

Western Regional Transmission Organization: Creating a Market to Support Renewable Energy

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ABSTRACT

Renewable energy must surmount a few obstacles before fully displacing fossil fuels. Intermittent generation of renewable energy is hard to predict and does not correlate with consumer demand. When demand is higher than renewable energy production, electricity must be supplied with stored energy. Because storage of renewable energy is expensive, most areas use fossil fuels as backup supply.

A Regional Transmission Organization (“RTO”) helps to mitigate some of these issues by diversifying sources of energy. Diversifying both the location of energy supplies and the type of energy sources helps to deal with fluctuations of consumer demand.

The Western United States does not have an RTO to facilitate energy sales. Currently, utilities in the West operate predominantly within localized areas. Sales can occur through a less-established market, but the energy imbalance market (“EIM”) is small and voluntary. An RTO would expand the market to share electricity and make utility participation permanent. The main opposition to this program is founded in mistrust between conservative and liberal states in the West. This is misguided because an RTO would use conservative free-market principles to promote liberal goals to combat climate change.

An RTO has many benefits. Creating a free market for energy will lower costs for consumers. By opening access to many suppliers, consumer demand will be satisfied by energy produced in areas with the cheapest production at that moment, lowering rates. Counterintuitively, transferring electricity over long-distances is predominantly more efficient than transmitting it locally.

The market also will mitigate many of the problems that renewable energy currently faces. States that produce more renewable energy than they can consume will be able to sell to a broader market of consumers. This will limit curtailment of energy and stop states from being forced to get rid of excess energy to avoid overloading the electricity grid. By diversifying the source of energy, an RTO will increase the reliability of each electricity market. This increased reliability will limit the need for fossil fuel backup supplies. The collaborative

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nature of the market will also allow members to coordinate research and development of technology.

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INTRODUCTION

A. RENEWABLE ENERGY GENERATION BACKGROUND

Unlike fossil fuel production, which is based on a quantifiable and predictable supply, many renewable energy sources, including solar and wind energy, rely on natural production. Environmental conditions, such as the timing of sunrise and sunset or the less predictable accumulation of cloud cover, determine energy production at each moment. This results in volatile shifts of the supply of renewable energy. Although technology is developing to better predict the abundance of certain energy sources, our current energy generation depends upon conditions out of the control of an energy supplier. Unlike storage of fossil fuels, which can supply large backups, the current storage technology for renewable energy is inadequate to rely upon as a backup. This intermittent character of renewable energy poses an obstacle to converting to renewable energy as the sole supply of electricity.

B. PROBLEMS WITH RENEWABLE ENERGY

1. Renewables Generate Energy Intermittently

Drastic fluctuations of production create inefficiencies at times of low and high production. When there is insufficient energy being produced, this is referred to as a capacity shortfall.¹ During these capacity shortfalls, consumers must rely on an alternative source of energy, which could derive from fossil fuel supplies, from a different renewable energy source, or theoretically from stored renewable energy.² At times of high demand and low supply, expensive peaking plants operate in cycles to temporarily satisfy short periods of transmission need.³ These

1. NICK SCHLAG ET AL., WESTERN INTERCONNECTION FLEXIBILITY ASSESSMENT 8 (Energy & Envtl. Econs., Inc. ed., 2015); *see also* CALIFORNIA ISO, ISO 2016-2017 TRANSMISSION PLANNING PROCESS 2 (Jan. 4, 2018), *available at* <https://www.caiso.com/Documents/SupplementalSensitivityAnalysis-Risksofearlyeconomicretirementofgasfleet.pdf>.

2. *See* David Danelski, *Here's How California Ended Up With Too Much Solar Power*, L.A. DAILY NEWS (Mar. 18, 2017), <https://www.dailynews.com/2017/03/18/heres-how-california-ended-up-with-too-much-solar-power/> (explaining that batteries are not a practical solution because they are too expensive to be functional back-up supplies of energy).

3. *See* Joni Sliger, *Transmission 101: Exploring the Hidden Currents*, GREEN ENERGY INST. LEWIS & CLARK L. SCH.: RENEWABLE ENERGY POL'Y BLOG (Mar. 21, 2017), <http://greenenergyinstitute.blogspot.com/2017/03/transmission-101-exploring-hidden.html>.

reserves are often costly, and running them unexpectedly causes excess stress to equipment, making it operate less efficiently.⁴

At times of peak production, there is often a surplus of energy produced, which can result in a flexibility shortfall.⁵ When a high supply of renewable energy outpaces demand, the energy must be blocked from entering the transmission system, sold at artificially low prices, or even sold at negative prices (paying the receiver to accept the energy).⁶ California has a high supply of renewable energy and does not have access to a large enough consumer base. The state is overproducing solar energy and being forced to curtail their electricity surplus.⁷ With stable levels of consumer demand and increased renewable energy supply, curtailments are expected to increase in California⁸ and also should be expected to develop around the Western Interconnection.

2. Batteries are not a Feasible Solution to Storage Problems for Renewable Energy

If batteries were an affordable storage option, then they could address problems with variability of renewable energy. Instead of wasting energy through curtailment during peak production, excess energy could be stored in battery reserves. During times of low production, consumers could access battery reserves of renewable energy produced in the past. As such, consumers could eliminate fossil-fuel energy reserves without relying on renewable electricity surpluses from other areas.

Unfortunately, given today's technological capabilities and foreseeable advances in technology, batteries are not a realistic solution to variability issues posed by renewable energy production. If battery technology advances sufficiently and becomes affordable, then the necessity of a diverse energy supply and a large geographic footprint would be lessened. Even in this unlikely future scenario, having an interconnected regional system would ease the strain on any battery system by providing reliable energy without requiring storage.

This note relies on the assumption that batteries are not a practical solution to addressing storage issues posed by renewable energy. Currently, batteries are too

4. See LORI BIRD, MICHAEL MILLIGAN & DEBRA LEW, *INTEGRATING VARIABLE RENEWABLE ENERGY: CHALLENGES & SOLUTIONS* 3 (Nat'l Renewable Energy Lab. ed., 2013).

5. See SCHLAG ET AL., *supra* note 1, at 8; CALIFORNIA ISO, *ISO 2016-2017 TRANSMISSION PLANNING PROCESS 2* (Jan. 4, 2018), available at <https://www.caiso.com/Documents/SupplementalSensitivityAnalysis-Risksofearlyeconomicretirementofgasfleet.pdf>.

6. See Memorandum from Carl Zichella, Director of Western Transmission, NRDC, to Envtl. & Renewable Energy Colleagues (May 2015) (on file with author).

7. See Memorandum from Steve Berberich, President & Chief Exec. Officer, Cal. Indep. Sys. Operator Corp., to ISO Board of Governors (Feb. 9, 2017), available at <https://www.caiso.com/Documents/CEOREport-Feb2017.pdf>; Ralph Cavanagh, *How California Can Avoid Throwing Away Solar Energy*, NRDC: EXPERT BLOG (Mar. 22, 2017), <https://www.nrdc.org/experts/ralph-cavanagh/how-california-can-avoid-throwing-away-solar-energy>.

8. See Danelski, *supra* note 2.

expensive, too large, and do not store electricity for long enough to address the intermittency of renewable energy.⁹ Solar batteries require an initial investment of at least \$5,000-\$7,000 and cost between \$400 and \$750 per kWh to operate.¹⁰ The average annual electricity consumption per residential utility customer in the United States in 2017 was 10,399 kWh.¹¹ Further, the actual battery capacity would need to be higher than average usage because typical household electricity usage requires surges of high voltages to operate large appliances.

