

# Draft high level analysis framework

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Version 2 (marked up): Amended following comments at 16 February TPAG meeting.

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23 February 2011

**Note:** This paper has been prepared for the purpose of discussion with the Transmission Pricing Advisory Group. Content should not be interpreted as representing the views or policy of the Electricity Authority.

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<u>Version</u>	<u>Date</u>	<u>Comments</u>
<u>1</u>	<u>9 February 2011</u>	<u>Draft for discussion and approval at TPAG meeting 16 February 2011</u>
<u>2</u>	<u>23 February 2011</u>	<u>Amended following comments at 16 February 2011 TPAG meeting</u>

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## 1 Introduction

- 1.1.1 This paper sets out a high level decision analysis framework that is intended to assist TPAG in evaluating options for Transmission Pricing Methodology (TPM) and determining a preferred option for articulation in a discussion paper to be released in late March 2011.
- 1.1.2 The key purpose of this paper is to engage with TPAG and agree on the analysis framework for the options to be considered<sup>1</sup>, which includes a set of criteria to be used for assessment and evaluation purposes.

## 2 TPAG Terms of Reference

- 2.1.1 The TPAG Terms of reference highlight that it has been established to:

- a) *recommend to the Authority Board, with supporting analysis, a preferred transmission pricing methodology (TPM) option, and associated guidelines, for each of the following areas:*
- I. *the allocation of all transmission costs including those that are currently categorised as connection, interconnection and HVDC costs;*
  - II. *providing incentives for participants to take action to defer or avoid transmission investments where there are benefits in doing so; and*
  - III. *static reactive compensation;*
- b) *provide analysis and justification to support the rejection of options, including at a minimum the options considered by the Electricity Commission in its 'Transmission Pricing Review: Stage 2 Options' consultation paper and alternatives provided by submitters; and*
- c) *review and comment on submissions received on:*
- I. *the Electricity Commission's 'Transmission Pricing Review: Stage 2 Options' consultation paper; and*
  - II. *the TPAG's discussion paper containing its preferred TPM option.*

- 2.1.2 These terms of reference provide some guidance as to the options that need to be considered and the extent of analysis that needs to be provided in support of the group's recommendations. In particular, it identifies that TPAG needs to provide sufficient analysis of the options considered in the Stage 2 options consultation paper to either reject or develop preferences. The options considered in the Stage 2 options consultation paper include:

- (a) The high level options first canvassed in the October 2009 consultation paper and explored further in section 3 of the Stage 2 options consultation paper (tilted postage stamp (TPS), augmented nodal pricing (ANP), and load flow-based (LFB) approaches);
- (b) The detailed options designed to develop and enhance the status quo and explored in section 4 of the Stage 2 options consultation paper (options to provide incentives for participants to take actions to defer or avoid reliability investments, and options for the treatment of HVDC costs); and

<sup>1</sup> The options are set out in more detail in the companion paper Transmission Pricing Options.

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- (c) The options that arise from considering the further issues explored in section 5 of the Stage 2 options consultation paper (options for connection charging and static reactive power compensation).

2.1.3 The TPAG terms of reference also highlight that:

*Any TPM options recommended by the TPAG must be consistent with the Act and therefore the Authority's statutory objective, and have regard to any Government Policy Statement (GPS) or Statement of Government Expectations in force at the time. The options must also be consistent with subpart 4 of Part 12 of the Code. Section 32(1) of the Act requires that Code amendment proposals must also be necessary or desirable to promote any or all of the following:*

- a) competition in the electricity industry;*
- b) the reliable supply of electricity to consumers;*
- c) the efficient operation of the electricity industry;*
- d) the performance by the Authority of its functions;*
- e) any other matter specifically referred to in the Act as a matter for inclusion in the Code.*

*In making recommendations to the Board, the TPAG must explain how the recommendations promote the Authority's statutory objective, are consistent with subpart 4 of Part 12 of the Code, and how the TPAG has applied the Authority's Code amendment principles (as published in Part 1 of the Authority's consultation charter) to arrive at its recommendations.*

