Submission to EA - DGPP

Reforming distributed generation pricing to promote efficient investment.

Consultation: https://www.ea.govt.nz/projects/all/distributed-generation-pricing-principles-reform/consultation/reforming-distributed-generation-pricing-to-promote-efficient-investment/

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Appendix J

Q1. Do you agree with the background and context summary above? Why? Is there additional background, evidence, or context relevant to the proposals in this paper?

Partially agree. The paper correctly identifies that pricing methodologies influence investment and system outcomes.
The context is incomplete because it treats pricing as the primary lever without recognising the system-level transition underway. It does not account for the increasing role of distributed resources, storage, and coordination across multiple timescales.
The context should explicitly recognise hydro as seasonal storage, renewable overbuild preserving that storage, and distributed energy resources coordinating in real time. Without this system view, pricing reforms risk being incremental adjustments rather than enabling an efficient future architecture.

Q2. Do you agree there are workability challenges with defining incremental costs under the current DGPPs? Why, why not? Are there any additional challenges not discussed above?

Agree there are workability challenges.
Incremental cost is inherently difficult to define in a shared network where impacts vary by location, time, and aggregation. The current framework is static, while system behaviour is increasingly dynamic.
A future framework should move toward pricing based on real system conditions, including capacity and congestion, rather than attempting to approximate incremental cost in isolation.

Q3. Do you agree the current DGPPs cause costs and benefits to be under-allocated to injection connections, which can cause the issues listed above? Why?

Agree.
Costs are under-allocated because cumulative impacts are not captured. Benefits are under-recognised because peak contribution and real-time system value are not measured.
A complete framework should explicitly value peak capacity and constraint relief, enabling distributed resources to act as system assets rather than passive generators.

Q4. Do you consider it remains appropriate to regulate injection pricing methodologies? Why?

Yes, regulation should remain.
Current regulation focuses on cost allocation but does not enable efficient coordination or reflect real-time system needs.
Regulation should evolve to support locational and time-based pricing aligned with system conditions, enabling coordinated operation of distributed resources.

Q5. Do you consider that consumers should remain residual payers? Why? Are there any additional economic concepts that should be considered in our reform of the DGPPs?

Partially agree.
Heavy reliance on residual charging weakens incentives and embeds cross-subsidies.
Over time, cost recovery should shift toward capacity and usage-based pricing, reflecting actual system impact and reducing reliance on fixed charges.

Q6. Do you consider that reframing the incremental cost rule to a requirement that charges 'must reflect a reasonable estimate of' rather than 'must not exceed' incremental costs is appropriate? Why?

Support replacing a hard cap with an incremental-cost anchor.

- **Incremental cost**: the *extra cost the network incurs* because a new connection (or additional injection) uses or stresses the network.
    - Example: a new exporter increases loading on a feeder at peak, bringing forward a transformer upgrade. That *incremental cost* is the share of that upgrade attributable to the additional peak loading.
- **Cap vs anchor**:
    - **Cap (current approach)**: a strict ceiling on what can be charged, often based on a narrow estimate of incremental cost. It can under-recover where impacts are broader or time/location specific.
    - **Anchor (proposed)**: a **reference point**, not a ceiling. It guides prices but allows them to vary around that reference to better reflect real system impacts.

An anchor improves flexibility, but by itself it can still misprice impacts if the definition of incremental cost is too narrow. In practice:

- Network impacts occur **at peak (kW), not just energy (kWh)**
- Impacts are **location-specific** (some feeders are constrained, others are not)
- Impacts are **time-specific** (a kW at 6pm is not equal to a kW at 2am)
- Many small connections create **cumulative effects** that are not visible in a single connection assessment

If these elements are excluded, the anchor risks being a better-structured approximation of an incomplete measure.

The incremental-cost anchor should be defined to include:

- **Peak capacity impact ($/kW)**: how much the connection contributes to or relieves peak loading
- **Congestion effects**: whether the connection worsens or alleviates local constraints
- **Losses and location**: distance and network conditions affecting delivery cost
- **Cumulative effects**: aggregated impact of multiple connections over time

This moves the anchor from a static estimate to a **proxy for real system value**, and creates a pathway toward:

- locational, time-based pricing
- recognition of DER as capacity
- alignment with a coordinated, real-time system

Q7. Do you consider that the proposed amendments to language and framing would support more efficient pricing? Why?

Yes. Improving the language and framing should support more efficient pricing by clarifying intent, reducing ambiguity, and giving distributors greater confidence to apply cost-reflective methodologies.

