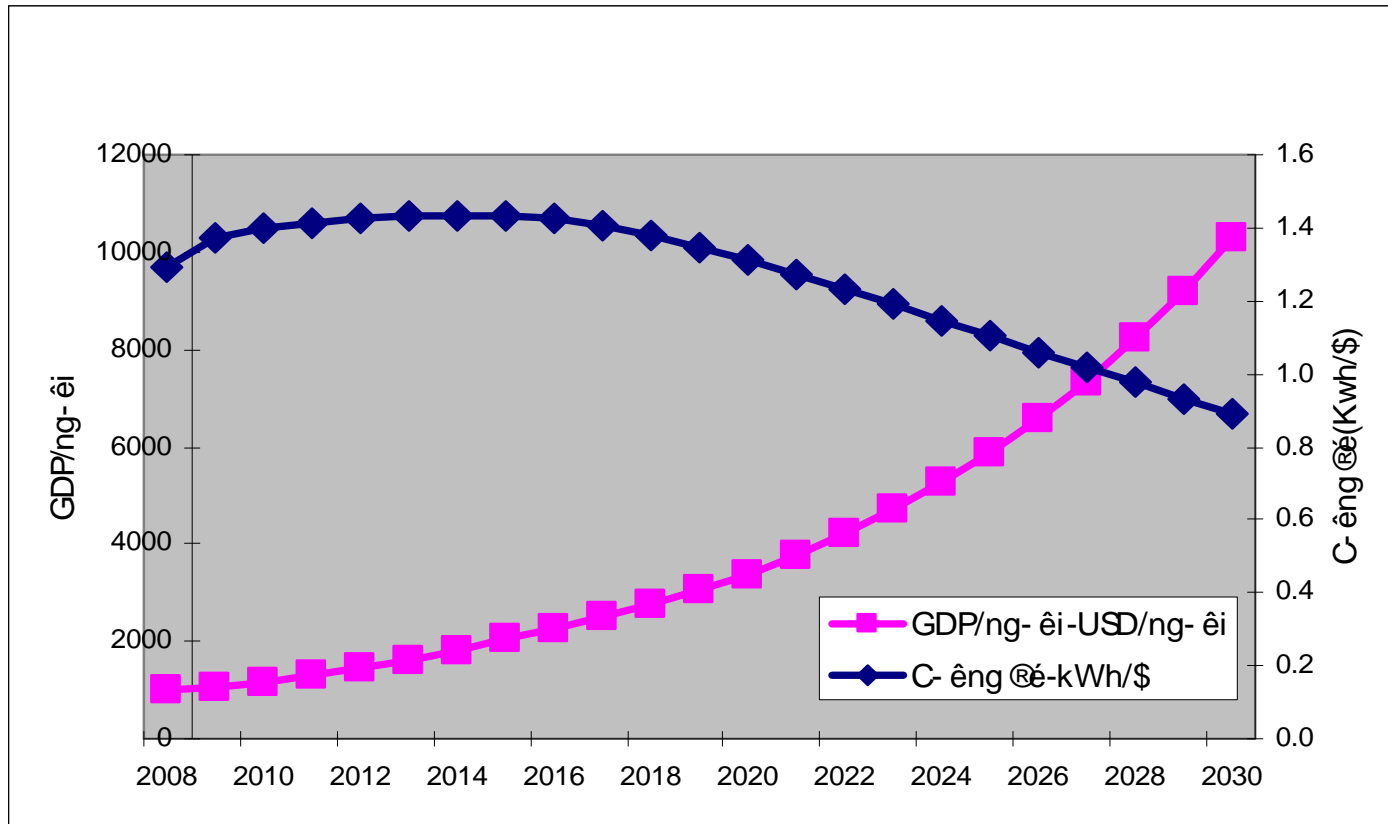
Elasticity

	2011-2015	2016-2020	2021-2025	2026-2030
Base case	1.89	1.41	1.06	0.95

4. Electricity demand forecast for 2011–2030

Hạng mục	2009		2010		2015		2020		2025		2030	
	GWh	%	GWh	%	GWh	%	GWh	%	GWh	%	GWh	%
Khu vực CAO												
Năng lượng công nghiệp & Thu thuế	700	0.92	789	0.90	1659	0.90	2040	0.64	2147	0.43	2233	0.30
Công nghiệp & xây dựng	38501	50.63	44708	51.00	97454	52.88	169962	53.36	255253	51.66	368694	49.96
Thương nghiệp & khách sạn	3512	4.62	4181	4.77	10057	5.46	15605	4.90	22930	4.64	34337	4.65
Quản lý & tiện ích dân cư	30534	40.15	34585	39.45	66319	35.99	113728	35.71	184501	37.34	286051	38.76
Các hộ gia đình	2799	3.68	3402	3.88	8796	4.77	17177	5.39	29295	5.93	46612	6.32
Tổng cộng	76046	100	87665	100	184284	100	318511	100	494126	100	737928	100
Tăng trưởng GDP		9.70		10.0		9.0		8.0		7.5		7.0
Tỷ lệ		3.0		3.1		3.6		4.0		4.5		4.5
Chỉ số	87109		100880		210852		361945		561506		833817	
Công suất (MW)	13867		16048		33426		57180		88401		132201	
Khu vực CỎ SỎ												
Năng lượng công nghiệp & Thu thuế	700	0.92	789	0.90	1528	0.90	1843	0.68	1951	0.49	2046	0.36
Công nghiệp & xây dựng	38501	50.63	44708	51.00	89805	52.88	145052	53.19	210596	52.43	294039	51.67
Thương nghiệp & khách sạn	3512	4.62	4181	4.77	9268	5.46	12939	4.74	16858	4.20	22267	3.91
Quản lý & tiện ích dân cư	30534	40.15	34585	39.45	61114	35.99	98122	35.98	148965	37.09	216290	38.01
Các hộ gia đình	2799	3.68	3402	3.88	8106	4.77	14745	5.41	23284	5.80	34456	6.05
Tổng cộng	76046	100	87665	100	169821	100	272701	100	401654	100	569098	100
Tăng trưởng GDP		9.70		10.0		9.0		8.0		7.5		7.0
Tỷ lệ		3.0		3.1		3.6		4.0		4.5		4.5
Chỉ số	87109		100880		194304		309888		456425		643048	
Công suất (MW)	13867		16048		30803		48956		71857		101955	

Elasticity and electricity intensity

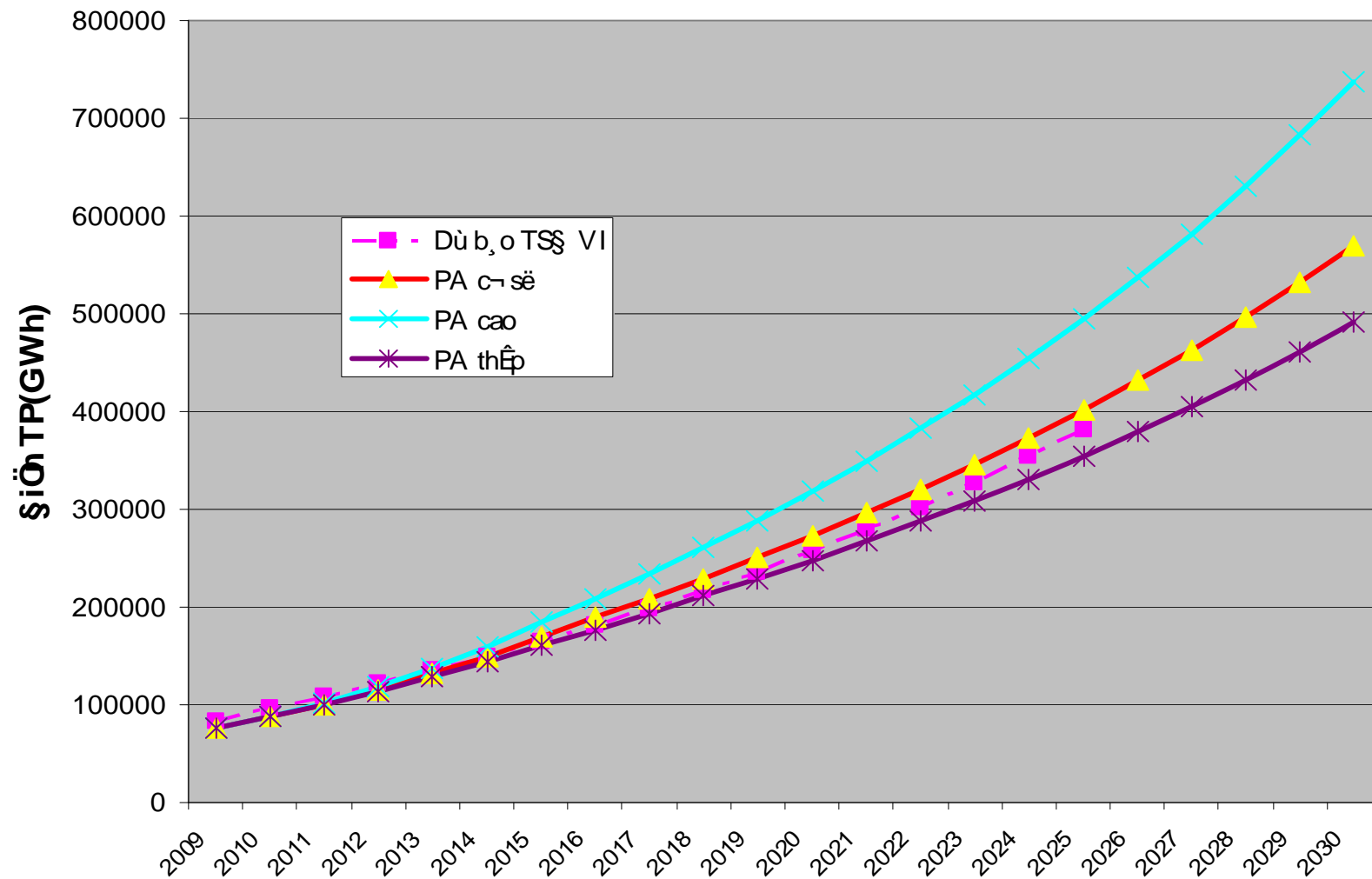


Electricity intensity, GDP/person, Consumption/person

	2010	2015	2020	2025	2030
kWh/USD(2005)	1,44	1,52	1,41	1,16	0,92
USD/person	1221	2023	3350	5000	9890
kWh/person/year	996	1836	2800	4020	5560

