

House Bill 3445 Policy Study

Invenergy Transmission Response to Request for Public Comment

October 20th, 2023

Invenergy Transmission LLC (“Invenergy Transmission”) appreciates the opportunity to provide comments on the Illinois Power Agency’s Policy Study. Invenergy Transmission is a subsidiary of Invenergy LLC, a leading privately held developer, owner, and operator of sustainable energy solutions headquartered in Chicago, Invenergy Transmission is a competitive transmission developer and focuses on Merchant High Voltage Direct Current (“HVDC”) projects across the United States.

Invenergy Transmission provides the following answers on the consideration of a policy proposal requiring the Agency to procure HVDC renewable energy credits as outlined in the Policy Study.

3) HVDC Transmission Line (Soo Green)

a) How would the development of a 2,100 MW HVDC line connecting renewable energy resources in Iowa into a delivery point in the PJM market area of Illinois impact the Illinois energy industry?

Invenergy Transmission cannot specifically address the impact of a 2,100 MW HVDC line interconnecting renewable energy resources in Iowa to a delivery point in the PJM market area of Illinois but can address broadly the impact of a HVDC line interconnecting high capacity, low-cost renewable energy resources to the power markets of which Illinois is a part. Invenergy Transmission can, however, provide the IPA with background concerning the impact of the Grain Belt Express transmission line project, an approximately 800-mile, overhead, multi-terminal 600 kilovolt (“kV”) HVDC transmission line and associated facilities, including converter stations and alternating current (“AC”) connector lines (the “Project”). Grain Belt will provide the capacity to deliver up to 5,000 MW, primarily from renewable energy generation facilities in Western Kansas, to load-serving entities in the Midwest and adjacent regions via an interconnection with Midcontinent Independent System Operator, Inc. (“MISO”), PJM Interconnection, L.L.C. (“PJM”), and Associated Electric Cooperative, Inc. (“AECI”).

i) With an Illinois Renewable Portfolio Standard goal of 40% by 2030 and 50% by 2040, significant amounts of new renewable resources will need to be developed to meet those goals. Would the development of this HVDC

transmission line impact the level of renewable development that would otherwise occur in Illinois?

As the IPA is aware, the development of renewable generating projects in Illinois is not a linear process, and despite the best and good faith efforts of policymakers in this state, there continue to be many challenges to their continued development, including but not limited to cost increases due to inflation, restrictive zoning rules, litigation, interconnection study delays and upgrade costs, supply chain constraints, workforce availability, and many others. These challenges have led to significant project delays or a lack of project availability for, or viability in, recent IPA procurements. Invenergy Transmission is confident that the industry will overcome these challenges but in the meantime the IPA's procurement goals continue to increase, coal and gas plant retirements loom in the future and there is a real need for an "all-hands on deck" approach to bringing renewable generation to the state.

The most recent Draft 2024 Long-Term Renewable Resources Procurement Plan clearly demonstrates the state is at a significant shortfall in meeting both specific REC procurement targets and larger statewide RPS goals in the near and long-term.¹ While existing HVDC facilities under development could certainly help Illinois accelerate its efforts to make up for the current REC shortfalls outlined in the IPA's plan, many, many more renewable generating projects in Illinois and adjacent states will be needed to help Illinois realize its decarbonization and renewable portfolio standards goals.

Thus, Invenergy Transmission believes the development of and support for HVDC line (including overhead transmission lines like the Grain Belt Express) would not have a measurable, *negative* impact on the number of renewable projects that would otherwise be developed in the state. Further, because HVDC facilities like Grain Belt Express are built to connect high-capacity, low-cost renewable resources with diverse, uncorrelated generating patterns (described in more detail below), resources interconnected to those HVDC facilities are more likely to perform at times when Illinois renewables are not and fossil fuel resources would otherwise have been needed to fill in the gap. Thus, by potentially allowing those fossil resources in Illinois to retire earlier than they otherwise would, HVDC facilities may actually have a positive impact on development of renewable generation in state. Furthermore, interconnection upgrades associated with the development of HVDC facilities can provide broader system benefits, such as reduced grid congestion and increased transfer capability, that may reduce costs for in-state renewable generation projects and Illinois consumers.

ii) Could the ends sought through supporting a transmission project carrying renewable energy from Iowa to Illinois instead be met through additional support of Illinois-based renewable energy generation?