I. BACKGROUND OF WESTERN RTO ESTABLISHMENT

A. HISTORICAL BACKGROUND OF RTOS

In the mid-1990s regional transmission organizations (“RTOs”) and independent system operators (“ISOs”)¹² emerged as facilitators of competitive wholesale power markets.¹³ These Federal Energy Regulatory Commission (“FERC”) regulated entities¹⁴ operate to make regional electricity systems efficient.¹⁵ In 1996 FERC required that transmission infrastructure be made accessible to all power producers,¹⁶ and RTOs became the primary way to manage these publicly available grids.¹⁷ FERC has encouraged regions to explore the option of establishing an RTO,¹⁸ and recently California conducted research into developing a Western RTO to fulfill a statutory mandate.¹⁹

RTOs have enabled renewable energy to account for a significant amount of their load generations. These regional systems have improved power market efficiency, regional infrastructure planning, and issues with variability that accompany integration of renewables.²⁰ Although heavily integrating renewable energy has prompted concerns about grid reliability, RTOs have eased these concerns by

9. *Id.* (quoting David Wright).

10. *How Much Does Solar Storage Cost? Understanding Solar Battery Prices*, ENERGY SAGE, <https://www.energysage.com/solar/solar-energy-storage/what-do-solar-batteries-cost/> (last updated Jan. 16, 2019).

11. *Frequently Asked Questions: How Much Electricity Does an American Home Use?*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/tools/faqs/faq.php?id=97&t=3> (last updated Oct. 26, 2018).

12. See CARL ZICHELLA, NRDC, REGIONAL TRANSMISSION ORGANIZATIONS: RECOMMENDATIONS FOR THE WEST 2 (Apr. 2016) (stating that these terms are practically “interchangeable”).

13. ENER NEX CORP., EASTERN WIND INTEGRATION AND TRANSMISSION STUDY 25 (Nat’l Renewable Energy Lab. ed., 2011).

14. See Federal Power Act of 1935 § 202(a), 16 U.S.C. § 824a (2015).

15. Joni Sliger, *Transmission, Part II: A Western RTO?*, GREEN ENERGY INST. LEWIS & CLARK L. SCH. (Apr. 24, 2017), <http://greenenergyinstitute.blogspot.com/2017/04/transmission-part-ii-western-rto.html>.

16. See FERC Order No. 888, 18 C.F.R. §§ 35, 385 (1996); 18 C.F.R. § 37.2 (1997).

17. See Sliger, *supra* note 15.

18. See FERC Order No. 2000, 18 C.F.R. § 35 (1999).

19. See CAL. PUB. UTIL. CODE § 359.5(e)(1) (West 2016).

20. See, e.g., GEN. ELEC. INT’L, INC., PJM RENEWABLE INTEGRATION STUDY: EXECUTIVE SUMMARY REPORT REVISION 05 7 (PJM Interconnection, LLC ed., 2014), available at <https://www.pjm.com/~media/committees-groups/subcommittees/irs/postings/pris-executive-summary.ashx>.

decreasing forecasting errors through technological improvements, diversifying fuel sources, and serving large geographic footprints.²¹

Coordination helps RTOs to compile research about their regions' energy situations and to develop projects that promote renewable energy.²² RTOs in the Midwest, a region with higher wind capacity than other areas around the country, have effectively harnessed their region's wind energy in recent years.²³ In fact, the Southwest Power Pool ("SPP") at times has produced over 50% of its electricity generation from wind power.²⁴ Pennsylvania-New Jersey-Maryland ("PJM") Interconnection LLC recently found that the most direct challenge to renewable energy generation—reliability—is significantly offset by integrating large geographic footprints, compared to smaller balancing areas.²⁵ The rapid growth of renewable energy in these regions is possible because these grids serve such a vast territory.²⁶

RTOs are able to rely on renewable energy generation without compromising reliability.²⁷ Utilizing a broad geographic landscape and diversifying renewable resources makes renewable integration more manageable and allows a transmission system to handle renewable energy's natural variability.²⁸ As a result, there is less need for flexibility reserves, which tend to be conventional fossil fuel plants.²⁹ The combination of low natural gas prices and the emergence of renewables as the fuel of the future have caused the recent decline of conventional generation resources.³⁰

Throughout Eastern RTOs, coal-generating plants are operating less frequently and are often being retired.³¹ The shift to renewable energy will not only allow for more competitive pricing, but also will help states to meet their renewable portfolio standards ("RPS").³² These legislative enactments are common around

21. See Robert Walton, *SPP Wind Power Sets Penetration Record, Serving 52% of Load One Day*, UTIL. DIVE (Feb. 17, 2017), <https://www.utilitydive.com/news/spp-wind-power-sets-penetration-record-serving-52-of-load-one-day/436447/>; see also MKTS. COMM. BD. DIRS., MIDCONTINENT INDEP. SYS. OPERATOR, INC. (MISO), WIND FORECASTING REVIEW (Aug. 26, 2015), available at <https://cdn.misoenergy.org/20150826%20Markets%20Committee%20of%20the%20BOD%20Item%2006%20Wind%20Forecasting111304.pdf>.

22. See MIDWEST ISO, REGIONAL GENERATION OUTLET STUDY (Nov. 19 2010), available at <https://puc.sd.gov/commission/dockets/electric/2013/EL13-028/appendixb3.pdf>.

23. See MISO, WIND CAPACITY CREDIT REPORT (Dec. 2017), available at <https://cdn.misoenergy.org/2018%20Wind%20Capacity%20Report97278.pdf>.

24. See Walton, *supra* note 21.

25. See GEN. ELEC. INT'L, INC., *supra* note 20, at 12.

26. See Walton, *supra* note 21.

27. GEN. ELEC. INT'L, INC., *supra* note 20, at 6–7.

28. *Id.* at 12.

29. See Zichella, *supra* note 12, at 4–6.

30. See OFFICE OF ENF'T: DIV. OF ENERGY MKT. OVERSIGHT, STATE OF THE MARKETS REPORT 2016 20 (2017).

31. See Zichella, *supra* note 12, at 2–3.

32. See MISO's *Renewable Energy Standards & Portfolio*, ENERGY LINK, <https://goenergylink.com/blog/misos-renewable-energy-standards-portfolio/> (last visited Feb. 3, 2019).

the country: twenty-nine states have binding renewable portfolio standards, and other states set voluntary targets for renewable energy production.³³ Utilities often exceed these measures, but having an RTO is essential to meeting commitments to high percentages of renewables.³⁴

B. PROBLEMS ARISING FROM BALKANIZATION IN THE WESTERN INTERCONNECTION

The eastern half of North America is divided into seven RTOs and ISOs, and Texas operates its own regional market.³⁵ Although these large, regionally-organized electricity markets govern most of the continent, the Western Interconnection of the United States operates predominantly through balkanized electricity markets.³⁶ The system is divided into the California Independent System Operator (“CAISO”) and thirty-eight independently operated balancing authorities, which all separately respond to changing electricity demand within their localities.³⁷ As a result, electricity trading is poorly organized, volatile, and consumers tend to rely on power that is produced near the region in which they reside. The system results in the unnecessary generation and duplicative construction of transmission infrastructure because balancing authorities have little incentive to coordinate grid improvement projects.³⁸ Consumers are only able to access electricity supplied by renewable energy if they live in an area that produces renewable energy, their local utility purchases renewable energy through a bilateral contract with a renewable supplier, or they participate in the Western Energy Imbalance Market (“EIM”).³⁹

Balkanization limits the maximum integration of renewable energy. The variability of renewables requires an integrated and centrally coordinated system. Western states should mitigate problems arising from variability of renewables by expanding their geographic footprint of energy production, diversifying types of renewable energy within their portfolios, and having reasonable levels of flexible energy reserves.

33. *State Renewable Portfolio Standards and Goals*, NAT’L CONFERENCE OF STATE LEGISLATURES, <http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx> (last visited Feb. 3, 2019).

34. See Robert Mullin, *Governance Plan Critics Urge Slowdown of Western RTO Development*, RTO INSIDER (July 28, 2016), <https://www.rtoinsider.com/caiso-plan-critics-slowdown-western-rto-29507/>.

35. U.S. Energy Info. Admin., *About 60% of the U.S. Electric Power Supply is Managed by RTOs*, TODAY IN ENERGY (Apr. 4, 2011), <https://www.eia.gov/todayinenergy/detail.php?id=790>.

