सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
उत्तर क्षेत्रीय विद्युत समिति
Northern Regional Power Committee

सं. उक्षेविस/ वाणिज्यिक/ 209/ आर पी सी (55वीं)/2022/6331-6378 दिनाँक: 25, जुलाई, 2022

सेवा में / To,

उ.क्षे.वि.स. के सभी सदस्य (संलग्न सूचीनुसार)
Members of NRPC (As per List)

विषय: उत्तर क्षेत्रीय विद्युत समिति की 55वीं बैठक का कार्यवृत ।
Subject: 55th meeting of Northern Regional Power Committee – MoM

महोदय / Sir,

उत्तर क्षेत्रीय विद्युत समिति की 55वीं बैठक दिनांक **30 जून, 2022** को **1100** बजे विडियो कोंफ्रेंसिंग के माध्यम से आयोजित की गयी थी । बैठक का कार्यवृत संलग्न है। यह उ.क्षे.वि.स. की वेबसाइट (http://164.100.60.165/) पर भी उपलब्ध है।

The 55th meeting of Northern Regional Power Committee (NRPC) was held at **1100 Hrs** on **30th June, 2022** via video conferencing. MoM of the same is attached herewith. The same is also available on NRPC Sectt. website (http://164.100.60.165/).

भवदीय
Yours faithfully,

Naresh
(नरेश भंडारी) 25/7/22
(Naresh Bhandari)
सदस्य सचिव
Member Secretary

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List of NRPC Members

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2. MD, PTCUL, Dehradun-248001, (Fax- 0135-2764496)
3. MD, UPPTCL, Lucknow-226001, (Fax-0522-2287792)
4. CMD, RRVPNL, Jaipur-302005, (Fax -01412740168)
5. Member (GO&D), CEA, New Delhi, (Fax-011-26108834)
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16. Representative of DHBVNL (Haryana Discom)
17. Managing Director, HPSEB Ltd, Shimla -171004 (Fax-0177-2658984)
18. Managing Director, HPPTC Ltd, Himfed Bhawan, Shimla-171005, (Fax-0177-2832384)
19. Managing Director, HPSLDC, HP State Load Despatch Authority, Totu, Shimla, (Fax-0177-2837649)
20. Managing Director, J&K State Power Dev. Corp., Srinagar, J&K, (Fax-0194-2500145)
21. Chairman and Managing Director, PSPCL, Patiala-147001, (Fax-0175-2213199)
22. Chief Engineer (LD), SLDC, Heerapur, Jaipur-302024, (Fax-0141-2740920)
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24. Representative of JVVNL (Rajasthan Discom)
25. Managing Director, SLDC, UPPTCL, Lucknow-226001, (Fax-0522-2287792)
26. Managing Director, UPRVUNL, Lucknow-226001, (Fax-0522-2288410)
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28. Managing Director, SLDC, PTCUL, Rishikesh, (Fax-0135-2451160)
29. Managing Director, UJVNL, Dehradun-248001, (Fax-0135-2763507)
30. Managing Director, UPCL, Dehradun-248001, (Fax-0135-2768867/2768895)
31. Director (Technical), NHPC, Faridabad-121003, (Fax-0129-2258025)
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33. Director (Commercial), NTPC, New Delhi-110003, (Fax-011-24368417)
34. Representative of CTUIL, Gurgaon-122001
35. CMD, SJVNL, New Delhi, (Fax-011-41659218/0177-2660011)
36. Director (Technical), THDC, Rishikesh-249201, (Fax-0135-2431519)
37. Director (Commercial), POSOCO, New Delhi-110016, (Fax-011-26560190)
38. ED, NRLDC, New Delhi-110016, (Fax-011-26853082)
39. CEO, Aravali Power Company Pvt. Ltd., NOIDA, (Fax-0120-2591936)
40. CEO, Jhajjar Power Ltd., Haryana, (Fax-01251-270105)
41. Representative of Lanco Anpara Power Ltd., (Fax-124-4741024)
42. Station Director, Rosa Power Supply Company Ltd., (Fax-05842-300003)
43. Director and head regulatory and POWER Sale, JSW Energy Ltd., New Delhi (Fax- 48178740)
44. COO, Adani Power Rajasthan Ltd., Ahmedabad-380006 (Fax No- 07925557176)
45. COO, Talwandi Sabo Power Ltd. Distt: Mansa, Punjab-151302(Fax: 01659248083)
46. MD, Lalitpur Power Generation Company Ltd., Noida-201301(Fax: 01204045100/555, 2543939/40)
47. Director (Commercial & Operations), PTC India Ltd., New Delhi (Fax- 01141659144,41659145)
48. CEO, Nabha Power Limited, (Fax: 01762277251 / 01724646802)
49. Representative of Prayagraj Power Generation Co. Ltd.
50. Representative of Greenko Budhil Hydro Power Private Limited (Member IPP<1000 MW)
51. Representative of TPDDL (Delhi Private Discom)

Content

उत्तरी क्षेत्रीय विद्युत समिति की 55वीं बैठक

55th MEETING OF NORTHERN REGIONAL POWER COMMITTEE

Time & Date of NRPC meeting: 11:00 HRS; 30th June, 2022

Venue: Video Conferencing

Minutes of Meeting

The meeting started with the opening remark from Chairman, NRPC. He stated that recently, the whole northern part of India had witnessed steep rise in temperature which has resulted in high power demand scenario in the region. Delhi has successfully met all-time peak demand of 7695 MW on 29th June 2022, climbing from earlier peak of 7601 MW on 28th June 2022, breaking last three years peak demand. India has achieved its all-time peak demand of 211 GW on 10th June, 2022 and is expected to reach 215-220 GW in coming days. Although, the demand may drop due to south-west monsoons approaching our country. Thus, the need of the hour is to maintain grid discipline by all power utilities and load dispatch centres in these challenging times. During these high demands, the incidents of low frequency also occurred. However, the member utilities have maintained self-discipline, restraining themselves from overdrawing from grid thereby ensuring safe and secured operation of Northern Grid. Chairman, NRPC congratulated member utilities for the same and asked them to maintain such discipline in upcoming new peaks.

MS, NRPC instructed states to ensure that they should give full requisition in ISGS plants and RSD units should be brought on bar at the earliest. Estimation and forecast should be meticulously so as to keep the deviations at minimum. States may manage their gaps/portfolios through purchases either from surplus states or from RTM/STOA instead of overdrawing from grid. He highlighted that northern region had clocked all-time peak maximum demand of 77GW on 28th June,2022 with a record energy consumption of 1737 MUs. He congratulated member SLDCs/RLDC for achieving this mark with proper grid discipline and planning. States like Rajasthan (15850 MW), Haryana (12540 MW), Punjab (14200 MW, due to ongoing paddy season) had achieved all time highest in the month of June. He also instructed states to ensure preventive maintenance of substations meticulously so as to avoid unforeseen tripping. He also instructed states to ensure healthy operation of defence mechanisms like UFR, SPS, df/dt protections.

A.1 Approval of MoM of 54th NRPC meeting

A.1.1 Forum was apprised that minutes of 54th NRPC meeting have been issued on 27.06.2022. No comment has been received till the date.

A.1.2 In the meeting, UP representative requested for correction in point no. A.7 of MoM and mentioned that capacity augmentation at Gorakhpur (UP) from 1055 MVA to

1315 MVA is expected by Feb,2023 instead of Oct,2022. Further, he mentioned that 400/220 KV substation Sahupuri is going to be charged soon from 220 KV side but 400 KV level may get charged by March, 2023 (instead of Sept 2022) due to some contractual issues.

A.1.3 Further, UP requested that under discussion of agenda no. A.2 of 54th NRPC meeting regarding non-inclusion of LTA quantum for calculation of transmission charges for UPPCL share in UCH Stage-II (132 MW), UCH Stage-III (66 MW) & ROSA Stage-II, CTU quoted information to forum but the same has not been received in writing to UP. UP request written reply from CTU.

A.1.4 MS, NRPC stated that although all the discussions are well recorded in minutes of 54th NRPC meeting, CTU is instructed to send a written reply to UP for their record/necessary action.

A.1.5 Minutes were approved with above corrections at point no. A.7 as above.

A.2 Manual of Communication Planning in Power System Operation (agenda by CTU)

A.2.1 Forum was apprised that CEA has recently published a "Manual of Communication Planning in Power System Operation" in March, 2022. As per clause 2.1 of the Manual, the planning criteria shall come into force from the date of its publication by the CEA i.e., 31.03.2022. Hence, for making coordinated plan for ISTS communication systems as per this manual, deliberation on important points with all the members for their views and suggestion w.r.t. planning of ISTS Communication System is necessary. Points requested for deliberation are:

1. Clause 4.1.2:

"*To ensure redundancy with route diversity, each communication channel (working path) planned for the Users shall be provided with alternate channel (protection path) in different routes, i.e., the working path and protection path should be resource disjoint. For last mile connectivity to load dispatch center, additional redundancy in different route may be considered. In case of failure of the working path, the protection path shall be available for the required communication services*."

2. Clause 4.1.12:

4.1.12 "The requirements of the applicant(s) shall be examined by the concerned nodal agency before allowing the connectivity to the existing communication system. Any augmentation/expansion of the existing communication system shall be planned by the nodal agency to ensure redundancy with route diversity of the allocated communication system. However, in case of radial connectivity to the existing node, the applicant(s) shall develop their own redundant communication system up to the existing wideband node."

(A) There are two types of cases:

(a) New & existing connectivity with the ISTS network where dual paths are feasible (OPGW/ADSS/UGFO): CTU will plan for redundant

paths to ensure redundancy with route diversity of the allocated communication system for both new and existing network. For existing nodes, the possibility of redundant path will also be planned.

(b) New & existing connectivity with the ISTS network over radial path:

(i) RE Generators connected through on single dedicated line with ISTS

Protection path may be provided by user on diverse communication media like leased line/GPRS etc. upto the ISTS station (Data Collection Point -DCP) as per the service requirement and availability of communication media at that location. ISTS nodes/ISTS Elements/ Conventional Generators etc.

In case redundant path is not feasible, user shall develop their own alternate path upto the DCP/nearest wideband node on diverse communication path i.e. leased line/GPRS etc. as per the service requirement and availability of communication media at that location.

(B) The meter readings from several locations (mostly STU nodes) in each region are intermittent and having communication issues as the meters at the state nodes are not having secure & reliable communication links and are operational on public domain communication links like GPRS.

POSOCO has identified a list of such nodes for each region. It is proposed to provide the connectivity of such nodes on captive OPGW network for receiving the data successfully. After the deliberation in RPCs, the scheme shall be put up for approval in NCT.

3. Clause 6. SECURITY RISKS AND REQUIREMENTS

"6.1 Communication System shall be planned to ensure that all users and control centres connected to the communication system have robust cyber security programs in place to adequately and continuously manage cyber security risks that could adversely impact power system infrastructure.

6.2 Security barriers and isolations may be considered to ensure security at multiple levels across the end-to-end communication.

6.3 While planning a secured Communication System, security risks and their impact assessment should be taken into account.

6.4 Services and applications like PMU, SCADA, protection, AGC, AMR, video surveillance, voice etc may be segregated into different security zones based on risk and impact assessment. Restrictive control over data exchange between different security zones may be done according to the security policy (e.g. firewalls). Consequent to partitioning the services and applications into separate security zones, partitioning of aggregate communication traffic is required which may be achieved by a combination

of physical separation (e.g. equipment/link) and virtual separation (e.g.VPNs)

6.6 In case of radial connectivity to the existing node, the user(s) developing their own redundant communication system up to the existing wideband node should follow the cyber security guidelines in practice."

A.2.2 CTU has included CEA (Cyber Security in Power Sector) Guidelines, 2021, along with requirement of firewall in RFP documents in consultation with CEA.

A.2.3 CTU representative apprised the forum that as the transmission network is getting complex day by day, supporting it with a reliable and secured communication system is the need of the hour for efficient grid operation.

A.2.4 With reference to clause 4.1.2 of "Manual of Communication Planning in Power System Operation", CTU representative explained the forum that resource disjoint refers to two things-

i Media i.e Route diversity.

ii Terminal Equipment diversity.

A.2.5 CTU explained that, firstly the media (optical fibre/OPGW/ADSS/UFGO) should not be at the same tower/pole/duct/cable. Secondly, the redundant path should not share common equipment.

A.2.6 CTU representative apprised total number of ISTS stations counts upto 250 approx. Out of this, total no. of ISGS stations is around 100, out of which 66 number of generators are on AGC. In view of this, CTU proposed following locations to be covered for complete resource disjoint i.e route diversity and standby equipment-

i All AGC locations;

ii All ISGS locations;

iii RE locations; and all radial links.

A.2.7 For radial links, the redundant path will be through a third-party lease line communications channel.

A.2.8 With reference to clause 4.1.12 (B), CTU representative apprised the forum that at all ISTS nodes, RLDCs are connected to ISTS network for communication purpose. State STU node is connected through transmission line to ISTS node. At present, data from STU node is sent through GPRS which is an unreliable method. In view of this, it is proposed for having OPGW connectivity between STU node and ISTS node so as to enable all data transmission through dedicated link instead of depending upon GPRS link. POSOCO along with coordination with states, may propose a scheme analysing the OPGW requirement, equipment requirement, integration with NMS etc.

A.2.9 With reference to security risk and requirements, CTU representative apprised the forum regarding proposal for dual firewall at substation having the following features –

i Two next generation firewalls in Main and Standby mode having electrical Ethernet interfaces/ports and placed between FOTE & SAS gateway/s at the substation.

ii All Ethernet based applications shall be terminated in the firewall ports directly (ex, PMU, AMR, VOIP, SAS/SCADA etc.).

iii Each port of firewall shall work as a separate zone.

iv Firewall has features of network encryption using IPSec, VPN etc.

v No. of Ethernet port in each firewall-16 Nos.

vi Minimum throughput-300 Mbps.

vii The firewall shall be managed/configured as standalone as well as through Centralized Management Console (CMC).

viii Other Features: Deep packet Inspection (DPI), Denial of Service (DoS), Intrusion Prevention System (IPS), Anti-Virus, Anti-Spyware.

ix Firewall shall have feature to update the definition/Signatures of Anti-Virus online as well as offline.

A.2.10 CTU representative proposed for installing firewall at RE gen/Load end having following features: -

i Two next generation firewalls in Main and Standby mode having electrical Ethernet interfaces/ports and placed between FOTE & SAS gateway/s at the substation.

ii All Ethernet based applications shall be terminated in the firewall ports directly (ex, PMU, AMR, VOIP, SAS/SCADA etc.).

iii Each port of firewall shall work as a separate zone.

iv Firewall has features of network encryption using IPSec, VPN etc.

v No. of Ethernet port in each firewall-5 Nos.

vi Minimum throughput-200 Mbps.

vii The firewall shall be managed/configured as standalone as well as through Centralized Management Console (CMC).

viii Other Features: Deep packet Inspection (DPI), Denial of Service (DoS), Intrusion Prevention System (IPS), Anti-Virus, Anti-Spyware.

ix Firewall shall have feature to update the definition/Signatures of Anti-Virus online as well as offline.

A.2.11 For metering data by dedicated links, CTU representative apprised the following proposal: -

i POSOCO and each state to identify and propose the OPGW+FOTE system for locations on GPRS.

ii Regional scheme to be evolved and put up with funding options to RPC for their views. Finally, it may be put up to NCT as per MoP guidelines.

A.2.12 NRLDC representative raised concern that PMU/RTU configuration need to be changed while installing firewalls at existing substations. Secondly, CMC, being integrated to firewall of particular make could update the definition/signatures of that firewall only. CMC could not be able to integrate with multiple make firewalls procured through TBCB. POSOCO and PGCIL representative raised the

proposal for the need of implementing the pilot project on Conventional/AIS substation, Kiosk based substation, AGC generator substation.

A.2.13 MS, NRPC highlighted that cyber secured data is the need of the hour and cannot be compromised.

A.2.14 It was decided that agenda may be discussed in details in TeST sub-committee first, thereafter it may be discussed in NRPC meeting.

A.3 Scheduling and settlement of URS power (Agenda by TPDDL)

A.3.1 Forum was apprised that the matter was included as an agenda in 54th NRPC meeting but it was not taken up due to absence of participants from TPDDL.

A.3.2 TPDDL has submitted that scheduling of URS power is a regular practice in day-to-day power scheduling and dispatch, however, financial settlement of the same is not being done in a time bound manner. As per the information available in the public domain, it is given to understand that details of state wise URS power is provided in the final Regional Energy Account and subsequently the credit is passed on to the beneficiaries. In case the final REA is issued by RPC with a delay then URS power settlement is also delayed. To overcome the above deficiency, it is proposed that time lines of issuance of Final REA by RPC's should be revisited and strict timelines should be defined/followed for the same, failing which provision of carrying cost/interest should be incorporated to offset the financial losses suffered by the beneficiary on account of delay in receipt of URS credit. It is also suggested that details of power scheduled under URS be incorporated in provisional REA, if possible, to expedite the settlement process. Also, procedure/timelines should be issued for issuance of URS credit/debit within the state boundary and to be followed by state load dispatch centres so as to ensure that URS settlement within intra-state entities is done in a time bound manner.

A.3.3 SE, NRPC mentioned that details of power scheduled under URS may be incorporated in monthly provisional REA as requested by TPDDL.

A.3.4 SLDC, Delhi representative stated that for the preparation of intra-state URS account, block wise data of URS which is booked from Delhi to outside on monthly basis is required from NRPC Secretariat on timely basis so as to calculate URS account on monthly basis.

A.3.5 EE(C), NRPC stated that the data required by Delhi SLDC is a unique requirement and not asked by any other state. However, the same may be provided to Delhi SLDC.

A.3.6 The forum decided that, as from now URS figures will be indicated in provisional REA. Also, the block wise data will be sent to Delhi SLDC within the same month. MS, NRPC also added that carrying cost/ interest is under the ambit of CERC.

A.4 Non-Scheduling of additional power to Haryana by JKSPDC - Violation of the agreement (Agenda by HPPC)

A.4.1 It was apprised that in reference to the JKSPDC offer dated 28.01.2022, HERC approved the source for procurement of 270 MW (May to Sep) from Baglihar

Stage-II for a period of 10 years w.e.f. 01.05.2022. HPPC issued Letter of Intent (LoI) to JK-SPDC and the same was accepted by JKSPDC on 15.06.2021.

A.4.2 In the meanwhile, JKSPDC vide mail dated 23.02.2022 offered additional 75 MW Power from Baglihar Stage-I w.e.f. 01.04.2022 and the same was accepted by HPPC vide mail dated 22.03.2022. HPPC approached HERC for source approval for the same. HERC vide its order dated 30.03.2022 approved the additional 75 MW Power. HPPC issued LoI dated 31.03.2022 to JK-SPDC for this power. The 75 MW Power was expected to be scheduled w.e.f. 01.04.2022.

A.4.3 Haryana has already considered this power (270MW+75MW) in all its demand supply projections which was expected to schedule to Haryana.

A.4.4 However, JK-SPDC vide mail dated 31.03.2022 intimated that Unit-III (150MW) of the plant is under shutdown for arresting leakages in the MIV of the said unit. The repair work may take 2-3 weeks, as such JKSPDC will not be able to schedule 75 MW (16.66% of 450 MW) additional quantum till repair works are completed.

A.4.5 In the meanwhile, HPPC vide mail dated 29.04.2022 asked JK-SPDC to confirm the scheduling of additional 270 MW Power w.e.f. 01.05.2022 to which it was informed that they shall supply only 50 MW Power as per the available discharge of water.

A.4.6 It is apprised that JK-SPDC vide mail dated 30.04.2022 refused to schedule any additional power (270MW+75MW) to Haryana stating that in view of upcoming Eid festival and prevailing power crisis, JKSPDC will not be able to supply any additional quantum to HPPC. This sudden refusal to schedule power by JKSPDC further aggravated the ongoing power crunch in the state.

A.4.7 HPPC again requested to schedule the additional Power to JKSPDC vide mail dated 30.04.2022 and 01.05.2022. However, no response was received from JKSPDC. Accordingly, vide letter dated 09.05.2022, MoP, GoI was requested to intervene and direct JKSPDC to honour its commitments and schedule the power to Haryana as per the agreement without any delay. HPPC is continuously writing to JKSPDC for scheduling the power but no communication has been received from their end till date.

A.4.8 Further, it has been observed from the schedule that JK-SPDC is selling the Power to M/s PTC w.e.f. 01.06.2022 which should be scheduled to Haryana.

A.4.9 In this regard, JK-SPDC may be asked to schedule the contracted Power (270MW+75MW) to Haryana.

A.4.10 HPPC representative apprised that there has been early pick up of load in the month of June and it is expected to rise in coming months. In view of this, HPPC is on high requirement that power from JKPDC shall be scheduled to them as per commitment.

A.4.11 JKPDC representative mentioned that they had scheduled only about 50 MW (from 1st-15th June) and 25 MW (16th -30th June) to PTC which was already scheduled/committed in December, 2021 i.e., prior to its commitment with Haryana. Therefore, there is no violation from JKPDC in giving power to PTC. He highlighted that PPA is yet to be signed with HPPC for sharing additional power (270 MW+75 MW) in Baglihar-II and Baglihar-I respectively.

A.4.12 JKPDC representative highlighted that water inflows behaviour was not up to the mark this year. If discharge inflow is favourable in coming days, JKPDC may sign the PPA for scheduling power to HPPCL from Baglihar HEP.

A.4.13 HPPCL representative stated that signing of PPA is a mere formality, and scheduling of power shall not be hindered due to that. HPPCL also stated that due to lack of clarity from JKPDC side in this regard, HPPCL is facing issue of planning power portfolio with increasing load demands.

A.4.14 JKPDC representative ensured to expedite the scheduling of 75 MW from Baglihar-I to Haryana at the earliest. Also, decision of scheduling of 270 MW to Haryana will be taken as the water inflows improves.

A.4.15 MS, NRPC concluded the deliberation, asking JKPDC to abide by their commitment and get the PPA signed at the earliest. He also asked JKPDC to inform in advance to HPPCL so that HPPCL could plan their generation accordingly.

A.5 Enhancement in upper limit of monthly fees and conveyance for technical and non-technical Consultants in NRPC Secretariat. (Agenda by NRPC Sectt)

A.5.1 Forum was apprised that as per the decision taken in the 17th NRPC meeting held on 17.07.2010, a committee was constituted for finalizing the modalities for selection of officers on short term contract, their salary structure, other terms & conditions of the service etc. Further, as per decision in the 26th NRPC meeting held on 13.07.2012, the upper limit of monthly fee for technical and non-technical consultant fixed in 2010 was increased by 20%. Subsequently, in the 29th NRPC meeting, held on 13.09.2013 upper limit of monthly fee for technical and non-technical consultant fixed in 2010 was enhanced by 50%, which was further increased by 100% w.e.f April'2018 as per the decision taken in 42nd NRPC meeting.

A.5.2 The payment of Rs.5,000/- per month towards conveyance to Senior Consultant / Consultant / Junior Consultant and Rs.2,500/- per month to Accountant / Administrator / Junior Administrator fixed in 2013 was increased by 100% w.e.f. April'2018 as per the decision taken in 42nd NRPC meeting.

A.5.3 In view of the increase in the cost of living, it is proposed to review the fee structure of the consultants. It is proposed that the upper limit of monthly fee for technical and non-technical consultant fixed in 2010 and the payment towards conveyance charges fixed in 2013 may be increased by 175% w.e.f 1st April 2022.

