The future impact of emerging technologies in the energy sector

Commerce Commission IM Review Conference

29 July 2015

NEW ZEALAND SMART GRID FORUM

Architecting a future electricity system for all New Zealanders

Smart Grid Forum - context

Paul Atkins - Chair

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SGF Purpose

The Forum's objective is to advance the development of a **smart electricity system** in New Zealand through information sharing and dialogue, supported by analysis and by focused work-streams where these are considered to be appropriate.

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Terms of Reference - scope

- Take an "**all-of-system**" approach that recognises convergence of electricity distribution and transmission with other aspects of energy supply and demand, and with wider ranging activities (such as emergency response capabilities and electric vehicle developments).
- Seek to foster **innovation** in the provision of smart technologies and associated systems.

Diverse Forum membership supports "all of system" view

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Smart Grid Forum work to date and the merits of customer choice

John Hancock - Secretariat

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Forum has a strong preference for customer choice

- Case studies of NZ and Victorian smart meter rollouts and NZ ripple control upgrades
- Characteristics of fast-changing technology
- Dynamic efficiency

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18 July 2015

Input Methodologies Review - invitation to contribute to problem definition

The Smart Grid Forum was commissioned by ENA and MBIE in late 2013 to explore issues related to the development of smart grids in New Zealand. The Forum is unlike similar groups overseas in many respects: it has a diverse membership including many organisations from outside the electricity industry, has a strong consumer-focus, is lightly resourced and is not directed at the implementation of a specific government policy such as decarbonisation or technology export.

As a result of this, the Forum's work has the credibility of genuine independence and diversity. It has been influential in the development of early thinking about the impact of new technologies on the NZ power system and describing a vision of smart grid development that emphasizes customer choice and benefit over central planning and government intervention.

The Commission has been an observer to the Forum's work since its inception and we have benefitted from its involvement. Given the diversity of our membership, we have limited our comments on the *Input methodologies review - Invitation to contribute to problem definition* document to Topic 4: The future impact of emerging technologies in the energy sector. Individual forum members may, of course, make their own submissions on other topics in their own right.

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http://www.med.govt.nz/sectors-industries/energy/electricity/new-zealand-smart-grid-forum

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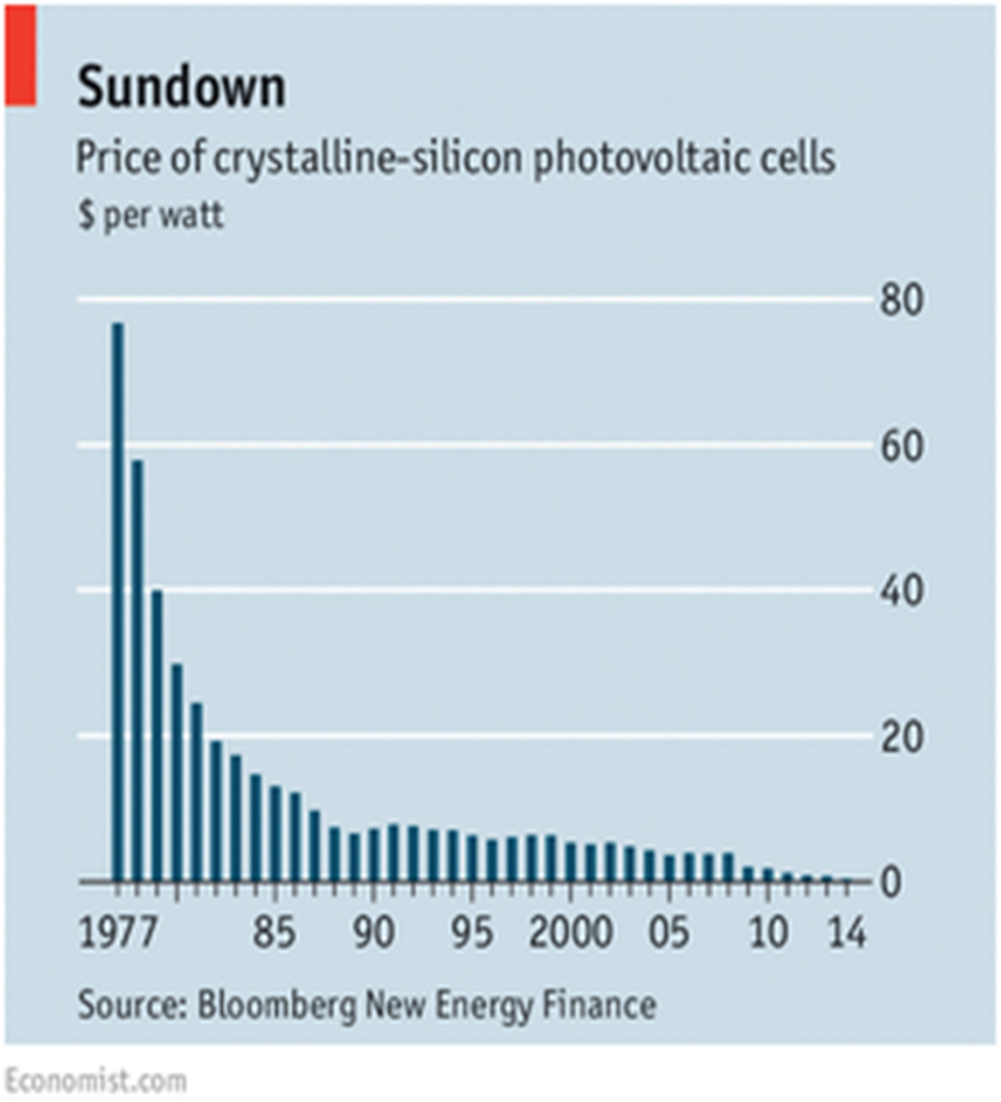
Exponential technology uptake is hard to predict