### 3 Analysis Framework

3.1.1 The TPAG terms of reference make it clear that the development of a preferred option and Guidelines for the TPM must be supported by an explanation of how the preferred option:

- (a) Promotes the Authority's Statutory Objective<sup>2</sup> – this requires analysis of the degree to which the preferred option promotes competition, reliable supply, and efficient operation (as outlined in section 4);
- (b) Is consistent with subpart 4 of Part 12 of the Code – this requires in particular that the preferred option must be consistent with the pricing principles set out in clause 12.79 of the Code.<sup>3</sup>

3.1.2 The Code Amendment Principles (CAPs) are also relevant as they are in essence an articulation of principles that will assist in meeting the Authority's Statutory Objective. It is therefore appropriate that the Guidelines and the preferred option are developed in a manner consistent with the CAPs. The guidelines are not part of the Code, whereas the determination of the TPM is. However, the Guidelines will direct Transpower in its development of the TPM, and any inconsistencies between the Guidelines and the CAPs could lead to inconsistencies between the CAPs and the TPM. The CAPs are therefore an important part of developing the analysis framework for the Guidelines.

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<sup>2</sup> The Authority has recently published its interpretation of its statutory objective, it is available at <http://www.ea.govt.nz/about-us/documents-publications/foundation-documents/http://www.ea.govt.nz/document/11845/download/our-work/consultations/corporate/statutory-objective/>

<sup>3</sup> The Authority is has published a Code amendment proposal on the regulatory framework for transmission pricing (specifically the pricing principles). It is available at: <http://www.ea.govt.nz/document/12863/download/our-work/consultations/priority-projects/regulatory-framework-tpm/>

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3.1.3 In combination these requirements provide a clear starting point for an analysis framework. It is noted that the requirement for consistency with the pricing principles (clause 12.79 of the Code) is currently subject to a Code amendment proposal. This complicates the process slightly because the pricing principles will be reviewed in parallel with the TPAG analysis of the preferred TPM.

3.1.4 The Statutory Objective, the CAPs, and the transmission pricing principles are all considered further in subsequent sections of this paper. Before turning to these issues it is useful to note that at the heart of any decision framework will be a cost-benefit analysis (CBA) that explores all the credible options and justifies the preferred option relative to some form of status quo counterfactual.

3.2 Narrowing Down the High Level Options

3.2.1 The focus of the CBA should be on the detailed options explored in section 4 of the Stage 2 options consultation paper. However, it is also necessary to assess the high level options first canvassed in the stage 1 options paper with reference to the revised statutory objective. This could be undertaken through a combination of qualitative and quantitative assessments based on existing work.

3.2.2 The objective is to solidify the understanding of the Generation Expansion Model (GEM) "co-optimisation" analysis in particular (because it is a significant factor in eliminating some of the high level options) and to ensure that there is general support for eliminating the application of tilted postage stamp, augmented nodal pricing signals and load flow based approaches to allocate all transmission costs. The GEM analysis was undertaken as part of stage 2.

3.3 Analysis of Current Options

3.3.1 The CBA of the current options (explored in section 4 of the Stage 2 options consultation paper) needs to be undertaken on a more formal and in-depth basis with a focus on quantitative results wherever feasible. Although some analysis has been completed, some further quantitative work may be necessary.

3.4 Developing a Preferred Option

3.4.1 The CBA of the preferred option will be exposed to the most scrutiny and will therefore need to be the most robust and to focus on quantitative results wherever feasible, with testing of a range of credible sensitivities. Nevertheless, a mix of qualitative and quantitative analysis is expected.