- **Language and framing** set the boundaries for how pricing rules are interpreted and applied.
- If wording is unclear or overly restrictive, distributors tend to:
    - default to conservative approaches
    - avoid innovative or dynamic pricing structures
- The proposed amendments aim to:
    - clarify how incremental cost is used
    - broaden interpretation of costs and benefits
    - reduce unintended constraints in the current rules

Improved wording alone does not guarantee efficient outcomes. There is a risk that:

- better language is applied to **unchanged underlying concepts**
- pricing remains:
    - static rather than dynamic
    - averaged rather than locational
    - focused on cost recovery rather than system optimisation

In this case, the framework becomes clearer, but not materially more efficient.

To fully support efficient pricing, the amended language should enable:

- **locational and time-based pricing**, reflecting real network conditions
- recognition of **peak capacity (kW)** as a primary driver of cost
- pricing that reflects **congestion and constraint relief**
- flexibility to evolve toward **dynamic and real-time signals**

This aligns pricing with actual system use and allows distributed energy resources to respond efficiently.

Efficient pricing requires more than clarity. It requires that:

- prices reflect **where and when** energy is used
- participants can respond to **meaningful signals**
- the system rewards **reducing peak demand and avoiding investment**

Improved language is a necessary step but must be paired with a framework that supports these outcomes.

Clearer language supports efficient pricing, but only if it enables locational, time-based, and capacity-reflective pricing aligned with real system conditions.

Q8. Do you consider that a non-prescriptive, enabling approach to capacity pricing is appropriate at this stage? Why?

Yes, a non-prescriptive, enabling approach is appropriate at this stage.

- **Capacity pricing** charges (or credits) based on **peak demand (kW)** rather than total energy (kWh).
- It reflects the main driver of network cost: infrastructure is built to meet **peak load**, not average usage.
- A **non-prescriptive approach** means:
    - distributors are given flexibility
    - different methods can be trialled
    - innovation is not constrained by rigid rules

A purely enabling approach carries risks:

- inconsistent implementation across distributors
- slow adoption due to uncertainty or conservatism
- continued reliance on legacy pricing (e.g. fixed charges)
- underdevelopment of capacity signals where they are most needed

Without minimum expectations, the transition may stall or deliver uneven outcomes. The enabling approach should be paired with **clear direction of travel**, including:

- recognition of **peak capacity (kW)** as a primary pricing driver
- development of **locational capacity signals** where constraints exist
- progression toward **dynamic capacity pricing** aligned with time and system conditions
- integration with distributed resources (e.g. batteries, V2G) that can provide capacity

Over time, this should evolve into a framework where:

- capacity is explicitly valued
- distributed resources can compete with network investment
- pricing reflects actual system stress

Capacity pricing is central to:

- reducing peak demand

- deferring network upgrades
- enabling efficient use of existing infrastructure

An enabling approach allows experimentation, but without direction it may not deliver these outcomes at scale. A non-prescriptive approach is appropriate initially, but it must be guided toward explicit, locational, and dynamic capacity pricing to ensure consistent and efficient outcomes.

Q9. Do you consider that the proposed extension of the pioneer scheme for load connections would help address position-in-queue issues for injection connections? Why?

Partially. Extending the pioneer scheme will improve fairness and may reduce some queue friction, but it will not materially resolve position-in-queue issues on its own.

- **Position-in-queue** issues arise when multiple applicants seek to connect in constrained areas.
- The first applicant can be required to fund upgrades that later applicants also benefit from.
- The **pioneer scheme** allows those costs to be shared with subsequent connections, reducing first-mover disadvantage.

Extending this to load connections improves symmetry and fairness across participants. Queue constraints are primarily a **capacity and information problem**, not just a cost allocation problem.

Extending the pioneer scheme:

- shares upgrade costs more fairly
- but does not:
    - increase available capacity
    - reduce congestion
    - guide applicants to better locations

As a result:

- queues can still form
- inefficient siting decisions persist
- upgrades may still be triggered unnecessarily

To materially address queue issues, the pioneer scheme should be complemented by:

- mandatory publication of **capacity and congestion maps**
- **EDB advisory service** recommending alternative connection locations
- **dynamic access mechanisms** (e.g. flexible connections, operating envelopes)
- recognition of **DER as controllable resources**, not fixed injections

This shifts the system from sequential, queue-based access to **informed and optimised connection decisions.** Improving cost sharing is necessary but not sufficient. Efficient outcomes require better information, better signals and better coordination.

Without these, the system will continue to:

- concentrate connections in constrained areas
- delay projects
- drive avoidable network investment

Extending the pioneer scheme improves fairness but does not resolve queue constraints, which require better visibility of network capacity and more coordinated connection and operation of distributed resources.

Q10. Do you consider that pioneer schemes should also cover network injection capacity? Why?

Yes. Pioneer schemes should cover network injection capacity to improve fairness between early and later connections. Injection capacity is often constrained in parts of the network.
When multiple generators seek to connect the first mover may fund upgrades, later entrants benefit from that investment.

Pioneer schemes allow these costs to be shared more equitably over time. Extending pioneer schemes addresses **who pays**, but not **how capacity is created or used**.

