

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
वित्तीय एवं वाणिज्यिक मूल्यांकन प्रभाग
Financial & Commercial Appraisal Division

Sewa Bhawan, New Delhi
Date: 22.07.2024

विषय: - ग्रीन हाइड्रोजन/ग्रीन अमोनिया परियोजनाओं के लिए ट्रांसमिशन और बैंकिंग से संबंधित मामलों की जांच (Examination of the matters related to transmission and Banking for Green Hydrogen/Green Ammonia projects)

The undersigned is directed to refer to MNRE OM dated 04.01.2024 on the subject matter and to enclose the report on issues related to banking for green hydrogen.

2. This issues with the approval of Chairperson, CEA

अनुलग्नक: ऊपरोक्त अनुसार


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1. Joint Secretary(Hydrogen),MNRE
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Copy to:

1. PPS to Secretary (Power)
2. PPS to Secretary (MNRE)
3. PPS to Chairperson/Member (E&C), CEA

Report on issues related to banking for green hydrogen

1. Background

Green Hydrogen is defined as Hydrogen generated by water electrolysis using electricity from renewable energy (RE) sources. The renewable energy sources like wind and solar are intermittent, while electrolyser and ammonia are process plants and need continuous power. Therefore, to meet their power requirement, the Green Hydrogen and Ammonia plant developer need to develop or contract higher renewable energy capacity. The overall requirement of developing RE capacity can be optimized if the excess power generation from renewable energy plants can be banked with the grid and the banked power can be drawn by Green Hydrogen and Ammonia plants during non-generation or low RE generation hours.

2, Legal Eco-system for Green Hydrogen Banking

Ministry of Power notified the Green Energy Open Access Rules, 2022 on 6th June 2022 and subsequently amended it in January 2023 and May 2023. Rule 8 provides for banking as under:

"Banking- (1) Banking shall be permitted at least on a monthly basis on payment of charges to compensate additional costs, if any, to the distribution licensee by the Banking and the Appropriate Commission shall fix the applicable charges.

(2) The permitted quantum of banked energy by the Green Energy Open Access consumers shall be at least thirty percent of the total monthly consumption of electricity from the distribution licensee by the consumers.

Explanation: For the purposes of this rule, the expression- Banking means the surplus green energy injected in the grid and credited with the distribution licensee by the Green Energy Open Access consumers and that shall be drawn along with charges to compensate additional costs if any:

Provided that the credit for banked energy shall not be permitted to be carried forward to subsequent banking cycles and shall be adjusted during the same banking cycle:

Provided further that the un-utilised surplus banked energy shall be considered as lapsed at the end of each banking cycle and the Renewable Energy generating station shall be entitled to get Renewable Energy Certificates to the extent of the lapsed banked energy.

Furthermore, Rule 12 provides for the Forum of Regulators (FOR) to prepare a model regulation on methodology for calculation of open access charges, as well as banking charges within a period of four months from the date of commencement of these rules.

FOR in its Model Regulations on Methodology for calculation of Open Access charges and Banking charges for Green Energy Open Access Consumers (issued in September 2022) have provided for the following:

"10. Banking Facility and Charges

a) Banking facility shall be provided to the consumers availing Green Energy Open Access. The surplus energy from a 'Green Energy' Generating Station after setoff shall be banked with the Distribution Licensee.

b) The banking facility including injection of surplus energy and drawal of banked energy shall be subject to scheduling.

c) The Banking Charges shall be adjusted in kind @ 8% of the energy banked.

d) The Banking of energy shall be permitted only on monthly basis as per Calendar month:

Provided that the credit for banked energy shall not be permitted to be carried forward to subsequent months and the credit for energy banked during the month shall be adjusted during the same month as per the energy injected in the respective Time of Day ('TOD') slots determined by the Commission in its Orders determining the tariff of the Distribution Licensee;

Provided further that, the energy banked during peak TOD slots shall be permitted to draw during peak as well as off-peak TOD slot by paying the banking charges as specified in Regulation 10.c of this Regulation. However, the energy banked during off-peak TOD slots shall be permitted to draw during off-peak ToD slot only.

d) The un-utilised surplus banked energy at the end of the month, shall be considered as lapsed at the end of each month:

Provided that, the RE Generating Station would be entitled to Renewable Energy Certificates to that extent."