¹ Draft 2024 Long-Term Renewable Resources Procurement Plan, August 15, 2023, at 55-57, available at: [https://ipa.illinois.gov/content/dam/soi/en/web/ipa/documents/procurement-plans/2024/2024-draft-long-term-plan-\(15-Aug-2023\).pdf](https://ipa.illinois.gov/content/dam/soi/en/web/ipa/documents/procurement-plans/2024/2024-draft-long-term-plan-(15-Aug-2023).pdf)

As noted earlier in its comments, Invenergy Transmission cannot speculate on the impact specifically of Illinois' support for an underground HVDC transmission project carrying renewable energy from Iowa to Illinois. However, Invenergy Transmission will comment on whether a policy proposal requiring the Agency to procure HVDC renewable energy credits associated with electricity transmitted across an HVDC transmission line is worth pursuing.

First, the “ends” sought through supporting an HVDC transmission project carrying renewable energy from another state to the power markets of which Illinois is a part are broader than simply meeting the state’s REC procurement goals and are necessary for the state’s goals to secure a reliable, affordable, clean energy future. As further described in Grain Belt’s application for, and Illinois Commerce Commission (“ICC”) Order granting a Certificate of Public Convenience and Necessity (“CPCN”) in Docket No. 22-0499, government and industry sources, such as the North American Electric Reliability Corporation (“NERC”) and the Department of Energy (“DOE”) have recognized that there is a strong need to expand and strengthen the overall transmission grid, particularly to support the movement of electricity generated by renewable resources to areas of market demand and to make the U.S. power grid more resilient to the impacts of climate change and in the face of national security threats.

Recently, the DOE commented that “insufficient transmission capacity— especially transmission that facilitates transfer of power across regions—presents another critical challenge facing the grid.² The DOE stated, “Upgrading and expanding the current transmission system will enhance grid reliability and resilience and enable the cost-effective integration of clean energy.”³ The DOE noted, “Investment in transmission infrastructure can help protect the grid against supply disruptions due to physical and cyber-attacks or climate-induced extreme weather, minimize the impact of supply disruptions when they happen, and restore electricity more quickly when outages do occur.”⁴ Specifically, the DOE stated, “Expanding transmission capacity also improves reliability by creating stronger and more numerous energy delivery pathways, helping to ensure that customers have a dependable source of electricity to power their homes, schools, and businesses” and will “spur[] economic growth.”⁵ With regard to Grain Belt specifically, the ICC has noted that the “... Project will provide substantial reliability and resiliency benefits by interconnecting three regions,” and, “... Illinois residents will benefit from this interconnection and delivery of electricity from this Project.”⁶ Interregional HVDC transmission is essential to improved reliability and resiliency as the state manages a transition to 100% clean energy future under the stressors of climate change.

Second, in answer to the question of whether those ends can be met solely through additional support to Illinois-based renewable energy generation, the answer is no. Interregional HVDC

² See U.S. Dept. of Energy, Building a Better Grid Initiative to Upgrade and Expand the Nation’s Electric Transmission Grid to Support Resilience, Reliability, and Decarbonization, at 2 (prepub. version Jan. 11, 2022), available at https://www.energy.gov/sites/default/files/2022-01/Transmission%20NOI%20final%20for%20web_1.pdf.

³ *Id.*

⁴ *Id.*

⁵ *Id.*

⁶ See Grain Belt Express LLC, Docket No. 22-0499, Order, p. 36 (March 8, 2023).

transmission projects like Grain Belt Express support a more reliable and resilient bulk power system not only by providing access to renewable generation with complementary production profiles relative to in-state resources but also more generally by “providing customers access to generation resources with diverse geography, technology and fuel sources” creating a buffer “against extreme weather events that affect a specific geographic location or some external phenomenon (unavailability of fuel and physical or cyber-attacks) that affected only a portion of the generating units.”⁷

Wind generation in southwestern Kansas (where Grain Belt Express’s westernmost terminus lies) is negatively correlated with the production of wind generators in Illinois and Kansas solar generation is not strongly correlated with Illinois solar. As a result, integrating wind and solar generation resources in southwestern Kansas with Illinois wind and solar generation facilities—which the Grain Belt Express will make possible—will reduce the overall variability of renewable generation serving Illinois, increase the reliability of renewable generation as a supply source to Illinois markets, reduce the costs of renewable generation integration into the Illinois supply portfolio and, coupled with energy storage or green hydrogen, will pave the way for renewable energy to become available on a 24/7 basis.⁸