Queue formation is primarily driven by:

- constrained network capacity
- static connection assumptions
- lack of visibility and coordination

As a result:

- capacity remains underutilised
- upgrades are triggered prematurely
- queues persist even with fair cost allocation

Where queues emerge, EDBs should not default to network upgrades. Instead, they should:

- **introduce coordinated control at the edge** (e.g. DC routers or equivalent control systems)
- provide an **orchestration service** to actively manage load and injection
- enable **dynamic access to capacity**, rather than fixed connection limits
- use **price signals** to:
    - encourage injection when capacity is available
    - reduce injection or shift load (applies to Q9) during constraints

This allows:

- more generation and load to connect within existing infrastructure
- better utilisation of network capacity
- reduction in queue length and connection delays

A system that only shares upgrade costs will still build more infrastructure than necessary. A system that actively manages capacity can connect more participants, defer upgrades, lower total system cost.

Pioneer schemes improve fairness for injection capacity, but queue constraints are best addressed by actively managing network capacity through **orchestration and price signals** rather than relying solely on infrastructure upgrades.

Q11. Do you consider that the proposed non-discriminatory pricing requirements would improve confidence that investors are safeguarded from discriminatory pricing? Why?

Yes. Clear non-discriminatory pricing requirements would improve investor confidence by reducing the risk of preferential or inconsistent treatment between similar users.

Non-discriminatory pricing means:

- similar users in similar circumstances face similar charges
- prices are based on objective factors (e.g. network impact), not ownership or negotiation power

- For investors (generation, storage, DER):
    - certainty of pricing is critical
    - perceived bias or inconsistency increases risk and deters investment

Clear rules provide:

- transparency
- predictability
- a level playing field

Pricing non-discrimination alone is not sufficient. There are two gaps:

1. **Operational discrimination risk**
    - Even if prices are equal, access to capacity or connection terms may differ
    - Queue management, curtailment, and connection conditions can still favour some participants
2. **Static framework limitation**
    - Equal pricing applied to **averaged conditions** can still be inefficient
    - It may not reflect real differences in location, timing, or system value

This can lead to:

- inefficient siting
- underinvestment in high-value locations
- overinvestment in constrained areas

Non-discrimination should be extended beyond pricing to include:

- **operational neutrality**:
    - equal access to capacity
    - transparent queue management
    - consistent connection rules
- **cost-reflective signals**:

    - pricing based on location and time
    - recognition of capacity and congestion
- **transparent network information**:
    - published capacity and congestion maps
    - visibility of constraints

This ensures that:

- investors are treated fairly
- investment decisions are guided by real system conditions
- distributed resources can compete on equal terms with traditional solutions

Investor confidence depends on:

- fairness
- transparency
- predictability

But efficient outcomes require:

- accurate signals
- consistent access
- coordination across the system

Non-discrimination is necessary but must be combined with these elements. Non-discriminatory pricing improves investor confidence but must be complemented by operational neutrality and cost-reflective signals to ensure both fairness and efficient system outcomes.

Q12. Application provisions (opt-out, retrospectivity, secondary networks)

Agree with the provisions as an interim measure. Secondary networks should be **enabled and encouraged.** Opt-out and retrospectivity remain necessary in the current, static framework.

Today's model allocates **fixed capacity at a connection point**. This creates:

    - **opt-outs** to bypass rigid rules
    - **retrospectivity** to manage legacy pricing differences
    - **special treatment** for embedded/secondary networks

These are mechanisms to manage a **static, one-directional system**.

These provisions do not address the root cause:

- capacity is treated as **fixed**, not time-varying
- connections are **isolated**, not coordinated
- pricing signals are **coarse**, not reflective of real conditions

Result: exceptions and transitional rules are required to make the system function.

If secondary networks are **actively enabled as coordinated microgrids**, using edge control (e.g., DC-router–type functionality):

- nodes (buildings, campuses, communities) **optimise internally first**
- excess generation/load is managed **between nodes**
- the EDB provides **thin-wire interconnection** and broadcasts **price/constraint signals**
- capacity becomes **dynamic and shared**, not pre-allocated

Under this **bi-directional, signal-driven model** (consistent with the *Energy Internet* concept associated with Jonas Birgersson):

- **Opt-out becomes unnecessary**
  → pricing reflects real conditions; no need for negotiated exceptions
- **Retrospectivity becomes less critical**
  → all participants respond to the same real-time signals regardless of connection date
- **Secondary networks become core infrastructure**
  → not edge cases, but primary units of optimisation and resilience

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Transitional pathway

- **Now**: keep provisions; expand secondary networks; publish capacity/congestion data
- **Next**: enable dynamic access (flexible connections, operating envelopes) and locational/time-based pricing
- **Then**: orchestrate nodes in real time; thin-wire transfers between nodes
- **Outcome**: provisions naturally diminish as the system self-coordinates

Result:

- Connect **more load and generation** without new build
- **Shorten queues** via better siting and dynamic access
- **Defer capex** by using existing assets harder
- **Improve resilience** via segmented, mutually supportive nodes

Opt-out and retrospectivity are necessary today but become progressively redundant as secondary networks evolve into coordinated microgrids operating under dynamic, locational price signals with EDBs acting as neutral orchestrators.