The Economist

World politics | Business & finance | Economics | Science & technology | Culture

Renewable energy

Banishing the clouds



Economist.com

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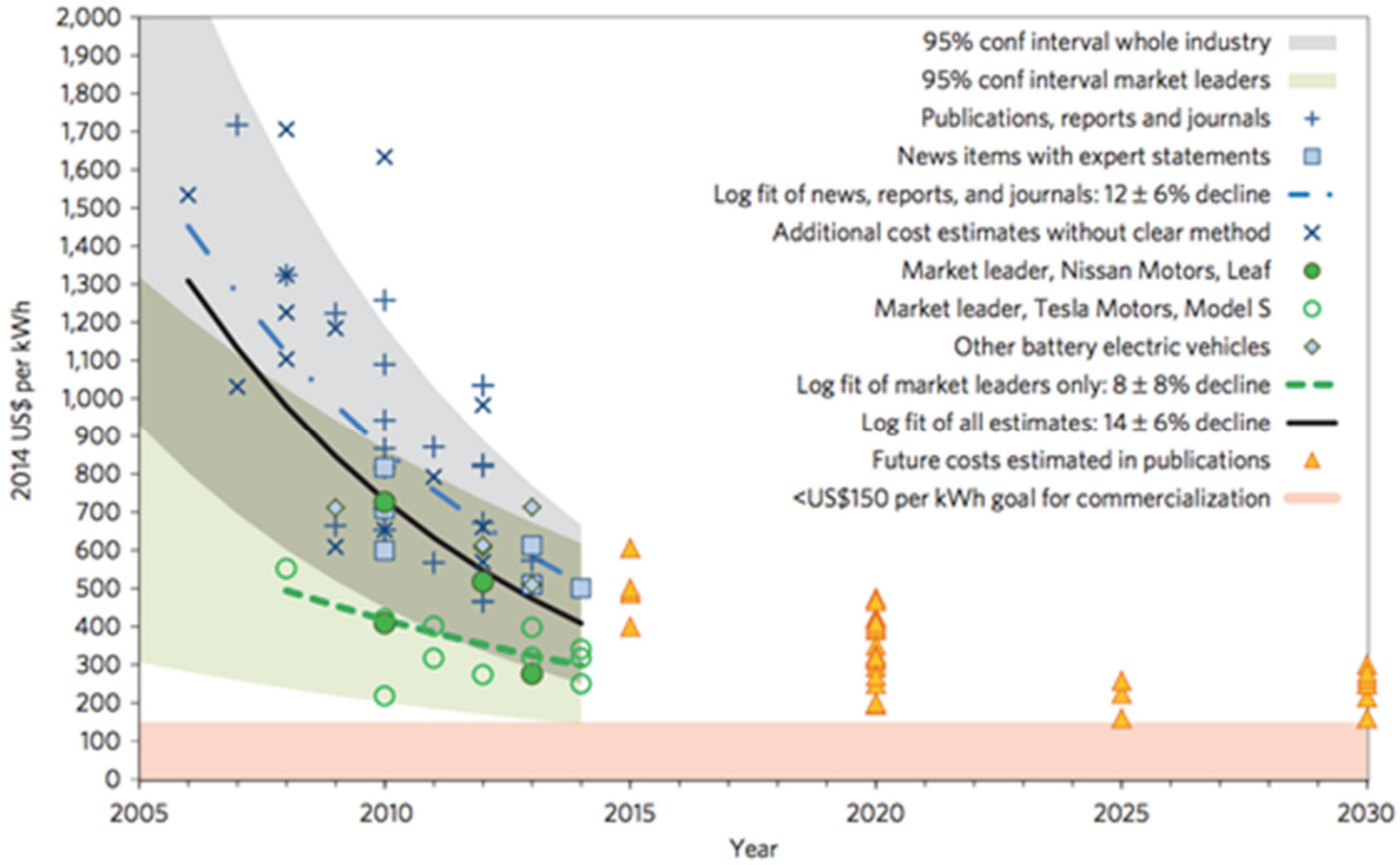
Uncertainty affects balance as well as supply and demand