36. U.S. Energy Info. Admin., *U.S. Electric System Is Made up of Interconnections and Balancing Authorities*, TODAY IN ENERGY (July 20, 2016), <https://www.eia.gov/todayinenergy/detail.php?id=27152>.

37. Ralph Cavanagh, *Why We Need an Integrated Western Power Grid*, NRDC EXPERT BLOG (Mar. 28, 2017), <https://www.nrdc.org/experts/ralph-cavanagh/why-we-need-integrated-western-power-grid>.

38. See Zichella, *supra* note 12, at 6.

39. An EIM is a loose confederacy of electricity sharing. It is discussed further in section III.A.

C. RTO WEST FAILURE

Although some Western states considered an RTO in the early 2000s, the system was not established because of key stakeholder opposition and an energy crisis in California.⁴⁰ Instead of becoming more regionalized, California increased their energy reserves following the 2000-2001 crisis.⁴¹ Deregulatory failures led to blackouts, and the state overcompensated by requiring an excessive capacity of reserves.⁴² This resulted in higher prices for ratepayers and over-generation to ensure reliability in the system.⁴³ Reliability issues could be mitigated by the integration of the Western grid, which would eliminate the necessity of large back-up reserves.⁴⁴ Not only is this over-generation unnecessary and expensive,⁴⁵ but back-up reserves tend to rely on fossil-fuel generated power plants.⁴⁶ By increasing variability of energy sources and expanding their renewable production, Western states can coordinate a reliable grid while also shifting electricity production from fossil-fuel reliance to renewable energy sources.⁴⁷

II. CURRENT WESTERN INTERCONNECTION ENERGY SITUATION

A. CALIFORNIA

Within California, the state-run CAISO operates the grid for 80% of the state,⁴⁸ accounting for about a quarter of electricity use and generation in the Western Interconnection.⁴⁹ California's electricity mix consists of 30% renewable energy.⁵⁰ In 2017 this renewable energy was composed of 36% solar, 31% wind, 16% geothermal, 8% hydro, and 9% biomass.⁵¹ California serves an important role as a global leader in implementing innovative environmental and energy policies, aligning with European levels of commitment to renewable

40. See Sliger, *supra* note 15.

41. Ivan Penn & Ryan Menezes, *Californians are Paying Billions for Power They Don't Need*, L.A. TIMES, Feb. 5, 2017, <https://www.latimes.com/projects/la-fi-electricity-capacity/>.

42. *Id.*

43. *Id.*

44. James L. Sweeney, *Integrate Western Power Grid to Reduce Emissions, Energy Costs*, SACRAMENTO BEE, Mar. 3, 2017, <http://www.sacbee.com/opinion/op-ed/soapbox/article135866278.html>.

45. See Penn & Menezes, *supra* note 41.

46. See Sweeney, *supra* note 44.

47. See Joni Sliger, *Renewables Too Variable? Here's One Solution*, GREEN ENERGY INST. AT LEWIS & CLARK L. SCH. (Oct. 21, 2015), <http://greenenergyinstitute.blogspot.com/2015/10/renewables-too-variable-heres-one.html>.

48. Sammy Roth, *Trump's Energy Secretary Wants to Save Coal. Will Californians End up Paying the Price?*, DESERT SUN, Oct. 3, 2017, <https://www.desertsun.com/story/tech/science/energy/2017/10/03/trumps-energy-secretary-wants-save-coal-californians-end-up-paying-price/723977001/>.

49. See Cavanagh, *supra* note 37.

50. CAL. ENERGY COMM'N, TRACKING PROGRESS: RENEWABLE ENERGY 1 (Cal. Energy Comm'n, ed., July 2018), available at https://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf.

51. *Id.* at 2.

energy.⁵² The state has set goals for its energy portfolio to be comprised of 33% renewables by 2020, 44% by 2024, 52% by 2027, and 60% by 2030.⁵³ Attaining this 50% goal would decrease greenhouse gas emissions by 2.6 million metric tons annually.⁵⁴ Although CAISO could pursue California's aggressive targeted renewable portfolio standards without regional coordination, expanding the state's ISO into a regional market would make attaining these renewable percentages more affordable.⁵⁵ Regional coordination is the most important early step in making California's 50% RPS goal more cost-effective.⁵⁶

CAISO is curtailing significant amounts of renewable energy. Solar and wind production curtailment has risen from 15% of the time in 2015, to 21% in 2016, to 31% by the start of 2017.⁵⁷ In 2017, the CAISO forecasted curtailments to reach between 6,000 to 8,000 MW.⁵⁸ The CAISO also predicted that curtailments would rise over 13,000 MW by 2024.⁵⁹ As solar has become cheaper, more efficient, and more widespread through both utility and rooftop panels, this resource has imposed complications for the system. Because it is difficult to calibrate electricity demand with time frames of high natural supply, the system is often overloaded during peak solar production.⁶⁰ As a result, California has limited generation, given away energy, and even paid nearby systems to absorb the excess energy.⁶¹ Because excess electricity has the potential to cause blackouts by overloading the grid, California is charging states like Arizona and Nevada negative prices to "sell" their surplus energy.⁶² In the long term, the state should broaden their consumer base through a Western RTO, a plan that the CAISO and other proponents are developing. In the interim, California should pursue time-of-use pricing to encourage ratepayers to run appliances during

52. Sammy Roth, *Jerry Brown Sets Aggressive California Climate Goal*, DESERT SUN, Apr. 29, 2015, <http://www.desertsun.com/story/news/environment/2015/04/29/jerry-brown-sets-aggressive-new-climate-goal/26606787/>.

53. 2018 Cal. Legis. Serv. Ch. 312 (West).

54. CAL. ISO, REGIONAL ENERGY MARKET: FAST FACTS 3 (Cal. ISO ed., 2018).

55. ENERGY & ENVTL. ECON., INC., MODELING CALIFORNIA'S 50 PERCENT RENEWABLES PORTFOLIO STANDARD (2018).

56. *Id.*

57. Ivan Penn, *California Invested Heavily in Solar Power. Now There's So Much That Other States Are Sometimes Paid to Take It*, L.A. TIMES, June 22, 2017, <https://www.latimes.com/projects/la-fi-electricity-solar/>.

58. Memorandum from Steve Berberich, *supra* note 7, at 2.

59. Michael Gergen et al., *CAISO Expects It May Need to Curtail Up to 8,000 MW This Spring and Up to 13,000 MW By 2024, Which Could Test Curtailment Risk Allocation Provisions in Renewable PPAs*, LATHAM'S CLEAN ENERGY LAW REPORT (March 12, 2017), <https://www.cleanenergylawreport.com/energy-regulatory/caiso-expects-it-may-need-to-curtail-up-to-8000-mw-this-spring-and-up-to-13000-mw-by-2024-which-could-test-curtailment-risk-allocation-provisions-in-renewable-ppas/>.

60. See Danelski, *supra* note 2.

61. See Penn, *supra* note 57.

62. *Id.*

peak production times.⁶³

B. PACIFIC NORTHWEST

The Pacific Northwest also has set noteworthy goals with their RPS; Washington is targeting 15% renewable electricity by 2020,⁶⁴ and Oregon is targeting 50% by 2040.⁶⁵ Some utilities within this region have entered the EIM, but the states have not entirely committed to the market.⁶⁶ The Pacific Northwest should embrace full-scale integration into a Western RTO because they specialize in complementary sources of energy with California, relying primarily on hydroelectric power production⁶⁷ and also serving as an emerging leader in wind energy.⁶⁸ A Western RTO presents an opportunity to limit costs for ratepayers, create a more reliable grid, and decrease the redundancy of the region's flexible energy reserves.⁶⁹

C. MOUNTAIN WESTERN STATES

Companies are planning for the long-term shift to renewable energy. As technology improves and costs of operation decrease because renewable fuel is free, renewable energy is predicted to be the future of energy markets.⁷⁰ Environmental policies in states such as California will expedite the competitive advantage of renewable energy by adding costs to plants for their carbon emissions.⁷¹ As such, regional integration will tend to favor cheaper renewable energy.⁷² Although the Clean Power Plan intended to promote renewable energy to decrease carbon emissions,⁷³ changes under the Trump administration will shift the analyses of states like Utah and Wyoming, temporarily inflating the

63. Jeff St. John, *California's Flood of Green Energy Could Drive a Record 8GW of Curtailment This Spring*, GREEN TECH MEDIA (March 21, 2017), <https://www.greentechmedia.com/articles/read/californias-flood-of-green-energy-could-drive-a-record-6-to-8-gigawatts-of-gs.hr1S6uGx>.