Comparison to the forecast in pdp-vi

Số lượng TSS VII & TSS VI



Forecasting fuels for electricity generation

	2010	2015	2020	2025	2030
Domestic coal *					
Dust 4b (1000.VND/ton)	648	916,5	1.012	1.117,3	1.233,5
Dust 5 (1000.VND/ton)	520	800,0	883	975,0	1.076,5
Imported coal *					
(USD/T)	71	78	87	96	106
Natural gas (USD/triÖu BTU)	3,55	6,37	7,65	8,90	10,72
DO (USD/ton)	874	964	1.065	1.176	1.298
FO (USD/ton)	703	776	857	946	1.044
Imported fuel rods					
Price (US cent/kWh)	0,70	0,70	0,773	0,853	0,942

* Not included transport cost to power plants, about 2-5 \$/T (North) and 10-11 \$/T (South)

5. Assessment of primary energy resources - exploitation

- **Hydropower:** Economic-technical potential ~75 - 80 billion kWh (20.000MW); 70.8 billion kWh on main rivers (not more than PDPVI):
 - 51.6% in North
 - 31.9% in Central, and
 - 16.4% in South
- **Coal:** according to coal development plan, by 2015:
 - 2015: production is 60-65 mil. tons/year
 - 2020: 70-75 mil. tons/year
 - 2025: > 80 mil. tons/year

coal supply for electricity generation: (not included coal in red river delta)

- 2010: 15,5 mil. tons
- 2015: 37,4 mil. tons (enough ~ 16000MW)
- 2020: 50,4 mil. tons ((enough ~ 21000MW)
- 2025: 68,8 mil. tons ((enough ~ 29000MW)

Need to find coal source for import

- **Fuel gas:** According to draft plan for development of supply sources and consumption market (Petroleum Institute) – Base/High case:

- ❖ 2010: **8.0 bil. m3**
- ❖ 2015: **13.2/ 13.4 bil. m3** => 10-:-11 bil. m3
- ❖ 2020: **14.8/ 20.3 bil. m3**
- ❖ 2025: **10.7/ 18.0 bil. m3**

Consider LNG and adding gas when gas reduction in pipeline

- ✓ Southeast offshore: ~ 7.5 – 9.5 bil. m3 (2025 4,5 – 6.8 bil. m3)
- ✓ Southwest offshore: ~ 5.6 – 8 bil. m3 (2025: 4.6 – 6.9 bil. m3)
- ✓ North & Central: ~ 1.6 – 2.9 bil. m3 (2020), 1.6 – 4.2 bil. m3 (2025)

Potential of renewable power resources

1. At present: about 150MW of co-generation using biomass (at sugar plants), 7.5MW of wind power (Tuy Phong-Ninh Thuan) and about 1.15MW of solar power.

2. Potential development / anticipated development:

- **Small hydropower**: 4000MW / 2400MW
- **Geothermal power**: 200MW / 0 (not efficient)
- **Biomass power**: 300 -:- 400MW
- **Wind power**: 3500MW / 2100MW
- **Solar power**: 4 -:- 6MW

❖ Total potential / anticipated RE capacity to be developed:

- 7800 -:- 8000MW / 4900MW

- 2015: Cả thỐ x©y dùng ~1600MW nguồn NL t_l t_o (~ 5,7 TWh);

- 2020: 3200MW (~11,2 TWh); vμ

- 2025: 4700MW (16,2 TWh)

- 2030: 4900MW (~17 TWh)

Updates

- According to the transmission project of 3 countries in Indochina (IE is entrusted with task by EVN) :
 - **In Northern Laos:** HPP Luong Prabang through 500kV line to Nho Quan (420km). Option with XÇm N-a substation is not feasible because HPP Nam Sum will send power to Vietnam on 220kV line, HPP NĚm Đt is not economically viable: not certain schedule of Luong Pra bang HPP.
 - **In Southern Laos:** Some HPP projects are less effective (Dak Emuele, Sekaman2); not yet agreement with project owner (Se Kong 4) => total capacity anticipated through Ban Sok - Pleiku line in 2015-2016 is lower than that in MOU between VN and Laos (reduced from 1500MW to ~800MW); added HPP Nam Theun 1 - 400MW
 - **In Northern Cambodia:** HPP Se San 1; located in eco-protection zone (Prekliang); changed investors (Srepok 5,6,8&9); Sambor, Not clear capacity of Strung Treng
- ⇒ Total anticipated imported capacity is reduced (Laos:3000MW instead of 5000MW, Cambodia: 1200MW instead of 2500MW)
- **In China:** maintaining import through 220kV line, but delaying import through 500kV lines

6. Power generation development program

Planning criteria

1. Methodologies – criteria for power generation development

- Concentrated planning
- Solving least cost planning problem
- Using advanced software, equivalent to regional level: STRATEGIST, PDPAT
- Technical zoning: 3 systems: North – Central – South interconnected by two 500kV lines
- Using comments of JICA experts
- Priority given to sites near load centers, reduction of far transmission

Inputs

- Reserve capacity ensure power supply shortage not exceeding 24h/year by each regional system in period 2021-2030
- Not served electricity value: 0.7 USD/kWh
- Transmission limit on 500kV line:
 - North <-> Central: 1800MW (to 2015), 2000MW (from 2016 to 2025) and 2500MW (from 2026)
 - Central <-> SOut: 1800MW (to 2012), 2500MW (from 2013 onwards)
 - **500kV line from Pleiku -> Cau Bong to be completed in 2013, enhancing supply reliability for the South in 2013 – 2015; importing electricity from Laos**
- Southern PSHPP: unit #1:300MW- 2019, increased to 3600MW; North: unit #1: 300MW- 2021, total capacity 1200MW
- Wind power plants are stimulated as one equivalent power plant with capacity of 50MW (~87GWh/yr); Wind power tariff: average ~9US cent/kWh
- Pmax in Central: 4700 – 5800MW in 2020 and 6800 – 9000MW in 2025 => simulated uniy capacity lower than that in the sourh and north (coal TPP: 300MW, GTCC: 450MW)
- Nuclear power: *Base case: 2020: unit #1; 2025: 4x1000MW; 2030: added 2x1350MW*
High case: 2020: unit #1; 2025:4x1000+2x1350MW; 2030: added 6x1350MW
- In additions to planned SHPPs, othe SHPPs after 2010 are cimulated as one equivalent HPP with capacity of ~100MW

Updated and anticipated generation
Development in 2010-2012

TT	Tên nhà máy	Công suất (MW)	Tiến độ theo QHD-VI	Chủ đầu tư
	Công trình dự kiến v/h 2010	2962		
1	TĐ Sơn La #1	400	2010	EVN
2	TĐ Cửa Đạt	2x48.5	2009	CTCPTĐ Cửa Đạt
3	TĐ Bản Vẽ	2x150	2009	EVN
5	TĐ Srêpok 3	2x110	2100	EVN
6	TĐ Sê San 4 #3	120	2010	EVN
7	TĐ Sông Tranh 2 #1	1x95	2010	EVN
8	TĐ Preikrong #2	50	2010	EVN
9	TĐ Đồng Nai 3#1&2	2x90	2009	EVN
10	NĐ than Sơn Động	2x110	2008	TKV
11	NĐ Hải Phòng I #1	300	2009	CTCPNĐ Hải Phòng
12	NĐ Cẩm Phả I	300	2009	TKV
12	NĐ Quảng Ninh I	2x300	2009	CTCPNĐ Quảng Ninh
13	TĐ Sre Pok 4	2x40	2012	CTCP Điện Đại Hải
	Vào vận hành năm 2011	3762		
1	Sơn La #2,3	2x400	2011	EVN
2	Nậm Chiến	2x100	2011	S.Đà
3	Nho Quế 3	2x55	2013	CTCP Bitexco
4	TĐ Na Le (Bắc Hà)	2x45	2010	LICOGI/IPP
5	Khe Bô #1	50	2011	CTCPDL
6	TĐ Sông Tranh 2 #2	1x95	2010	EVN
7	TĐ An Khê #2	80	2008	EVN
8	Sê San 4a	63	2010	CTCPTĐ Sê San 4a
9	Đak My 4	2x74+2x21	2011	IDICO
10	Se Kaman 3	2x125	2010	CTCP Việt Lào
11	DakR tih	2x41+2x31	2010	TCTXD số 1
12	Đồng Nai 4	2x170	2010	EVN
13	NĐ Hải Phòng I #2	300	2009	CTCPNĐ Hải Phòng
14	NĐ Cẩm Phả II	300	2009	TKV
15	Nhon Trạch 2	3x250	2011	PVN
	Vào vận hành năm 2012	2970		
1	Sơn La #4,5,6	3x400	2012	EVN
2	Bản Chát	2x110	2011	EVN
3	Hủa Na	180	2012	PVN
4	Khe Bô #2	50	2011	CTCPDL
5	A Lưới	2x85	2011	CP điện MT
7	NĐ Nông Sơn	30	2009	TKV
6	Mạo Khê #1	220	2009-2010	TKV ²⁶
8	Uông Bí MR #2	300	2011	EVN
9	Quảng Ninh II	2x300	2009	CTCPNĐ Quảng Ninh