3.5 Counterfactual

3.5.1 An important issue to consider in the context of the CBA, particularly with the analysis of the preferred option, is the definition of a counterfactual against which to measure the option. The counterfactual should include:

- (a) The status quo TPM;
- (b) Possible future electricity sector development as defined by the range of futures outlined in the latest SOO (varied appropriately where there may be material differences in the results);
- (c) Scarcity Pricing introduced such that an administered price floor would prevail at all South Island nodes (or all North Island nodes), if the System Operator has instructed load shedding during a Grid Emergency throughout the South Island (or throughout the North Island), and a different administered price floor would prevail at all South Island nodes (or all North Island nodes) where

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the System Operator has instructed participants to implement rolling outages throughout the South Island (or throughout the North Island);

- (d) Some form of financial transmission right (FTR) between North and South island hubs, made available to participants via an auction process, with the holder of any FTR receiving the market surplus rentals between the island hubs<sup>6</sup>. The proceeds from the auction will be distributed in the same manner as existing market surpluses – i.e. to those participants paying the charges associated with the assets between the North and South Island hubs (or nodes).
- (e) Other options for both scarcity pricing and locational hedging should also be considered in the counterfactuals, where these are possible outcomes for these projects.
- (f) A transmission alternatives regime, overseen by the Commerce Commission that encourages Transpower to consider alternatives to transmission investment, and is essentially similar to the existing regime.

#### 4 Electricity Authority Statutory Objective

4.1.1 Section 15 of the Electricity Industry Act 2010 (Act) provides the Authority with a single statutory objective:

*“To promote competition in, reliable supply by, and the efficient operation of, the electricity industry for the long-term benefit of consumers.”*

4.1.2 The Authority has finalised its interpretation of this objective and interprets its statutory objective as requiring it to exercise its functions in section 16 of the Act in ways that, *for the long-term benefit of electricity consumers:*

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- *facilitate or encourage increased competition in the markets for electricity and electricity-related services, taking into account long-term opportunities and incentives for efficient entry, exit, investment and innovation in those markets;*
- *encourage industry participants to efficiently develop and operate the electricity system to manage security and reliability in ways that minimise total costs whilst being robust to adverse events; and*
- *increase the efficiency of the electricity industry, taking into account the transaction costs of market arrangements and the administration and compliance costs of regulation, and taking into account Commerce Act implications for the non-competitive parts of the electricity industry, particularly in regard to preserving efficient incentives for investment and innovation.*

4.1.4 This interpretation suggests that the overall efficiency of the electricity industry is the primary objective of the Authority. Although it is useful to consider competition issues and reliability issues, these are essentially different aspects of efficiency in that, competitive pressures are seen as one means of achieving efficient outcomes, and standards of reliability should desirably achieve an efficient trade-off between the costs of unreliability and the costs of reliability.

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<sup>6</sup> Or possibly between designated nodes.

<sup>8</sup> Although they are consistent with the draft revised transmission pricing principles, it is noted that the evaluation criteria are less specific.

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- 4.1.5 The Authority's interpretation of its statutory objective supports the view that the framework for decision-making about options for TPM should focus primarily on overall efficiency of the electricity sector, while recognising that competition is one of the key means applied to the electricity sector to encourage efficient outcomes, and that measures that impact on reliability outcomes should encourage efficient trade-offs between the costs and benefits of reliability.
- 4.1.6 When considering efficiency, the key dimensions of efficiency are usefully broken down into, and assessed in terms of, productive, allocative and dynamic efficiency. Table 1 illustrates how the limbs of the statutory objective might usefully be considered within the key dimensions of efficiency.

**Table 1: Efficiency considerations for the statutory objective**

Statutory Objective	Competition Limb	Reliability Limb	Efficiency Limb
<b>Productive Efficiency</b>	Impact on competitive pressures resulting in changes to short-term costs	Impact on reliability of supply resulting in changes to short-term costs	Impact on overall short-run costs (industry and consumers) including transition costs and transactions costs associated with the different TPM options
<b>Allocative Efficiency</b>	Impact on competitive pressures causing changes to electricity prices that might impact on how electricity is used within the economy	Impact on reliability outcomes and flow-on impacts on how electricity is used within the economy	Impact on electricity prices and possible allocative inefficiencies
<b>Dynamic Efficiency</b>	Impact on competitive pressures resulting in changes to generation, consumer and transmission investments	Impact on reliability of supply resulting in changes to transmission, generation and consumer investments	Impact on overall investment efficiency (industry and consumers)