Where to reuse this logic

- **Q10 (pioneer/injection capacity)**: cost-sharing is transitional; dynamic capacity management is the solution
- **Q11 (non-discrimination)**: extend from pricing to **operational neutrality** under common signals
- **Q17 (information disclosure)**: capacity/congestion maps are prerequisites for node-based optimisation
- **Q30 (additional feedback)**: state the end-state explicitly and the planned transition

Bottom line: Keep the provisions now, Design the system so they are no longer needed

Q13. Do you agree with the proposed commencement provisions above? Why?

Yes, broadly agree. Commencement provisions are appropriate to ensure an orderly transition and provide certainty to participants.

Commencement provisions set:

- when new rules start
- how quickly participants must comply
- how existing arrangements transition

They are important because:

- abrupt changes can disrupt investment decisions
- participants need time to adapt systems and contracts

Commencement provisions often prioritise **stability over progress**, which can:

- delay the benefits of more efficient pricing
- prolong legacy arrangements that distort behaviour
- slow adoption of new technologies and operating models

There is a risk that transition becomes a mechanism for deferring change rather than enabling it.

Commencement should be structured to **accelerate transparency early**, including publication of capacity and congestion maps

- enable **early adoption of dynamic pricing signals**
- support **incremental deployment of coordinated systems** (e.g. microgrids, DC-enabled control at the edge)
- allow participants to transition **progressively toward real-time, signal-based operation**

This aligns commencement with a system that evolves from static, connection-based operation to **dynamic, coordinated network use.** The timing of implementation determines whether reform delivers benefits quickly or locks in inefficiencies for longer.

Efficient outcomes require:

- early visibility of constraints
- early access to improved signals
- clear direction of travel

Commencement provisions are appropriate but should prioritise early transparency and enable rapid adoption of dynamic, coordinated operation rather than prolonging static legacy arrangements.

Method statement - Approach to remaining questions (Q14–Q29)

The responses to Questions 14–29 follow a consistent framework:

- **Agreement in principle** where proposals improve the current framework
- Identification of **limitations**, where changes remain incremental or constrained by legacy assumptions
- Refer to **Q30**, which sets out the "end-state" architecture that these reforms should enable.

Q14–Q29

Support in principle. The proposed amendments improve clarity, consistency, and aspects of cost-reflectivity within the current framework.

However, these changes remain **incremental** and operate within a largely static, connection-based model. As a result, they do not fully address:

- dynamic use of network capacity
- real-time coordination of distributed resources
- locational and temporal value of energy and capacity

These limitations are not specific to individual questions but reflect the absence of a clearly defined system *"end-state"*. Refer to **Q30**, which outlines the proposed end-state architecture and provides the context within which these amendments should be assessed.

Q30. Do you have any comments on the drafting of the proposed amendment?

The amendment improves the current framework, but without a defined end-state it risks locking in incremental change. A clear system vision is needed to ensure today's reforms enable tomorrow's electricity system.

New Zealand could transition to a highly efficient, resilient electricity system. This requires not only incremental reform, but a clear view of the destination. Without this, there is a risk that decisions made today will need to be revisited, increasing cost and delaying progress.

The reform should be framed around a clear ***end-state***:

1. hydro as seasonal storage
2. renewable over-build preserving storage
3. flexible demand absorbing over-build surplus
4. DER rooftop solar
5. V2G managing peaks with distributed storage
6. DLMP pricing reflecting location, time, and constraints
7. Flexibility, real-time coordination of distributed resources

These 7 options are explained further here in the **Portfolio Option**

Vehicle-to-grid (V2G) represents the largest scalable source of distributed storage available to the electricity system. International work shows that its deployment is constrained not by technical feasibility, but by the absence of clear standards, coordinated regulatory frameworks, and consistent market signals. To unlock this opportunity, New Zealand should provide clear direction to OEMs to supply bidirectional-capable vehicles, align with international standards, streamline connection processes, and ensure pricing frameworks reflect the value of flexible capacity. In a coordinated system, V2G enables EVs to operate as distributed storage, supporting peak demand management, renewable integration, and system resilience.

The Energy Internet approach minimises total system cost, improves resilience, and provides a credible alternative to continued network expansion.

The proposed changes to DGPP are necessary but not sufficient on their own. When combined with real-time coordination, capacity valuation, and flexible demand, they enable a step-change in system efficiency and resilience.