64. WASH. REV. CODE ANN. § 19.285.040(2)(a)(iii) (West 2017).

65. OR. REV. STAT. ANN. § 469A.052(1)(h) (West 2017).

66. Robert Walton, *APS Joins Western EIM*, INDUSTRY DIVE UTIL. DIVE (Oct. 4, 2016), <https://www.utilitydive.com/news/aps-joins-western-eim/427536/>; see *About*, WESTERN ENERGY IMBALANCE MARKET, <https://www.westerneim.com/Pages/About/default.aspx> (last visited Feb. 2, 2019).

67. See *State Profile and Energy Estimates: Washington*, U.S. ENERGY INFO. ADMIN., <https://www.eia.gov/state/?sid=WA> (last visited Feb. 3, 2019); *Electricity Mix in Oregon*, OR. DEP'T OF ENERGY, <https://www.oregon.gov/energy/energy-oregon/Pages/Electricity-Mix-in-Oregon.aspx> (last visited Feb. 3, 2019).

68. *Renewable Energy*, ENERGY NORTHWEST, <https://www.energy-northwest.com/energy101/energysources/Pages/Renewable.aspx> (last visited Feb. 3, 2019).

69. Ted Sickinger, *PacifiCorp's Defection Pressures Northwest Utilities to Get Their Act Together on Energy Imbalance Market*, OREGONIAN, Nov. 8, 2014, http://www.oregonlive.com/business/index.ssf/2014/11/pacificcorps_defection_pressure.html.

70. See Carl Zichella, *Integrated Grid More Important Than Ever*, NRDC (Feb. 28, 2017), <https://www.nrdc.org/experts/carl-zichella/integrated-grid-more-important-ever>.

71. See Zichella, *supra* note 12, at 4.

72. CAL. ISO, *supra* note 54, at 2.

73. See Zichella, *supra* note 12, at 4.

financial viability of coal and natural gas.⁷⁴ Under the Clean Power Plan, these states would have been forced to limit their carbon footprint, but as these goals are no longer required, there is less reason for these states to join a regional system.⁷⁵

Although conservative states do not prioritize the fight against climate change, RTO participation offers other significant benefits. An RTO would increase flexibility, coordinate transmission planning, reduce costs for consumers, and increase reliability of the grid.⁷⁶ Further, Rocky Mountain states, such as Wyoming, have the potential to operate successful renewable programs including wind farms.⁷⁷ The region has greater potential to produce wind energy than California.⁷⁸ The time difference and geographic proximity would also complement the time frames of high demand for energy on the West Coast.⁷⁹ If these states recognize that renewables are a useful emerging market, they can capitalize on their comparative advantage of abundant natural resources.

Critics in conservative Western states have objected to plans to coordinate expansion of the CAISO into a Western RTO because of added requirements, such as greenhouse gas reporting, that would apply to energy generation occurring outside of California.⁸⁰ Conservative states also objected to the CAISO's plan because of the maintenance of Californian control over the potential RTO.⁸¹ These critics cited problems with the transition of governance over the Western RTO and that the new system would trace back to the existing CAISO.⁸² Instead, they suggested a board run by state regulators representing each state, and subjecting the RTO to FERC approval for all filings.⁸³ Additionally, different industries objected to subjecting themselves to the authority of other industry players, and they demanded that their representatives have roles in the Western RTO governance.⁸⁴

74. See Robert Mullin, *CAISO Expansion in Question as EIM Grows*, RTO INSIDER (Jan. 2, 2017), <https://www.rtoinsider.com/caiso-eim-2017-36294/>.

75. See Debra Kahn, *Mistrust, Pro-Coal Shift in D.C. Stifle Western Grid Talks*, E&E NEWS (Mar. 28, 2017), <https://www.eenews.net/energywire/stories/1060052151>.

76. Jen Neville, *Mountain West Electricity Providers Explore RTO Options*, W. AREA POWER ADMIN. (Jan. 6, 2017), <https://www.wapa.gov/newsroom/NewsReleases/2017/Pages/Mountain-West-explores-RTO-options.aspx>.

77. See Kahn, *supra* note 75.

78. ANTHONY LOPEZ ET AL., U.S. RENEWABLE ENERGY TECHNICAL POTENTIALS: A GIS-BASED ANALYSIS 14 (Nat'l Renewable Energy Lab. ed., 2012).

79. Roth, *supra* note 48.

80. Mullin, *supra* note 74.

81. Robert Mullin, *Governance Plan Fails to Dispel Western RTO Concerns*, RTO INSIDER (June 26, 2016), <https://www.rtoinsider.com/caiso-plan-fails-dispel-western-rto-concerns-28359/>.

82. *Id.*

83. *Id.*

84. *Id.*

The Governor of California proposed a new plan that “preserve[s] state authority over matters regulated by the states themselves”⁸⁵ and conceded many of the concerns about Californian control to conservative states and industry stakeholders.⁸⁶ The new proposal also addressed issues raised over the transition from the CAISO to a Western RTO and established a group of voters that would promote geographic diversity.⁸⁷ Some organizations, including the Sierra Club, questioned the revisions as misaligned with the goals of the market.⁸⁸ Even with modifications in place, the legislation has stalled amidst criticism from both sides of the issue.⁸⁹

III. REGIONALIZATION OF GOALS

Although statewide renewable targets are important and easy to coordinate through unilateral government action, multi-lateral jurisdictional coordination is vital to large-scale climate change goals. Many Western states lack binding renewable portfolio standards or have goals that are significantly lower than California’s or Oregon’s.⁹⁰ The 50% renewable energy target in these states is admirable, but progressive states should also focus on regional usage. Even if California and Oregon meet their targets, should other states maintain low rates of renewable usage, then the overall persistence of carbon emissions in the region will undermine efforts to combat climate change. California should focus on exporting its renewable energy and aid other Western states to meet their renewable targets. They should also promote renewable production in those states that have less ambitious, or non-existent, targets. Through a Western RTO, California connects its consumer base to renewable producers in states that do not support renewable production through portfolio standards.

Further, states that rely more heavily on fossil fuels possess greater long-term potential for improvement in their fuel source reliance. Because conservative states have less renewable energy in their current electricity mix, they would be able to incorporate renewable energy without considering the technical complications that accompany high percentages of variable renewable energy. Although benefits to renewable energy are compelling, the political messaging in conservative regions needs to be significantly altered to sell the project.⁹¹ Conservatives

85. CAL. ISO, REVISED PROPOSAL: PRINCIPALS FOR GOVERNANCE OF A REGIONAL ISO 3 (Cal. ISO ed., 2016).

86. See Robert Mullin, *Revised Western RTO Governance Plan Highlights State Authority*, RTO INSIDER (July 21, 2016), <https://www.rtoinsider.com/caiso-revised-western-rto-governance-29087/>.

87. CAL. ISO, *supra* note 85, at 5.

88. See Mullin, *supra* note 34.

89. Jason Fordney, *UPDATE: Last Minute Bill Boosts CAISO Regionalization Effort*, RTO INSIDER (Sept. 13, 2017), <https://www.rtoinsider.com/caiso-regionalization-49305/>.

90. NAT’L CONFERENCE OF STATE LEGISLATURES, *supra* note 33.

91. Memorandum from Carl Zichella, *supra* note 6, at 2.

may respond well to an emphasis on the benefits to ratepayers and the free market principles of the system.