A.5.4 Forum approved the proposal of NRPC Sectt. as above.

A.6 Increment in monthly fees and conveyance charges of Jr. Administrator (Agenda by NRPC Sectt)

A.6.1 Forum was apprised that as per the recommendations of the selection committee, the monthly consolidated fee paid to the Technical and Non-technical manpower on contract basis is to be reviewed based on their performance after the completion of one year.

A.6.2 The salary of Jr. Administrator at NRPC Secretariat, was increased by 12.5% w.e.f. 01.04.2019, and from there onwards there has been no further hike in salary due to ongoing pandemic.

A.6.3 It is proposed to increase the monthly consolidated fee @ 12.5% per year of Jr. Administrator at NRPC Secretariat, by considering the increase in cost of living, as per the following breakup, which was fixed at Rs. 27,338/- w.e.f. 01.04.2019.

Designation	**Monthly fee as on 01.04.2019**	**Effective monthly fee (w.e.f 01.04.2020)**	**Effective monthly fee w.e.f 01.04.2021**	**Proposed monthly fee w.e.f 01.04.2022**
Jr. Administrator	27,338/-	30,755/-	34,600/-	38,925/-
Designation	**Present monthly conveyance**	**Effective monthly conveyance w.e.f 01.04.2020**	**Effective monthly conveyance w.e.f 01.04.2021**	**Proposed monthly conveyance charges w.e.f 01.04.2022**
Jr. Administrator	2500/-	2,813/-	3,16 5/-	3,561/-

A.6.4 The proposed monthly payable fee and conveyance charges to the Jr. Administrator at NRPC Secretariat (effective from 01.04.2022) is Rs.42,486/-.

A.6.5 Forum approved the proposal of NRPC Sectt. as above.

A.7 Outsourcing of another Non-Technical Consultant (Jr. Administrator) in NRPC through ongoing manpower outsourcing contract (Agenda by NRPC Sectt)

A.7.1 Forum was apprised that presently, there is no Private Secretary posted at NRPC Sectt, due to which work of MS office is getting hampered. Three months have passed since PS to MS, NRPC has retired and since then no one has been posted from CEA. It is therefore proposed to outsource one Non-Technical Consultant (Jr. Administrator) as Private Secretary to MS, NRPC to look after the work of MS office, through ongoing manpower outsourcing contract.

A.7.2 It is proposed to hire one non-technical consultant through outsourcing contract at monthly fees and conveyance charges suitable to MS, NRPC. The fees and charges shall be within approved upper limit of monthly fee and conveyance charges.

A.7.3 Forum approved the proposal of NRPC Sectt. as above.

A.8 Observation of low voltage & oscillations in the grid (agenda by NRLDC)

A.8.1. GM NRLDC stated the following:

1. On 27.05.2022, 09.06.2022 and 10.06.2022 oscillations were observed dominantly in RE evacuation substations of Rajasthan in Northern region during high solar and high wind generation conditions in the Northern region. Plots for

oscillations observed on 27th May'22 and 10th June'22 in ISTS system are enclosed as ***Annexure-I***.

2. In an integrated power system, such oscillations may propagate to affect or even trip other elements in the power system viz. line, generating unit etc.

3. Voltage fluctuation along with tripping/dip in RE generation was first observed on 15th Jan'22 and same was deliberated in 192nd and 193rd NRPC OCC meetings held on 18th Feb'22 and 22nd March'22. Apart from voltage fluctuation and voltage oscillations all other RE related issues were also deliberated in 195th NRPC-OCC meeting.

4. Oscillations were most severe on 10th June'22:

   i. On 10th June'22 at 10:05hrs Oscillations in voltage started with a Jerk of around 15kV, later sustained with amplitude of 3-4kV at 220kV level up to 10:13Hrs. After that, amplitude of oscillation strengthened to 25-40kV/35-40kV at 220kV/400kV level. Oscillations sustained upto 10:55 hrs.

   ii. Largest amplitude of oscillations were observed at 220kV Fatehgarh-II (PG) connected RE plants in comparison of 220kV Bhadla (PG), 220kV Bhadla-II (PG) and 220kV Bikaner (PG) i.e. around 25kV~40kV.

   iii. During the period of oscillations, the grid voltage near the RE generation was on the lower side.

5. Issues in Rajasthan control area during oscillations observed in grid:

   i. High MVAr drawls were observed at intra-state network of Rajasthan.

   ii. Voltages at all RE stations in RE Pocket & nearby substations were low and fluctuating.

   iii. Oscillations in the grid with high magnitudes in RE pockets.

   iv. High loading of 220kV lines in Western Rajasthan.

   v. High export of power from Rajasthan state transmission system to ISTS network namely 400kV Barmer-Bhinmal loading (N-1 non-compliant).

   vi. Plots for oscillations observed on 10th June'22 and MVAR drawl in Rajasthan control area are enclosed as ***Annexure-II***.

6. Rajasthan were requested to carry out the study and analyze the quantum of RE generation and load in that area/zone to be curtailed including prioritization to improve the voltage profile and loading on 400kV & 220kV intra-state line within permissible limits. Moreover, curtailment of RE power needs to be quick so that oscillations can damp out quickly.

7. SLDC Rajasthan was requested to pursue the intrastate RE generators to support the grid by operating in voltage control mode and same should be regularly monitored at SLDC level. In case of high wind & high solar scenario, SLDC may make sure to keep maximum possible Thermal power plants such as Suratgarh, Rajwest machines on bar near the RE pocket.

A.8.2. GM NRLDC also shared the studies and analysis carried out on available data at NRLDC end:

1. As per below plots of Voltages for Solar/Hybrid generators connected at 220 kV, Oscillations of upto 20 kV are present in case of generators connected at 220 kV level and upto 30 kV in case of generators connected at 400 kV level. It is also clear that almost all the generators are oscillating coherently except ABCRL (denoted by orange color) which is quit out of phase with others.

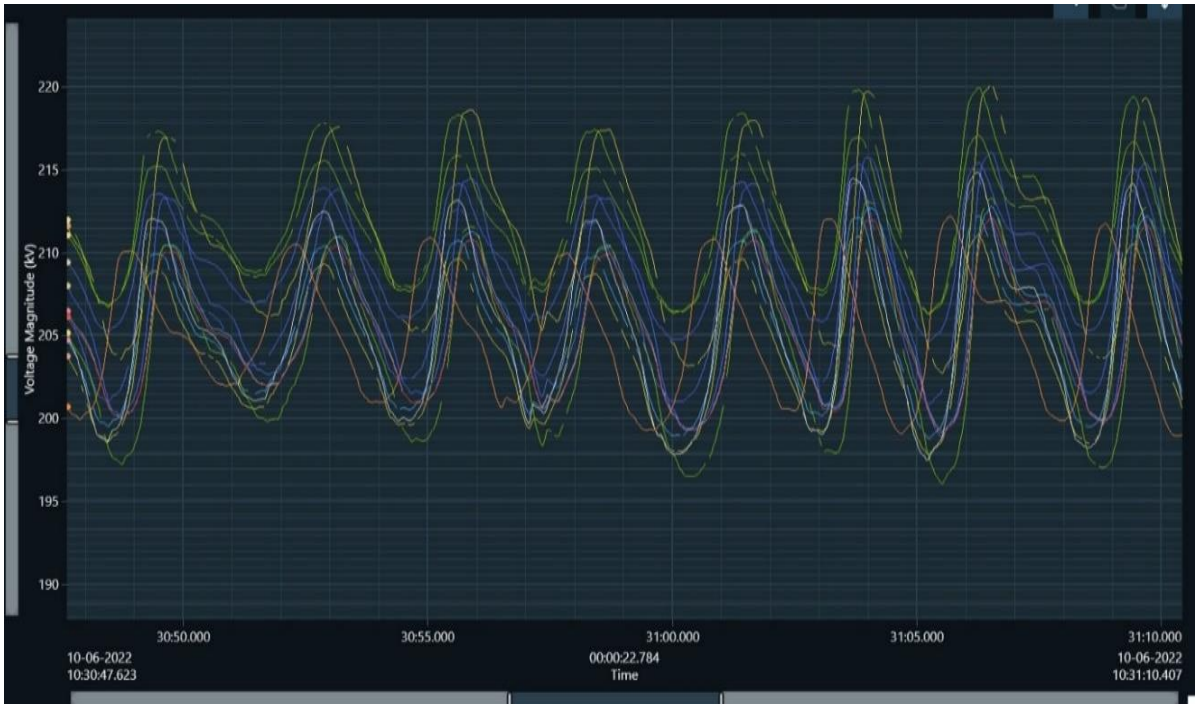

Fig 1: Voltages for generators connected at 220 kV

2. Below given plots depicts Oscillations magnitude (normalized for comparison) in neighbouring stations of Rajasthan. It is clear from chart the other stations are oscillating in phase with RE pooling stations such as Fatehgarh-II(PG) and Bhadla (PG). Also, the magnitude of Oscillations is reducing as we are moving away from Fatehgarh-II(PG). The maximum magnitude is present at Fatehgarh -II(PG).

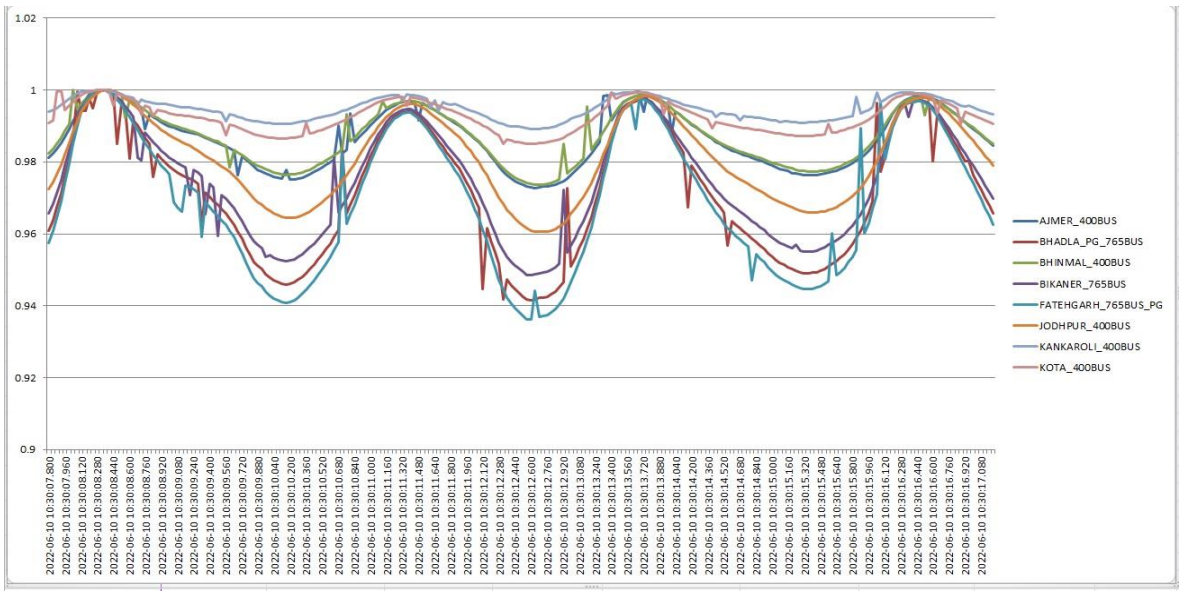

Fig 2: Oscillations magnitude (normalized for comparison)

3. Table-1: Details of Mode frequencies, Mode magnitude and Damping

PLANT	Frequency_Mode (Hz)	Normalised_Magnitude (dB)	Damping Factor	Phase (Rad)
Bikaner_765BUS	0.486	3106.7	-0.0228	5.34
TS1PL	0.485	782.7	-0.0214	5.255
BIKNP	0.485	1447.12	-0.0215	5.27
RSRPL	0.484	1239.33	-0.0196	5.1
SPCEP	0.485	813.25	-0.0218	5.283
AVADA	0.483	1336.74	-0.02	5.17
Bhadla_PG_765BUS	0.484	3050.87	-0.021	5.21
RAWARA	0.484	1042.33	-0.0216	5.21
AREPR	PMU DOWN_DATA NOT COMING			
MRPL	PMU FRAME DROP TOO HIGH_MODE ANALYSIS NOT POSSIBLE			
ESURL	PMU DOWN_DATA NOT COMING			
TPREL	PMU FRAME DROP TOO HIGH_MODE ANALYSIS NOT POSSIBLE			
AZRMP	PMU DOWN_DATA NOT COMING			
ACME	0.484	1504.72	-0.0269	5.45
AZR41	PMU DOWN_DATA NOT COMING			
SURJA	PMU FRAME DROP TOO HIGH_MODE ANALYSIS NOT POSSIBLE			
	PMU DOWN_DATA NOT COMING			
SKBSL	PMU FRAME DROP TOO HIGH_MODE ANALYSIS NOT POSSIBLE			
APTFL	0.485	961.789	-0.0212	5.19
Bhadla_2_PG				
AHPPL	PMU DOWN_DATA NOT COMING			
MSUPL	0.487	1029.73	-0.0209	4.41
ABCRL	0.486	1783.18	-0.019	5.76
Fatehgarh_Renew				
AFSPS	PMU DOWN_DATA NOT COMING			
ASPS1	0.485	1686.39	-0.025	4.75
SPRJ	0.485	2038.6	-0.0285	5.53
AWPS1	0.483	1759.36	-0.0253	5.4
ASPS2	0.484	1661.36	-0.025	5.41
AWPS2	PMU DOWN_DATA NOT COMING			
Fatehgarh_PG_765BUS	0.486	3198.02	-0.02099	5.22
EDEN	PMU DOWN_DATA NOT COMING			
RJ3PL	0.484	1770.33	-0.025	4.7
AHEJ2	0.482	1619.96	-0.024	5.4
RSBPL	0.487	1658.23	-0.02455	4.62
AHEJ3	0.48	2610.58	-0.0264	0.365
RNEWJ	0.487	1445.87	-0.02231	4.53
ADNHB	PMU DOWN_DATA NOT COMING			
RSUPL	0.481	1939.14	-0.02664	4.69
Other Stations				
400 kV Bhinmal	0.473	624.16	-0.0161	4.82
400 kV Kankaroli	0.502	316.165	-0.02449	5.72
400 kV KOTA_PG	0.488	266.35	-0.0177	5.18
400 kV Jodhpur	0.467	1002.62	-0.013372	4.44
400 kV Ajmer Bus	0.484	1375.51	-0.0204	5.25

A.8.3. Result of Analysis are summarized in above table and are as follows:

i. It is clear that all the nodes were experiencing oscillations of around 0.485Hz with magnitude being maximum at Fatehgarh-II(PG) 765 kV bus.

ii. Other 765 kV buses i.e. at Bhadla (PG) and Bikaner (PG) were also among the highest magnitude. Out of solar generators, AHEJ3 (Adani Hybrid Energy Jaiselmer Three Pvt. Ltd.) had maximum magnitude in %age voltage variation with NTPC Nidan coming at second place.

iii. The damping factor observed was negative at all nodes as oscillations were persistent and increasing during the 02 min analysis window. The lowest sampling was observed at 400 kV Jodhpur, among solar generators RSRPL and ABCRL were having lowest damping.

GM NRLDC also stated that two meeting were organized by NRLDC on 13th June'22 (Online mode) and 21st June'22 (Offline mode) to discuss all the RE related issues being faced in NR Grid, reason behind these issues and way to mitigate those.

Gist of discussion of the meeting on 13th June "NR RE issues meeting with RE developer" are as follows;

Agenda No-1 (High Voltage Ride Through (HVRT) non-compliance by RE Generators at interconnection point):

1. All users (RE plants) need to report any tripping events within 24 hrs. of event at NRLDC tripping portal along with requisite data. All RE plants need to submit DR/EL of Inverter terminal, SOE of the Plant, Reason of tripping and details of controller actions/PPC actions during the event.
2. Plants of Adani and Renew (connected at 220kV Fatehgarh-II(PG)) need to submit the report on momentarily dip in generation, HVRT/LVRT settings, downloaded settings from Inverter and existing settings of controllers to NRPC/NRLDC.

Agenda No-2 (Dynamic varying Reactive power support in power factor range of +/- 0.95 lag and lead):

1. All RE plants should have the capability to deliver Q(MVAR)=31.3% of P(MW) as per CEA regulation clause B(2), necessary actions need to be taken by all the Plants to meet the compliance and as per the decision of meeting as mentioned in Table-1&2.
2. P-Q & Q-V monitoring at Plant level may also be done by RE developers to observe the performance. Data for next month (13th June'22-13th July'22) will also be analyzed at NRLDC end to see the improvement.
3. In case, any RE plant failed to meet the compliance to inject required MVAR as per its capability defined in CEA standard (by 13th July'22), notice would be issued to that plant and further necessary actions for disconnection would be taken thereafter as per provisions of regulations and Grid standard.

Agenda No-3 (Injection of harmonics by wind/solar generators at injection point):

1. All RE plants as mentioned in table-3 (Commissioned almost one year ago or before) need to perform the Measurement of harmonic content, DC injection and flicker test at site and submit the report to NRPC/NRLDC/CTU in line with CEA regulation clause B1 (1,2,3 &4) as early as possible.
2. A tentative date for Power Quality testing by RE Plants need to be shared to NRPC/CTU/NRLDC.

Agenda No-4 (Issues related to wrong settings kept in 220kV lines and 220/33kV kV ICTs):

1. RPC approved protection philosophy shall be implemented by all the RE plants.

2. Protection settings of all the lines/ICTs/IDTs/Inverters and other elements of Plants need to be kept in such a coordinated way that Plant would comply CEA standards at Point of Interconnection.
3. Protection settings of all the Plants need to be reviewed and rectified accordingly (if required) by respective developers and Plant OEM.

***Agenda No-5 (Difference between response of model submitted and Actual response of Plant* during event):**

1. All RE plants need to submit the final validated plant model after tuning the model as per existing implemented settings of Controllers and Inverters at site.

Agenda No-6 (Oscillations in RE pocket of NR grid):

1. All RE Plant need to carry out the studies to analyze the Plant performance and its controller actions for low SCR at POI and Sensitivity of plant controllers for any disturbance in case of low SCR at POI. All RE plants need to submit the report mentioning how plant performance is changing with reduction in SCR.
2. AHEJ3L (Adani Hybrid Energy Jaisalmer Three Ltd.), Saurya Urja Pvt. Ltd. and NTPC Nidan will submit the report on oscillation observed on 27.05.22 and 10.06.22 as oscillation magnitude were higher at these nodes. Other plants also need to submit their observations on the event of 27.05.22 and 10.06.22 as oscillation were observed in almost all the RE plants.

Others decision for secure evacuation of RE from the complex:

1. RE generation connected at ISTS and Rajasthan that can be safely evacuated will be assessed under different conditions.
2. In case of outage of certain line(s)/ICT(s) or some other scenario of contingency, Curtailment would be done accordingly, if required.
3. Export quantum may be declared 2 days prior considering planned outage of line/ICTs/Machines and STOA may be allowed accordingly. However, as per Real-time grid scenario necessary actions for RE curtailment may be taken for security of grid.
4. It was also decided that after one month (i.e., 13th July'22) all the compliance met by RE plant as per the decision taken in meeting would be reviewed and if any non-compliance observed same would be highlighted and required action will be taken accordingly.
5. In case of any violation of Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations 2007, (Amendment) Regulations, 2013 & 2019, notice would be issued to concerned user (RE plant) on first violation. Issues due to which user (RE plant) was violating CEA regulation should be resolved within 48 hours and compliance should be submitted to NRPC/NRLDC. In case, if second violation would observe after 48 hours of notice issued to concerned user (RE plant), disconnection request of that concerned user (RE plant) along with details of all the Non-compliance may be submitted to CEA by NRPC/NRLDC for taking appropriate actions/disconnection of the concerned user (RE plant) from the Grid.

It was informed to the forum that on 21st June meeting all RE developers were requested to have a 24x7 manned control centre for better coordination with NRLDC. All RE generators agreed to explore the possibility in this regard and take action on priority. The issues related to SCADA data availability including PPC mode data were also discussed. All RE generators agreed to ensure the availability PPC control mode data at NRLDC end. Further, RE related issues such as Harmonic Injection. Wrong settings kept in 220 kV and at ICTs, difference between response of model submitted and actual response, operating the plant in voltage control mode etc. were also discussed. RE generators agreed to take action on all the issues in order to have secure and reliable operation of Northern grid.

A.9 Status of DSM Charges

NRLDC appraised the status of DSM Charges payable to pool account. It was observed that there is a significant outstanding amount due since by Jammu & Kashmir.

NRLDC also appraised that, these are statutory pool accounts & payment to the pool accounts shall have high priority. Due to non-payment of the charges by JKPCL within due time, payments to the receivable constituents & RRAS/AGC Up service providers are getting delayed.

MS, NRPC advised Jammu & Kashmir to expedite the settlement of the long pending outstanding to avoid any surcharge/interest liability and any due to receivable constituents from the pool shall be settled without any further delay.

MS, NRPC also advised to take up the matter with Jammu and Kashmir through one-to-one meeting.

Further MS, NRPC instructed all concerned utilities having amount payable to pool, to make the payment in accordance with CERC Regulations.

A.10 Status of LC for delayed payment of deviation charges

NRLDC appraised the status of LC not opened by the entities for default in payment of deviation charges.

MS, NRPC urged all the defaulting entities to open LC of the required amount in accordance with CERC regulation and as per the format of NRLDC.

NRLDC has already received the details of opening of LC from Power grid-NR and Punjab as claimed by the parties in the meeting.

A.11 Submission of Bank Account Details for disbursement of payments of pool accounts

NRLDC intimated that, Payments to Chandigarh & Railways are being made through cheques due to non-submission of Bank Account details.

MS, NRPC advised to take up the matter with Chandigarh & Railways through one-to-one meeting.

A.12 Status of Reactive Energy Charges

NRLDC appraised the current status of Reactive Energy charges pool account and informed that Jammu & Kashmir has a long outstanding due to the tune of Rs.19.59 Crore and only after the settlement of the dues by Jammu & Kashmir, the settlement of other constituents who are supposed to receive amount from the pool could be done.

MS, NRPC advised Jammu & Kashmir to expedite the settlement of the long pending outstanding so that the receivable constituents from the pool shall be settled without any further delay.

MS, NRPC also advised to take up the matter with Jammu and Kashmir through one-to-one meeting.

A.13 Status of Congestion Charges

NRLDC appraised the current status of Congestion Charges pool account and informed that Jammu & Kashmir has a long outstanding due of 0.24 lakhs.

MS, NRPC advised Jammu & Kashmir to expedite the settlement of the long pending outstanding without any further delay.

MS, NRPC also advised to take up the matter with Jammu and Kashmir through one-to-one meeting.

A.14 Status of Reconciliation of Pool Accounts

NRLDC stated that, a separate web portal poolar.nrldc.in has been created in house for reconciliation of pool accounts and all the entities were provided with Username & Password to access the web portal to reconcile the accounts.

Monthly reconciliation statement of the pool accounts has been published through the web portal up to May 2022.

NRLDC stated that only few entities are not doing the reconciliation even through the web portal.

MS, NRPC urged all the entities to do the reconciliation within the due date else the statement will be considered deemed reconciled**.**

A.15 Status of NRLDC Fee & Charges

NRLDC informed that JKPCL & ACME Chittorgarh has outstanding due to be paid towards NRLDC Fee & Charges.