...updated and
anticipated

Generation 2013 - 2015

In total 22,160 MW
put in 2010-2015,
EVN 's power plants
12,926MW (58.3%)

2016-`17 of added 14,300MW
4380MW is under EVN
(30.6%):

Lai Chau HPP, Mong Duong
II#2 TPP,
Thị bình I, D.Hải III TPPs,
HPP H¹ S.San 2

TT	Tên nhà máy	Công suất (MW)	Tiến độ theo QHĐ-VI	Chủ đầu tư
	Vào vận hành năm 2013	1507		
1	Bá Thước I	40	-	
2	Bá Thước II	80	-	
3	Srê Pok 4a	64	-	
4	Đak Rinh	2x62.5	2011	PVN
5	Đồng Nai 2	78	2012	IPP
6	Hải Phòng 2 #1	300	2009-2010	EVN
7	Mạo Khê #2	220	2009-2010	TKV
8	Vũng Áng I #1	600	2010	PVN
	Vào vận hành năm 2014	6795		
1	Huội Quảng	2x260	2012	EVN
2	Nậm Mô (Lào)	95	2012	IPP
3	Se Ka man 1 (Lào)	290	2012	CTCP Việt Lào
4	Hải Phòng 2 #2	300	2009-2010	EVN
5	Mông Dương 1 #1	500	2011-2012	EVN
6	Mông Dương 2 #1	600	2011-2012	AES (BOT)
7	Nghi Sơn 1	2x300	2011-2012	EVN
8	Vũng Áng I #2	600	2010	PVN
9	NĐ Lục Nam #1	50	-	IPP
10	Vĩnh Tân 2 #1,2	2x600	2013-2014	EVN
11	Duyên Hải (Trà Vinh) 1 #1	600	2012-2013	EVN
12	Ô Môn I #2	300	2010	EVN
13	Hiệp Phước 2 #1	390	-	Hiệp Phước PC (đề nghị)
14	Ô Môn III (TBKHH)	3x250	2014	EVN
	Vào vận hành năm 2015	7126		
1	Trung Sơn	250	2012	EVN
2	Thượng Kon tum	220	2013	CP VS-S.Hinh
3	Sông Bung 4	156	2012	EVN
4	Sông Bung 2	100	2013	EVN
5	Đồng Nai 5	140	2012	TKV
7	Mông Dương 1 #2	500	2011-2012	EVN
9	Hải Dương #1	600	-	Jak Behad (BOT)
10	Thái Bình II #1	600	-	PVN
11	Vĩnh Tân 1	2x600	2011	CSG (BOT)
12	Ô Môn II (TBKHH)	3x250	2013-2015	BOT
13	Ô Môn IV (TBKHH)	3x250	2014	EVN
14	Duyên Hải (Trà Vinh) 1 #2	600	2012-2013	EVN
15	Long Phú (Sóc Trăng) 1 #1	600	2013-2014	PVN
16	Vân Phong 1	660	-	Sumitomo-BOT

Calculation results of generation - loads in base case

Generation	2010	2015	2020
Electricity production	100.9 TWh	194.3 TWh	329.4 TWh
Pmax whole country:	16,048 MW	30,803 MW	52,040 MW
Total installed capacity:	19,937 MW	43,050 MW	69,433 MW
<i>Total reserve:</i>	<i>3,889 MW</i>	<i>12,247 MW</i>	<i>17,393 MW</i>
<i>In which: HPP&PSPP</i>	<i>7,726MW (38.8%)</i>	<i>14,351 (33.3%);</i>	<i>7,455 (25.1%)</i>
<i>Oil&Gas TPPs:</i>	<i>7,703MW(38.6%);</i>	<i>10,582 (24.6%)</i>	<i>13,625 (19.6%)</i>
<i>Coal TPPs:</i>	<i>3,231MW(16.2%)</i>	<i>15,365 (35.7%);</i>	<i>32,385 (46.6%)</i>
<i>Import:</i>	<i>750MW(3.8%):</i>	<i>1,073 (2.5%)</i>	<i>1,839 (2.6%)</i>
<i>RE</i>	<i>527MW(2.6%)</i>	<i>1,679(3.9%)</i>	<i>3,129 (4.5%)</i>
<i>NPP</i>			<i>1,000 (1.4%)</i>
System max monthly reserve	19.5%	39.8%	33.4%

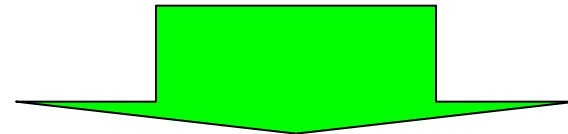
in 2025 capacity of RE ~4,800MW, accounting for 5% of 97,900MW installed capacity

Calculation results of generation development alternative (RE increase)

Generation mix 2020

(base case / RE increased case)

Electricity production	329.4 TWh	
Pmax whole country :	52,040 MW	
Total installed capacity :	69,433 MW	69,823 MW
<i>Total reserve:</i>	<i>17,393 MW</i>	<i>17,783 MW</i>
<i>In which:</i>		
<i>HPP&PSPP</i>	<i>17,445 MW (25.1%)</i>	<i>17,455 (25.0%)</i>
<i>Oil&Gas TPPs :</i>	<i>13,625 MW (19.6%)</i>	<i>13,565 (19.4%)</i>
<i>Coal TPPs :</i>	<i>32,385 MW (46.6%)</i>	<i>32,385 (46.4%)</i>
<i>Import:</i>	<i>1,839 MW (2.6%)</i>	<i>1,839 (2.6%)</i>
<i>RE</i>	<i>3,129 MW (4.5%)</i>	<i>3,579 (5.1%)</i>
<i>NPP</i>	<i>1,000 MW (1.4%)</i>	<i>1,000 (1.4%)</i>



In 2025 RE capacity ~5,700MW,
(of which SHPP 3100MW, wind, solar , biogas 2600MW)
accounting for 5.8% of 98,100MW installed capacity

Balancing coal for electricity production

Than tiêu thô-Triều tền	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Miền Bắc-trong nước	10.8	12.7	16.0	18.9	21.0	25.1	28.3	30.2	34.0	37.0
<i>Miền Bắc-Nhập khẩu</i>	0	0	0	0	0	0	0	1.5	1.3	3.3
miền Trung-trong nước	0	0.07	0.07	0.08	0.08	0.07	0.07	0.06	0.06	0.07
miền Trung-nhập khẩu	0	0	0	0	0	0	0.9	2.3	3.1	3.3
Miền Nam-trong nước	0.0	0.0	0.0	3.4	9.0	9.6	9.5	9.3	9.6	9.6
Miền Nam-Nhập khẩu	0.4	0.4	0.5	0.4	1.98	7.6	13.8	17.5	21.4	23.9
Nhu cầu Tổng quốc	11.2	13.2	16.5	22.8	32.0	42.4	52.6	60.8	69.5	77.1
Tổng nhập khẩu	0.38	0.42	0.46	0.43	2.0	7.6	14.7	21.3	25.8	30.5
Trong nước				22.4	30.0	34.8	37.9	39.6	43.7	46.6
Khả năng cấp theo TKV					37.4					50.4

Than tiêu thô-Triều tền	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Miền Bắc-trong nước	41.1	44.1	47.9	52.5	53.6	57.2	59.8	59.9	58.6	57.5
<i>Miền Bắc-Nhập khẩu</i>	2.7	3.3	3.3	3.5	7.1	7.5	9.9	16.6	25.3	34.4
miền Trung-trong nước	0.08	0.08	0.08	0.09	0.09	0.09	0.08	0.07	0.07	0.116
miền Trung-nhập khẩu	4.3	4.4	4.3	5.3	6.5	8.7	10.6	9.7	9.8	9.0
Miền Nam-trong nước	9.5	9.3	9.2	9.0	8.9	9.0	8.9	8.8	8.7	8.6
Miền Nam-Nhập khẩu	26.8	28.6	31.4	35.4	40.1	44.5	50.9	58.0	68.3	78.5
Nhu cầu Tổng quốc	84.4	89.8	96.2	105.8	116.4	126.9	140.2	153.0	170.8	188.1
Tổng nhập khẩu	33.7	36.2	39.1	44.2	53.8	60.6	71.4	84.2	103.5	121.9
Trong nước	50.6	53.6	57.1	61.6	62.7	66.2	68.8	68.8	67.3	66.2
Khả năng cấp theo TKV					68.8					30