A. EXISTING ENERGY IMBALANCE MARKET

In 2014, the CAISO and other utilities created an EIM, which is an alternative to coordinating electricity markets through an RTO.⁹² This growing market has participants across many Western states, with others planning to join in the future.⁹³ Expanding this market will improve coordination amongst balancing authorities, and the EIM has benefited ratepayers by lowering costs and promoting renewable energy.⁹⁴ The market allows for real-time electricity trading, which balances fluctuations of renewable power supply with consumer demand, shares reserves between members, and expands the participants' geographic footprints.⁹⁵ Sharing flexibility reserves and allowing for faster dispatch intervals carry estimated annual benefits between \$146 million and \$300 million, depending on the extent of participation in the market.⁹⁶ The EIM has also allowed CAISO to export renewable energy that may have otherwise been curtailed.⁹⁷ This increases efficiency, produces profits out of otherwise wasted energy, and prevents carbon emissions.⁹⁸

Utilities around the West have begun to enter this market, but this loose association does not coordinate control of transmission and participation is voluntary.⁹⁹ Although it is unlikely that all utilities will join the EIM, higher participation increases cost savings for members.¹⁰⁰ CAISO estimates that the EIM will eventually cover two-thirds of the Western Interconnection,¹⁰¹ but because participation is voluntary and there are no exit fees, it would be easy for current members to abandon the market.¹⁰² Utilities can stop participating in the voluntary EIM, and each defector diminishes the benefits of the EIM for all other members.¹⁰³ Unlike an EIM, which is susceptible to a mass exodus of participants in response

92. See Carl Zichella, *Big Step Taken Toward a More Coordinated Grid*, NRDC (Nov. 24, 2014), <https://www.nrdc.org/experts/carl-zichella/big-step-taken-toward-more-coordinated-grid>.

93. OFFICE OF ENF'T: DIV. OF ENERGY MKT. OVERSIGHT, *supra* note 30, at 22.

94. CAL. ISO, WESTERN EIM BENEFITS REPORT: FIRST QUARTER 2017 10 (Cal. ISO ed., 2017).

95. Zichella, *supra* note 92.

96. MICHAEL MILLIGAN ET AL., NAT'L RENEWABLE ENERGY LAB., EXAMINATION OF POTENTIAL BENEFITS OF AN ENERGY IMBALANCE MARKET IN THE WESTERN INTERCONNECTION 89 (2013).

97. Robert Mullin, *CAISO EIM Boosts Market for Renewables in Q1*, RTO INSIDER (May 9, 2016), <https://www.rtoinsider.com/caiso-eim-renewables-q1-25997/>.

98. *Id.*

99. See Mullin, *supra* note 74.

100. MILLIGAN ET AL., *supra* note 96, at 89.

101. *Cal-ISO Eyes Adding Day-ahead Option for EIM, with Changes Possible as Early as Late 2019*, S&P GLOBAL PLATTS, Dec. 4, 2017, at 2.

102. See *id.* at 1.

103. See Mark Watson, *Politics, Economics Favor SPP's Westward Expansion*, S&P GLOBAL PLATTS (Nov. 12, 2017), <https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/111217-politics-economics-favor-spps-westward-expansion-analyst>.

to some utilities pursuing other market options,¹⁰⁴ an RTO would provide a stable source of profits for those involved.

The SPP serves as an example of how to convert an existing imbalance market into a full-scale RTO.¹⁰⁵ This RTO was originally a disorganized collective of utilities, but the region expanded to include a day-ahead market in 2014.¹⁰⁶ Joining an EIM requires substantial effort¹⁰⁷ and often demands one-time upgrades to utilities' systems.¹⁰⁸ Participants that bore these costs to enter the Western EIM would not have to finance any upgrades to join the RTO.¹⁰⁹ The existing EIM should follow SPP's model, expand to include a broader area, and incorporate a day-ahead market. This would optimize scheduling and efficiency of the regional market. Day-ahead markets are more efficient than operating independently and scheduling bilateral contracts, as is the status quo.¹¹⁰

As such, an EIM is insufficient compared to a full-scale RTO because it does not allow for long-term planning and only operates a real-time market.¹¹¹ Currently the EIM grid only facilitates five- and fifteen-minute markets, whereas an RTO would allow for the coordination of day-ahead markets.¹¹² Because a centralized, bid-based market for day-ahead transactions is complex, RTOs are better suited than EIMs to facilitate these optimal markets.¹¹³ The EIM is planning to develop a day-ahead market in the future by expanding the CAISO's current system.¹¹⁴ Improving the integration of the Western grid through a full Western RTO would allow for more coordination and promote the most efficient energy sources.¹¹⁵

Some utilities in the Western Interconnection are considering joining RTOs in the Eastern Interconnection,¹¹⁶ and the Mountain West Transmission Group ("MWTG") has entered public negotiations about the potential connection.¹¹⁷

104. *See id.*

105. *See* Zichella, *supra* note 92.

106. *Id.*

107. Jennifer Delony, *How the Energy Imbalance Market Is Unleashing Renewables and Saving Millions*, RENEWABLE ENERGY WORLD (Dec. 5, 2017), <http://www.renewableenergyworld.com/articles/print/volume-20/issue-6/features/cover-story/how-the-energy-imbalance-is-unleashing-renewables-and-saving-millions.html>.

108. Jason Fordney, *Hydro, Jointly Owned Coal Face EIM Challenges*, RTO INSIDER (Nov. 30, 2017), <https://www.rtoinsider.com/caiso-regional-issues-forum-eim-hydropower-80839/>.

109. *See* S&P GLOBAL PLATTS, *supra* note 101.

110. Memorandum from Carl Zichella, *supra* note 6, at 1.

111. Carl Zichella, *Energy Imbalance Market Progress and Why It Matters*, NRDC (May 18, 2017), <https://www.nrdc.org/experts/carl-zichella/energy-imbalance-market-progress-and-why-it-matters>.

112. CAL. ISO, *supra* note 54, at 3.

113. PAUL DENHOLM & JACQUELINE COCHRAN, NAT'L RENEWABLE ENERGY LAB., *BALANCING AREA COORDINATION: EFFICIENTLY INTEGRATING RENEWABLE ENERGY INTO THE GRID 3* (2015).

114. *See* S&P GLOBAL PLATTS, *supra* note 101.

115. *See* DENHOLM & COCHRAN, *supra* note 113.

116. *See* S&P GLOBAL PLATTS, *supra* note 101; *see also* Watson, *supra* note 103.

117. *See* S&P GLOBAL PLATTS, *supra* note 101 (discussing Public Service Co. of New Mexico and the MWTG's potential membership with the SPP).

This would require the establishment of new transmission lines, which would be an unnecessary expense.¹¹⁸ Further, the time difference in both generation and consumption, as well as the diversification of energy sources makes Western regionalization more beneficial than connecting with the SPP.¹¹⁹

B. POLITICAL IMPLICATIONS OF A WESTERN RTO

The current political atmosphere pits extreme partisanship against progress. Conservative and liberal states mistrust each other and prioritize divergent goals, frustrating regional coordination.¹²⁰ This mistrust is ill-founded because a Western RTO would promote progressive goals and would do so through conservative, free-market principles. To accomplish a long-term shift from fossil fuels towards renewable energy, which is necessary to combat climate change, liberal states need to cede some control of energy markets to regional entities. Some environmental groups worry that a FERC board composed of officials nominated by President Trump might undermine California's environmental policies through control of a potential Western RTO.¹²¹ This fear is unlikely to materialize and would only be temporary until FERC control was shifted. FERC promotes competitive markets and has traditionally avoided supporting one fuel over another.¹²² The Trump Administration could already interfere with California's energy supply without added FERC authority over an RTO because there is a small percentage of the state's electricity load supplied by coal.¹²³ Added federal control over a Western RTO would not expose liberal states to new authority of a conservative administration. Further, the forced purchase of fossil fuel in California would be offset by purchases of renewable energy in conservative regions that currently rely on conventional fossil fuel production.