3. Issues faced by Green Hydrogen developers regarding banking

Ministry of New and Renewable Energy (MNRE) had flagged number of issues related to banking for production of green hydrogen/ammonia. These issues were discussed with

States and industry representatives by a Committee headed by Chairperson, CEA with representatives from MNRE, Ministry of Power, GRID-India, CTUIL on 10.06.2024 (discussion with States) and 24.06.2024 (Industry). Deliberations on these issues and recommendations of the Committee on these issues are given as under:-

3.1 Banking only allowed if the entity availing green energy open access is a consumer of DISCOMs and not for captive consumers

Rules 8(2) of Green Open Access Rules provides that the permitted quantum of banked energy by the Green Energy Open Access consumers shall be at least thirty percent of the total monthly consumption of electricity from the distribution licensee by the consumers. Therefore, green hydrogen/ammonia developers need to be customer of DISCOMs. The industry has contended that the contract demand changes in states are very high.

MNRE has requested that regulatory framework is required to recognize such requirements of green hydrogen industry and allow the green hydrogen/ammonia producers to seek minimum contract demand from distribution licensee and draw the power requirement under open access by paying low demand charges.

On this issue, representatives from States highlighted their concerns regarding allowing banking for at least 30% of total monthly consumption from DISCOMs. They highlighted that for allowing banking, they have to back down their contracted generation during the solar period, when energy is banked and to arrange additional sources of generation during non-solar hours for supplying the banked power back to the consumer. Backing down of internal generation during solar hours, would depend on type of internal generation sources tied up by States (e.g. thermal resources can not be backed down beyond a certain limit). Similarly, it has been mentioned that many States depend on drawal of power from ISTS network during non-solar hours and thus, drawal of additional power for supplying the banked power back would translate into requirement of additional GNA capacity and consequent payment of higher ISTS charges. Further, cost of power during solar hours is much cheaper compared to cost of power during non-solar hours. Considering the above, the States suggested that minimum banking quantum should not be specified in the Rules and left to the discretion of the States.

Analysis and Recommendation:

Providing banking facility to Green Hydrogen producers, even if on cost-of-service basis, requires considerable effort by DISCOMs. However, Green Hydrogen producers located in a state will also contribute to economic development of the state. Therefore, Green Hydrogen producers can keep at least part of total demand in the form of Contracted Demand with DISCOMs, as most open access consumers in any case do. The banking can be provided as percentage of contracted demand. However, it may not be justified

to keep lower demand charges for one set of industry. Further, each DISCOM may have limited capacity to provide banking facility based on its demand pattern, grid characteristics and type of resources contracted.

Therefore, it is suggested that out of total banking quantum allowed by DISCOM, a portion of the total quantum may be made available for banking by Green Hydrogen producers and the same may be allocated amongst Green Hydrogen producers based on a transparent criteria. SERC can frame regulations on this issue in consultation with all stakeholders including state government.

3.2 Banking Charges have been considered at 8% based on the Forum of Regulator (FOR) Model Regulation

Many States have adopted the banking charges of 8% (in kind) in line with Model Regulation issued by FOR regarding "methodology for calculation of open access charges and banking charges for Green Open Access Customers". National Green Hydrogen Policy 2022 of MNRE says that charges for banking shall be as fixed by the State Commission, which shall not be more than the cost differential between the average tariff of renewable energy bought by the distribution licensee during the previous year and the average market clearing price (MCP) in the Day Ahead Market (DAM) during the month in which the renewable energy has been banked. MNRE had pointed out that SERCs have not considered the norms provided in the Green Hydrogen Policy except Odisha and Rajasthan and accordingly requested that SERCs should come out with banking charges in line with National Green Hydrogen Policy.

Representatives of States had highlighted that cost of power during solar hours and non-solar hours vary significantly and banking charges of 8% prescribed in FOR Model Regulation is not adequate to cover the prudent cost incurred by DISCOMs for providing banking facility. It was requested that banking charges as prescribed in the FOR model regulation should be revisited and there should not be any ceiling on banking charges.