MS, NRPC advised Jammu & Kashmir & ACME Chittorgarh to clear all the outstanding amount towards NRLD Fee & Charges at the earliest.

A.16 Reconciliation of NRLDC Fee & Charges

NRLDC intimated that, the reconciliation is being done through the newly developed software & the entities are requested to do the reconciliation the Fee & Charges Software.

MS, NRPC urged all the entities to do the reconciliation within the due date else the statement will be considered deemed reconciled.

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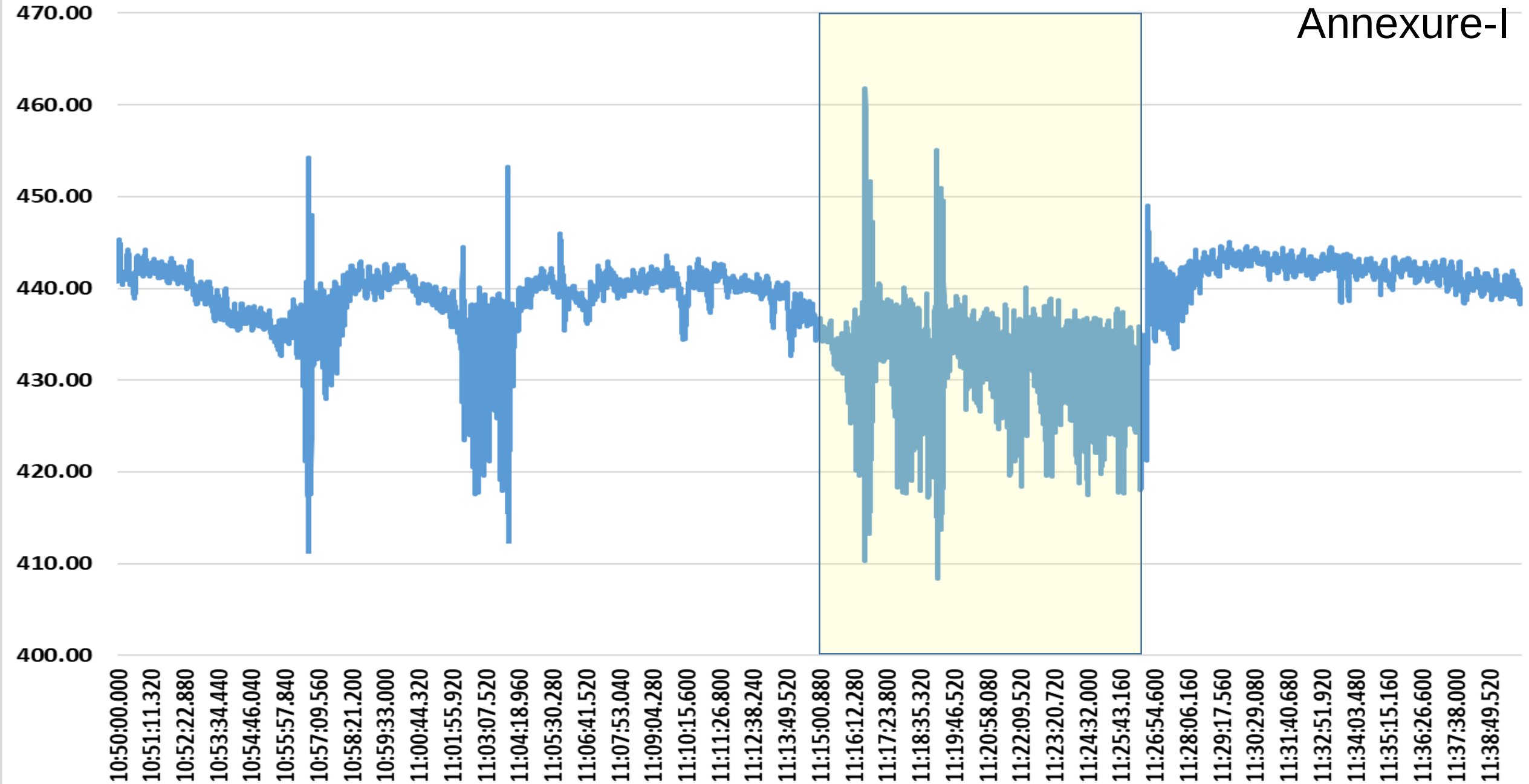
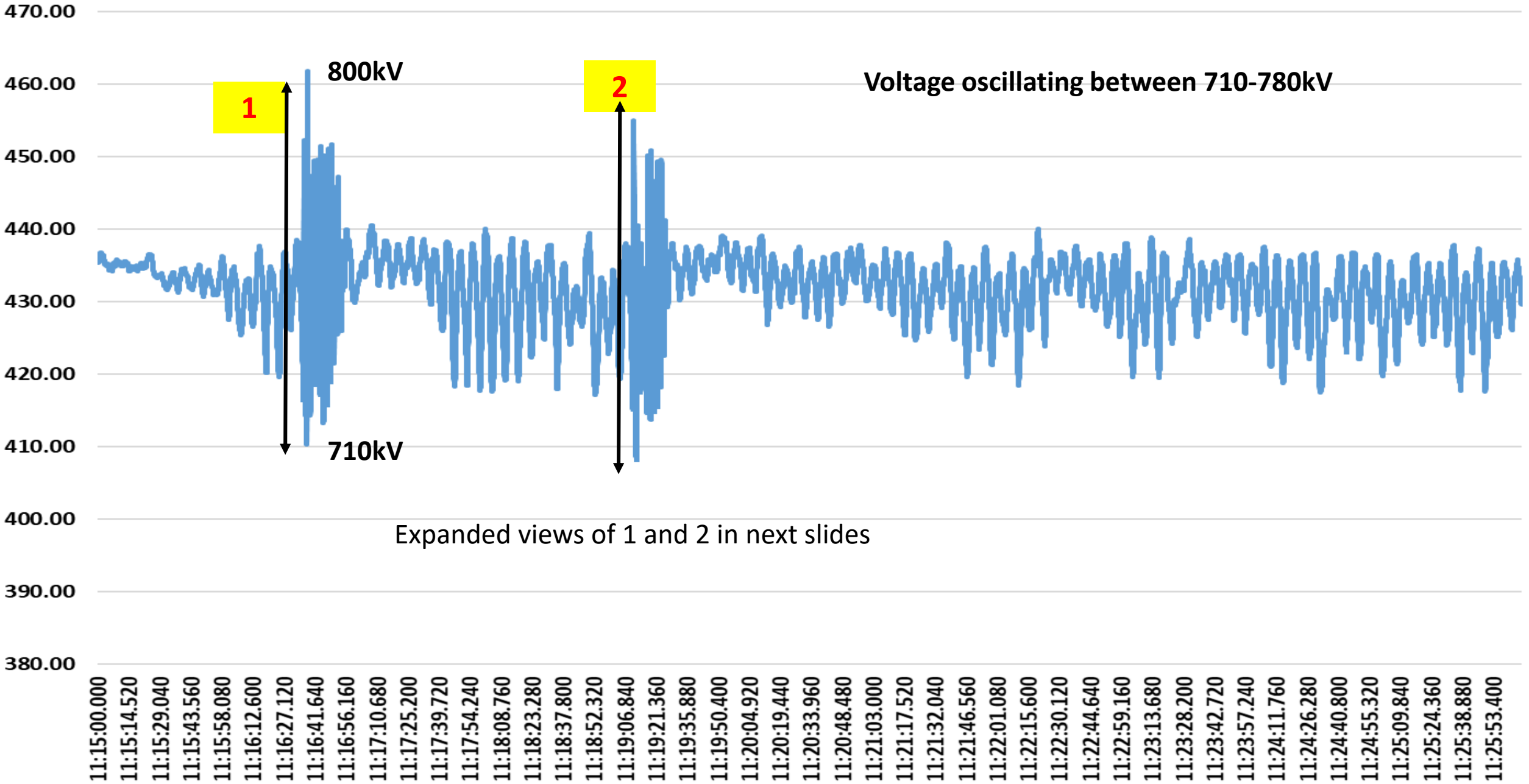
Fatehgarh-II Voltage of Bhadla-II line (phase voltage)

Annexure-I

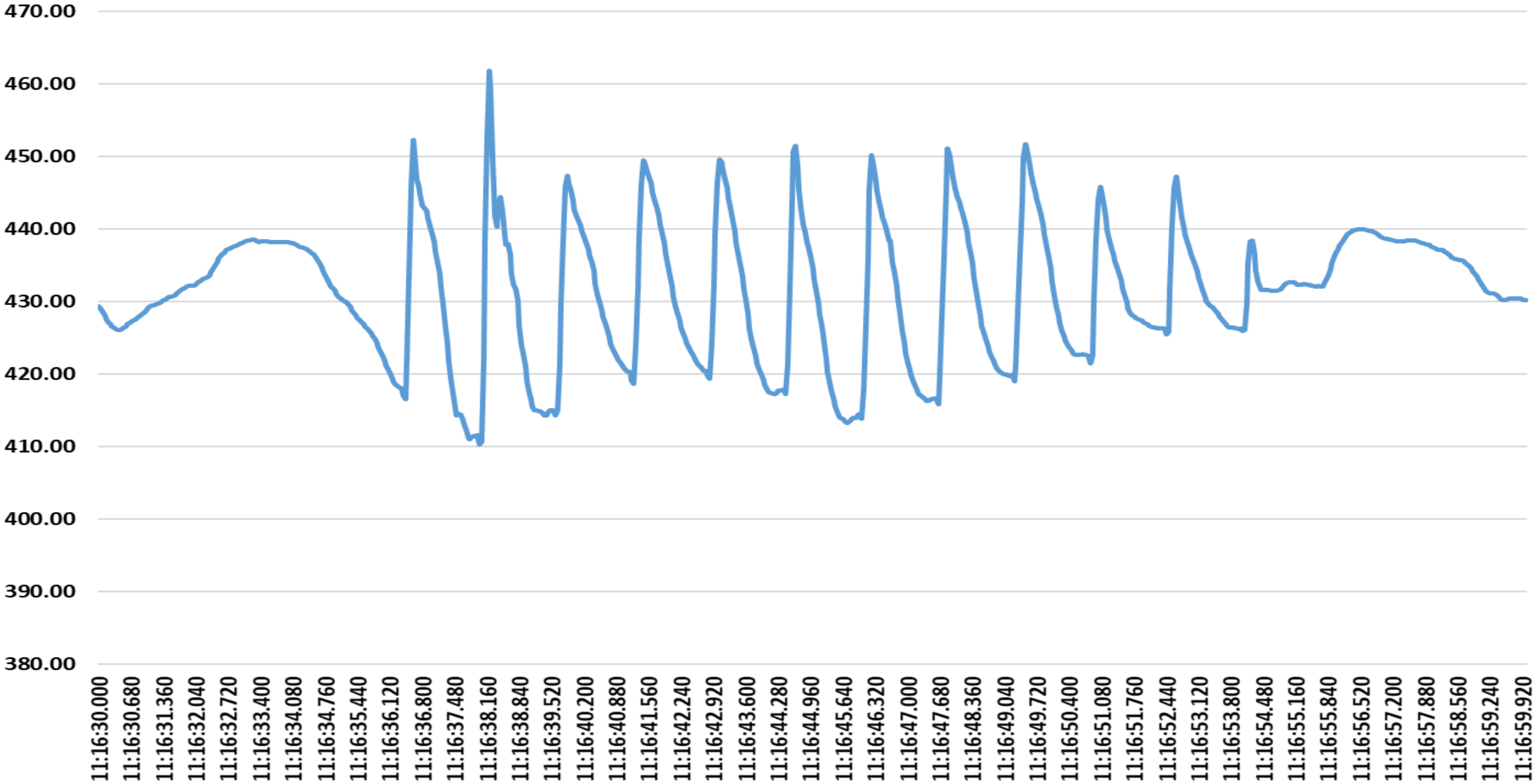


Fatehgarh-II Voltage of Bhadla-II line (R phase voltage)

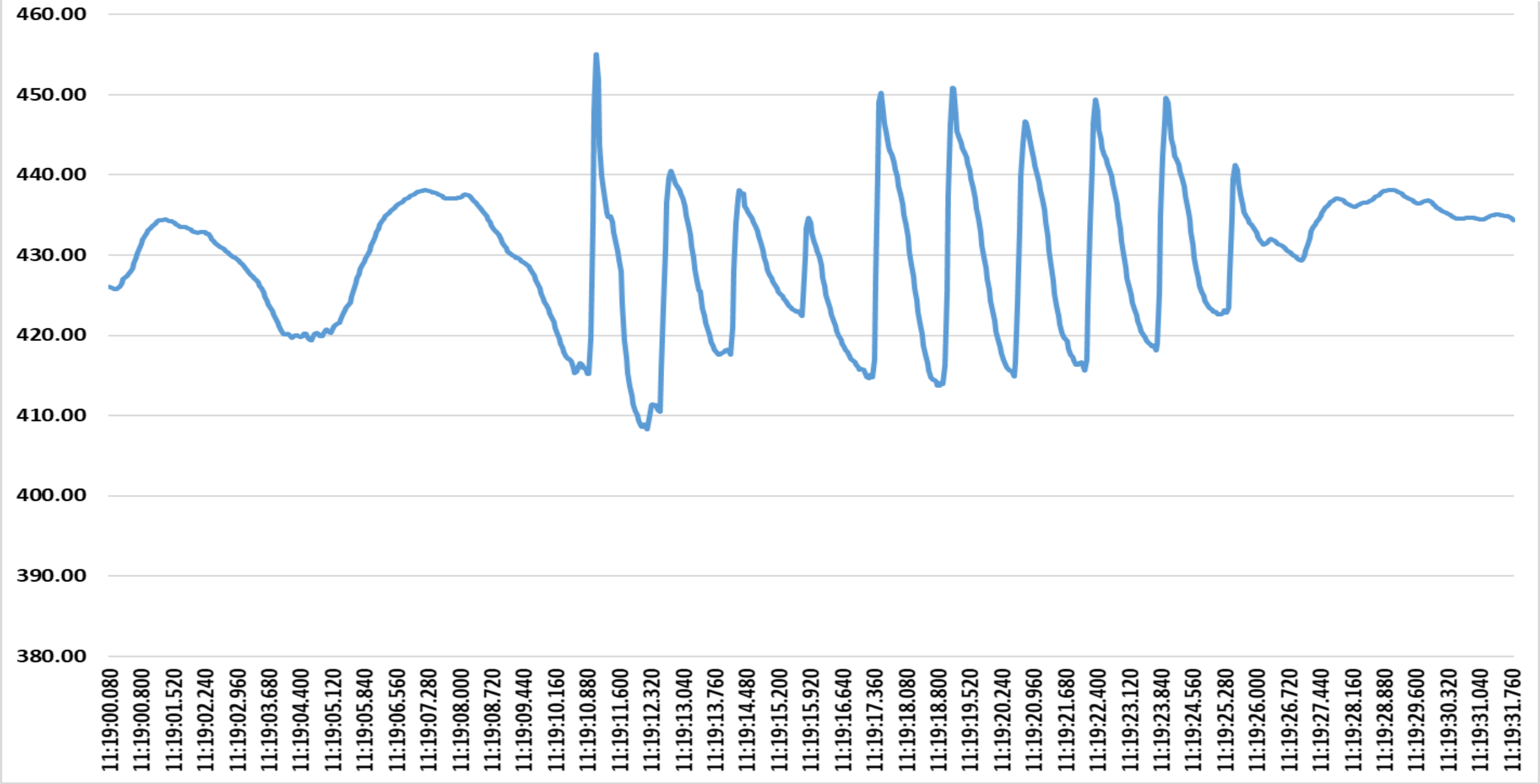


1

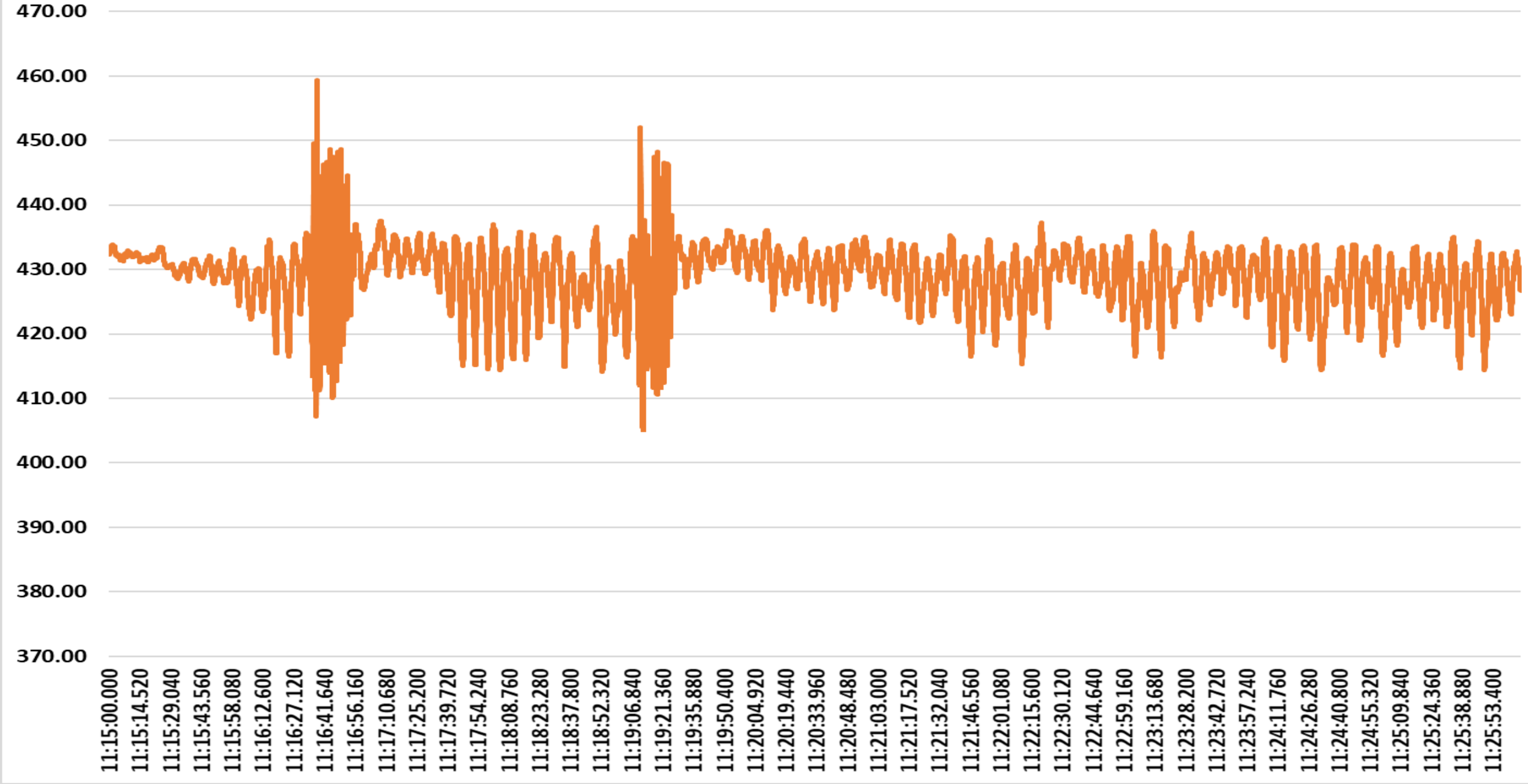
Fatehgarh-II Voltage of Bhadla-II line (R phase voltage)



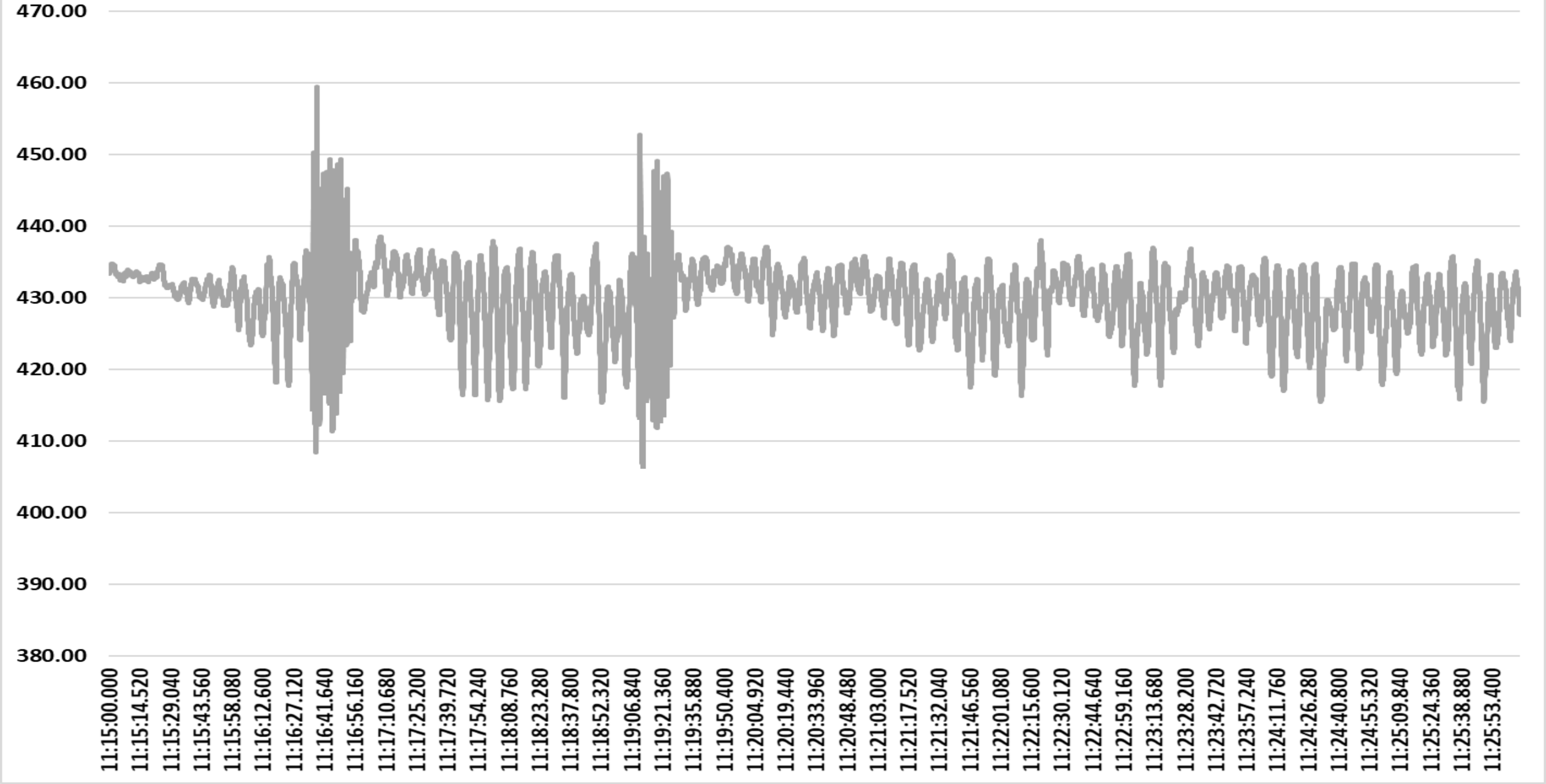
2 Fatehgarh-II Voltage of Bhadla-II line (R phase voltage)



