'CALIFORNIA DREAMIN' – AMBITIOUS OBJECTIVES AND RAPID TRANSITION IN THE ELECTRICITY MARKET

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Overview

California has been able to set ambitious environmental policies due to broad based electoral support over a sustained period. Stringent state regulations combined with federal incentives have been the harbinger of significant changes to the Californian energy mix. In the near term, environmental policy goals are likely to be evermore ambitious, especially given discussions on a 100% renewable standard and a potential 'battle of wits' with the federal administration. Past experiences, such as the 2001 electricity crisis, serve to illustrate the risks to consumers of having too rapid a transition timeline.

The pace of renewable development is also likely to stretch the operation of the grid to the limit of its current capability. The grid operator has already highlighted risks relating to system balancing and frequency response. To its credit, the California system operator has instituted new services and market frameworks to encourage competitive responses to the problem. By contrast, California's economic regulator has adopted a central-planning approach by forcing the buildout of energy storage with seemingly limited consideration of its economic efficiency and the cost to consumers. To date, California has benefited high levels of interconnection and excess capacity reserves that has allowed the state to tolerate current levels of renewable penetration. Going forward, forced fossil power plant retirements are likely to deplete capacity reserves leaving the system with less 'safety margin' to tolerate the variability from renewable generation.

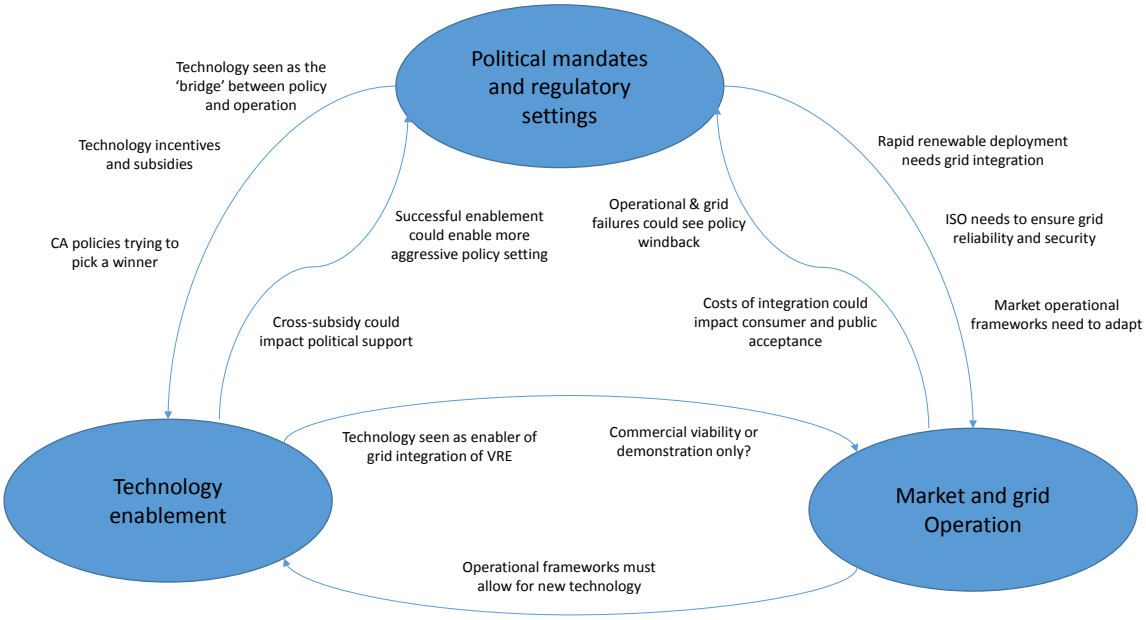
Technology is seen as the 'great enabler' of reform, providing a bridge between current operation and ambitious policy objectives. However, while technology innovation has demonstrated potential it needs to meet the commercial reality. Subsidies aim to get new technology across the 'cost gap' but in certain cases (such as rooftop solar subsidies), this can push the financial burdens to those most vulnerable and least able to afford the technology.

While ambitious goal setting can incentivise adaption and new business models, given the essentiality of electricity service, government and regulators must tread a fine line, so as not to push the system beyond its operating bounds and thus risk failure of the reform agenda.

Methods

In order to understand long term trajectories and critical risks this paper assesses the electricity market transition using a thematic framework of 'policy-operations-technology'. First, the political mandate and policy settings are important as they set the broad approach to the transition and importantly the timeframe for change. Second, the policy goals need to be integrated into operational grid management and commercial models for reliability and security of supply. Third, the gap between current operational capabilities and the ambitions of the policy is expected to be met through ongoing and future technology development. Technology is seen as the enabler of the transition and the bridge between the 'old' and 'new'. Key issues include commercial viability of new technology, its market impacts and who the costs fall upon.

Each core theme is first assessed using a 'SWOT' matrix (Strength, Weakness, Opportunity and Threat) followed by a detailed assessment. Core assumptions underpinning the Californian approach are tested, and hidden risks are identified. The paper also examines the inextricable linkages between the three themes. For example, the pace of policy change affects the ability of CAISO and industry to integrate renewables. The inability to successfully integrate renewables could result in an unreliable grid – which could affect public support for the policies. Finally, the paper assesses the implications and risks for key stakeholders across the electricity supply and value chain.



Results

The analysis finds that the mandate for aggressive environmental policy setting is enabled by perceived electoral support. The key risk relates to the pace of transition, which may become more rapid given state-federal tensions. Historical events such as the California energy crisis have served to illustrate that policy reforms that have been enforced at too rapidly have come at the expense of good policy design resulting in inadvertent risks on the market and ultimately the consumer.

From an operational perspective, notwithstanding the growth of renewable energy in recent years, the paper finds that there remains an excess of dispatchable generation capacity that has supported system balancing. This excess is likely to diminish over coming years mainly as a result of environmental regulations on once-through cooling, which is likely to stress existing operating frameworks. The decline of frequency response performance is indicative of increased strains on system intermittency.

Technology enablement through energy storage, distributed energy and demand response is expected to provide the bridge between policy and current operations. Key risks relate to socio-economic and consumer impacts, and financing risks given the link between clean technology development and venture capital.

Conclusions

In summary, the paper concludes that there are strong interlinkages between each of the core themes relating to policy expectations, existing grid operations frameworks and technology adaptation. It was found that there are a number of key risks to the transition, most of which relate to policy timelines and grid operation. While adaptation is required for all stakeholders, including the market operator, setting overly aggressive policy timelines can result in compromised market design and system unreliability which can impact political support and ultimately force reform rollback. The experience with the California energy crisis in 2001 provides a case in point.

References

Borenstein, S. (2002). The Trouble with Electricity Markets : Understanding California' s Restructuring Disaster. *Journal of Economic Perspectives*, *16*(1), 191–211.

CAISO. (2015a). Annual Report on Market Issues and Performance. Sacramento, California.

Goulder, L. H., & Stavins, R. N. (2011). Challenges from State-Federal Interactions in US Climate Change Policy. American Economic Review, 101(3), 253–257.

Schreurs, M. A. (2008). From the Bottom Up Local and Subnational Climate Change Politics, 343–355.

Sioshansi, F. P. (2016). Future of Utilities - Utilities of the Future: How Technological Innovations in Distributed Generation Will Reshape the Electric Power Sector. San Francisco, CA: Elsevier Science & Technology Books.