## 5 Transmission Pricing Principles

- 5.1.1 The development of a preferred option for TPM must be supported by an explanation of how the preferred option is consistent with subpart 4 of Part 12 of the Code – this requires in particular that the preferred option must be consistent with the pricing principles set out in clause 12.79 of the Code.
- 5.1.2 The Authority is currently consulting on a Code amendment which may result in the removal of the pricing principles in their entirety; the inclusion of revised pricing principles; or the retention of the status quo.
- 5.1.3 Analysis by the Authority suggests that the existing transmission pricing principles should be removed from the Code and that TPM guidelines would be better assessed against the Statutory Objective. Alternatively, the existing transmission pricing principles should be replaced by a revised set of principles reflecting the Statutory Objective.

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5.1.4 In order to proceed with the development of a preferred TPM in parallel with the review of the transmission pricing principles, it is proposed to derive the decision framework substantially from the Statutory Objective and the CAPs, while cross-testing to ensure that the framework is not inconsistent with the existing pricing principles or any revised (draft) pricing principles.

## 6 The Code Amendment Principles

6.1.1 When considering amendments to the Code, the Authority and its advisory groups are required to have regard to the CAPs to the extent that they are considered to be applicable. The CAPs are an articulation of the Statutory Objective. The Guidelines are not a Code amendment, whereas the determination of the TPM is. The CAPs are therefore not directly applicable to the development of Guidelines. However, as both the Guidelines and the CAPs are relevant to the development and determination of a revised TPM, to ensure consistency from the earliest stages, the CAPs will be a useful consideration in the development of the Guidelines.

6.1.2 The following tables summarise the CAPs and provide some commentary on how they could be considered in the context of the guidelines for TPM and criteria to be applied in evaluating TPM options.

**Table 2: The Code amendment principles 1 to 3 and their application to the TPM Guidelines**

Principle		Key Points from Code Amendment Principles (CAP)	Applicability to TPM Guidelines
1.	Lawfulness	<ul style="list-style-type: none"> <li>Must be consistent with Statutory Objective</li> </ul>	<ul style="list-style-type: none"> <li>To be consistent with the Statutory Objective the guidelines for TPM must promote efficiency, competition and reliability.</li> </ul>
2.	Clearly Identified Efficiency Gain	<ul style="list-style-type: none"> <li>Must be able to demonstrate an efficiency gain or a market failure or problem with Code</li> <li>To be used as a form of screening test</li> </ul>	<ul style="list-style-type: none"> <li>Only TPM options that promise clear improvements to market efficiency, or correction of an identified market failure, should be considered</li> <li>The criteria for evaluating options should focus on efficiency gains (dynamic, productive, and allocative efficiency)</li> <li>This principle could be usefully applied to screening high level options in particular</li> </ul>

**Deleted:** <#>The revised (draft) pricing principles are as follows:¶  
 <#>Ensure full recovery of Transpower’s economic costs in providing transmission services¶  
 <#>Promote competition by allocating cost of transmission services in a way that increases competitive pressures in the markets for electricity and electricity-related services without compromising long-term opportunities and incentives for efficient entry, exit, investment and innovation in those markets¶  
 <#>Promote reliability by allocating costs of transmission services in a way that encourages market participants to develop and operate the electricity system to manage security and reliability in ways that minimise total cost whilst being robust to adverse events¶  
 <#>Promote efficient operation which includes:¶  
 I) Where practicable charging the costs of connection to the connecting party (connection charges); and¶  
 II) Where practicable providing locational signalling of long run transmission costs, to the extent that these are not already signalled by nodal prices, the regulatory investment test and connection charges; or¶  
 III) Where such locational signals are inefficient or only partially recover the balance of Transpower’s economic costs not recovered by connection charges, these residual costs should be recovered in the least distortionary manner.¶  
 <#>Be transparent and enduring in a way that is broadly acceptable to stakeholders ... [2]