7. Transmission development program (Ch.8)

Viewpoints and design standard for 500kV network

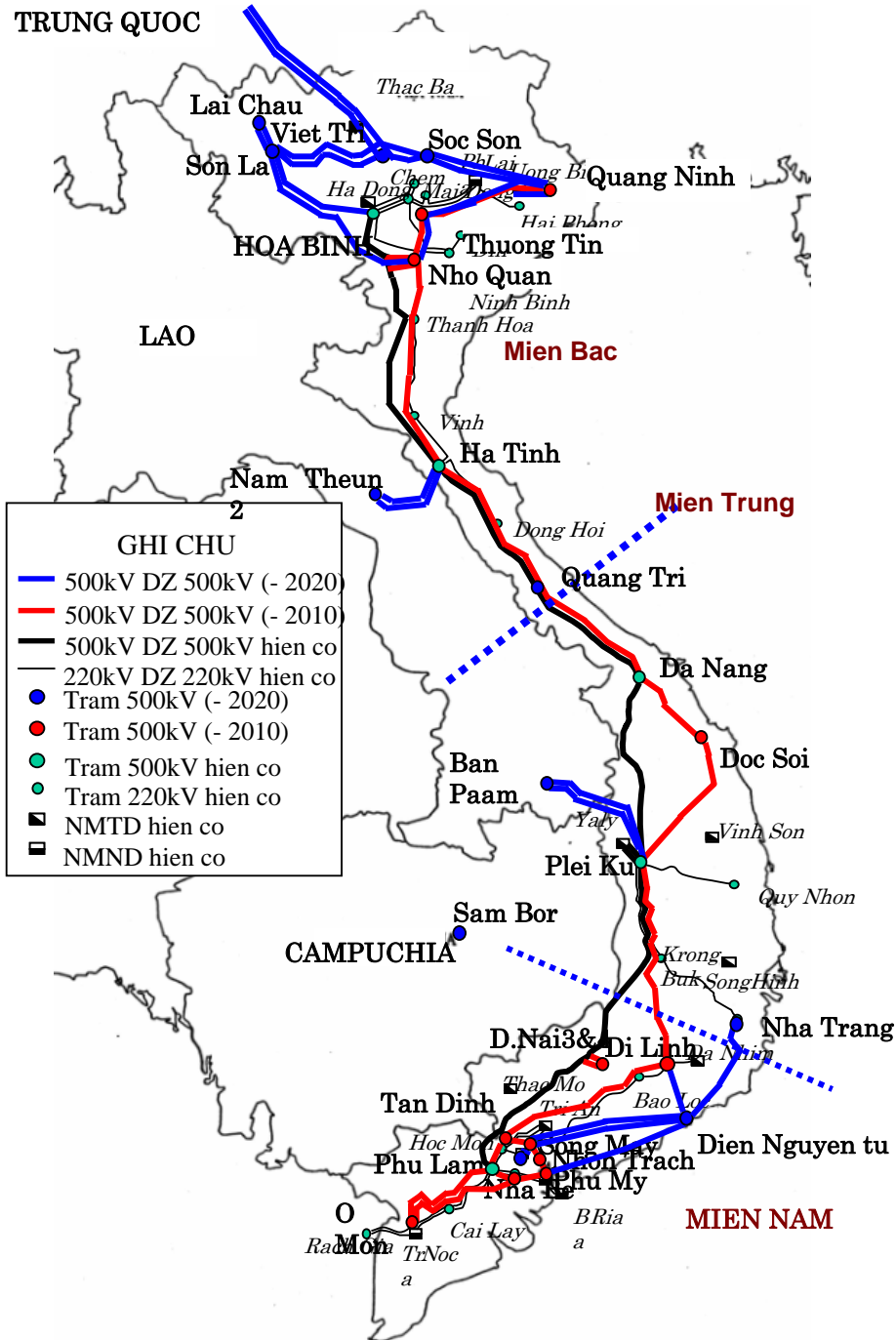
- **Balance of supply and demand in North, Central and South, reducing far transmission lines;**
- **Interconnection of 3 regions in order to exchange electricity and optimal operation of power systems**
- **Balance of supply and demand in each province, area, big load center (Hanoi, HCMCT): design power systems for divided areas.**
- **Focus on safe design power networks for big load centers (Hanoi, HCMCT...)**
- **Ensuring electricity quality, simple network, flexible operation**
- **Lines:**
 - **Applying criterion (N-1), design with loop or double circuit 500kV line with conductor 1300 - 2400 mm², or bigger for cities.**
 - **Using multi-circuit towers** **Số đông §Z cét nhiều m'ch, xem xĐt kh¶ n'ng số đông, considering re-using existing routes of lines 110kV, 220kV..., by rehabilitation to multi-voltage levels, multi-circuit towers.**
- **Substation:**
 - **In HCMCT, Hanoi: 2 – 4 MBA/substation, 900-2000 MVA/ transformer, in other areas: 2 – 3 MBA/substation, 450 – 2000 MVA/ transformer.**
 - **Expansion of existing 500kV substations: considering possibility of changing switchyards by using GIS to increase number of feeders.**

Zoning of electricity systems

Whole country system

consisting of 3 regional interconnected systems

- **North system:** northern provinces to Ha Tinh.
- **Central system:** North-central provinces, central coastal provinces to Khanh Hoa and 4 provinces in highland: Kon Tum, Gia Lai, $\frac{3}{4}$ L $\frac{3}{4}$ C, $\frac{3}{4}$ N \ll ng
- **South system:** Southern provinces, B \times nh Thu \ddot{E} n, Ninh Thu \ddot{E} n, L \odot m \S \grave{a} ng