HVDC transmission facilities provide access to renewable energy sources from geographically diverse locations to provide a more balanced, reliable energy mix to help meet the State of Illinois’ policy goals. Projects like Grain Belt Express will enable Illinois to diversify its energy supply – both technologically and geographically – to take advantage of the complementary generation profile of high-capacity factor remote renewable energy resources. By delivering wind and solar generation with complementary generation profiles vs. local renewable resources alone, HVDC transmission avoids coincident generation that can cause operational and reliability challenges for utilities. Such high coincident generation can lead to a simultaneous loss of output from local solar resources, representing a single unit contingency. Conversely, remote wind and solar generators delivered by HVDC transmission facilities are unlikely to be affected by weather events that might impact local generation assets.

Finally, as the ICC also noted in its Order granting Grain Belt Express its CPCN, there are additional project benefits outside of the provision of technologically and geographically diverse renewable resources that the generating resources cannot provide alone, because “the project will mitigate high energy prices during extreme weather events, avoid loss of load, reduce local resource adequacy procurement obligations, hedge against future capacity procurement needs,

⁷ See Chupka and Donohoo-Vallett, *Recognizing the Role of Transmission in Electric System Resilience*, at 3 (May 9, 2018), available at <https://wiresgroup.com/wpcontent/uploads/2020/06/2018-05-09-Brattle-Group-Recognizing-the-Role-of-Transmission-inElectric-System-Resilience-.pdf>.

⁸ See *Verified Application of Grain Belt Express LLC, as a Qualifying Direct Current Applicant, for a Certificate of Public Convenience and Necessity Pursuant to Sections 8-406(b-5) and 8-406.1 of the Public Utilities Act to Construct, Operate, and Maintain a High Voltage Direct Current Electric Service Transmission Line as a Qualifying Direct Current Project and to Conduct a Transmission Public Utility Business and Authorizing Grain Belt Express LLC to Construct the Electric Transmission Line*, at 16 in Docket No. 22-0499 (July 26, 2022).

provide valuable system restoration capabilities like “black start” and provide active and reactive power control and fast power run back capabilities.”⁹

iii) How do the projected costs of supporting an HVDC transmission line project compare to other investments that could help meet similar goals?

Given the significant REC shortfall the state faces, procurement of renewable generation that can be efficiently and reliably delivered to Illinois via HVDC transmission can help close this gap at reasonable cost. When considering costs to meet the state’s goals, the IPA should incorporate a broader view of costs needed to ensure grid reliability. Interregional HVDC transmission projects like Grain Belt Express provide important reliability and resiliency benefits as well as a broad range of ancillary services necessary to affordably maintain grid stability. Interregional HVDC transmission, whether installed overhead or underground, can make significant contributions to meeting Illinois’ RPS goals while also bolstering grid reliability and resiliency. However, the costs of underground HVDC transmission may be significantly greater relative to overhead transmission due to additional installation costs, which would increase the cost of delivered renewable energy.

b) How would a new HVDC transmission line benefit consumers in northern Illinois within PJM’s territory? How would this line help with reliability, resiliency, prices, and equity for Illinois electrical consumers, and how do those benefits compare to potential costs?