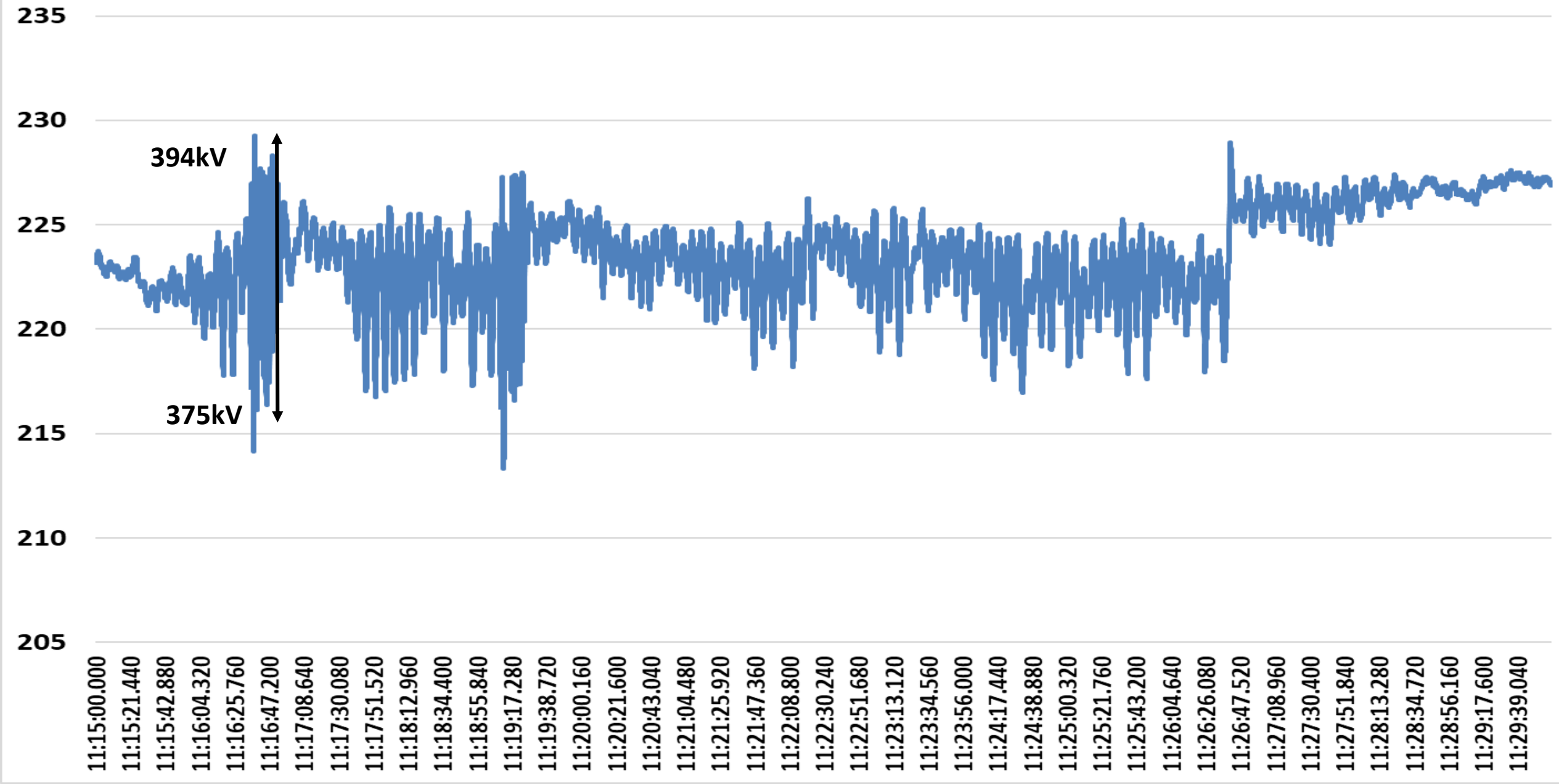
Fatehgarh-II Voltage of Bhadla-II line (Y phase voltage)



Fatehgarh-II Voltage of Bhadla-II line (B phase voltage)

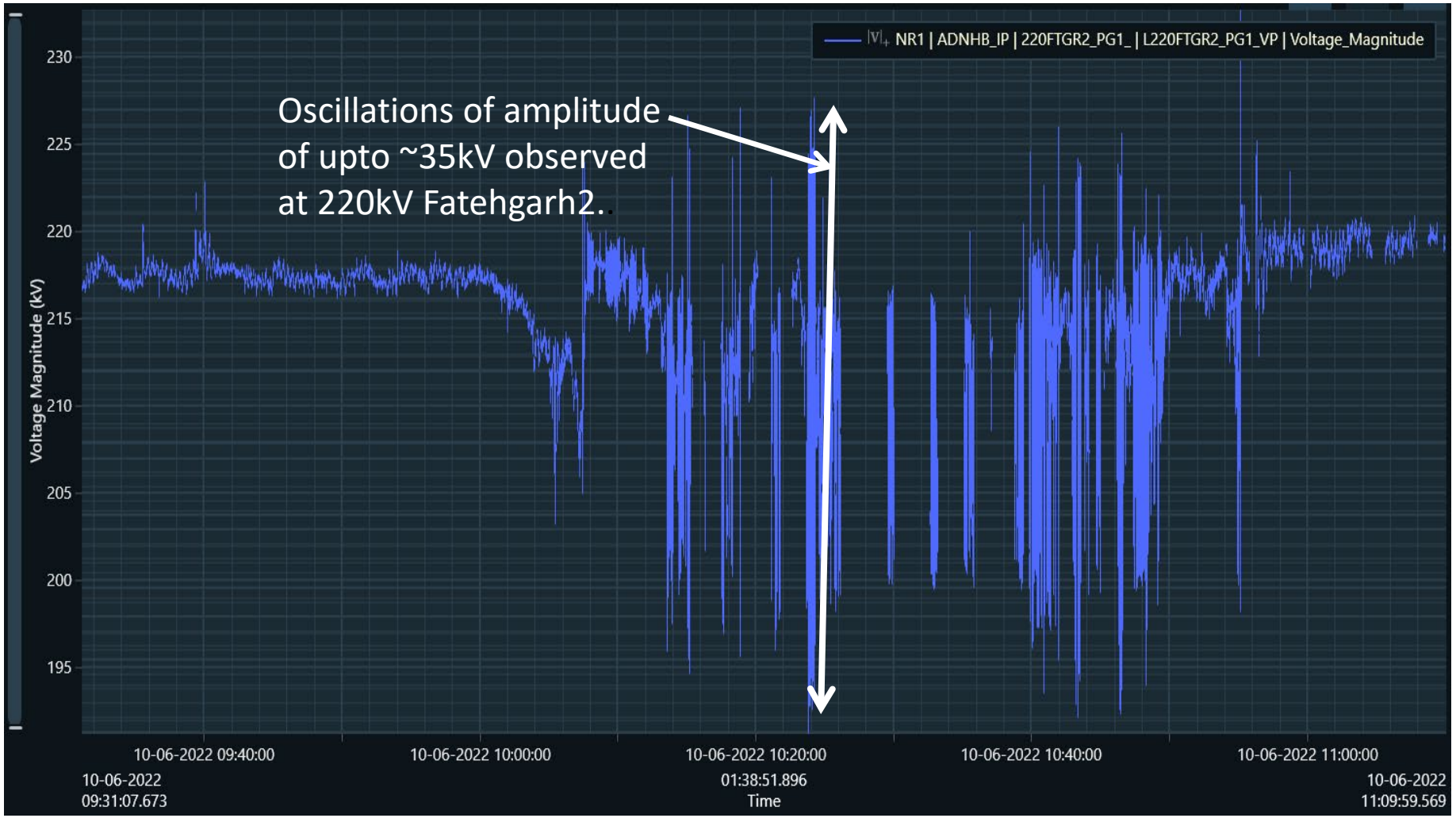


Voltage of Jodhpur 400kV bus (R phase voltage)



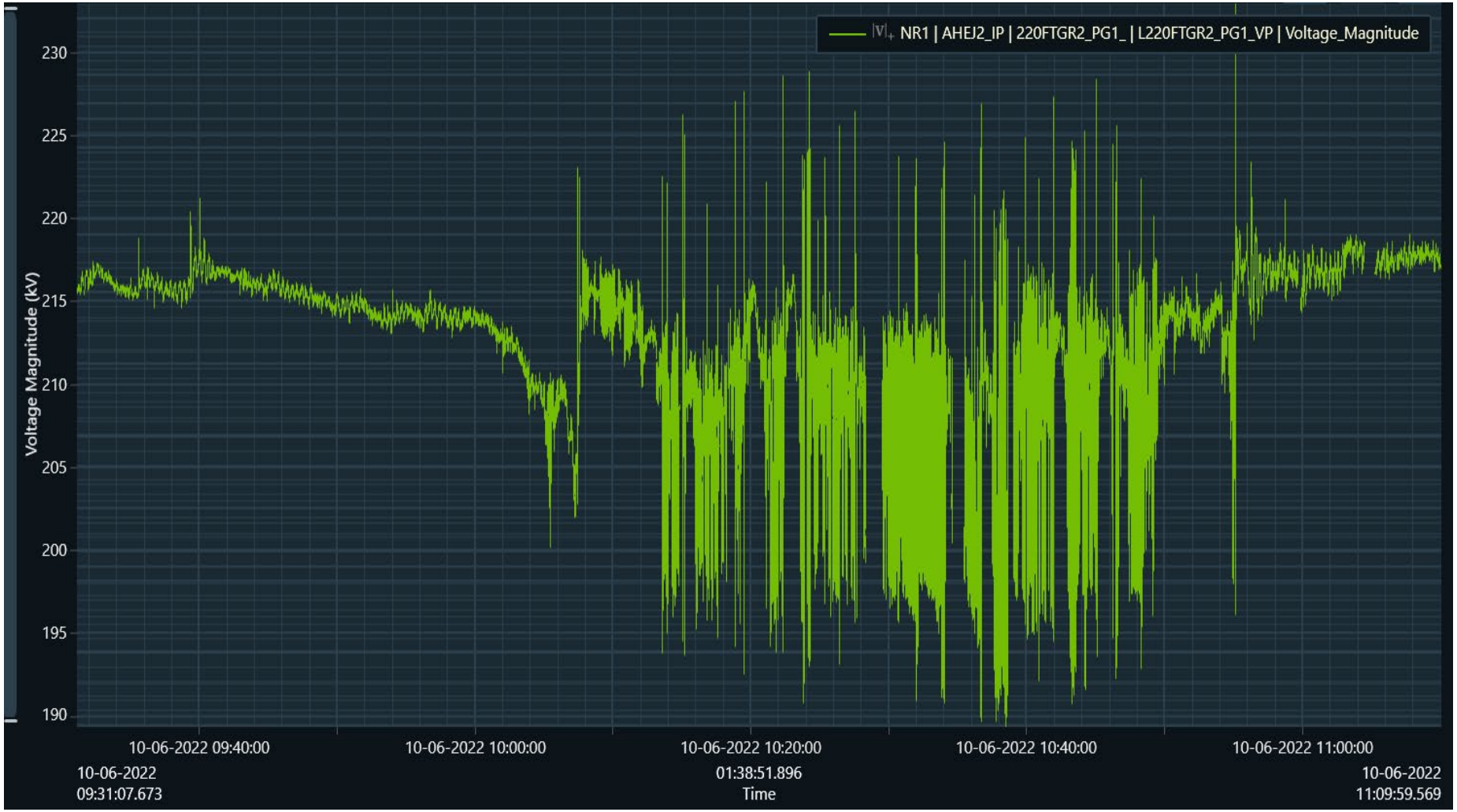
PMU data of Voltage of 220kV Fatehgarh2-AHEJOL ckt-1 at AHEJOL end (connected at Fatehgarh2)

10.06.22



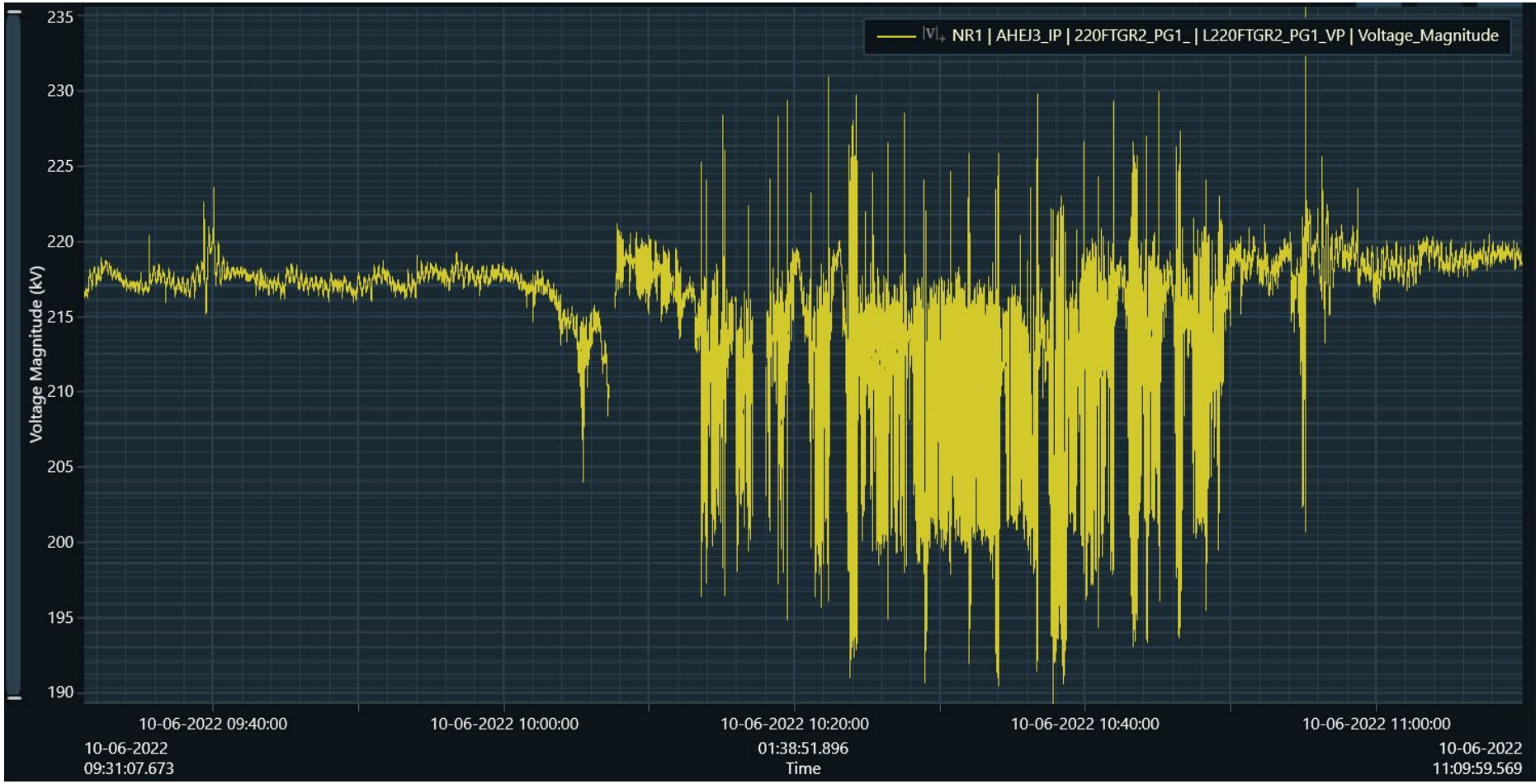
Oscillations in voltage in the range of 25-40kV during time period 10:05hrs-10:55hrs.

PMU data of Voltage of 220kV Fatehgarh2-AHEJ2L ckt at AHEJ2L end (connected at Fatehgarh2)



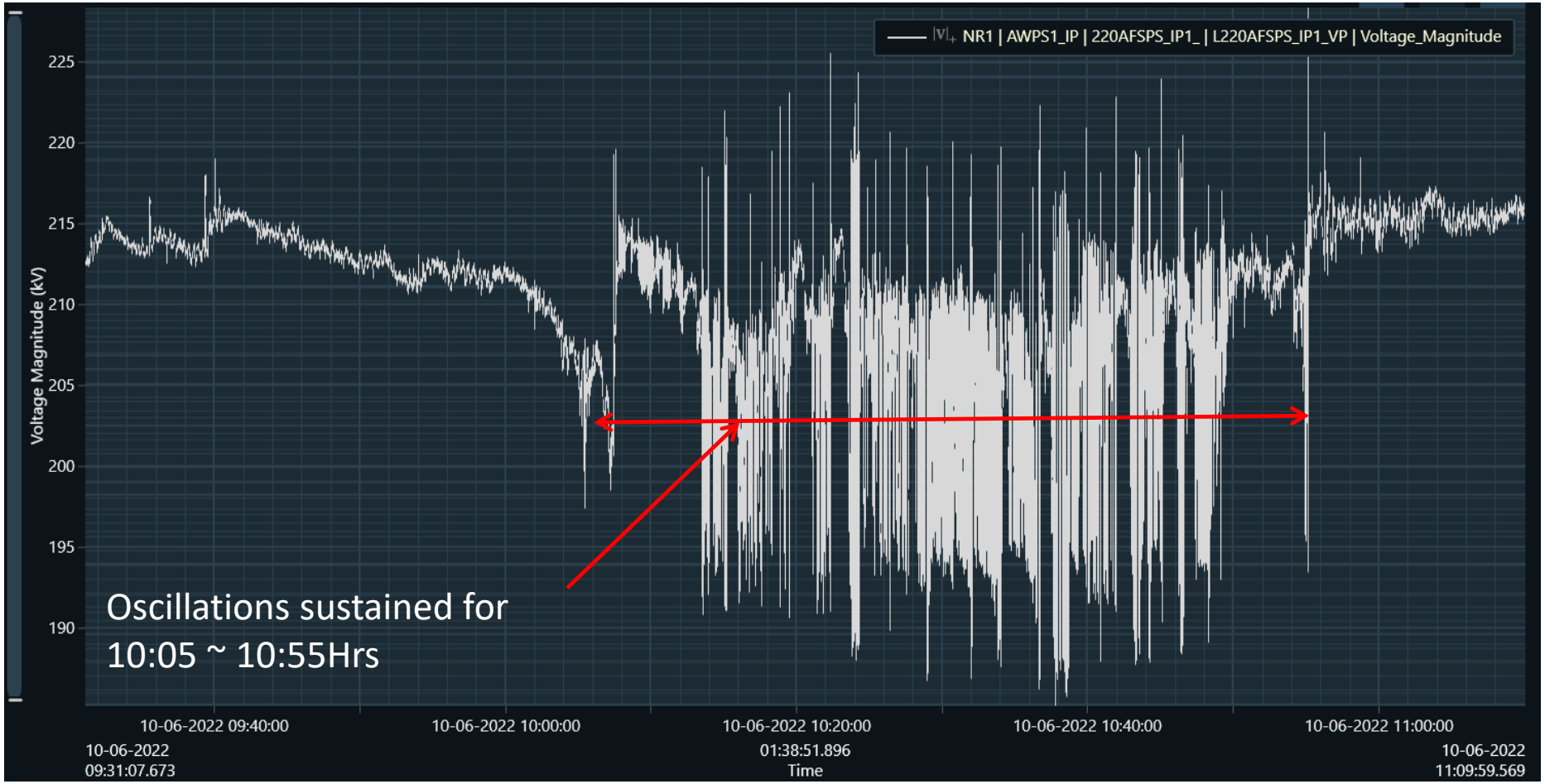
Oscillations in voltage in the range of 25-40kV during time period 10:05hrs-10:55hrs.

PMU data of Voltage of 220kV Fatehgarh2-AHEJ3L ckt at AHEJ3L end (connected at Fatehgarh2)



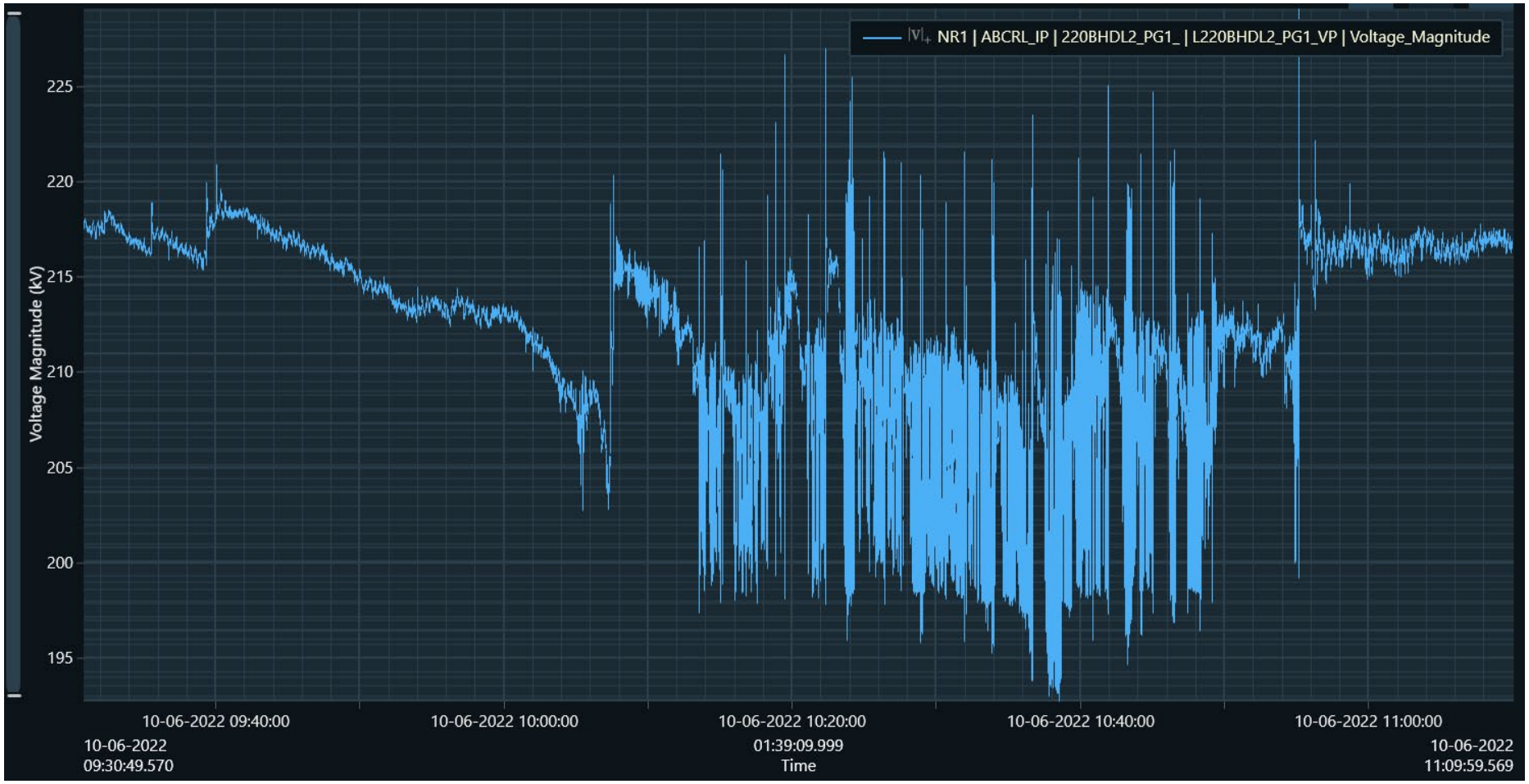
Oscillations in voltage in the range of 25-40kV during time period 10:05hrs-10:55hrs.