North system

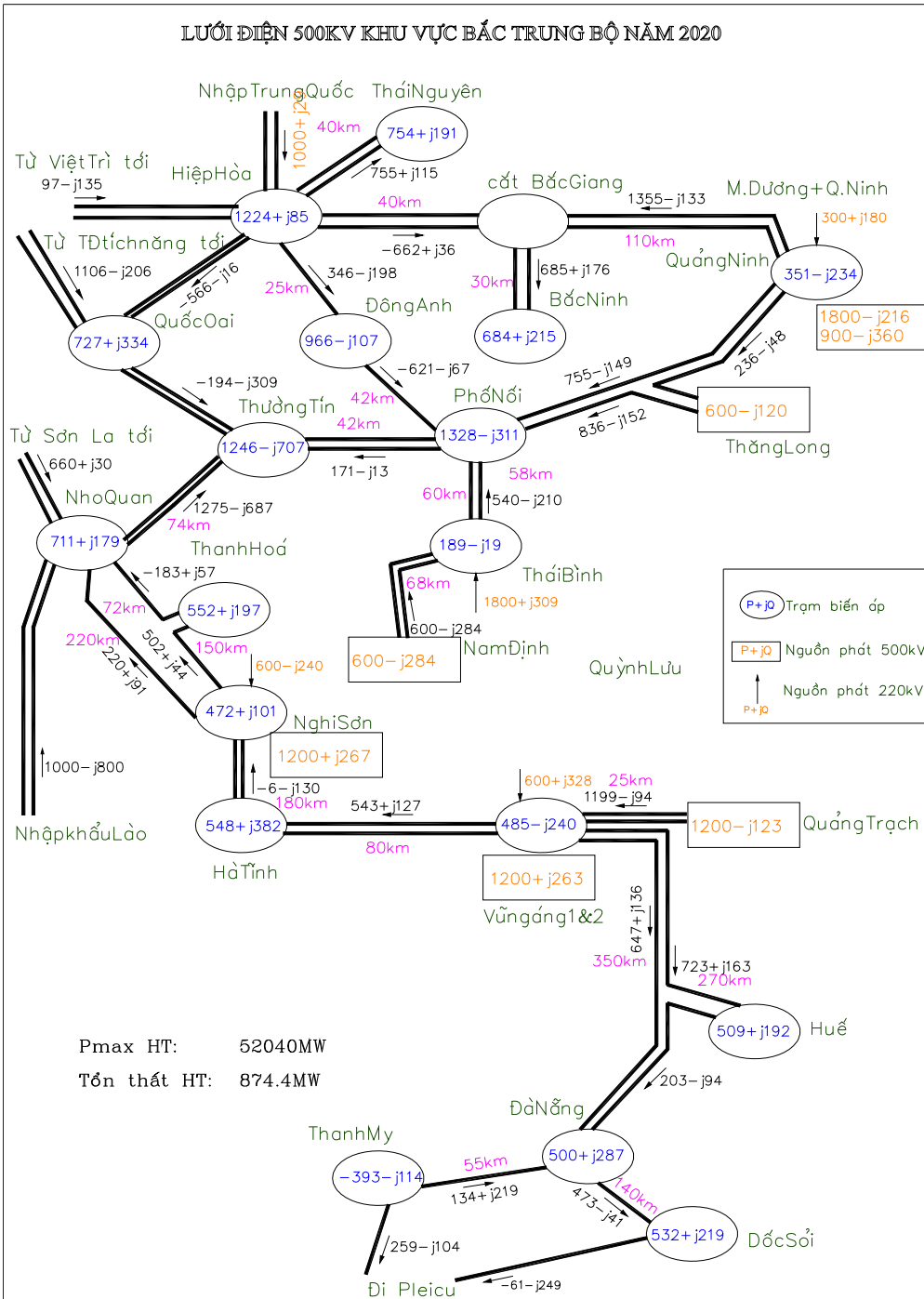
Central system

South system

HỒ THẲNG ĐIỆN 500KV

khuvàc miền B^{3/4}C
& B^{3/4}C Trung bé

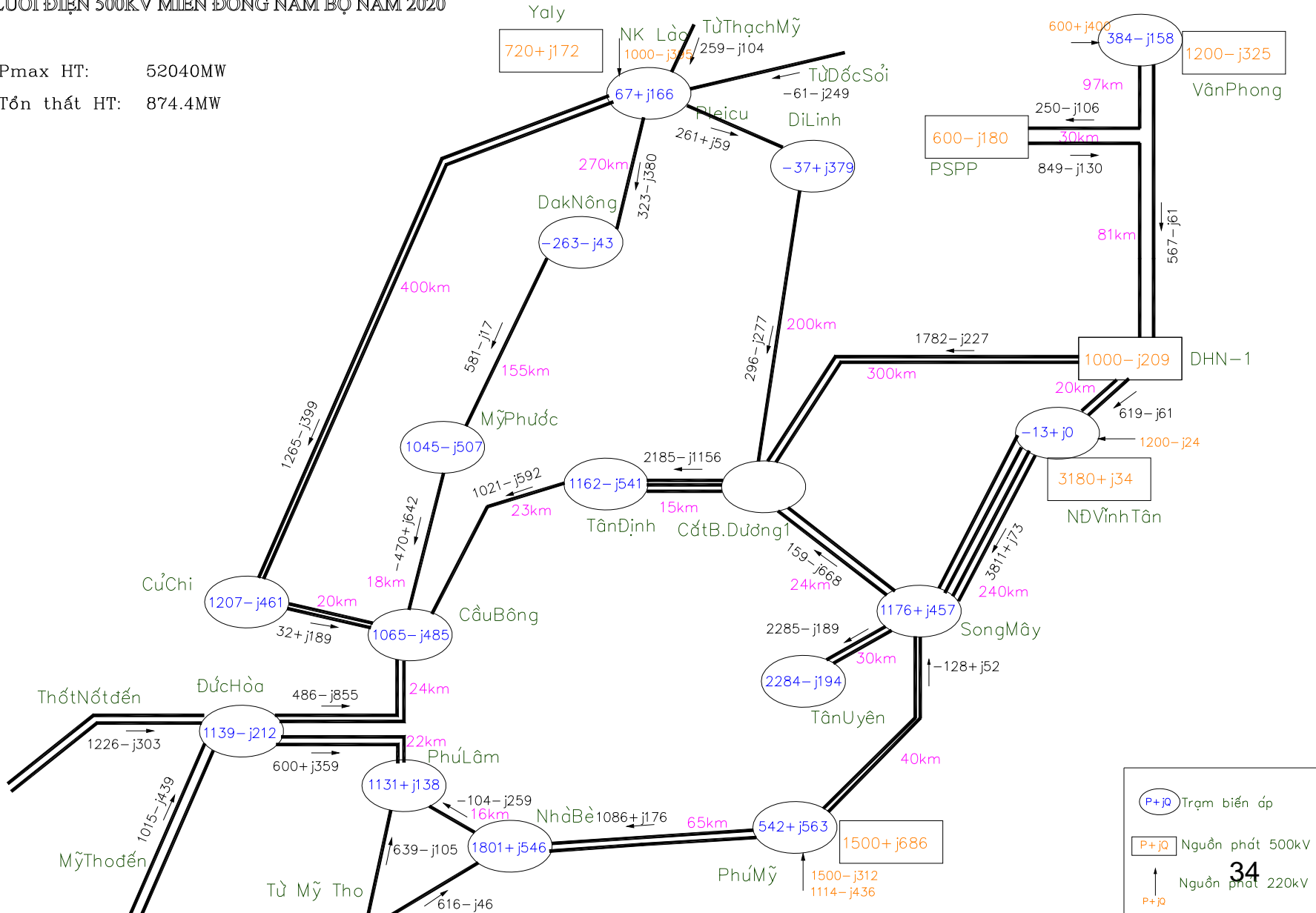
năm 2020



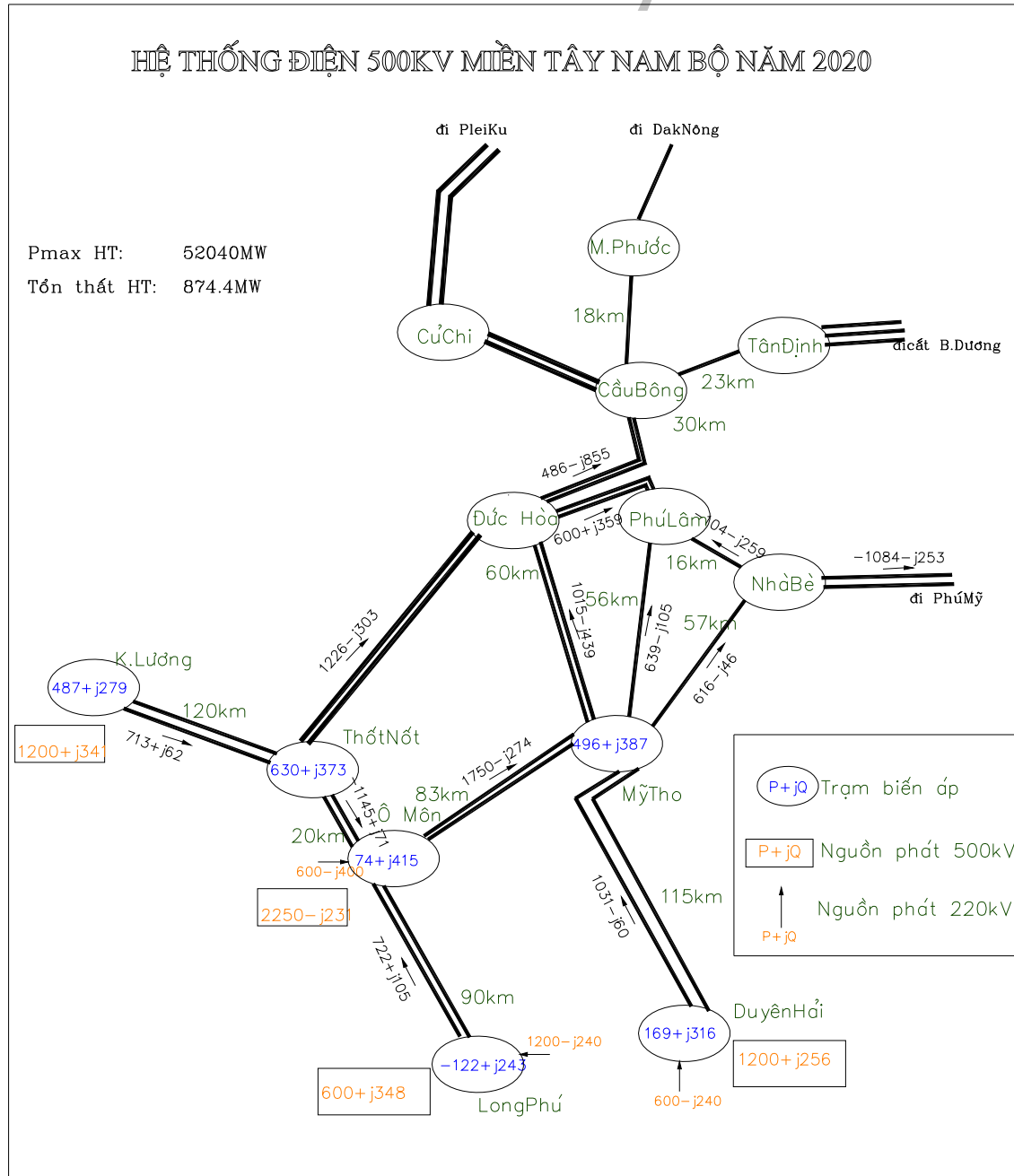
Southeast 500kV system in 2020

LUỚI ĐIỆN 500KV MIỀN ĐÔNG NAM BỘ NĂM 2020

Pmax HT: 52040MW
 Tổn thất HT: 874.4MW



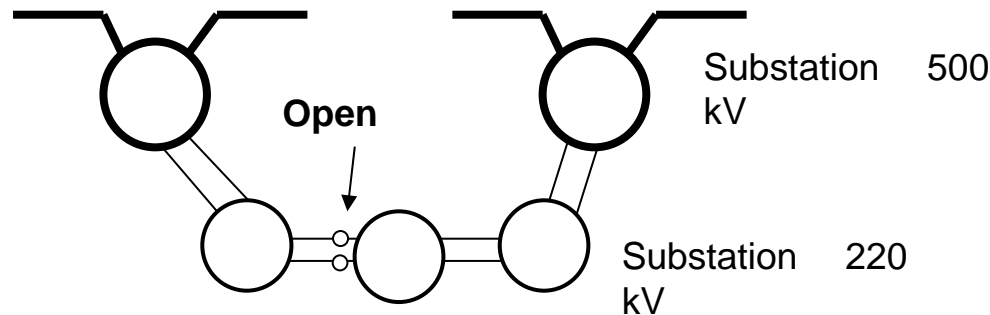
Southwest 500kV system in 2020



...transmission development program

Design standards for 220kV network in HCM city and Hanoi city

- **Substation:** HCM city, Hanoi area: 2(3)x250MVA, or 1-phase 2x(3x100) MVA transformers.
- **220kV network:** In Hanoi and HCM city : open operation, one substation 500/220kV feeds to 2-3 substations 220kV; Double circuit lines 2x610 (810)mm²



Design standards for other areas

- **Substation :** 1 (2)x125(250)MVA.
- **220kV network:** double circuit line with conductor 1(2) cores, 330-400 -600mm².