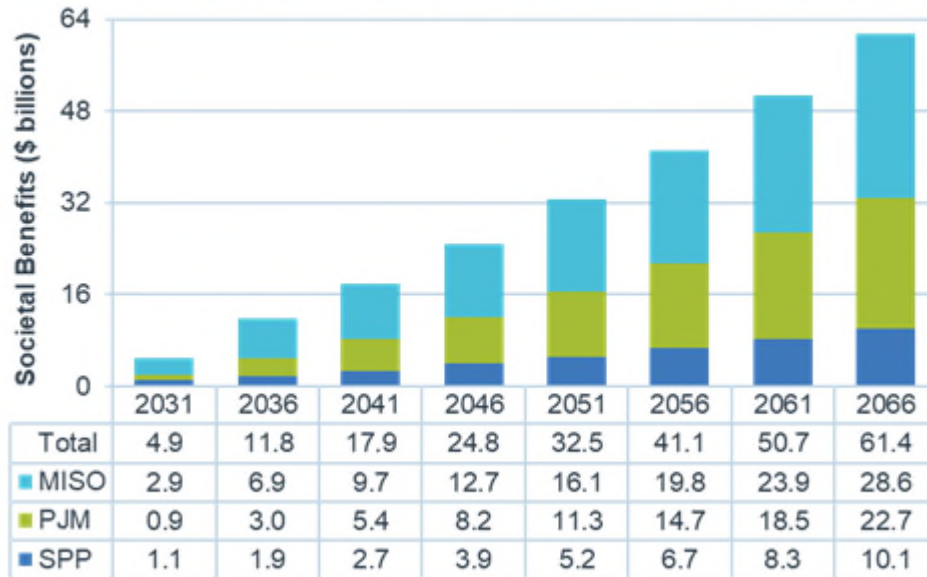
As is noted above, a new HVDC transmission line interconnected to either or both power markets of which Illinois is a part, like Grain Belt Express, will provide significant benefits to Illinois ratepayers by giving the state access to high capacity, low-cost, uncorrelated renewable resources, particularly during extreme grid conditions. All else equal, adding transmission capacity to the power grid improves reliability by creating more numerous and robust energy pathways from sources to loads, allowing more economic flow as well as enabling more capacity availability in the case of transmission and/or generator outages. HVDC lines (like Grain Belt Express) are considerably more efficient in transporting energy over long distances and can be controlled by system operators to improve system stability.

In a study attached to these comments, PA Consulting found that Grain Belt Express will reduce energy and capacity costs for Illinois energy consumers by approximately \$4.3 billion over 15 years, with total power cost savings across SPP, MISO, and PJM of \$51.9 billion over 15 years. In addition to economic savings for energy consumers, Grain Belt Express delivers substantial emissions reductions and environmental justice benefits. Grain Belt Express provides for \$4.2 billion in incremental societal benefits from avoided emissions across broader regions over 40 years, including 33 million tons of avoided carbon dioxide emissions. Grain Belt Express also significantly reduces emissions of criteria pollutants – such as sulphur dioxide and nitrogen oxides – providing even more tangible benefits to local residents in the form of reduced air

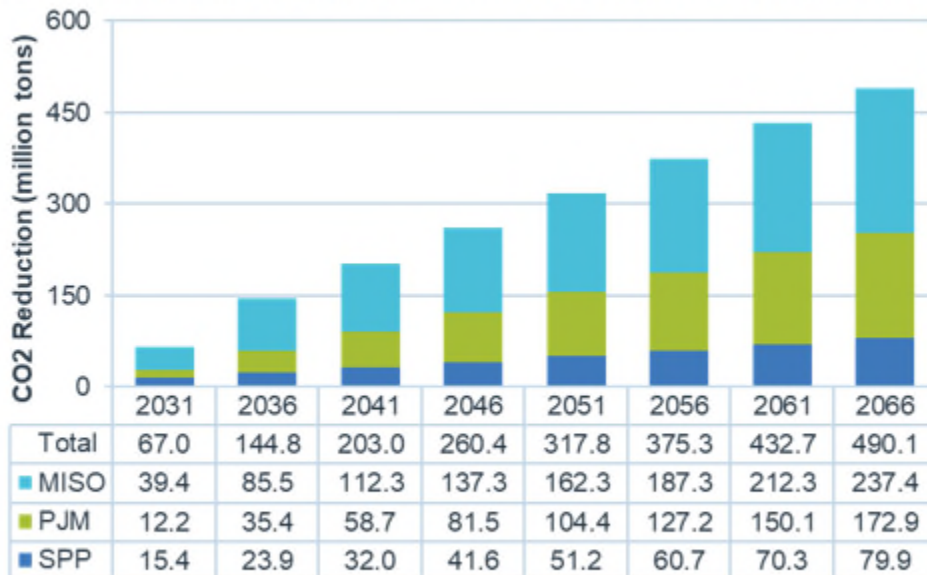
⁹ See Grain Belt Express LLC, Docket No. 22-0499, Order, p. 36 (March 8, 2023).

pollution (and therefore reduced respiratory illness and distress, saving lives and healthcare costs). For Illinois alone, the Project is projected to deliver over 3,100 tons of avoided SO_x emissions and over 11,500 tons of avoided NO_x emissions.