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Principle		Key Points from Code Amendment Principles (CAP)	Applicability to TPM Guidelines
3.	Quantitative Assessment	<ul style="list-style-type: none"> <li>Quantitative CBA to assess long-term benefits</li> <li>Competition and reliability effects are to be assessed within CBA framework</li> <li>Dynamic efficiency is particularly important</li> <li>Sensitivity analysis is required</li> </ul>	<ul style="list-style-type: none"> <li>Quantitative CBA should be applied to assess long-term benefits associated with each of the detailed options</li> <li>Competition and reliability effects should be assessed within the CBA framework</li> <li>Analysis of dynamic efficiency effects should be given emphasis within the CBA framework</li> <li>The CBA should include sensitivity analysis</li> </ul>

6.1.3 Principles 1-3 are the primary principles to be applied to the development of TPM Guidelines. In the event that the application of these primary principles is inconclusive about which is the best option a number of “tie-breaker” principles would be applied as follows.

Table 3 Code amendment principles 4 to 9 and their possible application to the TPM Guidelines

Tie Breaker Principle		Key Points from Code Amendment Principles (CAP)	Applicability to TPM Guidelines
1.	Preference for Small-Scale Options	<ul style="list-style-type: none"> <li>Favour small-scale trials</li> </ul>	<ul style="list-style-type: none"> <li>To the extent that it can be implemented incrementally from the status quo</li> </ul>
2.	Preference for Competition	<ul style="list-style-type: none"> <li>Prefer options that focus on competition to achieve efficiency gains</li> </ul>	<ul style="list-style-type: none"> <li>If CBA is inconclusive then place a preference on options that increase competition</li> </ul>
3.	Preference for Market solutions	<ul style="list-style-type: none"> <li>Prefer options that focus on efficient market-based structures</li> </ul>	<ul style="list-style-type: none"> <li>If CBA is inconclusive then place a preference on options that focus on market-based arrangements</li> <li>Could have particular application where TPM addresses transmission alternatives</li> </ul>
4.	Preference for Opt-Out Features	<ul style="list-style-type: none"> <li>Prefer options that give participants opt-out options</li> <li>However, non-rivalry and non-excludability conditions will favour “one size fits all” approach</li> </ul>	<ul style="list-style-type: none"> <li>TPM is a case where non-rivalry and non-excludability conditions generally favour “one size fits all” approach</li> <li>Careful use of opt-out features could be considered in particular circumstances</li> </ul>
5.	Preference for Non-Prescriptive Options	<ul style="list-style-type: none"> <li>Focus on options that specify outputs rather than inputs</li> </ul>	<ul style="list-style-type: none"> <li>[Not applicable as the Code requires a TPM]</li> </ul>

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Tie Breaker Principle		Key Points from Code Amendment Principles (CAP)	Applicability to TPM Guidelines
6.	Risk reporting	<ul style="list-style-type: none"> <li>Final tie-breaker if CBA is inconclusive and principles 5-8 do not discriminate</li> <li>Report required to assess risks of proceeding or not proceeding with option</li> </ul>	<ul style="list-style-type: none"> <li>A report assessing the risk of proceeding with the preferred option or retaining the status quo should be included</li> </ul>

## 7 Criteria for Evaluation

7.1.1 It is therefore proposed that the decision framework is based on the statutory objective as expanded on in the first three CAPs interpreted as follows:

- (a) Consistent with the Statutory Objective – TPM must promote efficiency, competition and reliability;
- (b) Clearly identified efficiency gain – any change to the TPM must demonstrate a clear efficiency gain or resolve a market failure;
- (c) Quantitative assessment – CBA must be applied to assess the relative efficiency benefits of the TPM options with a particular focus on dynamic efficiency, and including sensitivity analysis.

7.1.2 The experience of decision-making on regulatory issues in the electricity sector suggests that, while a focus on efficiency outcomes taking into account specific outcomes for competition and reliability is a sensible approach, the resulting (CBA) is often insufficient on its own to inform correct decisions. This is because sensitivity analysis will often create overlapping ranges of CBA values and many benefits and costs are difficult to quantify. A range of other factors are therefore useful in informing a final decision between particular options as they highlight some particular aspects of efficiency which may tend to be overlooked in quantitative assessments of efficiency gains. It is useful to consider them in parallel with the more quantifiable components of efficiency.