IV. BENEFITS OF AN RTO

A. MARKET BENEFITS

RTOs are market-based mechanisms to facilitate trade of wholesale power. If a Western RTO is formed, utilities in the region would expand their pool of suppliers, diversifying types of resources and expanding the geographic footprint of renewable energy.

118. See Watson, *supra* note 103.

119. See S&P GLOBAL PLATTS, *supra* note 101.

120. See Kahn, *supra* note 75.

121. Debra Kahn, *Western Regionalization Efforts Dealt a Blow by Trump*, E&E NEWS (Nov. 18, 2016), <https://www.eenews.net/energywire/stories/1060045994/>; Roth, *supra* note 48.

122. See Roth, *supra* note 48.

123. *Id.*

1. A Western RTO Would Promote Renewable Energy Production Because the Expansion of Regional Markets Tends to Benefit Renewable Energy

The market for renewable energy is volatile and fluctuates at local levels. Expanding a market that promotes short-term sales of energy inherently tends to benefit renewable resources because it enables intermittent suppliers to sell power based on their temporary generation.¹²⁴ As a result, RTO markets are tailored to the success of renewable energy, and renewable energy is growing most rapidly in regions that have an RTO to coordinate their sale.¹²⁵

Because renewable energy's fuel is free, and operation costs are low, renewable producers are successful when competing with costly fossil fuel generation.¹²⁶ The vast majority of recent capacity additions are renewable energy.¹²⁷ This emerging market is operating with competitive prices, and ratepayers benefit from lower prices when they have access to markets that utilize renewable energy.

Consumers want to support renewable energy to combat climate change,¹²⁸ but they are often uninterested in their personal energy sources, and rarely understand the source of their electricity. Over 50% of consumers have the option to purchase renewable electricity, often through green pricing programs that charge a small fee for the renewable energy.¹²⁹ Consumers are unlikely to change default settings and tend to pick the cheapest electricity supplier, resulting in only 2.1% of consumers opting-in to participate in these programs.¹³⁰ Increasing competition among suppliers will facilitate consumers' desires to choose the cheapest energy supplier, while also supporting renewable energy. This would enable public utilities to operate as consumers' agents, opting for affordable renewable energy.

2. A Western RTO Would Be a Free Market Regime that Promotes Specialization in Regional Comparative Advantages to Lower Prices for Ratepayers

The current balkanized market leads to both waste and unreliability. Electricity production is a prime example of specialization in different localities'

124. See Sliger, *supra* note 15.

125. JOHANNES PFEIFENBERGER ET AL., THE BRATTLE GRP., THE ROLE OF RTO/ISO MARKETS IN FACILITATING RENEWABLE GENERATION DEVELOPMENT 15 (2016).

126. See Zichella, *supra* note 12, at 3.

127. OFFICE OF ENF'T: DIV. OF ENERGY MKT. OVERSIGHT, *supra* note 30, at 18.

128. See Anna Clark, *What's Holding Consumers Back From Buying Green Power?*, GREENBIZ (Aug. 21, 2013), <https://www.greenbiz.com/blog/2013/08/21/whats-holding-back-consumers-green-power> (asserting that 85% of consumers desire green power).

129. *Buying Clean Electricity*, OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, <https://www.energy.gov/energysaver/buying-and-making-electricity/buying-clean-electricity> (last visited Feb. 3, 2019).

130. INST. FOR ENERGY RESEARCH, EVALUATING VOLUNTARY CONSUMER ADOPTION OF GREEN PRICING PROGRAMS: IER WHITE PAPER 8 (2013).

comparative advantages. On the rare occasion when the sun is not shining in Southern California, San Diegans' electricity would not be supplied by locally-stored backup reserves of fossil fuels, but they would bid on solar power in Arizona or hydroelectric power in Oregon. On sunny days, producers of solar power in Southern California would avoid wasting their product through curtailment and could sell their energy to a wider consumer base. With a Western RTO, not only would Southern California specialize in solar power, Oregon specialize in hydroelectricity, and Wyoming specialize in natural gas to provide flexible reserve energy, but each market would also ease the volatility of the other. These resources work in conjunction and their variability requires a system of connection. This free market approach will benefit businesses that efficiently produce energy and will lower electricity prices for consumers.

Electricity systems that provide suppliers access to a wider consumer base will capitalize on comparative advantages and facilitate competition. Increasing competition among energy producers will lower the price of electricity and benefit consumers. A recent report in California estimates that western regional grid integration would save ratepayers between \$1 billion and \$1.5 billion by 2030.¹³¹ Opening electricity markets between localities would eliminate barriers to trade and create a more efficient system. By facilitating a wider variety of options for consumers, the RTO promotes arbitrage, lowering prices by allowing suppliers with surplus electricity to compete in larger consumer markets.

The establishment of a publicly-regulated RTO would benefit consumer transparency in pricing.¹³² Not only would a Western RTO market be more publicly accessible because bidding aggregations would be published, but also the pricing would be more reflective of demand than the current system. Market pricing in RTOs is developed consistently and transparently, whereas bilateral transactions that operate through spot prices have wide variations of prices throughout the day.¹³³ Reporting of prices is voluntary without an RTO, and price information can be unpublished or misrepresented.¹³⁴ With more access to information about participants in the marketplace, both ratepayers and utilities would be able to understand the prices charged when clearing prices are clearly posted by an RTO.

131. CAL. ISO, SB 350 STUDY: BENEFITS TO RATEPAYERS: FAST FACTS 1 (Cal. ISO ed., 2018).

132. *Top 4 Reasons ISOs/RTOs Are Good for North America*, ISO/RTO COUNCIL, <https://ircweb.worldsecuresystems.com/About/topreasons> (last visited Feb. 3, 2019).

133. OFFICE OF MKT. OVERSIGHT AND INVESTIGATIONS, FED. ENERGY REGULATORY COMM'N, STATE OF THE MARKETS REPORT: ASSESSMENT OF ENERGY MARKETS FOR THE PERIOD JANUARY 1, 2002 THROUGH JUNE 30, 2003 53 (Dep't of Energy ed., 2004).

134. *See id.*

3. Capacity Markets Should Not be Included in the Western RTO Because they Artificially Inflate Conventional Energy Sources Contrary to Principles of Fair Competition

Often Eastern RTOs include capacity markets, which exist to guarantee sufficient resources will be produced in the future.¹³⁵ One reason fossil fuels have remained financially viable is that they secure future sales in capacity markets even if there is a lower bidder. Some environmentalists raised concerns that a Western RTO could keep coal plants from being retired through a similar system.¹³⁶ Many private companies seem to be abandoning coal as uneconomical and have disputed that they view an EIM or RTO as a way to preserve these high-emission plants.¹³⁷ To ensure that the RTO does not artificially prop up these conventional energy sources, capacity markets should either be left out of the Western RTO program or should be limited.

A Western RTO could use capacity markets to guarantee demand for renewables, which would mitigate risks for emerging renewable industry investments.¹³⁸ Conservative states would be skeptical of this version of a capacity market. Similarly, some want assurances that coal plants will be retired sooner than expected because of their potential prolongation through capacity markets.¹³⁹ This is not only a short-sighted policy goal, but it is also counterproductive to negotiations for an electricity system that will enable renewable integration.¹⁴⁰ Conservative regions will not respond well to this messaging, and the country's renewable fleet is not yet sufficient to offer power for the region. If some environmentalists demand artificially killing coal plants, then they will sustain coal inadvertently because coal-friendly states will avoid entering markets that are naturally ill-suited for coal's survival.

Capacity markets should not be included in the new RTO because they operate contrary to free-market principles and artificially prop up inefficient resources. There is little reason to introduce this anti-competitive feature into a market designed to increase efficiency.¹⁴¹

135. Zichella, *supra* note 12, at 4.

136. *See* Kahn, *supra* note 75.

137. *See* Mullin, *supra* note 34.

138. Zichella, *supra* note 12, at 4.

139. *See* Carl Zichella, *Regional Coordination and Markets: Key to a Renewable Energy Future*, NRDC: EXPERT BLOG (July 23, 2015), <https://www.nrdc.org/experts/carl-zichella/regional-coordination-and-markets-key-renewable-energy-future>.