9. SEA report

Works have been being done

1. **Establishment of SEA team consisting of members from IE and other organizations**
2. **Information collection: technical-social information, natural conditions, status of national environment, forest area, reservation planning**
3. **Determining core environmental elements; development of environmental assessment matrix for PDP 7**
4. **Development of detailed SEA report**

Works to be done

1. **Getting opinions from localities with projects**
2. **Selecting typical sites for survey**
3. **Using model for ranking priority project**
4. **Feedbacks on draft alternatives in PDP-VII**
5. **Coordinating with ADB experts to perform: social survey, scenario design**
...
6. **Development of supervision of implementation according to the recommendations of SEA**

Recommendations of some solutions

1. In 2011-2014 total added capacity is ~15,000MW, of which ~8,900MW in the North, 2,100MW in the Central, but only < 4000MW in South => electricity shortage risk in 2013 -:- 2014, especially in South
2. => Focus on speeding up power plants in the south (up to 2015): thermal power complexes of α M_{αn}, V_{Ünh T_{©n}}, Duy^an Hải, 01 GTCC 390MW in Hi_{Öp Ph-íc} by late 2014;
3. Promoting HPP projects in Laos & Cambodia * transmission network for importing electricity from Laos, Cambodia to Vietnam.
4. Calculation of investment in GTCC power plants in East area using LNG instead of investment in TPP as α M_{αn} V
5. Song Hau TPP will be considered with capacity of 2x600MW
6. Starting importing coal
7. Consider PSHPP in area of Ch_{©u Th_{αn}-Ngh_Ö An}, near to large TPPs.

Recommendations of some solutions

8. Soon construction of line 500kV Pleiku – CÇu B«ng;
9. Ensuring construction of transmission network in harmony with power plants; upgrading series capacitors along 500kV lines; Construction of 220kV lines such as ĐakNông-Bình Long-Phước Long, Vũng Áng-Đồng Hới-Huế.
10. Considering construction of switchgear substation 500kV Bình Định 2 (in harmony with NPP 1)
11. Calculation balancing demand-supply according to base case (2011-2015:14.1%/yr), implementing development of generation according to high case (2011-2015: 16%/yr)

Thank you for attention

STRATEGIC ENVIRONMENTAL ASSESSMENT OF PDP VII

INTRODUCTION TO STRATEGIC ENVIRONMENTAL ASSESSMENT

The Context: SEA & Power Sector Planning in Viet Nam

- SEA relatively new to Viet Nam but now a mandatory requirement for national planning processes
- Some SEA experience, including for hydropower, but not yet fully established at a strategic planning level
- SEA Guidelines established by MoNRE guide the process but need interpretation

Strategic (Environmental) Assessment

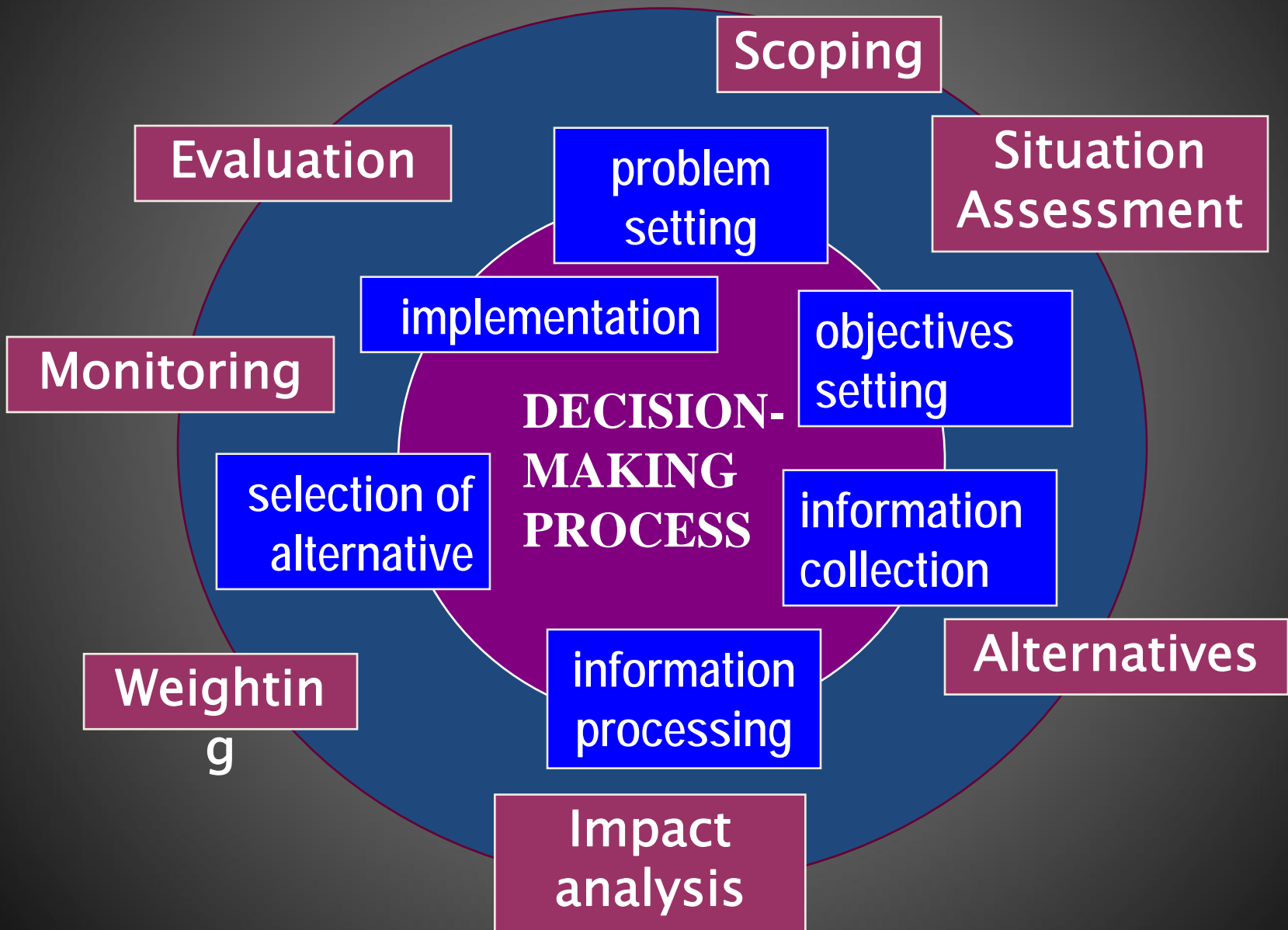
“The formalised, systematic and comprehensive process of evaluating effects of a policy, plan or programme and its alternatives, including the preparation of a written report of its findings, and using the findings in publicly accountable decision-making.” (Therivel and Partidario, 1996)

“SEA is a process directed at providing the authority responsible for policy development and the decision-maker with a holistic understanding of the environment, social and economic implications of the policy proposal, expanding the focus well beyond what were the original driving forces for new policy.” (Brown and Therivel, 2000)

SEA as a tool for Strategic Planning

- SEA is a process of evidence-based analysis of social and environmental issues
- Balanced analysis to build consensus, including recognising trade-offs and linking sector goals to national development
- Decision-oriented: not just about identifying problems, but also about agreeing on solutions

SEA PROCESS



How is SEA different from EIA?

SEA: Policies, plans, programs

EIA: ⇒ Projects

SEA: Integration throughout the decision-making

EIA: ⇒ Evaluation of results

SEA: Formulation of problem, goals, alternatives

EIA: ⇒ Only impact prediction

SEA: Focus on indirect and systems effects, including development effects

EIA: ⇒ Focus on direct and local environmental impacts

SEA: Flexible applications

EIA: ⇒ Strongly regulated

SEA: Less information available

EIA: ⇒ More information available

SEA: Usually more solution or action space

EIA: ⇒ Less solution space

Lessons we have learned: Success factors for SEA

Political

that there is **political will** to carry out and use results

that there are **acceptable political goals** with targets and objectives

Institutional

that there is **capacity** to commission and interpret the assessment

that the process is well **organised and timed**

that an **evaluative function** is established

that there is a close **link with the decision-making process**

that organisation **involves all relevant ministries/agencies**

Lessons we have learned:

Success factors for SA continued

Methodological

that data **needs and tools** are matched and agreed

that results can be **combined with economic analysis**

that **macro and place-based** analyses are combined

that data is made available **electronically**

that there is **agreement on weighting**

Communicational

that results and knowledge are fed in **parallel and continuously**

that results are presented **simple and comprehensible**

that **comparable alternatives** are presented next to each other

that results are presented **next to national and sectoral targets**

Thanks for Listening

Law and law implementation on strategic environmental assessment in vietnam

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Ministry of Natural Resources and Environment

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contents

1. Regulation on SEA according to environmental law 2005
2. Regulation on SEA according to decree no. 80/2006/Nd-CP
3. Regulation on SEA according to circular 05/2008/TT-TNMT
4. Some implementation activities

1. Regulation on SEA according to environmental law 2005 (1)

1.1. Subjects to have SEA report preparation: *Article 14:*

- a) **Socio-economic development strategy / planning / plan at national level.**
- b) **Sector development strategy, plan, for the whole country.**
- c) **Provincial socio-economic development strategy, plan of province, city under management of Central Government, region (herein after referred as provincial level).**
- d) **Land use planning: forest protection development; exploitation and use of other natural resources on inter-provincial, inter- regional areas.**
- ®) **Important economic area development plan.**
- e) **River basin plan on inter-provincial areas.**

1. Regulation on SEA according to environmental law 2005 (2)

1.2. Carrying out SEA and SEA report preparation :

Article 15 of Environment Law 2005:

- Organization which is entrusted to prepare strategy, planning and plan as mentioned in Article 14 of this Law is responsible for carrying out SEA and preparing SEA report.
- SEA report is one content of the project and shall be prepared at the same time with project report, that means in parallel with development of strategy, planning and plan.