Source: Electric vehicle batteries 'already cheaper than 2020 projections', Nature Climate Change, 23 Mar 2015

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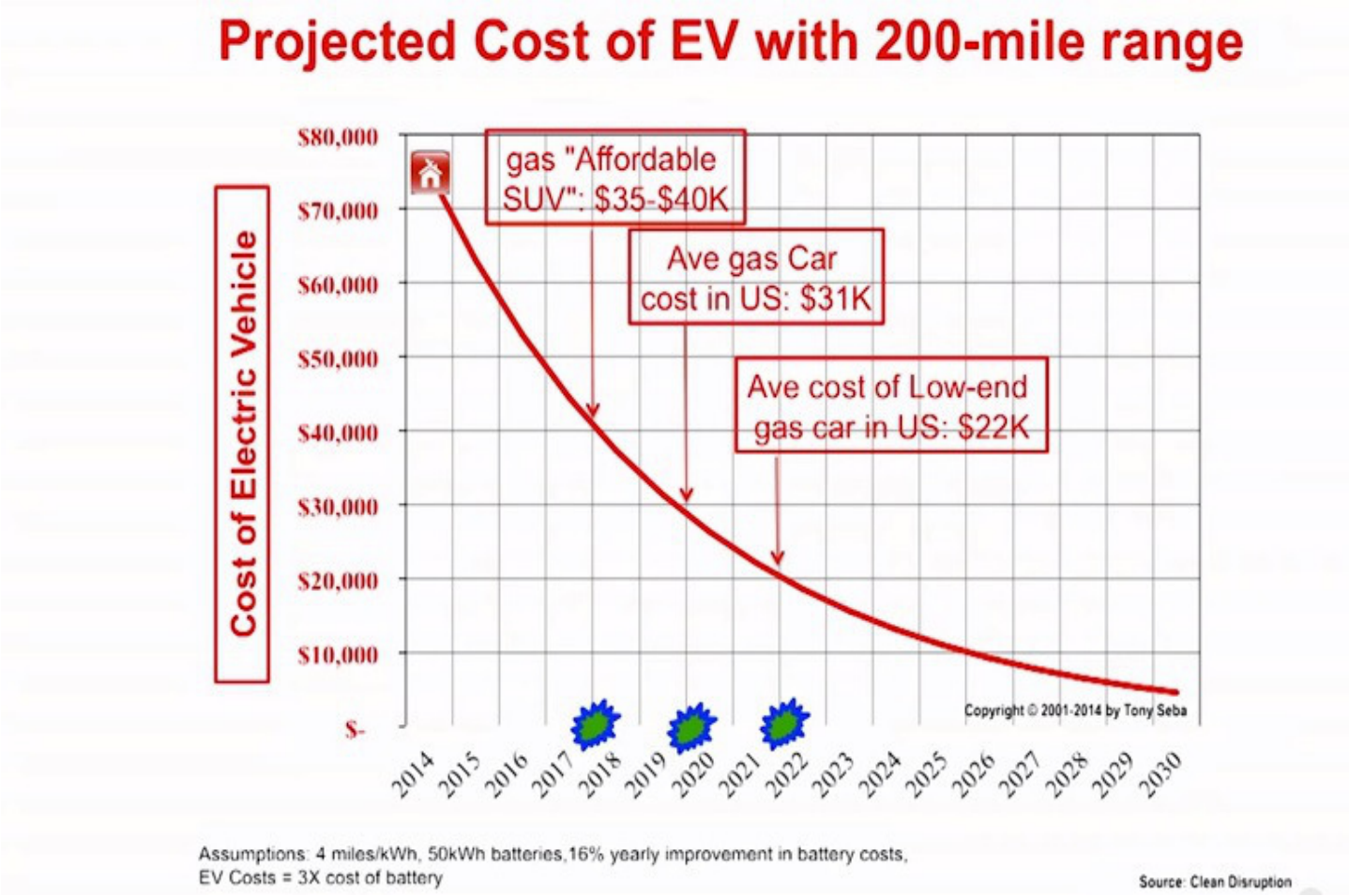
EVs might be cost equivalent by 2022