7.1.3 A proposal can not be “efficient” if it can not be implemented, or sustained, and proposals that are unnecessarily complex or controversial imply ongoing “transaction costs” which, in aggregate across the industry, can be quite substantial. Also, since this is only a partial analysis, in the sense that it only focuses on one of many parallel changes now in train, it should be recognised that substantial inefficiencies could arise if an option was chosen that did not fit well with those other developments.

7.1.4 The following table summarises the recommended set of criteria to be applied in evaluating TPM options.

**Deleted: <#>Transmission Pricing Principles¶**  
 <#>The development of a preferred option for TPM must be supported by an explanation of how the preferred option is consistent with subpart 4 of Part 12 of the Code – this requires in particular that the preferred option must be consistent with the pricing principles set out in clause 12.79 of the Code.¶  
 <#>These pricing principles are currently being reviewed by the Authority. This may result in the Authority proposing a Code amendment.¶  
 <#>Draft analysis by the Authority suggests that the existing transmission pricing principles should be removed from the Code and that TPM guidelines would be better assessed against the Statutory Objective. Alternatively, the existing transmission pricing principles should be replaced by a revised set of principles reflecting the Statutory Objective. The revised (draft) pricing principles are as follows:¶  
 <#>Ensure full recovery of Transpower’s economic costs in providing transmission services¶  
 <#>Promote competition by allocating cost of transmission services in a way that increases competitive pressures in the markets for electricity and electricity-related services without compromising long-term opportunities and incentives for efficient entry, exit, investment and innovation in those markets¶  
 <#>Promote reliability by allocating costs of transmission services in a way that encourages market participants to develop and operate the electricity system to manage security and reliability in ways that minimise total cost whilst being robust to adverse events¶  
 <#>Promote efficient operation which includes:¶  
 I) Where practicable charging the costs of connection to the connecting party (connection charges); and¶  
 II) Where practicable providing locational signalling of long run transmission costs, to the extent that these are not already signalled by nodal prices, the regulatory investment test and connection charges; or¶  
 III) Where such locational signals are inefficient or only partially recover the balance of Transpower’s economic costs not recovered by connection char( ... [3]

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Table 4 Evaluation criteria

Category	Criterion	Measure	Transition	Ongoing
Dynamic efficiency	For any proposal we need to understand any potential impacts on dynamic efficiency, in terms of investment incentives for transmission, generation, load, DSM etc with particular emphasis on competition and reliability	Quantitative /Qualitative		X
Productive efficiency	For any proposal we need to understand any potential impacts on productive efficiency with particular emphasis on increasing competitive pressures, minimising administrative and operating costs and promoting reliability	Quantitative /Qualitative		X
Allocative efficiency	For any proposal we need to understand any potential impacts on allocative efficiency with particular emphasis on the alignment of price signals with marginal costs on an operational time scale	Quantitative /Qualitative		x
Fit	Any proposal needs to be logical and workable, while applying a philosophy consistent with other parts of the market design and how that is expected to evolve	Qualitative	x	x
Durability	It is important that any proposal can generate a reasonable degree of support from sector stakeholders, both now and in any likely future circumstance.	Yes/No/maybe? Qualitative	x	x
Implementation risk	Any proposal must be readily implemented within a reasonable timeframe, taking into account disruption costs and transactions costs	Quantitative /Qualitative	X X	X X
Flexibility and robustness	Any proposal needs to provide the ability to adapt to a reasonable variety of possible future scenarios, while continuing to deliver appropriate outcomes	Qualitative	x	X

7.1.5 These criteria are consistent with the Statutory Objective, the CAPs, and the draft revised transmission pricing principles outlined in section 6<sup>8</sup>. However, they also provide some expansion of the efficiency criteria that will usefully inform the CBA.

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## 8 Recommendations

8.1.1 It is recommended that TPAG:

- (a) Agree that the decision framework applied to the evaluation and development of a preferred TPM should be derived substantially from the Authority's Statutory Objective and the [articulation of that Objective through the](#) Code Amendment Principles ;
- (b) Agree that the evaluation criteria set out in section 7 of this paper should be applied to the evaluation of TPM options.

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