PMU data of Voltage of 220kV ADANI Fatehgarh Solar park-AWPS1 ckt at AWPS1 end (pooled at Fatehgarh2)



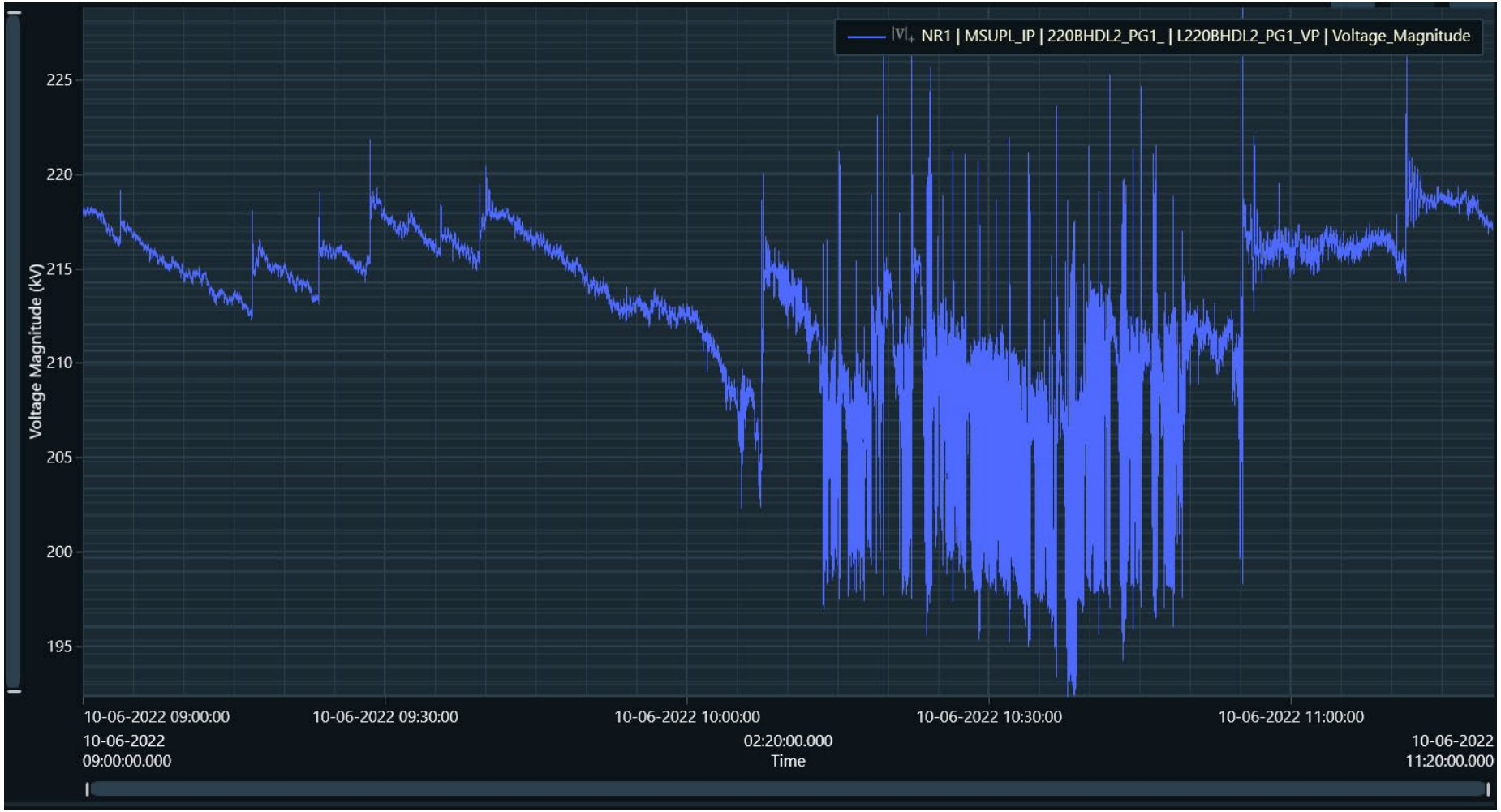
Oscillations in voltage in the range of 25-40kV during time period 10:05hrs-10:55hrs. Voltage dropped to 185kV.

PMU data of Voltage of 220kV Bhadla2-ABC Renewable ckt at ABCRL end (connected at Bhadla2)



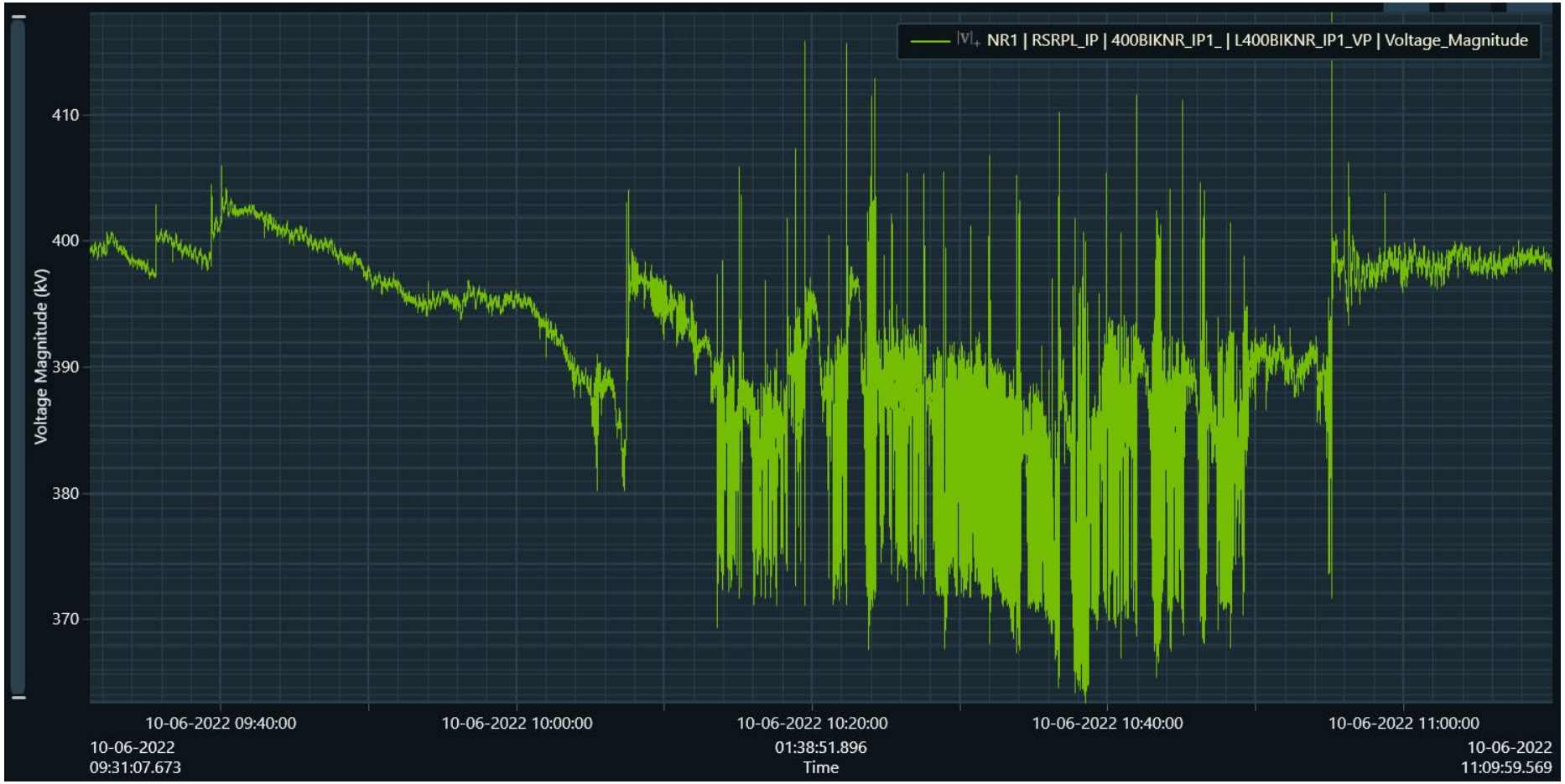
Oscillations in voltage in the range of 20-25kV during time period 10:05hrs-10:55hrs.

PMU data of Voltage of 220kV Bhadla2-MSUPL ckt at MSUPL end (connected at Bhadla2)

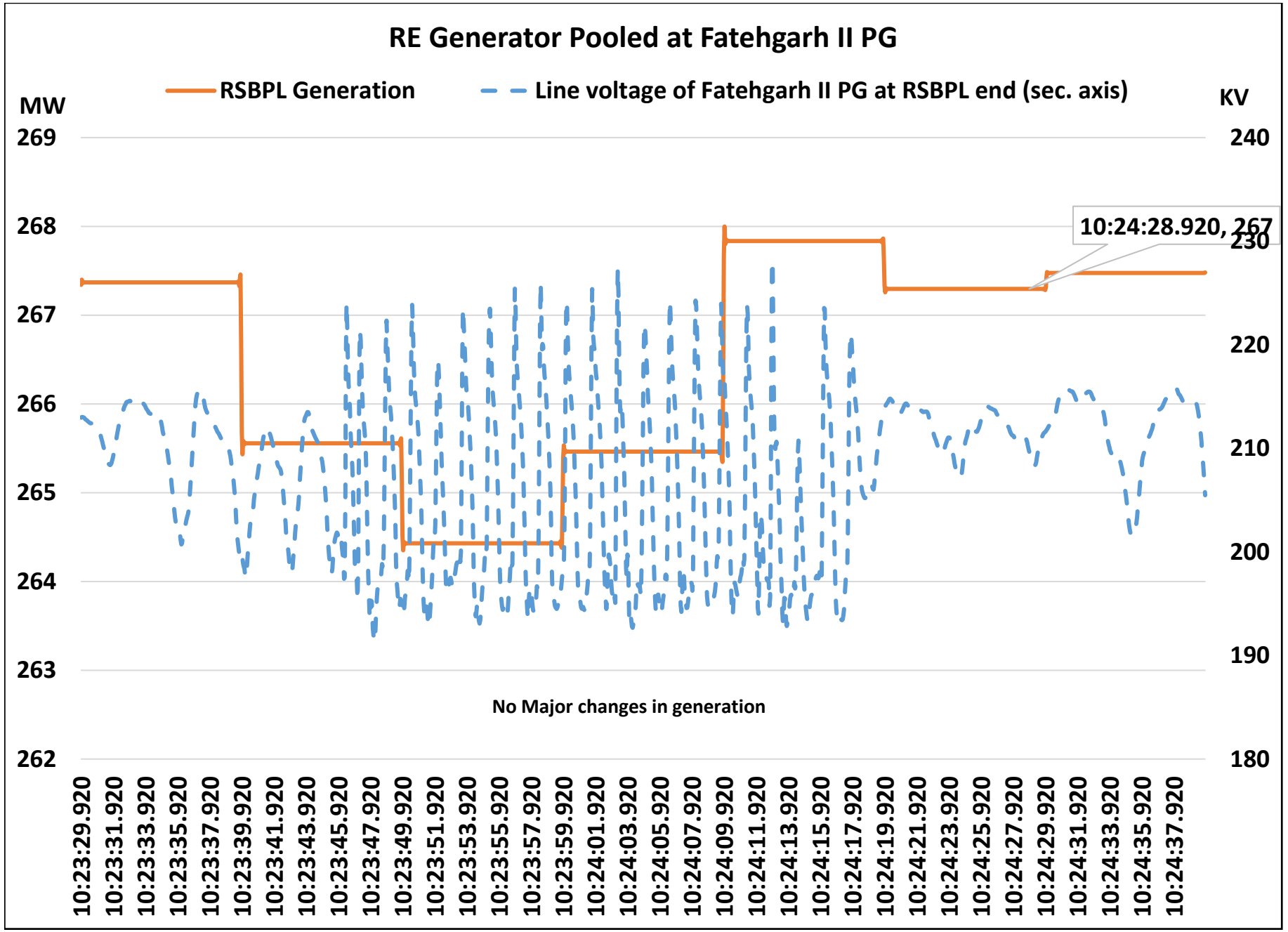


Oscillations in voltage in the range of 25kV during time period 10:05hrs-10:55hrs.

PMU data of Voltage of 400kV Bikaner-RSRPL ckt at RSRPL end (connected at Bikaner)



Oscillations in voltage in the range of 30-35kV during time period 10:05hrs-10:55hrs.


RE Generator Pooled at Fatehgarh II PG
RSBPL Generation
Line voltage of Fatehgarh II PG at RSBPL end (sec. axis)
MW
KV
269
268
267
266
265
264
263
262
240
230
220
210
200
190
180
10:24:28.920, 267
No Major changes in generation
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
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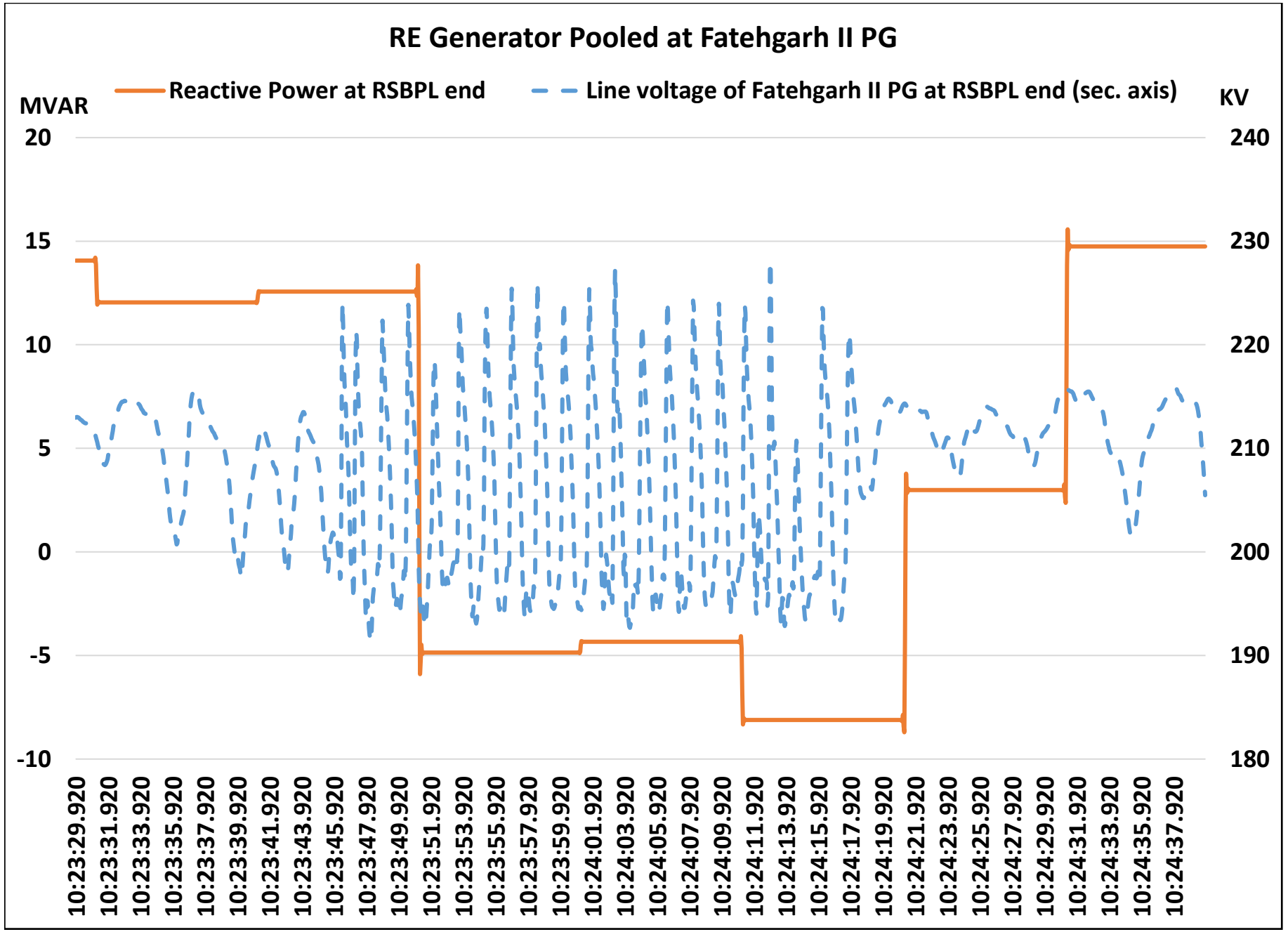
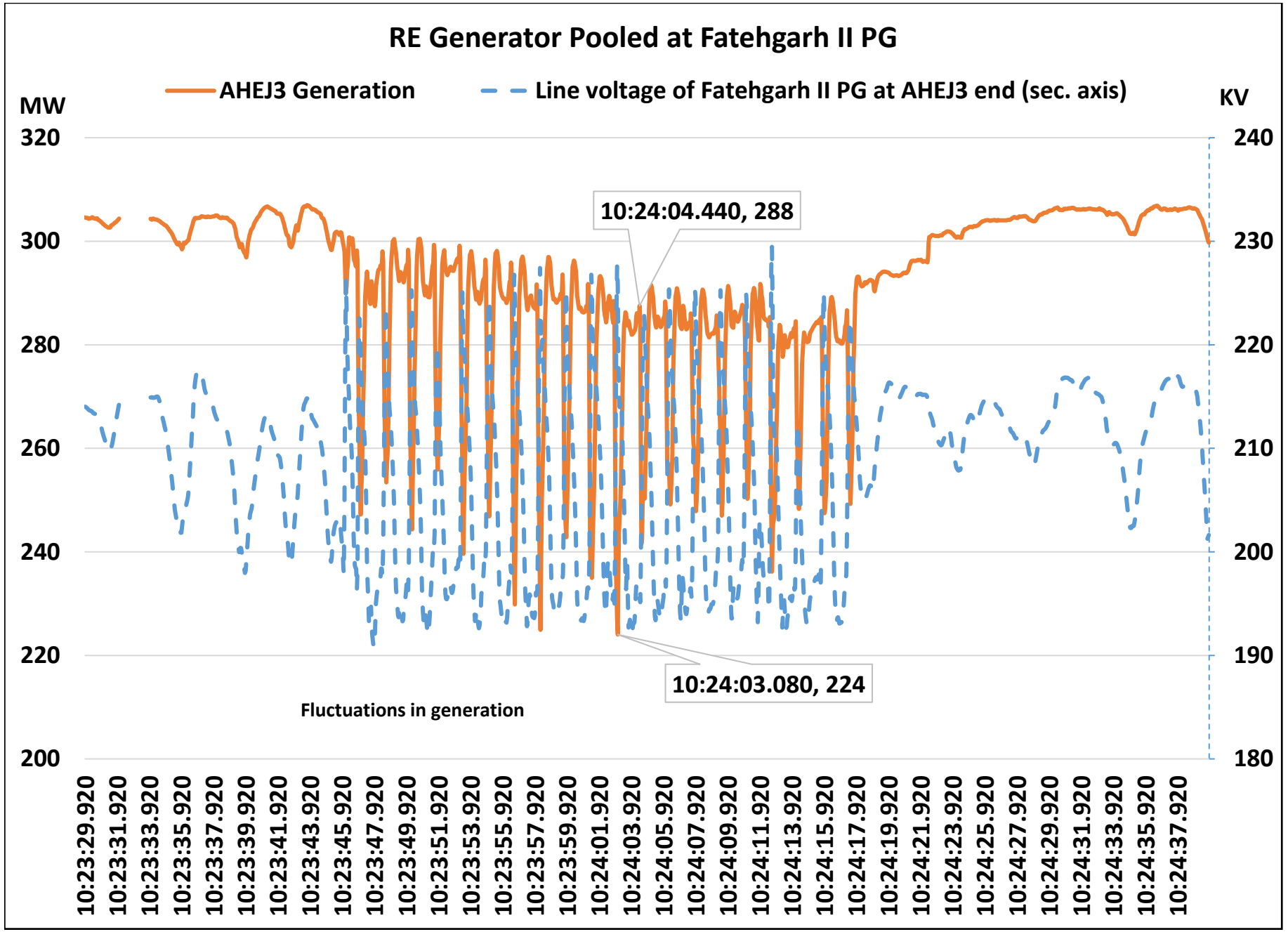
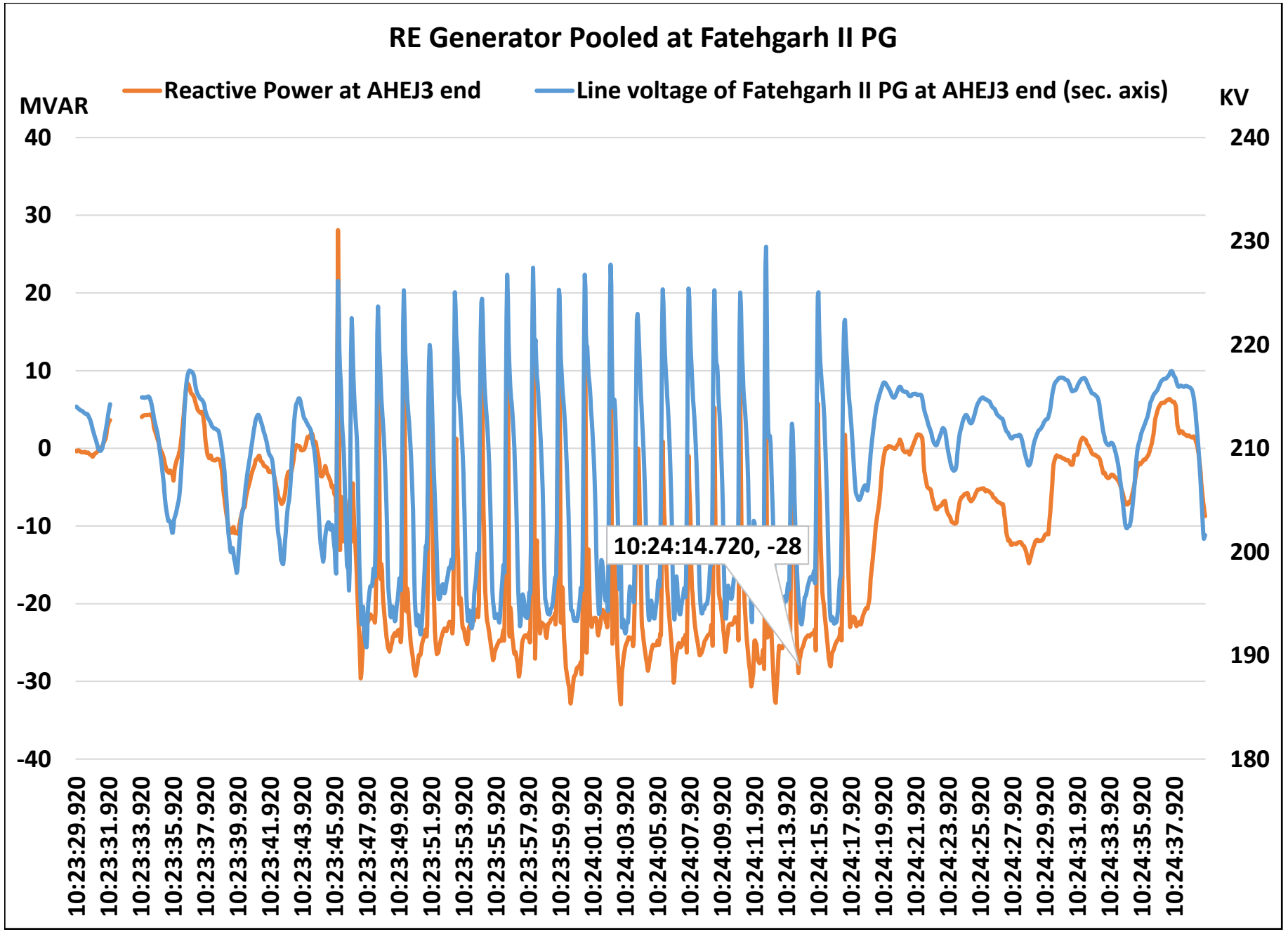
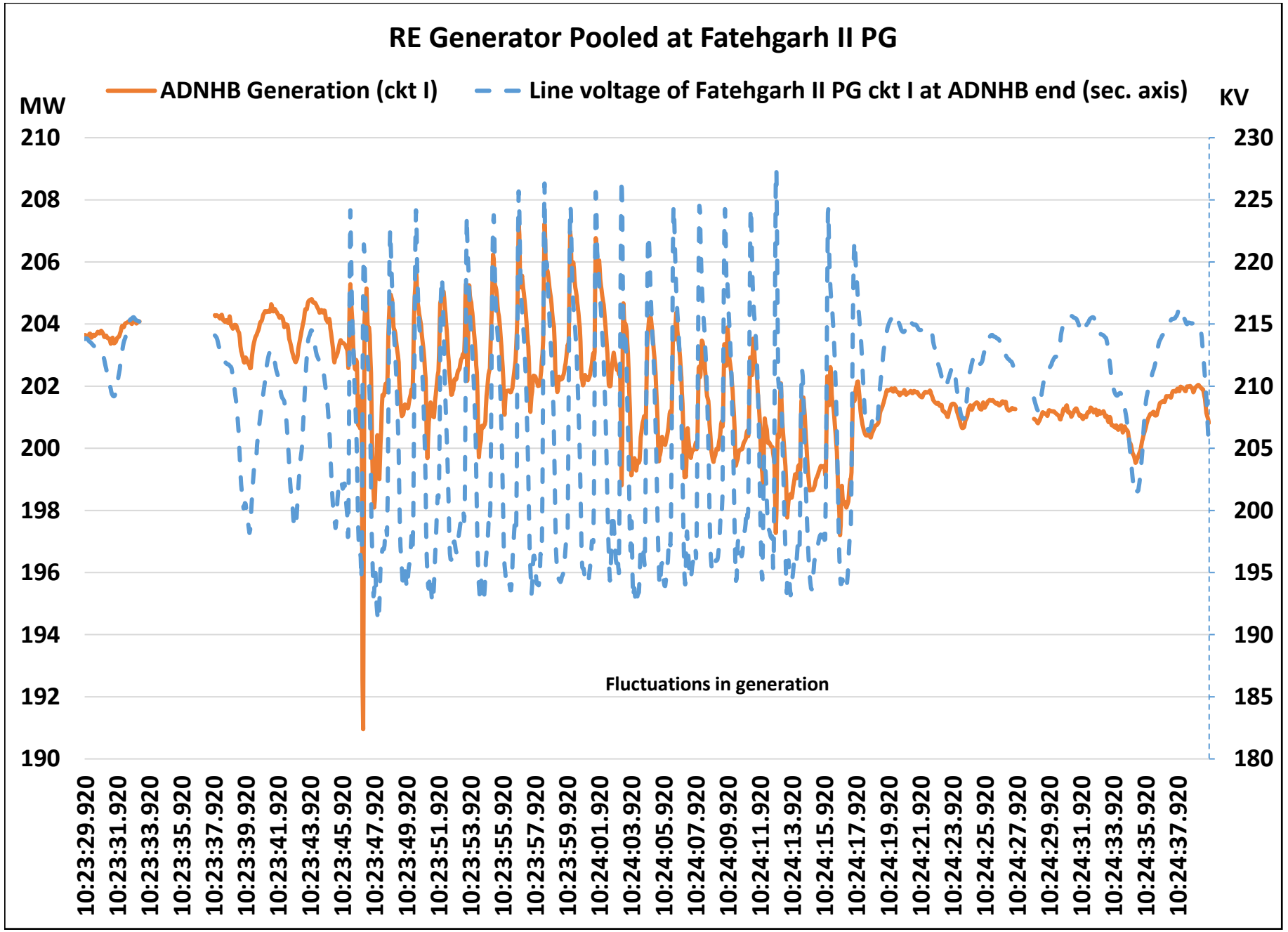
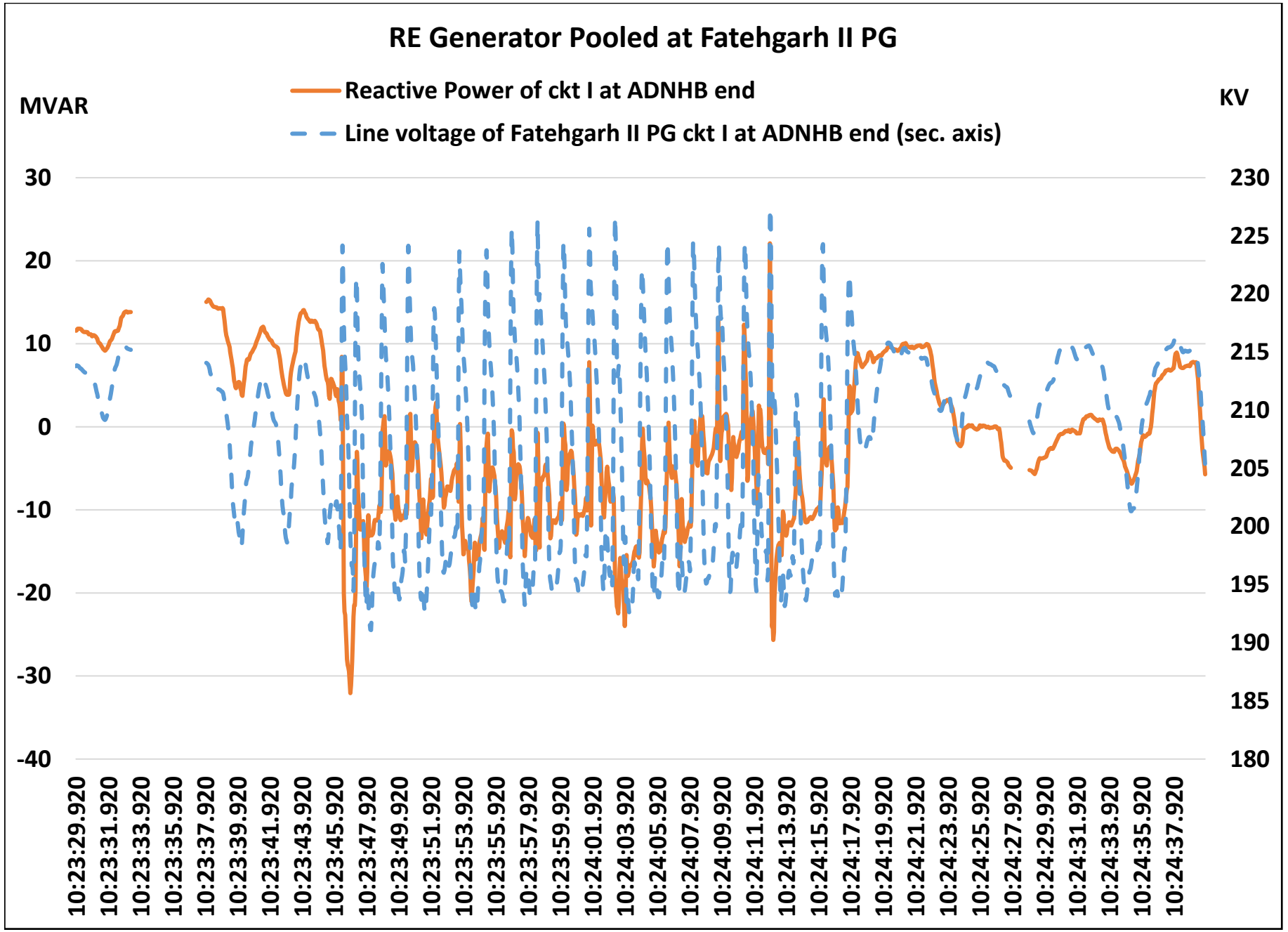
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