Analysis and Recommendation:

The Committee noted that National Green Hydrogen Policy 2022 talks about considering differential in average prices prevailing in power market and cost of renewable energy bought by DISCOM as the basis for deciding the banking charges as the Rules provide that banking charges should reflect the prudent cost incurred by DISCOMs in extending banking facility. It is well known that the electricity prices in Power Exchanges vary significantly during solar and non-solar hours and therefore considering only average prices prevailing in power market may not reflect the expenditure incurred by DISCOMs in extending banking facility.

It has also been observed that the Rules per se does not prohibit banking of energy during solar hours and taking back the same during non solar hours. However, the Model Regulations of FOR do not provide for return of energy in peak hours that was banked during off-peak hours. This provision of the Model Regulations does not serve the very purpose for which banking of energy will be opted by the Green Hydrogen Producers.

As the cost incurred by DISCOMs for providing banking will depend on number of factors, including cost of power to be returned by DISCOM during non-solar hours in-lieu of banked energy during non-solar hours, it is recommended that the Forum of Regulators may be asked to review 8% banking charges (in kind) as specified in their model Regulation in discussion with States keeping in view the prudent cost incurred by distribution licensee. It is also recommended that the Model Regulations should allow for drawal of energy during peak hours that was banked during off-peak hours, and may specify a different rate of banking charges.

3.3 Restrictions on banking timeline and drawl of banked energy imposed

Green Energy Open Access Rules, 2022 provide for "Banking shall be permitted at least on a monthly basis". Further, Rules also provide that the credit for banked energy shall not be permitted to be carried forward to subsequent months and the credit of energy banked during the month shall be adjusted during the same month. SERCs in guidance of the FOR's Model Regulations have provided for restriction on banking to be only on monthly basis. Further, FOR model regulations prescribes that banked energy during peak period shall be allowed to be drawn during both peak and off-peak period, while banked energy during off-peak period is not allowed to be drawn during peak period.

Representative of TANGEDCO had pointed out that Rules have provision for providing banking on monthly basis. However, there is no restriction on withdrawal of the banked energy and there must be some provision in the Rules for putting restrictions on the withdrawal of banked energy, as per network constraints of DISCOM.

Representative of Uttar Pradesh had informed that as per regulations published by their SERC, withdrawal of banked energy shall be allowed as per four time slots in a day and shall not be more than the power banked in the respective slot.

The Committee noted that even the European Regulation on Green Hydrogen has kept a temporary provision for banking period of one month and lapsing of banked energy after banking. Further, after 31st December 2029, the banking period will be changed to one hour period. Therefore, concerns regarding lapsing of banked energy after banking period does not seem to be founded.

Analysis and Recommendation:

The Committee has already made recommendation in para 3.2 about banking of energy during off-peak hours for its drawl during peak hours and specifying a separate rate of banking charge for the same.

Banking for a period of one month duration is in line with the present EU stipulations. It is also noted that, hourly banking in future will ease the banking requirement of distribution licensees as instead of banking all energy during cheaper solar period and drawing in the non-solar peak over a month, there will be adjustments in the same hour. As banking for smaller time frame can be better managed by distribution licensees, a lower banking interval may also be chosen by the States. Green Hydrogen developers may choose to tie up with BESS/PSPs to meet additional banking requirement than can be provided by the distribution licensees.

3.4 Banking cycle not provided as per Green Energy Open Access Rules

Green Energy Open Access Rules have provided for a provision of banking cycle wherein the banked energy can be settled within the banking cycle and not be carried forward to subsequent banking cycle. Banking cycle/banking period has been adopted by most of SERCs on a monthly basis. MNRE suggested that a larger banking cycle (3 months as determined by Madhya Pradesh) enables the consumer to settle the banked energy over a longer time period. This is particularly favourable for green hydrogen producers.

The Committee has noted that even the European Regulation on Green Hydrogen has kept a provision for banking period of one month and lapsing of banked energy after banking period. European Regulation also provides that 2030 onwards, the banking period will be changed to one hour period.

Analysis and Recommendation:

Increasing the banking period from monthly to quarterly will not serve the green hydrogen developers. As banking for smaller time frame can be better managed by distribution licensees, a lower banking interval may also be chosen by the States. Green Hydrogen developers may choose to tie up with BESS/PSPs to meet additional banking requirement than can be provided by the distribution licensees.