1. Regulation on SEA according to environmental law 2005 (3)

1.3. Contents of SEA report:

Article 16 of Environment Law 2005 stipulates contents of SEA report as follows:

1. Outlines of objectives, scale and features of project related to environment.
2. Overall description of natural, socio-economic, environmental conditions related to project.
3. Forecasting environmental negative impacts which may occur when implementation of the project.
4. Indicating data and assessment method resources.
5. Proposing overall directions, solutions for solving environmental issues during implementation of the project.

1. Regulation on SEA according to environmental law 2005 (4)

1.4. Review of SEA report:

1.4.1. Review mode:

According to point 1 Article 17 of the Environment Law, SEA report shall be reviewed by one Reviewing Council.

1.4.2. Members of Reviewing Council

According to points 2, 3, and 4 of Article 17 of the Law, the council shall consist of over 50% members which have knowledge on environment and areas related to the project of strategy, planning, plan and specified concretely as follows:

1. Regulation on SEA according to environmental law 2005 (5)

1.4.2. Members of Reviewing Council (continued):

- *For national, interprovincial strategy, planning, plan projects:* members come from project approving institution, agency under Government, people committees related to the project; ministry, ministerial level agency; experienced qualified experts suitable to the project; other members decided by competent agency which established council.

- *Provincial strategy, planning, plan projects:* members will be representatives of provincial people committee; environmental agency, experienced qualifies experts suitable to the projects and other members decided by competent agency which established council.

1. Regulation on SEA according to environmental law 2005 (6)

1.4.3. Responsibilities of reviewing council:

According to point 7, Article 7 of environment law 2005:

1. MONRE shall organize council for reviewing SEA report of project (strategy, planning, plan) which are approved by the National Assembly, Government;
2. Ministry, ministerial agency, agency under the Government will establish council for reviewing SEA report of the projects under their approval authority;
3. Provincial people committee establishes council for reviewing SEA report of the projects under their deciding authority and of same level people council.

1. Regulation on SEA according to environmental law 2005 (7)

1.4.4. Legal value of the review results of SEA report:

According to the point 6, Article 7:

Review results of SEA report are one of background for approval of projects (that means, approval shall not be done before review results of SEA report are available)..

1. Regulation on SEA according to environmental law 2005 (8)

1.4.5. Some notices:

- Environmental law 2005 does not specify procedure for approval of SEA reports.

(After reviewing SEA report, reviewing organization shall report results to the competent organization which approves strategy, planning or plan)

- Organization, individuals have rights to send requirements, recommendations on environmental protection to the organization which organizes review council and organization which approves strategy, planning or plan; Review council and approving organization are responsible for considering requirements, recommendations before making conclusions, decisions (point 5 Article 17).

2. Regulation on sea according to decree 80/2006/ND-cP (1)

2.1. Dossier requesting for review of SEA report:

2.1.1. Type of dossiers:

Point 1, Article 9 of decree 80/2006/ND-CP specifies contents of the dossier requesting for review of SEA report as follows:

- a) Paper requesting for review by project owner;
- b) SEA report;
- c) Draft reports of strategy, planning, plan.

2.1.2. Sending dossier:

Project owner shall send dossier to organization which responsible for establishment of review council as specified in point 7, Article 17 of the law.

(Government entrusted MONRE to issue format, guidelines etc.)

2. Regulation on sea according to decree 80/2006/ND-cP (2)

2.1.3. Acceptance and processing dossier:

Point 6 Article 9 of decree 80/2006/ND-CP states that: In case not eligible dossier, within **05 working days**, from the date of receiving dossier, dossier receiving organization is responsible for informing the project owner in order to supplement, complete dossier.

2.2. Time for reviewing SEA report:

- For projects under authority of decision, approval of the Prime Minister, Government, National Assembly: **45 working days**, from the date of receiving eligible dossier.

- For the projects not under authority of decision, approval of the Prime Minister, Government, National Assembly : **30 working days**, from the date of receiving eligible dossier.

(This time is also applied for reviewing SEA reports which are failed in the previous review)

2. Regulation on sea according to decree 80/2006/ND-cP (3)

2.3. Authority for establishment of review council:

According to point 1 Article 10 of the Decree: Prime Minister or Head of organizations specified in the point 7 Article 17 of the environment law 2005 which issued decision for establishment of the council for review of SEA report.

2.4. Review results and review report:

- Results of reviewing SEA report are presented in the form of meeting minutes of the council with contents, conclusions and signatures of the council chairman and secretary (point 2 Article 10 of the Decree).

- Environmental agency of ministry, ministerial level organization, organizations under the government, provincial people committee shall report to the minister, head of organization which has authority to approve review report of SEA report with attached copied minutes of meeting of review Council as the base for approval of the projects (point 4 Article 10 of Decree).

3. Regulation on sea according to circular 05/2008/tt-btnmt (1)

3.1. Structure and contents of SEA report

Organization which is entrusted with the task to prepare strategy, planning, plan specified as objects in Article 14 of environment law 2005, is called Project Owner. It will establish working team on SEA for carrying out and preparing SEA report. The SEA report shall have structure and contents as specified in [Annex 1](#), as follows:

preface

1. Project rationale
2. Legal and technical bases for implementation of SEA
3. Organization of SEA implementation

3. Regulation on sea according to circular 05/2008/tt-btnmt (2)

3.1. Structure and contents of SEA report (continued)

Chapter 1: brief description of the project and key environmental issues

1.1. Project Owner.

1.2. Brief description of the project.

1.3. Scope of SEA and key environmental issues related to the project.

Chapter 2: description of key environmental issues progress related to the project

2.1. Description of natural, environmental, socio-economic conditions of studied area.

2.2. forecasting tendency (change) of environmental issues related to the project in case without project implementation (Alternative 0).

3. Regulation on sea according to circular 05/2008/tt-btnmt (3)

3.1. Structure and contents of SEA report (continued)

Chapter 3: forecasting environmental impacts when project implementation takes place

- 3.1. Assessment of consistency between viewpoints, objectives of the project and environmental protection viewpoint and objectives.
- 3.2. Assessment, comparison between proposed alternatives.
- 3.3. Forecasting tendency (change) of (key) environmental issues related to the project in case of project implementation.

Chapter 4: consultation to project stakeholder during sea

- 4.1. Organizing consultation to stakeholders during SEA process.
- 4.2. Results of consultation to stakeholders.

3. Regulation on sea according to circular 05/2008/tt-btnmt (4)

3.1. Structure and contents of SEA report (continued)

Chapter 5: proposing preventive, mitigation measures, and environmental monitoring, management program

5.1. Proposing preventive, mitigation measures and improvement of the project.

5.2. Environmental monitoring, management program.

Chapter 6: indication on data, information resources and assessment methods

6.1. Data, information sources.

6.2. Methods applied in SEA process.

6.3. Comments on detail, reliability of assessments.

3. Regulation on sea according to circular 05/2008/tt-btnmt (5)

3.1. Structure and contents of SEA report (continued)

Conclusions and recommendations

1. On effectiveness of SEA for preparation of the project.
2. On level of negative environmental impacts.
3. On approval of the project
4. Other conclusions and recommendations

3. Regulation on sea according to circular 05/2008/tt-btnmt (6)

3.2. Sending dossier for reviewing SEA report:

- Project owner sends dossier to the responsible organization for reviewing SEA report in accordance with point 7 Article 17 of environment law 2005.

- Quantity of dossiers:

a) 01 paper of request in format specified in Annex 2;

b) 09 sets of SEA reports as specified in Annex 3;

c) 09 draft strategy, planning or plans with signature, name, title of project owner and stamped at the first page.

(In case number of council members is more than 9 or in case of other necessary, project owner shall provide more sets of SEA reports and draft strategy/planning/plan in accordance with requirements of the reviewing organization).

3. Regulation on sea according to circular 05/2008/tt-btnmt (7)

3.3. Reviewing SEA report:

- Competent organization will appoint one of its agencies as the duty member at the reviewing council.
- Organization and operation of reviewing council, duties of the duty agency shall be complied with regulation of MONRE.
- Number of reviewing council members is 09 people at least..
- Time of reviewing is specified in point 1 Article 12 of decree 80/2006/NĐ-CP (45 and 30 days).

3. Regulation on sea according to circular 05/2008/tt-btnmt (8)

3.4. Responsibilities of reviewing agency

- Issuing announcement to the project owner on results of review within **05 working days** after ending meeting of the reviewing council;
- Reviewing contents of SEA report after amended by project owner;
- Send written report to competent organization which is responsible for approval of strategy/planning/plan the review results within **10 working days** from the date of receiving sufficient dossier from the project owner. The review report shall:
 - + Present assessments and recommendations;
 - + Attach copies of minutes of council's meetings.
 - + Attach paper of project owner on revisions, supplementations.

3. Regulation on sea according to circular 05/2008/tt-btnmt (9)

3.5. Responsibilities of the project owner:

- Finalize SEA report according to the requirements of reviewing agency (in case of passed with supplement and revision);
- Adjustment of strategy/planning/plan based on the consideration, recommendations of reviewing agency (*in case project and SEA report are carried out in parallel???*);
- resending to the reviewing agency the complete dossier consisting of:
 - + 01 draft strategy/planning/plan;
 - + 02 SEA reports attached with electronic file in CD; and
 - + Document for explanation on revision, supplementation.