140. *See id.*

141. *See* Zichella, *supra* note 12, at 4–5.

B. TRANSMISSION BENEFITS

The current transmission situation in the Western Interconnection is reliable despite its high volume.¹⁴² Congestion is expected to rise as new renewable production is developed and conventional generators are retired.¹⁴³ Therefore, connecting the region through a Western RTO should result in pricing, technical, and coordination benefits, with few drawbacks.

1. Rate Pancaking Increases Costs to Ratepayers

The creation of an RTO will benefit consumers by eliminating unnecessary duplication of fees. When suppliers deliver power, they must purchase transmission services, and when there are multiple transmission services, suppliers have to pay for each transmission service separately.¹⁴⁴ The accumulation of fees from multiple transmission systems is passed onto consumers, but under RTO control, transmission services would be consolidated into one entity. By coordinating transmission through a single regional system, suppliers would limit this “rate pancaking” and pass savings onto their customers.¹⁴⁵

2. Line Losses Can be Limited with Long Distance Transmission Lines

Although electricity would travel longer distances in an RTO system, longer transmission lines are often more efficient and limit line losses.¹⁴⁶ Because transmission lines, which typically transport electricity over long distances, operate at a higher voltage than short-distance distribution lines, they generally lose less power.¹⁴⁷ Energy traveling longer distances, which would seem to be subject to greater losses, counterintuitively encounters lower line losses because the longer travel tends to occur through high-quality transmission lines. These losses are significantly variable, with line losses ranging from 2.2% to 13.3% among Western states.¹⁴⁸ By coordinating long-distance transmission lines, some Western states could decrease the amount of power lost during transmission. This long-distance transmission would assist smaller balancing areas by integrating renewable energy into their systems without line-loss issues.¹⁴⁹

142. DEP'T OF ENERGY, NATIONAL ELECTRIC TRANSMISSION CONGESTION STUDY 50–51 (Dep't of Energy ed., 2015).

143. *Id.* at 51.

144. *See* Sliger, *supra* note 15.

145. *See* FED. ENERGY REG. COMM'N, FACT SHEET: ORDER NO. 890: FINAL RULE: PREVENTING UNDUE DISCRIMINATION AND PREFERENCE IN TRANSMISSION SERVICE 3, *available at* <https://www.ferc.gov/industries/electric/indus-act/oatt-reform/order-890/fact-sheet.pdf>.

146. *See* Sliger, *supra* note 3.

147. *Id.*

148. Jordan Wirfs-Brock, *Lost in Transmission, How Much Electricity Disappears Between a Power Plant and Your Plug*, INSIDE ENERGY (Nov. 6, 2015), <http://insideenergy.org/2015/11/06/lost-in-transmission-how-much-electricity-disappears-between-a-power-plant-and-your-plug/>.

149. *See* ENERNEX CORP., *supra* note 13, at 225–26.

3. Coordination of Infrastructure Will Prevent Duplication of Future Projects

An RTO would also limit costs of transmission by coordinating future infrastructure projects. New transmission lines require bureaucratic, environmental, and physical organization.¹⁵⁰ The costs of building a transmission line are both complicated and expensive.¹⁵¹ By providing stability and consistency through regional coordination, there will be less unnecessary duplication of transmission projects.¹⁵² RTOs coordinate transmission expansion and plan effectively by representing multiple stakeholders through a centralized system.¹⁵³ As a result, these projects will be determined by a coordinated planning process, limiting unnecessary expenses for multiple transmission lines.¹⁵⁴ This system also will allow projects to be completed more quickly because fewer projects will be constructed and legal hurdles will be more manageable.¹⁵⁵ In addition to ensuring that only necessary transmission projects are developed, an RTO is able to share costs and distribute benefits.¹⁵⁶ This cost saving will be passed on from companies to benefit consumers. Facilitating transmission through a single organization will cut costs, both in the short term by limiting rate pancaking and line losses and in the long term by coordinating future projects to properly meet market needs.

C. CURTAILMENT

The creation of a Western RTO will particularly benefit renewable energy because of its inconsistent nature and high levels of peak production. As mentioned earlier, California's renewables have experienced issues with curtailment problems because demand is too small to purchase the entire supply during peak production.¹⁵⁷ Curtailment is expected to rise, especially as states such as California and Oregon attempt to meet their RPS by producing more renewable energy.¹⁵⁸ Ramping is not expected to significantly hinder states from achieving their renewable energy goals, but over-generation could impair reliability, requiring curtailment.¹⁵⁹ Excess energy could be sold to a broader region as a renewable alternative to states that would otherwise supply their electricity through fossil

150. See Sliger, *supra* note 3.

151. *Id.*

152. Memorandum from Carl Zichella, *supra* note 6, at 2.

153. See MISO, MISO TRANSMISSION EXPANSION PLANNING: JAN.–FEB. 2018 STATUS REPORT (2018), available at <https://cdn.misoenergy.org/201801-201802%20Transmission%20Planning%20Status%20Report138255.pdf>.

154. See FED. ENERGY REG. COMM'N, *supra* note 145.

155. Memorandum from Carl Zichella, *supra* note 6, at 2.

156. See MISO, *MISO Cost Allocation Response* (Feb. 15, 2018), available at <https://cdn.misoenergy.org/20180215%20RECBWG%20Item%2002%20and%2003%20MISO%20Cost%20Allocation%20Response127807.pdf>.

157. Memorandum from Steve Berberich, *supra* note 7, at 2.

158. See Gergen, *supra* note 59.

159. See TRIEU MAI ET AL., RENEWABLE ELECTRICITY FUTURES STUDY: EXECUTIVE SUMMARY 12 (Nat'l Renewable Energy Lab. et al. eds., 2012).

fuel generation.¹⁶⁰ This would enable the sale of surplus Californian solar energy or surplus Pacific Northwestern hydroelectric power through the regional market instead of curtailing or selling at negative prices, which would prevent companies from burning fossil fuels to satisfy demand.¹⁶¹ Companies would be less likely to burn coal or natural gas during peak renewable energy hours, and the market for these energy sources would become less economical.¹⁶² Consequently, avoiding curtailment is estimated to save 1.5 million metric tons of carbon emissions per year.¹⁶³

D. RELIABILITY

A well-coordinated, interconnected regional grid is vital to developing a reliable system that operates primarily based on renewable energy.¹⁶⁴ Coordinating a Western RTO will promote renewable energy without compromising reliability. Although the Trump Administration has asserted that coal and nuclear are necessary to ensure reliability, grid reliability has improved as coal plants have been replaced by intermittent renewable energy sources.¹⁶⁵ By diversifying renewable energy sources and facilitating trade among balancing areas, utilities can mitigate variability and guarantee a more consistent renewable energy supply for consumers.¹⁶⁶ Because storage of renewable energy is expensive,¹⁶⁷ some back-up energy reserves are required when renewable energy supply is low or unavailable. By improving forecasting and sharing flexible reserves that are affordable to cycle quickly, high percentages of renewables can be integrated into a regional grid. Increased reliance on renewable energy and avoided curtailment through regional cooperation have already had a significant impact on carbon savings, and further integration into a larger RTO will have even more drastic effects.¹⁶⁸

1. Diversifying Resources Pairs Complementary Renewables to Increase Reliability and Facilitate Trade

By coordinating between various areas of the Western United States, an RTO can diversify load patterns across regions.¹⁶⁹ This mixture of resources will result in complementary regional production at different times, which will reduce

160. See Zichella, *supra* note 12, at 3.

161. Memorandum from Carl Zichella, *supra* note 6, at 1–2.

162. *Id.*

163. *Id.*

164. *Id.* at 2.

165. See Roth, *supra* note 48.

166. See MICHAEL MILLIGAN ET AL., MARKETS TO FACILITATE WIND AND SOLAR ENERGY INTEGRATION IN THE BULK POWER SUPPLY: AN IEA TASK 25 COLLABORATION 2 6 (Nat'l Renewable Energy Lab. ed., 2012).