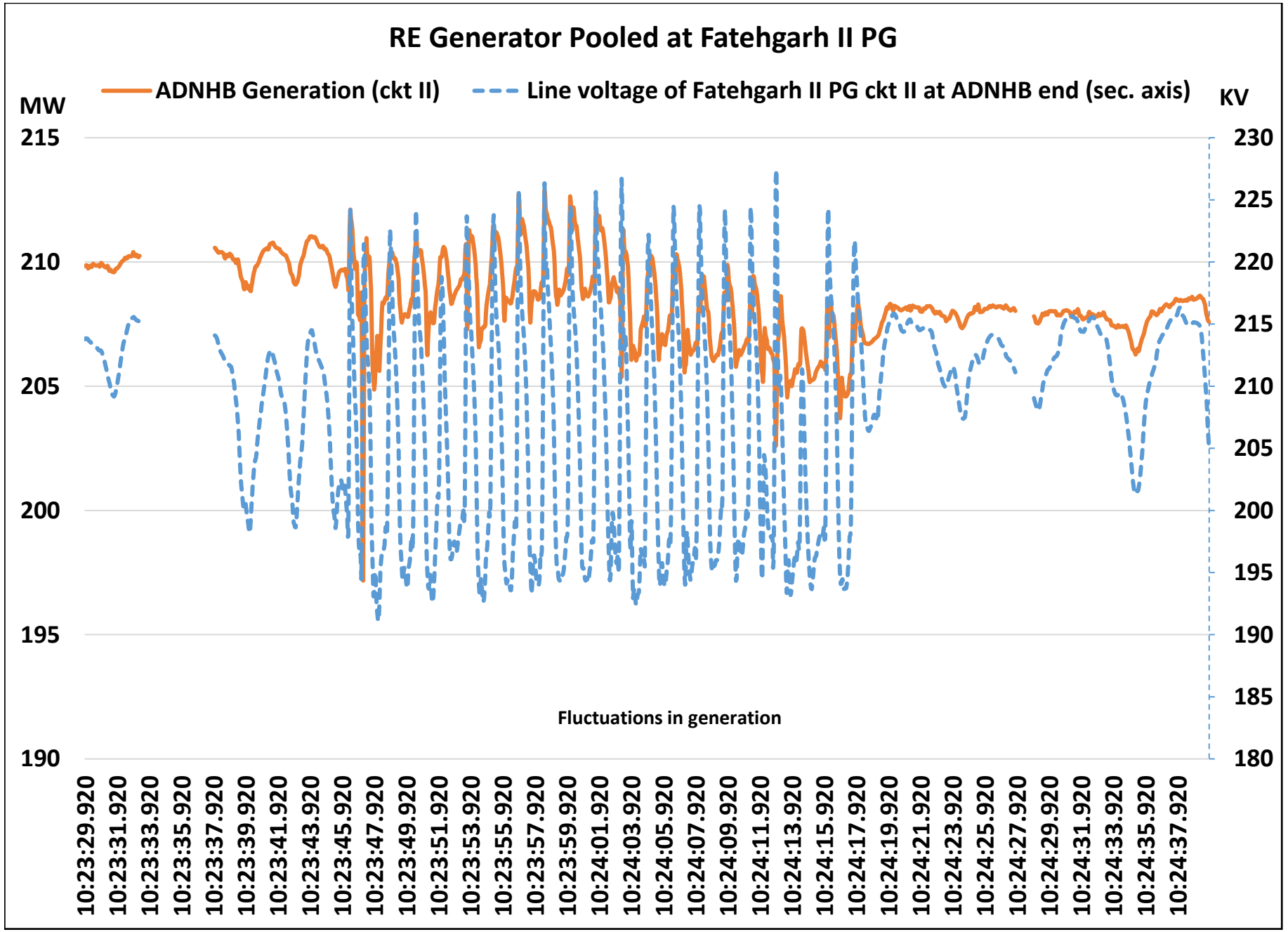

RE Generator Pooled at Fatehgarh II PG
Reactive Power at RSBPL end
Line voltage of Fatehgarh II PG at RSBPL end (sec. axis)
MVAR
KV
20
15
10
5
0
-5
-10
240
230
220
210
200
190
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

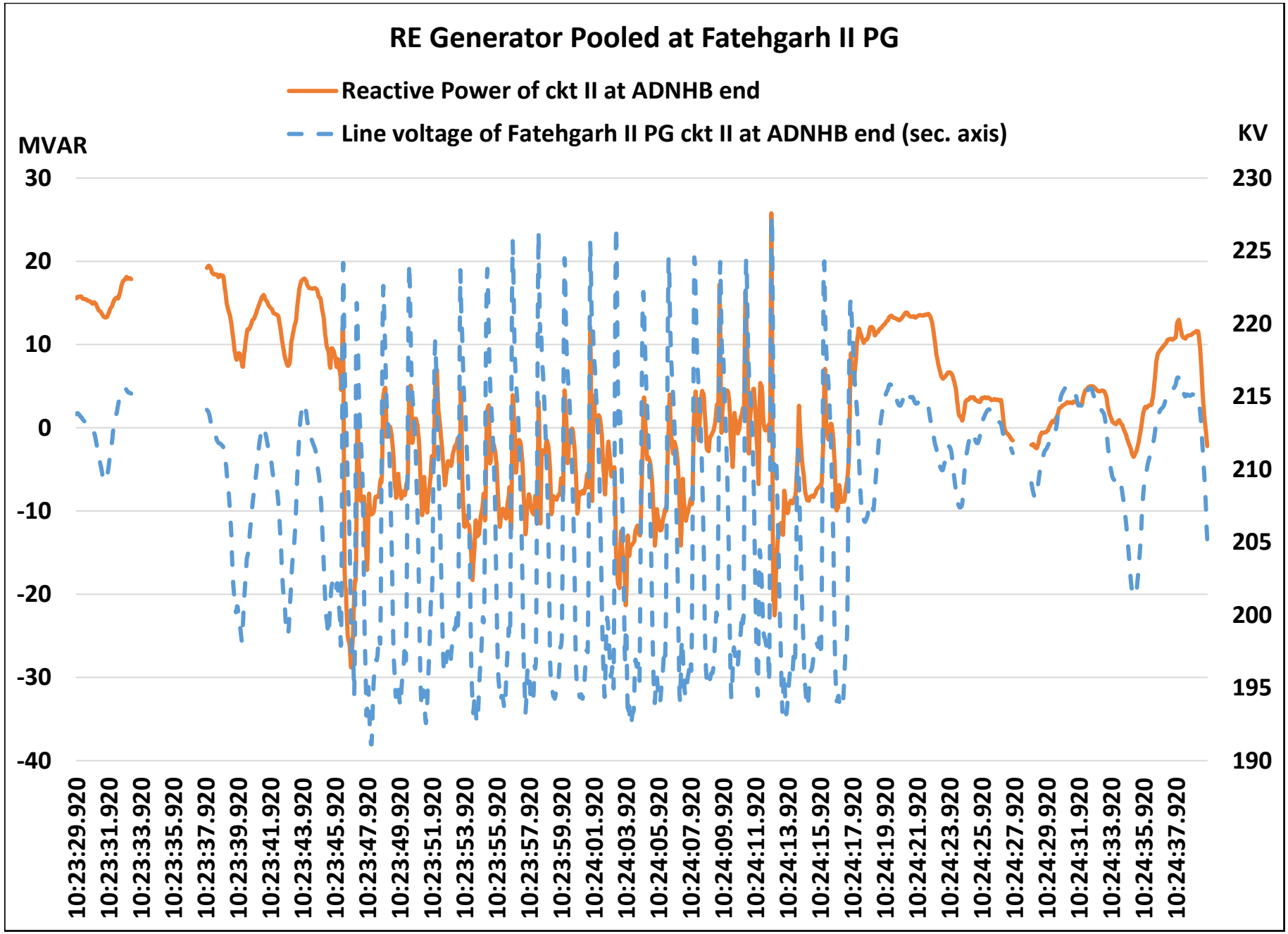

RE Generator Pooled at Fatehgarh II PG
AHEJ3 Generation
Line voltage of Fatehgarh II PG at AHEJ3 end (sec. axis)
MW
KV
320
300
280
260
240
220
200
240
230
220
210
200
190
180
10:24:04.440, 288
10:24:03.080, 224
Fluctuations in generation
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

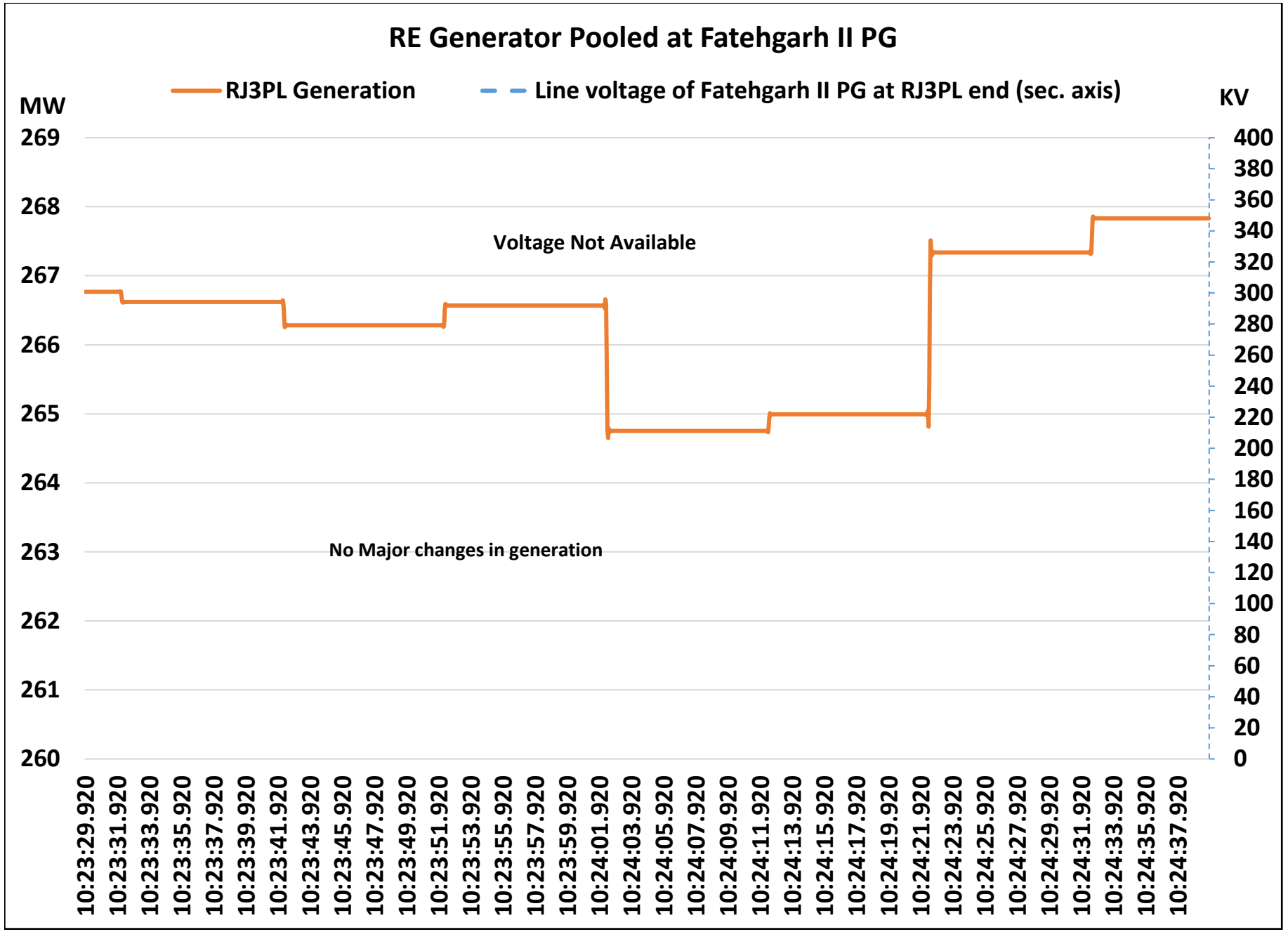

RE Generator Pooled at Fatehgarh II PG
Reactive Power at AHEJ3 end
Line voltage of Fatehgarh II PG at AHEJ3 end (sec. axis)
MVAR
KV
40
30
20
10
0
-10
-20
-30
-40
240
230
220
210
200
190
180
10:24:14.720, -28
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

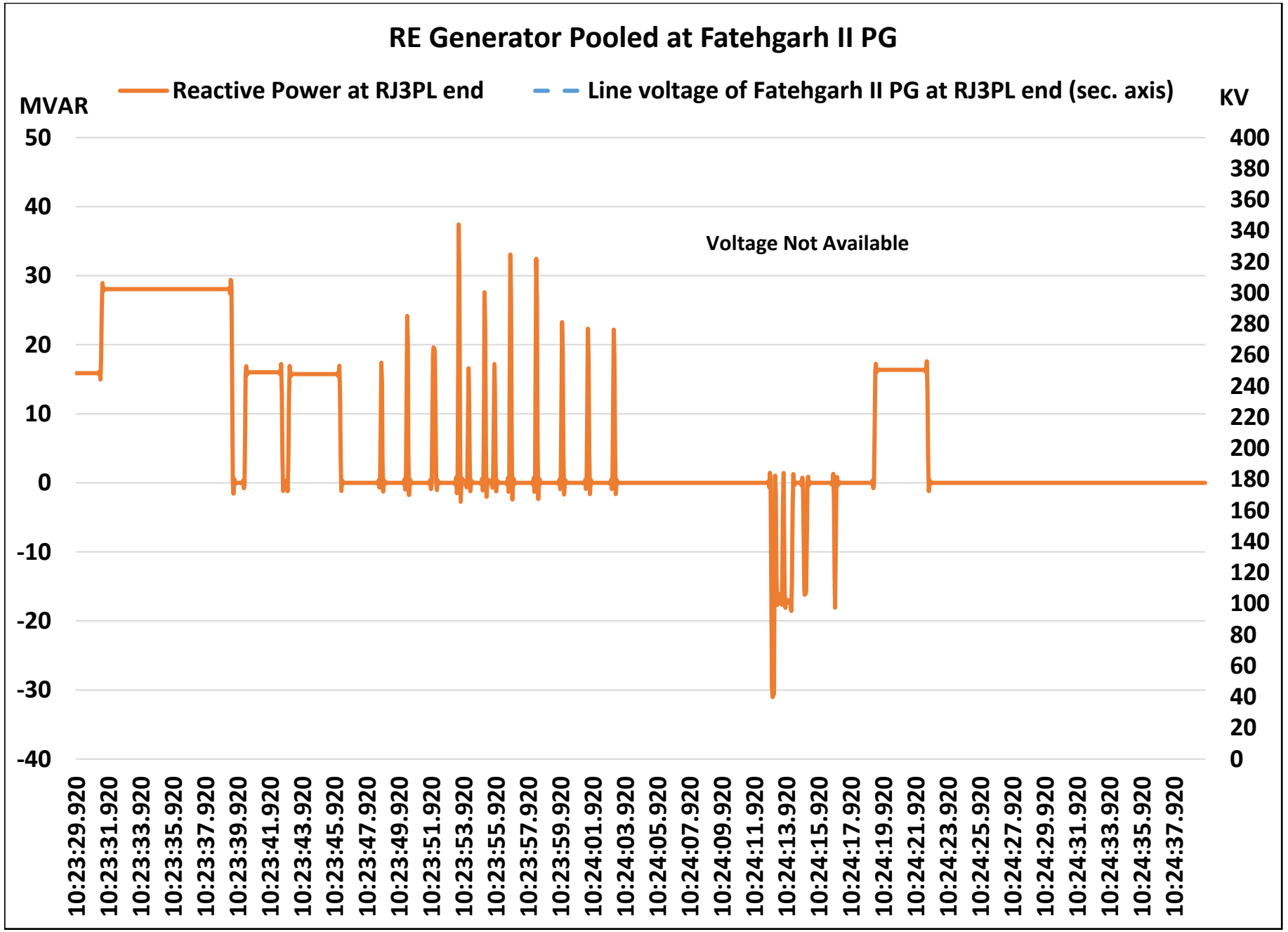

RE Generator Pooled at Fatehgarh II PG
ADNHB Generation (ckt I)
Line voltage of Fatehgarh II PG ckt I at ADNHB end (sec. axis)
MW
KV
210
208
206
204
202
200
198
196
194
192
190
230
225
220
215
210
205
200
195
190
185
180
Fluctuations in generation
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