Notes: Time for project owner to revise, finalize SEA report is not included in the review time as specified in point 1 and point 2 of Decree No. 80/2006/ND-CP (45 and 30 days)

4. Some implementation activities

- 4.1. development of sea implementation roadmap.
- 4.2. development of capacity building program.
- 4.3. development of general technical guideline on sea.
- 4.4. carrying out some training courses on sea:
 - training of trainers;
 - training of implementers.
- 4.5. carrying out some pilot SEA, aiming to:
 - facilitate learning ‘through practice’;
 - preparation of guidelines on sea;
 - development of manual for pilot areas.
- 4.6. development of overall training program, increasing awareness of sea.
- 4.7. development of new decree on sea, eia, environmental mitigation policy, environmental planning

(Replacement of contents on SEA, EIA, Environmental mitigation policy in Decrees No. 80/2006/ND-CP dated 09/8/2006, No. 21/2008/ND-CP dated 28/02/2008, and No. 140/2006/ND-CP dated 22/11/2006)

Thank you for attention!

STRATEGIC ENVIRONMENTAL ASSESSMENT OF THE POWER DEVELOPMENT PLAN VII OVERVIEW OF SEA APPROACH AND OBJECTIVES



KOM
Photo by:lovea7cva

Presenter: Nguyen Thi Thu Huyen – Institute of Energy

CONTEXT

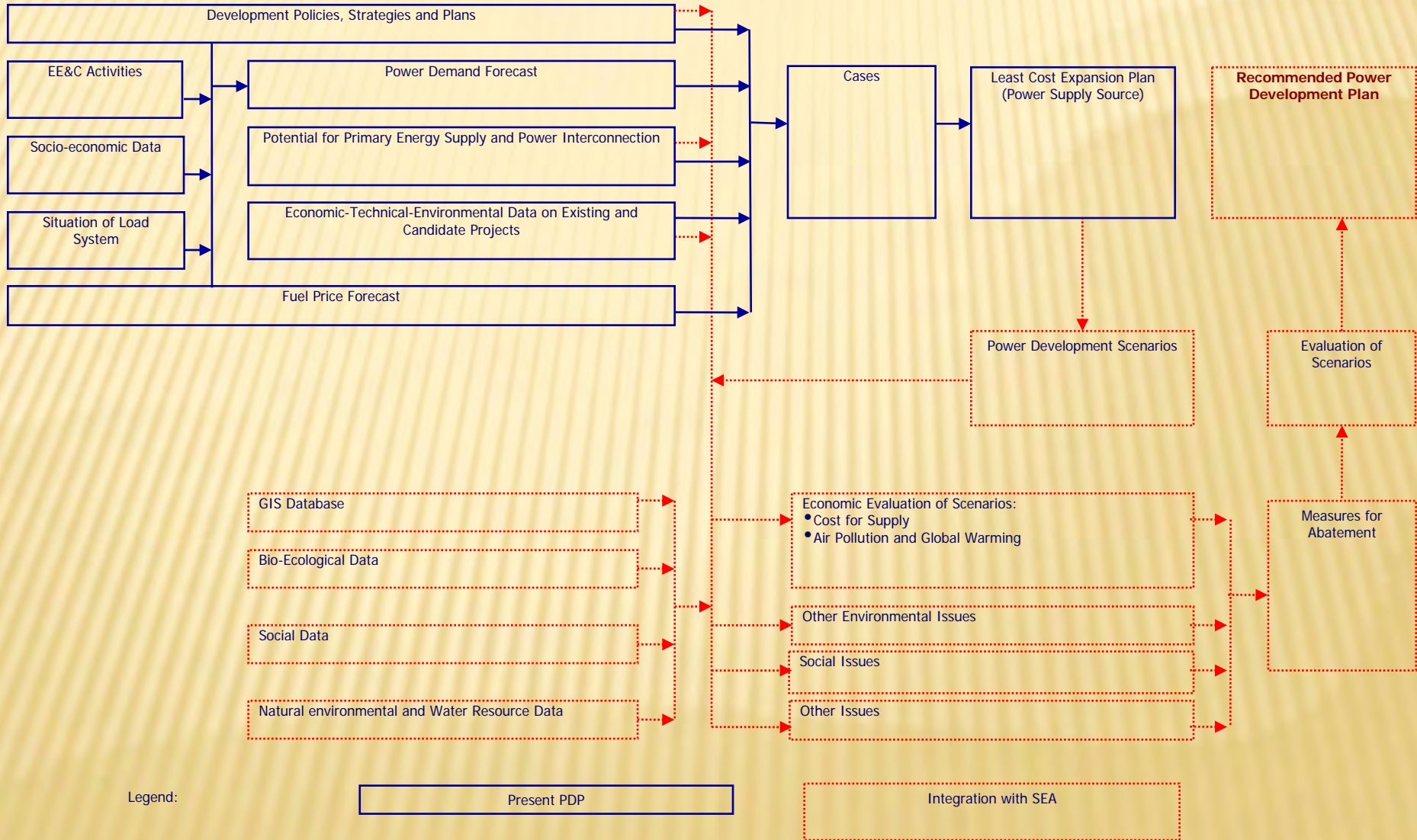
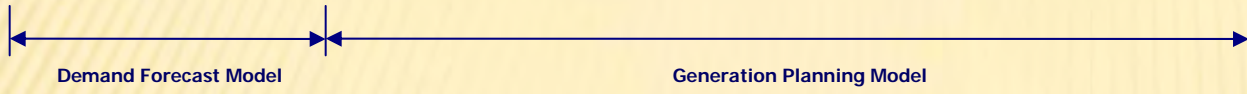
- ✘ The current SEA is the first time that social and environmental issues have been fully integrated into the preparation of the PDP
- ✘ It is one of the first fully integrated SEAs in the preparation of a national sector strategic plan in Viet Nam
- ✘ It is based on international best practice, adapted to a Vietnamese context and to reflect the national SEA Guidelines as prepared by MoNRE
- ✘ It builds in the lessons learnt in the pilot SEA for hydropower in PDP VI

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.

Approach

- ✘ The valuation and internalization into the overall cost calculations for supply options of all measurable costs and benefits from different proposed sources of power generation.
- ✘ Based on quantitative and objectively verifiable indicators
- ✘ Weightings of valuations made to reflect (a) key national policy and development objectives and (b) the opinions and knowledge of key stakeholders



Stages in the SEA

Stage 1: Define the Analytical Framework

- ✘ Define the key indicators to measure impacts
- ✘ Establish the policy context in relation to national policies and targets
- ✘ Establish the supply and demand options and alternatives
- ✘ Define the role of GIS analysis in the overall SEA approach

Stage 2: Data Collection and Definition of the Baseline Analysis

- ✘ Identify data availability
- ✘ Establish the parameters of the GIS analysis
- ✘ Acquire the PDP VII demand scenarios and baseline supply options
- ✘ For hydropower, identify where the analysis undertaken in the PDP VI Pilot SEA needs extension and/or amendment

Stage 3: Initial Consultations

- ✘ First stakeholder workshop and national consultation
- ✘ Distribute and collect the Impact Matrices to relevant provincial authorities

Stage 4: Impact Analysis and Weighting

- ✘ Quantitative analysis of the physical quantities of different impacts
- ✘ Economic valuation and development of indicators where valuation is not possible
- ✘ Weighting of values to reflect priorities of key GoV policies
- ✘ Integration of the impact valuations into the overall economic analysis
- ✘ Ranking of the power supply options, based on the internalization of impacts previously treated as externalities

Stage 5: Identification of Areas and Options for Mitigation and Compensation

- ✘ For areas and people affected negatively by power plant and transmission line development, identify appropriate compensation and mitigation approaches
- ✘ Assess the financial implications and financing options for mitigation and compensation measures

Stage 6: Final Consultation and Recommendations

- ✘ Interviews with key national stakeholders, to review possible recommendations for the SEA
- ✘ Final national stakeholder workshop
- ✘ Preparation of the SEA report, including the final recommendations



KEY ISSUES IN SEA OF PDP VII

The group of Social – economic issues

1. Importance of PDP VII in Vietnam's social – economic development.
2. Assurance of the national energy security.
3. Moving and resettlement for impacted people by power development projects.
4. Change of people and economic structure
5. Division of living standards and income between regions in Vietnam.
6. Contribution into poverty-alleviation movement and social fairness.
7. Issues of water use.
8. Food security.
9. Environmental conflict

The group of natural environmental issues

1. Change of land use structure
2. Maintenance of ecosystem and biodiversity.
3. Save utilization for national resource consists of coal, oil, limestone.
4. Issues on climate change
5. Issues of air, water, soil pollution.



TOOLS

- ✘ GIS is used to analyse quantitative, where this is possible, of the physical quantities of different impacts, positive and negative. And map **feedback** from the impact matrices at different aggregation levels (individual indicator, type of impact, total impact) by mixing layers.
- ✘ Expert choice is used to rank of the power supply options, based on the new economic calculations that internalize impacts previously treated as externalities.
- ✘ IPCC method is used to calculate GHG emission.

UTILITY PERSPECTIVE

- ✘ Ensure the sustainable national power development plan: to obtain economic effect and environmental harmonization.
- ✘ Calculate the cost for damage and benefit from environmental and social economic indicators quantitatively and integrate the impact valuations into the overall economic analysis of each power supply option.
- ✘ Ensure that the national target and policies of climate change, environmental protection and promoting renewable energy to reflect into SEA and PDP VII.
- ✘ Suggest recommendations and feedback to PDP VII feasibly.



*Thank you for your
listening!*