Projected Cumulative Societal Benefits from Emissions Reductions due to Grain Belt Express



Projected Cumulative Carbon Dioxide Emissions Reductions due to Grain Belt Express



Grain Belt Express is an approximately \$7 billion infrastructure investment and the cost of that investment will be recovered from customers in a number of states who contract for transmission service over the line. Even if Illinois chose to contract for HVDC RECs over only a portion of the line, the benefits of the Project to Illinois would far outweigh the cost of any HVDC REC contract.

c) Should Illinois support merchant transmission projects outside of the traditional RTO/ISO transmission development process? What other nontraditional interstate transmission development processes should Illinois consider?

Yes, Illinois should support merchant transmission projects, which occur outside of the traditional RTO/ISO transmission development process.

As is noted in a 2021 study by the Brattle Group, in spite of near-consensus that the benefits and value of expanding interregional transmission capabilities often exceed its costs (thereby reducing overall system costs), virtually no major interregional transmission projects have been built in the U.S. through traditional transmission planning processes in the last few decades.¹⁰ FERC Order 1000 encouraged the regional planning authorities to coordinate interregional transmission planning but did not mandate the development of interregional transmission plans. Today, a decade after FERC Order 1000 was enacted, interregional transmission planning processes remain largely ineffective.¹¹

While Brattle and other industry experts have suggested potential solutions to this problem, resolution of these issues is many years away and politically difficult. Thus, support for merchant transmission is virtually the only near term (perhaps in the next 10-20 years) solution to encouraging interregional transmission development to help Illinois realize its decarbonization and renewable procurement goals.

Invenergy Transmission is not aware of other nontraditional interstate transmission development processes that Illinois could consider outside of support for the development, contracting and construction of merchant transmission, that would be available to Illinois at this time to support its decarbonization goals.

i) What are the policy implications for Illinois from development of a merchant transmission project that does not take place through the regular PJM and MISO transmission development processes?

Merchant interregional HVDC transmission projects like Grain Belt Express can offer important public policy, reliability, and operational benefits that RTO-sanctioned planning process may not

¹⁰ See A Roadmap to Improved Interregional Transmission Planning at iv, November 30, 2021, available at https://www.brattle.com/wp-content/uploads/2021/11/A-Roadmap-to-Improved-Interregional-Transmission-Planning_V4.pdf.

¹¹ *Id* at 3.

fully recognize. Such projects can improve system reliability, improve market efficiency, and facilitate state clean energy policies, such as achieving Illinois' RPS goals. Considering merchant transmission projects, particularly interregional HVDC facilities, can ensure that Illinois can benefit from the reliability, resiliency, affordability, and accelerated decarbonization benefits that such projects can deliver. Further, embracing merchant transmission gives the state an opportunity to control its own transmission expansion goals, unlike the RTO planning process which requires complete consensus from RTO stakeholder groups and other state regulatory bodies before a project can move forward.

d) How can Illinois most effectively ensure that renewable resources developed outside of Illinois, to serve Illinois load, meet the same labor and equitable workforce standards as projects developed under the Illinois Renewable Portfolio Standard?

Inverenergy Transmission supports the state and Agency's goals regarding labor and equitable workforce standards and is committed to supporting a diverse and equitable workforce while creating good-paying jobs. According to the Agency's most recent draft Long Term Renewable Resource Procurement Plan, utility-scale wind and solar projects developed under the Illinois Renewable Portfolio Standard are only required to meet minimum equity standards for work performed in Illinois (p109). Inverenergy Transmission cannot comment on whether the state should require the same standards be applied for all renewable resources developed outside of Illinois and only recommends a consistent requirement for all renewable resources developed outside of Illinois. Inverenergy Transmission can state that any of its projects will be constructed under similar labor standards as any project developed under the Illinois RPS, currently required to submit supplier diversity reporting, and has experience developing disadvantaged community benefits programs for our HVDC transmission line contracted with the New York State Energy Research and Development Authority.

e) Are there best practices or lessons learned from other states or jurisdictions about the development of underground HVDC transmission lines, including practices related to supply chain issues and project cost management?

In Inverenergy Transmission's experience, the consideration of whether to build HVDC transmission lines overhead or underground is dictated by the project's voltage, route, cost, maintenance plan, and desire of the project offtaker, as further discussed below. The majority of transmission lines in the United States are overhead lines.