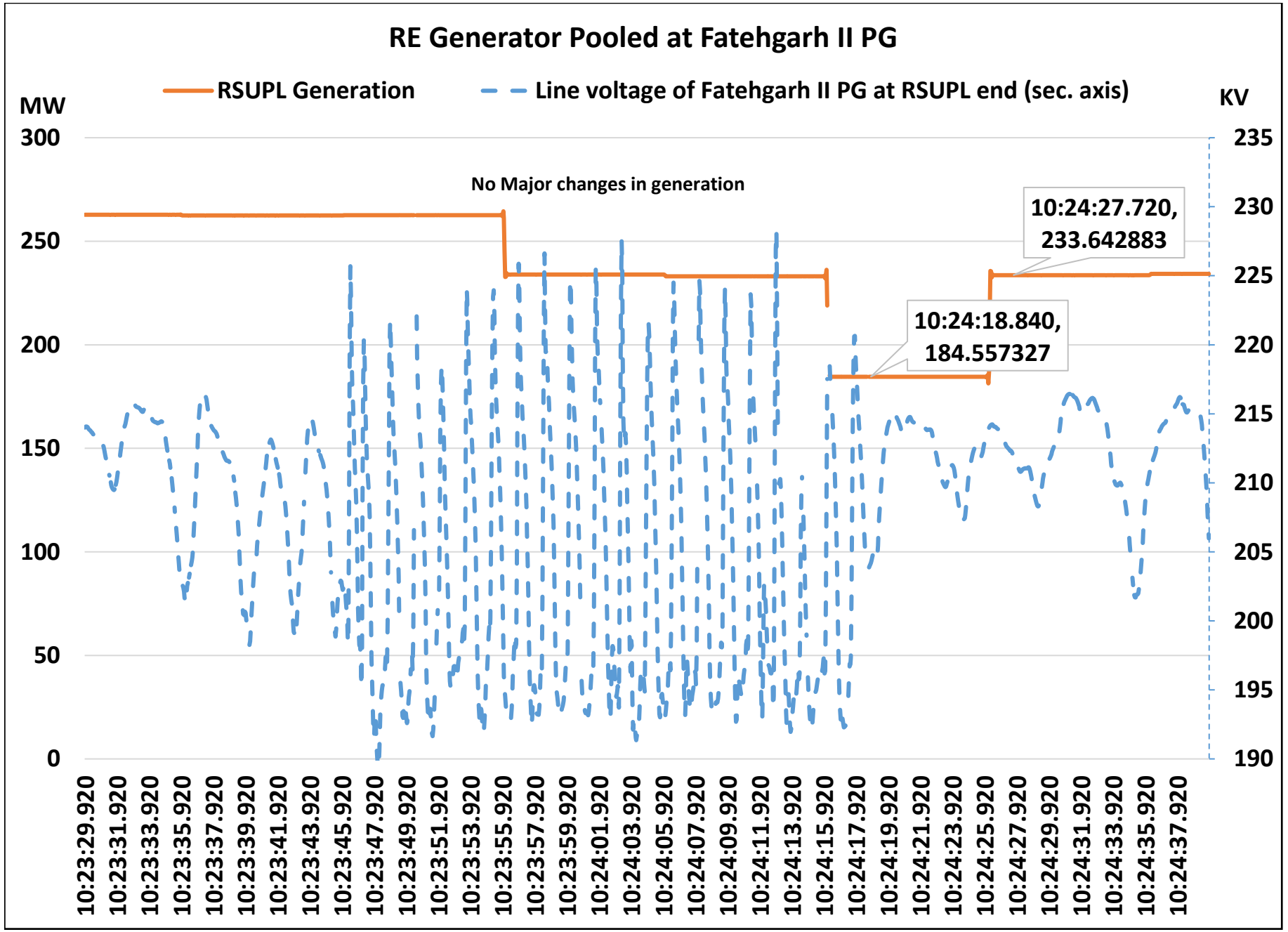

RE Generator Pooled at Fatehgarh II PG
Reactive Power of ckt I at ADNHB end
Line voltage of Fatehgarh II PG ckt I at ADNHB end (sec. axis)
MVAR
KV
30
20
10
0
-10
-20
-30
-40
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

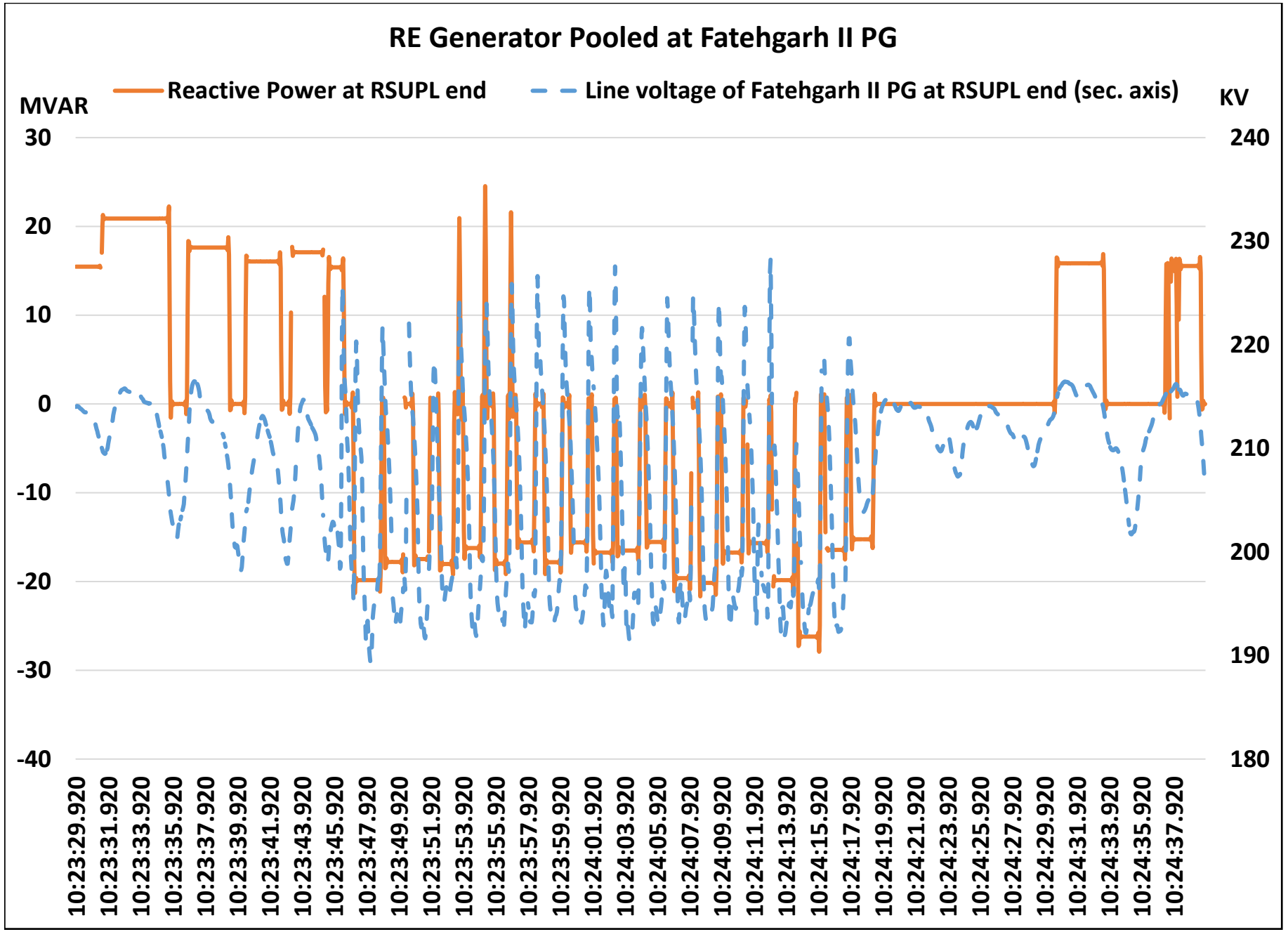

RE Generator Pooled at Fatehgarh II PG
ADNHB Generation (ckt II)
Line voltage of Fatehgarh II PG ckt II at ADNHB end (sec. axis)
MW
KV
215
210
205
200
195
190
230
225
220
215
210
205
200
195
190
185
180
Fluctuations in generation
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

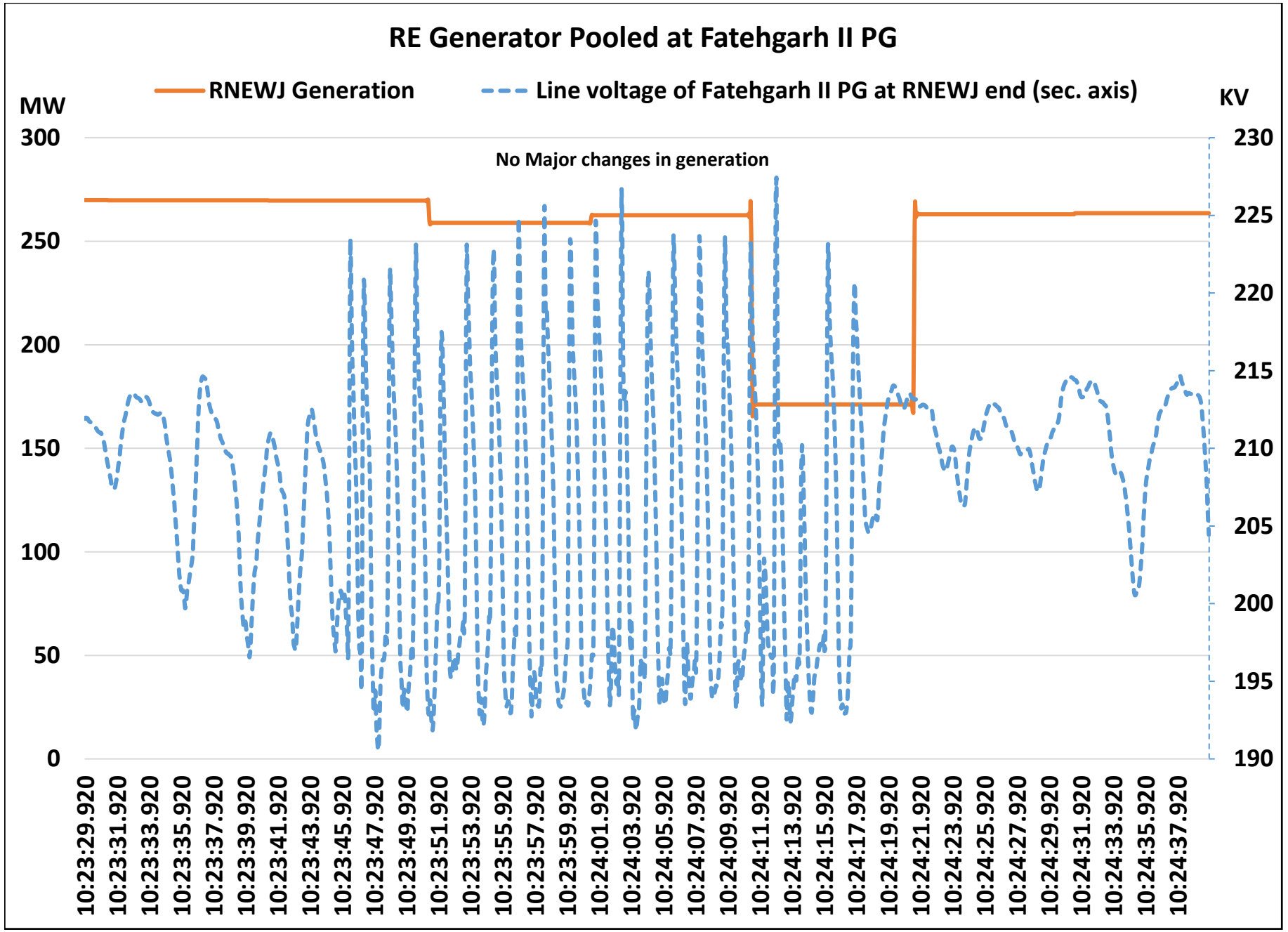

RE Generator Pooled at Fatehgarh II PG
Reactive Power of ckt II at ADNHB end
Line voltage of Fatehgarh II PG ckt II at ADNHB end (sec. axis)
MVAR
KV
30
20
10
0
-10
-20
-30
-40
230
225
220
215
210
205
200
195
190
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

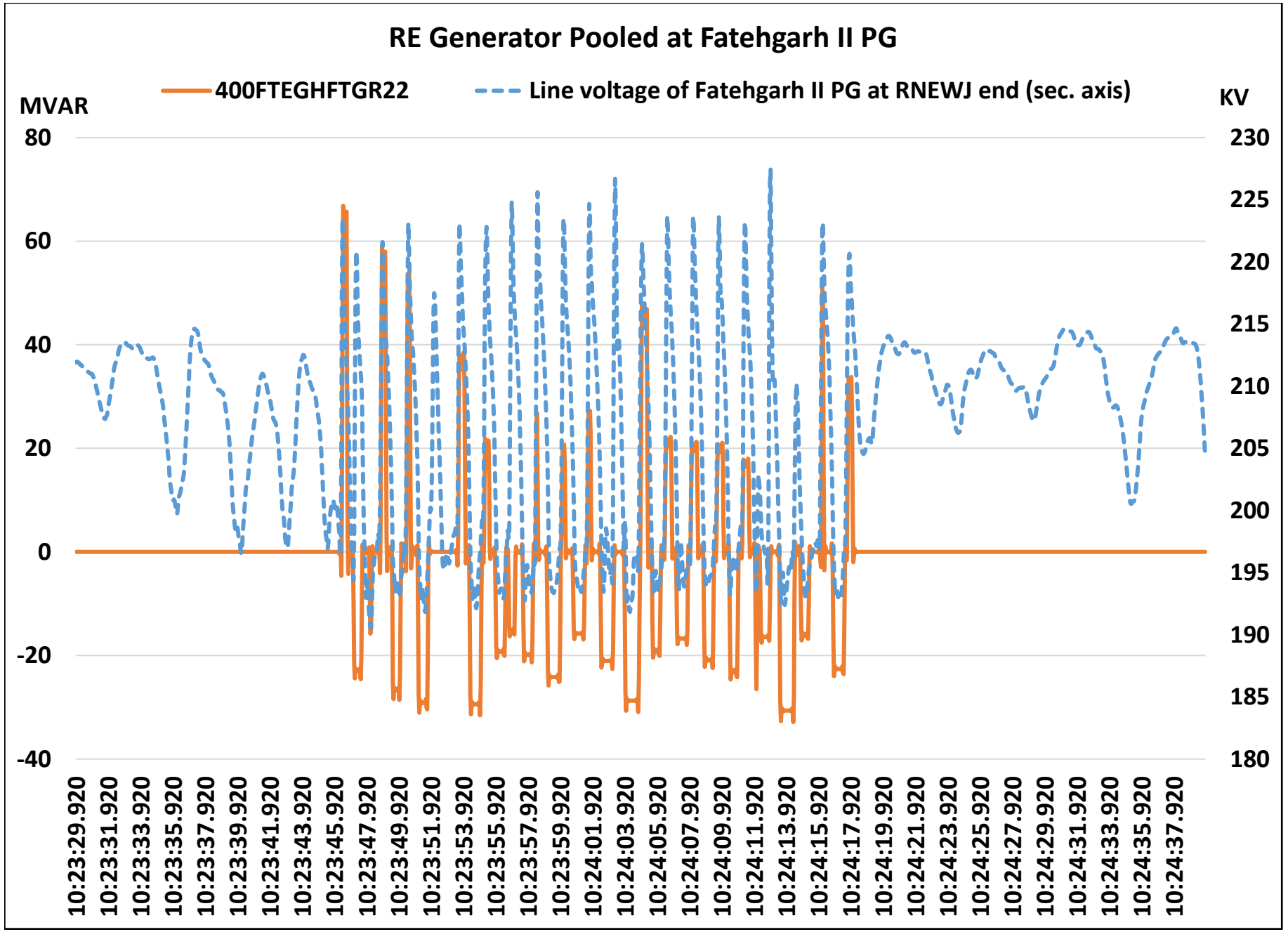

RE Generator Pooled at Fatehgarh II PG
RJ3PL Generation
Line voltage of Fatehgarh II PG at RJ3PL end (sec. axis)
MW
KV
269
268
267
266
265
264
263
262
261
260
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Voltage Not Available
No Major changes in generation
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

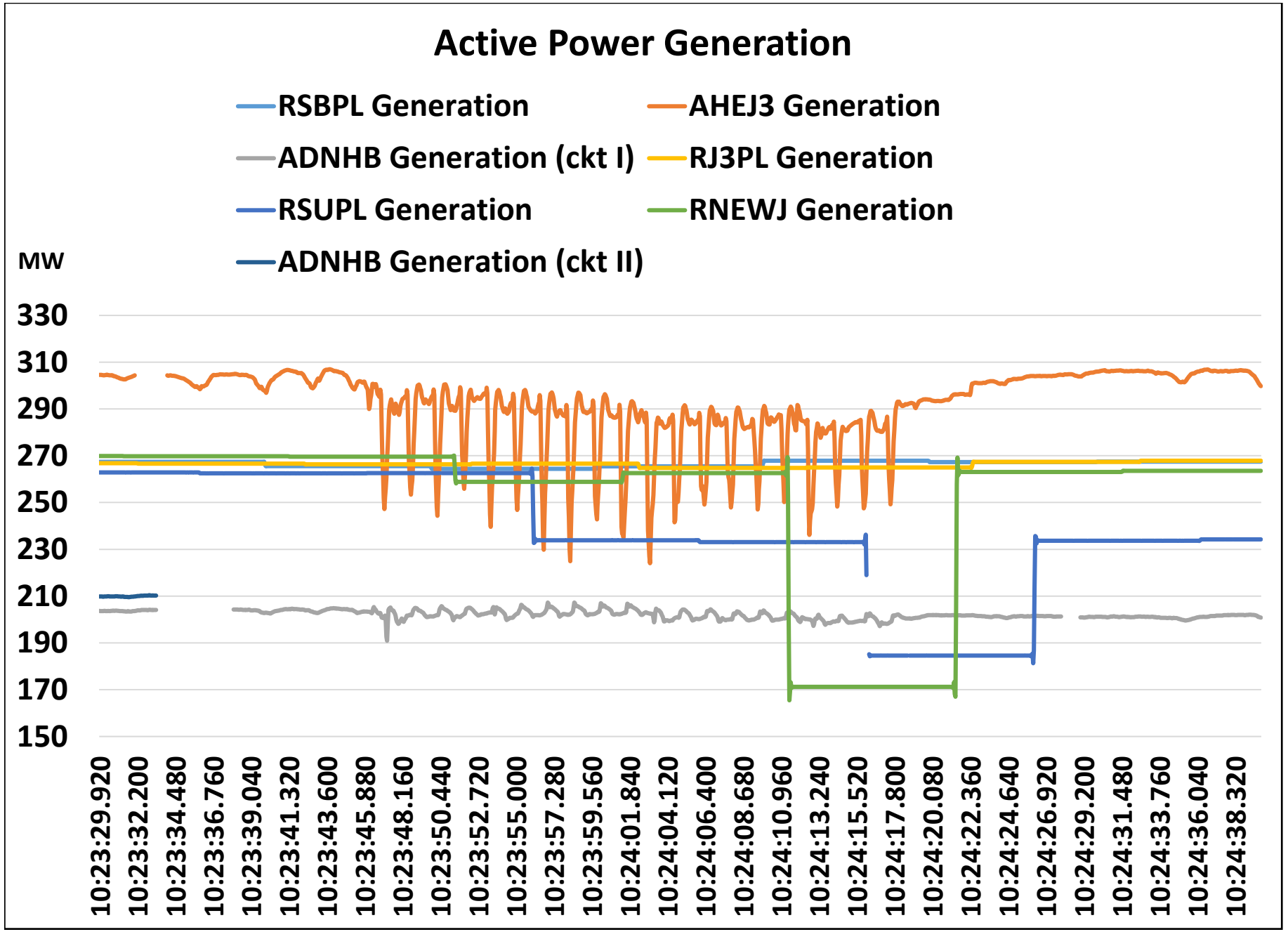

RE Generator Pooled at Fatehgarh II PG
Reactive Power at RJ3PL end
Line voltage of Fatehgarh II PG at RJ3PL end (sec. axis)
MVAR
KV
Voltage Not Available
50
40
30
20
10
0
-10
-20
-30
-40
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