3.5 Non recognition of inter-state and intra-state generation for the green hydrogen/ammonia production

MNRE had pointed out that requirement of banking is for both types of generation (within state and outside state) for green hydrogen/ammonia production. Presently banking is allowed within the State and the concept of banking for inter-state has not been

recognized either in Green Energy Open Access Rules, FOR Model Regulation or SERC Regulations.

Representative of States had informed that in case of inter-state banking, the green hydrogen developer will have to pay for cross-subsidy charge and thus, the amount to be paid for banking would be very high and would not be acceptable to green hydrogen developer.

Analysis and Recommendation:

There is no bar for Green Hydrogen developers to source green power through open access from any inter-state supplier. Cross subsidy surcharge and additional surcharge are not applicable if green energy is utilized for production of green hydrogen and green ammonia production as per the Green Energy Open Access Rules. Inter State banking may require a counter party other than the distribution licensee depending on the limit of banking imposed under SERC Regulations as mentioned in para 3.1. In such a case, the Green Hydrogen developer could tie up with storage providers such as Battery Energy Storage Systems and Pumped Hydro Storage Systems. If a Green Hydrogen developer is connected to both the intra-state grid and the inter-state grid, they may avail banking through the distribution licensee as well as inter-state storage providers. Further, if any trader desires to provide banking on inter-state basis, the same may be allowed.

3.6 Un-utilised banked power treated as lapsed

As per Green Energy Open Access Rules, 2022 unutilized banked power at the end of banking period is considered as lapsed. Similarly, FOR Model Regulations also do not provide for any payment for unutilized banked energy. MNRE expressed that the RE Generators be allowed to seek Renewable Energy Certificate (RECs) for such lapsed energy. MNRE has informed that Green energy banked is actually consumed instantaneously by the distribution licensee and the concerned licensee gets paid by consumers for such consumption. Therefore, not recognizing the renewable attribute of such power and non-payment to generator may not be proper.

The Committee noted that allowing withdrawal of banked energy by green hydrogen developer after banking period stands equivalent to deemed purchase and any deemed purchase is not appropriate.

Analysis and Recommendation:

It is challenging for a distribution licensee to give banking to Green Hydrogen developer as the absorption of RE will need to back down base load generators and bearing the fixed cost of stranded capacity. The quantum of banking technically possible will also vary from state to state based on their total consumption. Therefore, the distribution

licensees may not be further burdened with costs of lapsed banked energy. The Green Hydrogen developer may use measures such as storage to optimize their utilization of green RE power.

On the issue of giving Renewable Energy Certificate for banked energy, it may be noted that renewable energy generated by green hydrogen producers during solar hours is consumed by DISCOMs and therefore such renewable energy should be eligible for issue of Renewable Energy Certificate as per applicable Regulations. It is recommended that the same may be included in the Model FOR Regulations for better clarity and the Regulations on REC may be amended, if required

Other Issues:

3.7 Long term visibility of charges levied by distribution licensees

During the meetings of the Committee, it was proposed that a long-term certainty in charges levied by distribution licensees could help the Green Hydrogen sector in taking investment decision.

Analysis and Recommendations

It was noted that the Green Energy Open Access Rules envisage the following charges to be levied by distribution licensees only:

- a) Transmission charges;
- (b) Wheeling charges;
- (c) Cross subsidy Surcharge;
- (d) Standby charges wherever applicable;
- (e) Banking charge and
- (e) Other fees and charges such as Load Despatch Centre fees and scheduling charges, deviation settlement charges as per relevant regulations of the Commission.

The Cross-subsidy surcharge and additional surcharge are not applicable to green energy being utilized by Green Hydrogen developers for production of Green Hydrogen/Ammonia. In case of standby charges, the Green Energy Open Access Rules specify that the Standby charges shall not be more than 25 percent of the energy charges applicable to the consumer tariff category.

Considering the tariff of DISCOM are decided by the SERCs mostly on 5 year control period basis, it will not be feasible to specify the charges to be levied by DISCOMs for longer than 5 year.