The cost of constructing an underground cable system is considerably more compared to overhead lines and consumers ultimately pay those higher costs. Overhead lines are easily accessible for repairs, cost-effective to build and have a longer working life, which typically will result in lower total costs for consumers. According to industry provided data, the expected construction cost for an underground line is 5 to 8 times more than for an overhead line, often due to time, materials, processes and specialized labor.

In addition, there are environmental and visual impacts associated with underground lines which must be buried in a duct bank for protection and then placed in a vault with access from the surface. These vaults are essentially concrete bunkers placed underground and would occupy roughly 10-by-30 feet of surface area, to a depth of approximately 10 feet. The vaults would also need to be buried at regular intervals approximately every 2,000 feet or less along a project's route. Additionally, each vault would take agricultural land permanently out of production and add obstacles to agricultural operations.

Most proposed or under construction buried HVDC projects in the U.S are predominantly underwater or routed where existing buried transmission infrastructure already exists. For example, Invenegy Transmission's Clean Path NY project is sited primarily either underwater, or underground following existing rights of way where transmission lines already exist in large part.

Further, only approximately 5% percent of Clean Path NY crosses cultivated cropland land, compared to 58% for Grain Belt Express. This difference is relevant and notable because studies have shown buried infrastructure projects on productive farmland (like that existing in Illinois) reduce yields due to factors including compaction and the mixing of topsoil and subsoil caused by trenching during construction.

Finally, and notably, the state of New York agreed to a revenue contract sufficient to pay the cost required to construct Clean Path NY underground.

In terms of supply chain issues and project cost management, HVDC lines are subject to many of the same risks a typical generating project would be. One unique aspect of HVDC projects is the requirement of "converter stations" to convert AC current to DC current on one end of the line and DC to AC on the other. This equipment is highly specialized, with only a small number of suppliers globally, and it is important for projects to secure this technology well in advance, as Grain Belt did when selecting Siemens Energy as its preferred HVDC supplier in January 2023, significantly ahead of its planned start of construction.

f) Are there acute regulatory or administrative hurdles facing this HVDC transmission line project for which the IPA should be aware?

Invenegy Transmission cannot specifically address the regulatory or administrative hurdles facing the SOO Green HVDC transmission project but can more broadly note regulatory and administrative hurdles faced by interregional HVDC transmission projects in general.

Merchant HVDC transmission projects face many practical hurdles to their permitting, interconnection, financing and construction – many of which are outlined in Invenegy Transmission's Technical Conference request to the Federal Energy Regulatory Commission ("FERC") in Docket No. AD22-13.¹²

¹² Request for Technical Conference of Invenegy Transmission LLC, Docket No. AD22-13, July 19, 2022, November 10, 2022 and February 10, 2023.

Importantly for Illinois' purposes, these projects require the same long term revenue certainty that generating projects do, in order to proceed to financing, construction and operation and have a valuable product that they can provide to load serving entities. However, under current law the lines themselves do not qualify to bid into IPA renewable energy credit procurements and the projects interconnected to them may be challenged in passing the current IPA geographic screening process.

i) If so, what is the process for overcoming those hurdles?

In its legislative declarations and findings, the Climate and Equitable Jobs Act (CEJA) outlined that “[t]he State should encourage the development of interregional high voltage direct current (HVDC) transmission lines that benefit Illinois,” but the changes to CEJA to allow the state to support these projects did not go far enough.

CEJA made certain changes to allow wind and solar projects interconnected specifically to the SOO Green project to bid into the IPA's procurements, bypassing some of the IPA's geographic screens that would otherwise have made those projects ineligible. However, the bill unnecessarily limited wind and solar projects interconnected to other similar HVDC projects, like Grain Belt Express, from bidding in, as their location in Kansas would result in such a low score on the IPA's adjacent state public interest criteria that they would be screened out.

There is a simple fix to this issue – and that is to allow the treatment afforded to SOO Green interconnected projects to other HVDC interconnected projects.

Separately, because the projects interconnected to interregional HVDC facilities provide a superior product (wind and solar generation with complementary, non-coincident generation profiles) and because the HVDC facilities provide additional reliability and resiliency benefits to the state aside from RECs, the state should strongly consider a separately funded HVDC REC program funded outside of the existing renewable portfolio standard.