167. Danelski, *supra* note 2.

168. Memorandum from Carl Zichella, *supra* note 6, at 1–2.

169. SCHLAG ET AL., *supra* note 1, at 10.

curtailment.¹⁷⁰ Californian solar energy is predominantly produced during the summer and peaks during the late afternoon, which complements Pacific Northwestern hydroelectric energy, a resource that is predominantly produced in the winter and peaks during the mid-morning.¹⁷¹ Further, wind energy is generally more available in the winter and at nighttime.¹⁷² Spring will remain a problem for curtailment because many different energy sources coincide with overproduction during that time of year.¹⁷³

Those investigating the most reasonable ways for states such as California to reach their long-term renewable targets have recognized that regional coordination and renewable source diversity is required.¹⁷⁴ Coordination through a regional mechanism, such as a broad Western RTO will make these renewable standards more affordable.¹⁷⁵

2. Expanding a Market's Geographic Footprint Reduces Variability

Short-term variation is hard to predict, but temporary changes to supply or demand are “uncorrelated across large areas.”¹⁷⁶ Renewable energy becomes more predictable with a larger geographic area because aggregating predictions normalizes with more suppliers.¹⁷⁷ By consolidating the operation of multiple balancing areas, the larger demand and larger supply smooth out intermittent variations.¹⁷⁸ Challenges in variability are limited to times when renewable energy growth is concentrated in one location and with one renewable source, such as in Southern California.¹⁷⁹ Geographic diversity is important for reducing variability for intermittent renewable sources.¹⁸⁰ Studies conducted by California, other RTOs, and the National Renewable Energy Laboratory suggest that reliability will not limit renewable energy's growth, even if it accounts for as much as 80% of all U.S. electricity generation.¹⁸¹ With sufficient diversification

170. *Id.* at 109.

171. JIM LAZAR, TEACHING THE “DUCK” TO FLY 19 (Reg. Assistance Project ed., 2014).

172. BIRD ET AL., *supra* note 4, at 1.

173. SCHLAG ET AL., *supra* note 1, at 133.

174. Carl Zichella, *Coordination Is California's Least Cost Path to a Clean Energy Future*, NRDC: EXPERT BLOG (Jan. 16, 2014), <https://www.nrdc.org/experts/carl-zichella/coordination-californias-least-cost-path-clean-energy-future>.

175. See ENERGY & ENVTL. ECON., INC., *supra* note 55.

176. DENHOLM & COCHRAN, *supra* note 113, at 2.

177. See BIRD ET AL., *supra* note 4, at 1.

178. See *Balancing Area Cooperation*, GREENING THE GRID, <http://greeningthegrid.org/integration-in-depth/balancing-area-coordination> (last visited Feb. 3, 2019).

179. CARL LINVILL ET AL., CLEAN ENERGY KEEPS THE LIGHTS ON 2 (Reg. Assistance Project ed., 2014).

180. See ENERNEX CORP., *supra* note 13, at 225.

181. See MAI ET AL., *supra* note 159, at 20; see also IRA SHAVEL ET AL., EXPLORING NATURAL GAS AND RENEWABLES IN ERCOT PART II: FUTURE GENERATION SCENARIOS FOR TEXAS 3 (Brattle Group ed., 2013).

and improvements to infrastructure, renewable portfolio standards will not be limited by the potential reliability problems posed by renewable variability.

3. An RTO Promotes Reserve Sharing, Which Can Offset the Intermittent Nature of Heavy Integration of Renewable Energy

Because of the intermittent character of renewable energy, such as solar and wind power, day-ahead markets will face increased uncertainty.¹⁸² Cloud cover can result in relatively unpredictable changes to the production of solar power, and wind energy is even less predictable.¹⁸³ Wind energy forecasts change more slowly than solar energy, and short-term markets can account for these prediction errors.¹⁸⁴ Renewables' intermittent character will require a consistent reserve of energy. These reserves could stem from renewable energy such as biomass, geothermal, or hydropower energy programs.¹⁸⁵ This decreases the need for massive fossil fuel backups and allows utilities to avoid running fossil fuels into their systems.¹⁸⁶ In the interim, fossil fuels, especially natural gas which is at a low price and at a current surplus, can serve as sufficient flexibility reserves.¹⁸⁷ If coal reserves were used as a back-up to California's renewable fleet, the energy imported would still be subject to the state's cap-and-trade program, making it a less viable option.¹⁸⁸

Both conventional fossil fuel plants and renewable reserves should improve their flexibility to immediately produce energy during quick cycles.¹⁸⁹ Reserve energy plants can be turned on and off to account for unpredictable variation in renewable generation.¹⁹⁰ This cycling can be costly and is also stressful on infrastructure at the reserve plants.¹⁹¹ Units that are designed to serve as flexible reserves can mitigate these costs, and natural gas and hydropower are especially affordable to cycle quickly.¹⁹²

By establishing an RTO, localities can share reserves, requiring less fuel reserves in the aggregate. As a result, an RTO would lower the total quantity of costly reserves, which tends to be fossil fuels, while retaining flexibility and reliability.¹⁹³ Reserve sharing and long-term shifts to renewable reserves can lower

182. GEN. ELEC. INT'L, INC., *supra* note 20, at 45.

183. BIRD ET AL., *supra* note 4, at 1.

184. *Id.* at 2.

185. See Roth, *supra* note 52; BIRD ET AL., *supra* note 4, at 3, 8.

186. Memorandum from Carl Zichella, *supra* note 6, at 2.

187. See Zichella, *supra* note 12, at 5.

188. Carl Zichella, *Creating Western Regional Energy Market Could Help State Meet Climate Goals*, SACRAMENTO BEE (Aug. 1, 2015), <https://www.sacbee.com/opinion/op-ed/soapbox/article29679142.html>.

189. See GEN. ELEC. INT'L, INC., *supra* note 20, at 49.

190. BIRD ET AL., *supra* note 4, at 3.

191. *Id.*

192. *Id.* at 3, 8.

193. DENHOLM & COCHRAN, *supra* note 113, at 2.

carbon emissions by minimizing reliance on fossil fuel flexibility reserves, which are necessary today.

4. Improvements to Forecasting Will Make Heavy Integration of Renewable Energy More Feasible

Advancements in forecasting accuracy will lower flexibility requirements from reserve fuels.¹⁹⁴ Forecasting is improving,¹⁹⁵ and fewer errors, especially in day-ahead forecasts, will have significant cost-saving implications.¹⁹⁶ Under-predicting the supply of energy leads to multiple sources operating at partial output, decreasing efficiency.¹⁹⁷ Over-prediction of supply requires the rapid generation of other costly reserve energy sources.¹⁹⁸ Both of these mistakes are costly, making renewable energy less profitable and less reliable.

E. TECHNOLOGICAL INNOVATION

Coordination through an RTO also fosters innovation. Because this entity has the broader resources of its members, it is able to share information and coordinate technological advancements to the grid.¹⁹⁹ An RTO can explore the efficiency of its current system, and it can research and develop technologies to improve operation and integration of renewable sources, such as improvements to forecasting technology.²⁰⁰ Unlike the status quo, in which studies are limited by disjointed data in the current balkanized system,²⁰¹ full-scale RTOs are easily able to conduct research to improve their operations.

CONCLUSION

Western states should establish an RTO to promote renewable energy through free market principles. This system would benefit ratepayers by lowering prices and limiting carbon emissions without compromising the reliability of the grid. Coordination of markets and transmission services would promote efficiency and lead to less waste than exists in the current balkanized Western system.

194. See ENERNEX CORP., *supra* note 13, at 225.

195. See BIRD ET AL., *supra* note 4, at 4.

196. GEN. ELEC. INT'L, INC., *supra* note 20, at 46.

197. DENHOLM & COCHRAN, *supra* note 113, at 1.

198. *See id.*

199. ISO/RTO COUNCIL, *supra* note 132.

200. *See id.*

201. See MILLIGAN ET AL., *supra* note 96, at 90.