Source: *Clean Disruption of Energy and Transportation*, Tony Seba.

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Impacts on electricity lines services – and how this is relevant to the IM

Ryno Verster - Member

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Distribution network of the future

- Customer-centric
  - Provide energy choice and options
  - Understanding what customers really want
- The role of the network will be to:
  - Facilitate customer and third party transactions (open access)
  - Supplement locally generated electricity
  - Provide supply reliability and resilience
- The network operator will ensure:
  - The safe and reliable operation of the network
  - System stability, power quality and adequacy of supply
  - The integrity of network assets

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Key change (1)

- Future demand patterns are uncertain
  - Credible scenarios for increased and decreased use
  - Demand could become more intermittent and peaky
  - Two-directional power flows
- Implications for distributors
  - New and changed future network architectures
  - Altered stranding risk for long-life assets
  - Increasing network complexity

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Key change (2)

- System instability from variable generation
  - Power quality issues on distribution networks
  - Increasing potential for frequency excursions
  - Balancing power in- and out- flows
- Implications for distributors
  - Additional investment and skills
  - Shared transmission/distribution responsibilities
  - Increased information needs (ooth of new customer devices and network performance)

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Key change (3)

- Competing network requirements
  - Rate of technology uptake will vary greatly
    - Many consumers will remain as is
    - Major differences between urban and rural networks
  - Safety and reliability of supply will remain paramount
    - Although the way we measure reliability will change
  - Many networks face major renewal programmes
- Implications for distributors
  - Ongoing investment required in conventional assets
  - Uncertainty about recovering costs over asset-lives
  - Integrating new energy solutions

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Key change (4)

- Customer segmentation
  - New technologies just for those who can afford it?
  - Potential for cross-subsidisation to those with new technologies (from the rest)
  - How to recover costs from those who cause additional investment
- Implications for distributors
  - The true cost and value of emerging technology?
  - Rate-setting will require major overhaul
  - Need to gradually introduce cost changes

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Short term actions for DBs

- Developing least-regret outcomes under credible scenarios
- Window over the next regulatory period to:
  - Learn more about our customers
  - Research, test and integrate new energy solutions
  - Transform our long-term network architecture plans
  - Develop enablers for upcoming technology changes
  - Develop our skills-base for what's coming
- Collaboration – industry; govt.; academia; suppliers
  - Information-sharing, avoid duplication
  - Agreement on reasonable standards

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How can the IMs help?

- SGF has not explicitly considered IMs but accepts the principle that

  "Distributors want to be facilitators to our customers' changing energy needs – not blockers due to an inability to recover costs or unreasonable technical expectations"
- Implies that IM regime accepts
  - Legitimacy of increased R&D spend and pilots
  - Need for expanding technology enablers
  - Need for expanding and developing internal skills
  - The increased complexities distributors face
  - Transitional service nature, as new technologies are embedded
- May require:
  - Shorter new technology depreciation periods
  - Clear definitions of what can be in the RAB

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