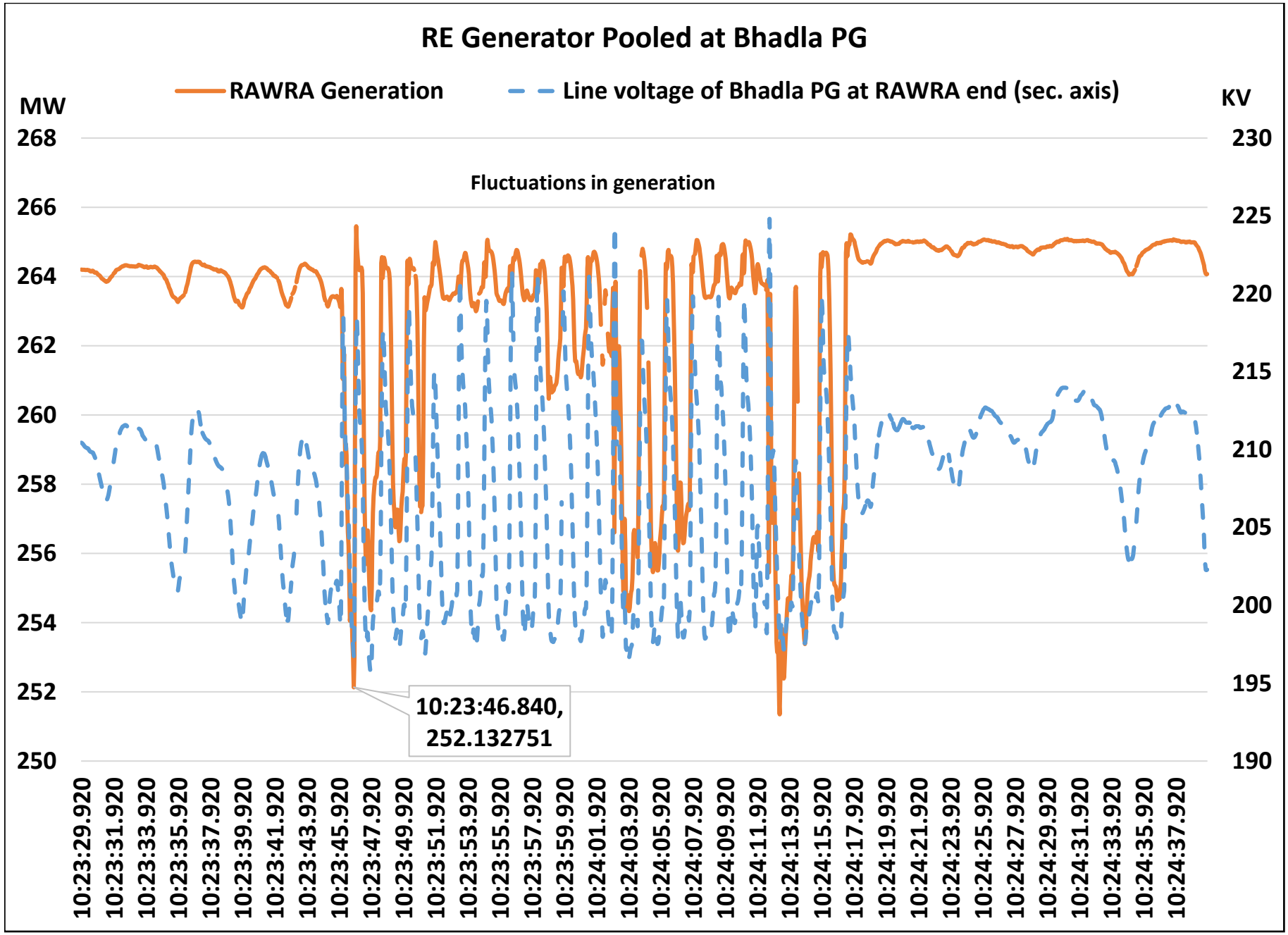

RE Generator Pooled at Fatehgarh II PG
RSUPL Generation
Line voltage of Fatehgarh II PG at RSUPL end (sec. axis)
MW
KV
No Major changes in generation
10:24:27.720, 233.642883
10:24:18.840, 184.557327
300
250
200
150
100
50
0
235
230
225
220
215
210
205
200
195
190
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

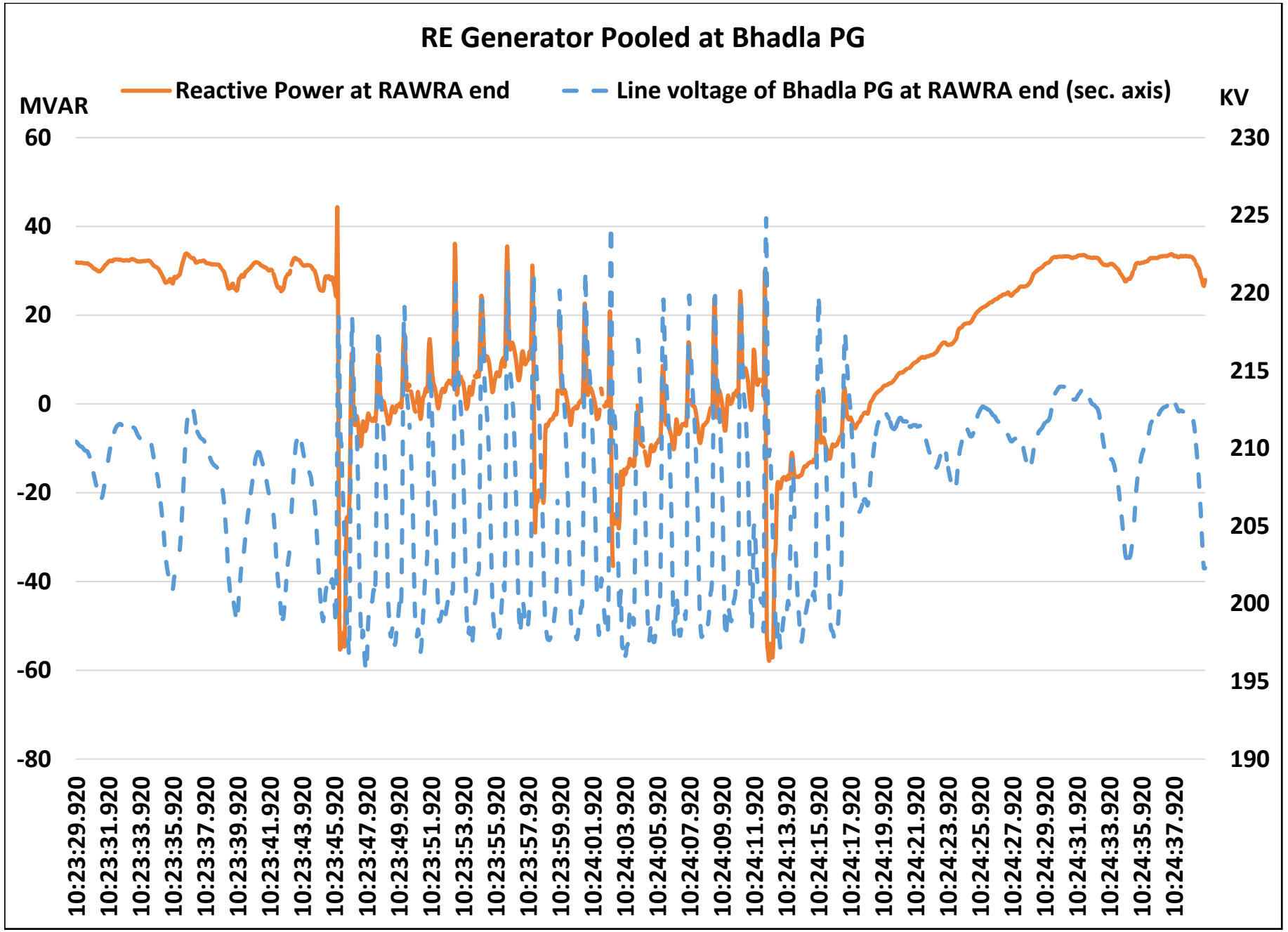

RE Generator Pooled at Fatehgarh II PG
Reactive Power at RSUPL end
Line voltage of Fatehgarh II PG at RSUPL end (sec. axis)
MVAR
KV
30
20
10
0
-10
-20
-30
-40
240
230
220
210
200
190
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

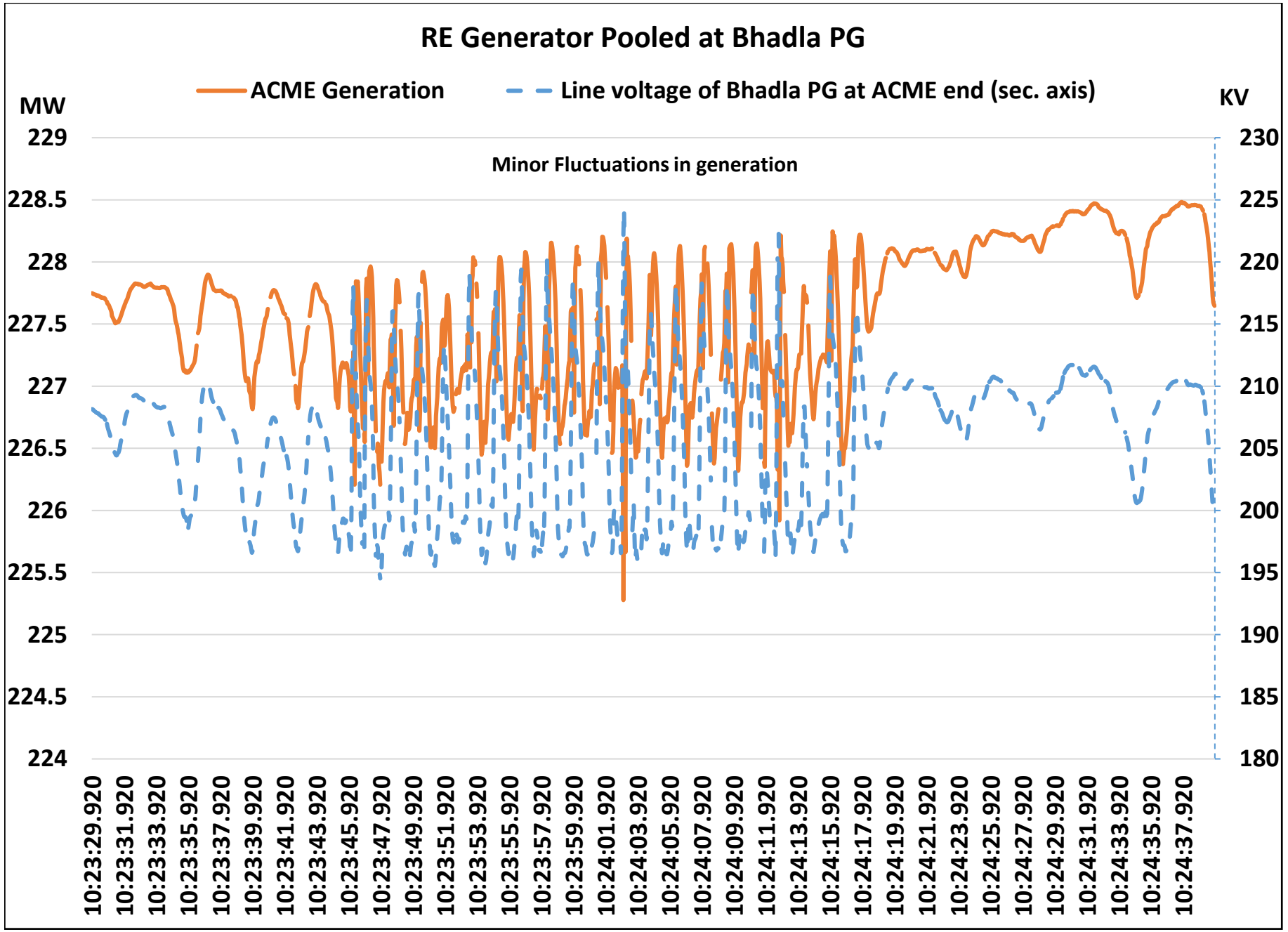

RE Generator Pooled at Fatehgarh II PG
RNEWJ Generation
Line voltage of Fatehgarh II PG at RNEWJ end (sec. axis)
MW
KV
No Major changes in generation
300
250
200
150
100
50
0
230
225
220
215
210
205
200
195
190
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

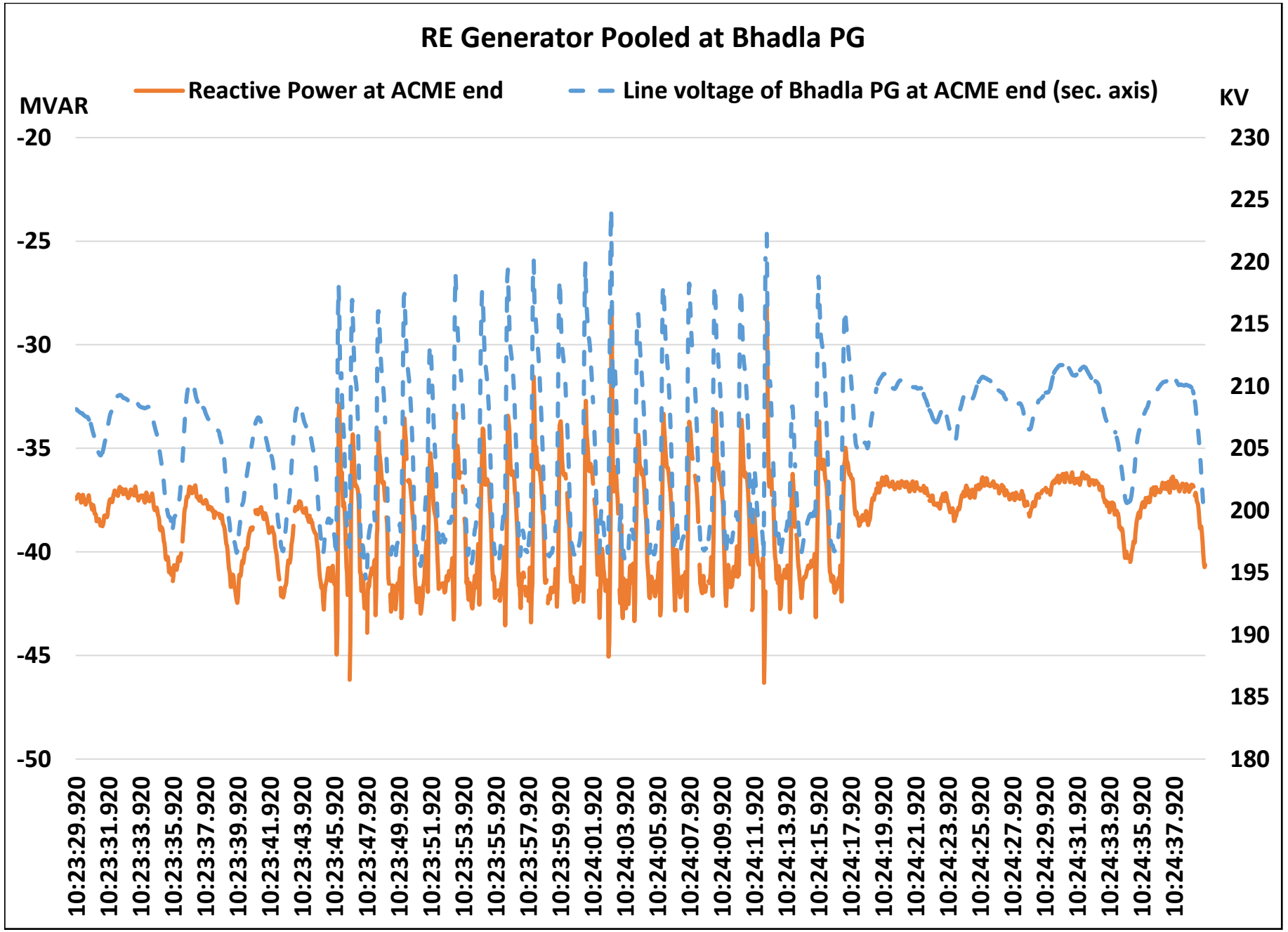

RE Generator Pooled at Fatehgarh II PG
400FTEGHFTGR22
Line voltage of Fatehgarh II PG at RNEWJ end (sec. axis)
MVAR
KV
80
60
40
20
0
-20
-40
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

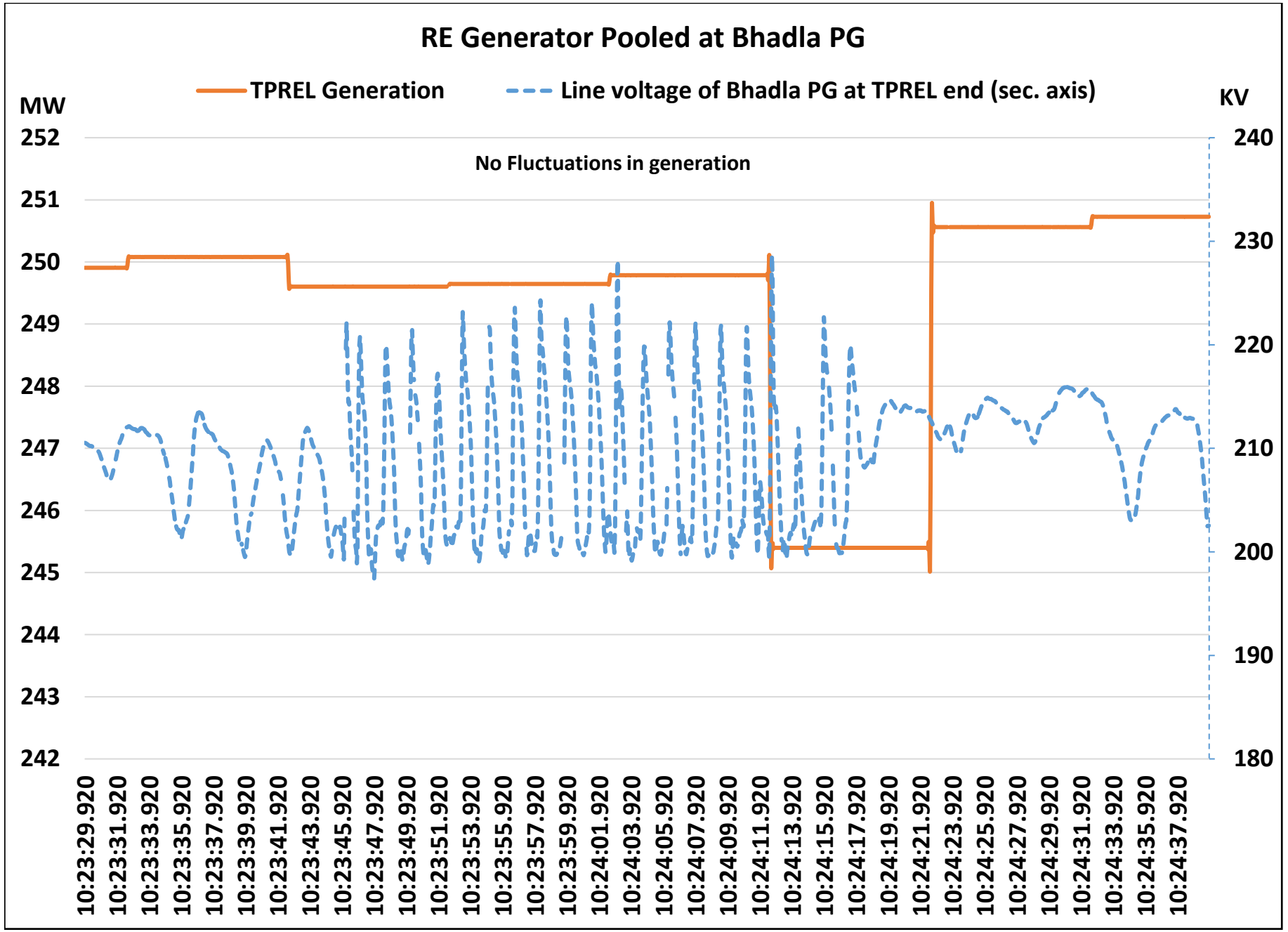

Active Power Generation
RSBPL Generation
AHEJ3 Generation
ADNHB Generation (ckt I)
RJ3PL Generation
RSUPL Generation
RNEWJ Generation
ADNHB Generation (ckt II)
MW
330
310
290
270
250
230
210
190
170
150
10:23:29.920
10:23:32.200
10:23:34.480
10:23:36.760
10:23:39.040
10:23:41.320
10:23:43.600
10:23:45.880
10:23:48.160
10:23:50.440
10:23:52.720
10:23:55.000
10:23:57.280
10:23:59.560
10:24:01.840
10:24:04.120
10:24:06.400
10:24:08.680
10:24:10.960
10:24:13.240
10:24:15.520
10:24:17.800
10:24:20.080
10:24:22.360
10:24:24.640
10:24:26.920
10:24:29.200
10:24:31.480
10:24:33.760
10:24:36.040
10:24:38.320

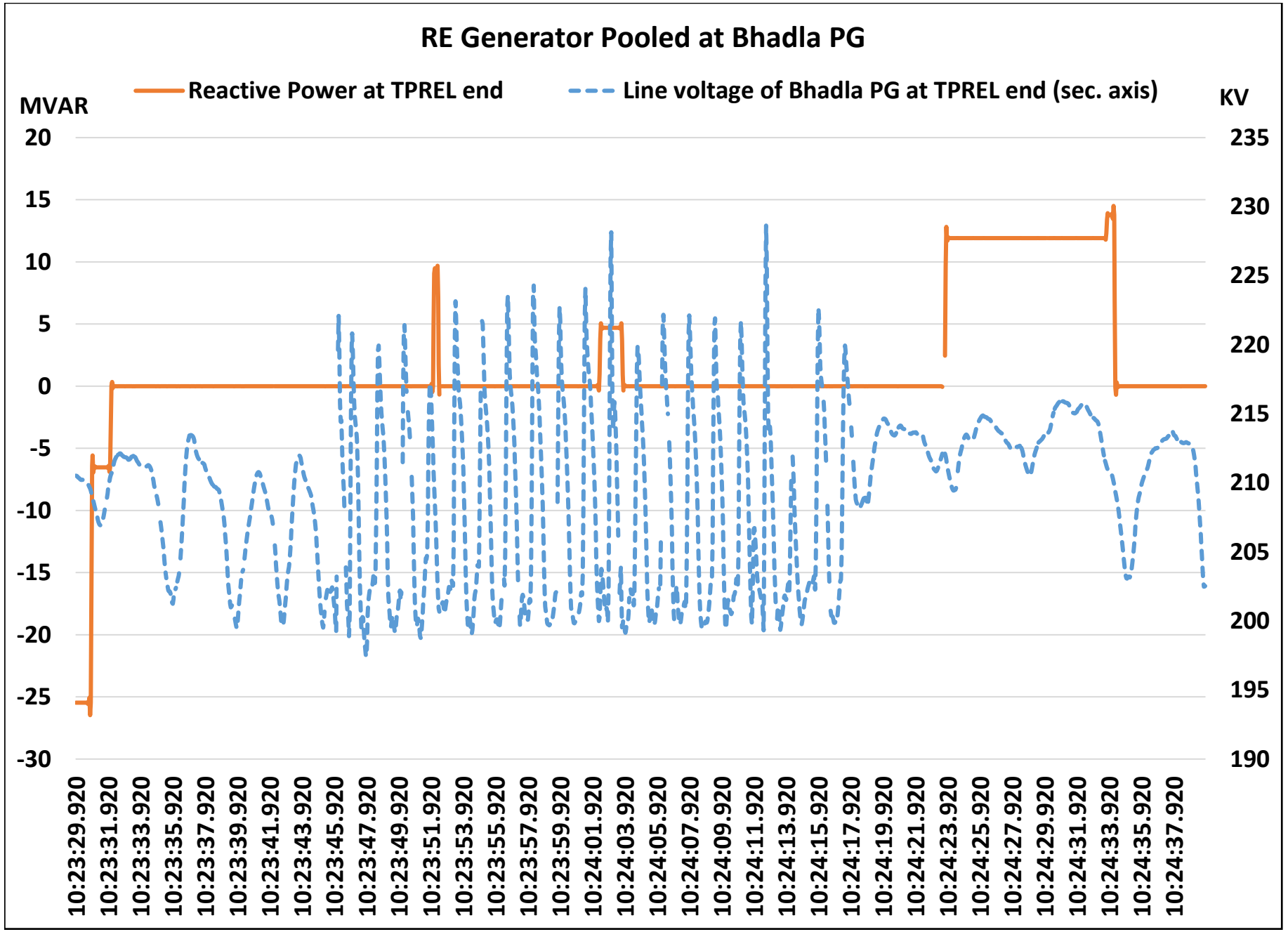

RE Generator Pooled at Bhadla PG
RAWRA Generation
Line voltage of Bhadla PG at RAWRA end (sec. axis)
MW
KV
Fluctuations in generation
10:23:46.840, 252.132751

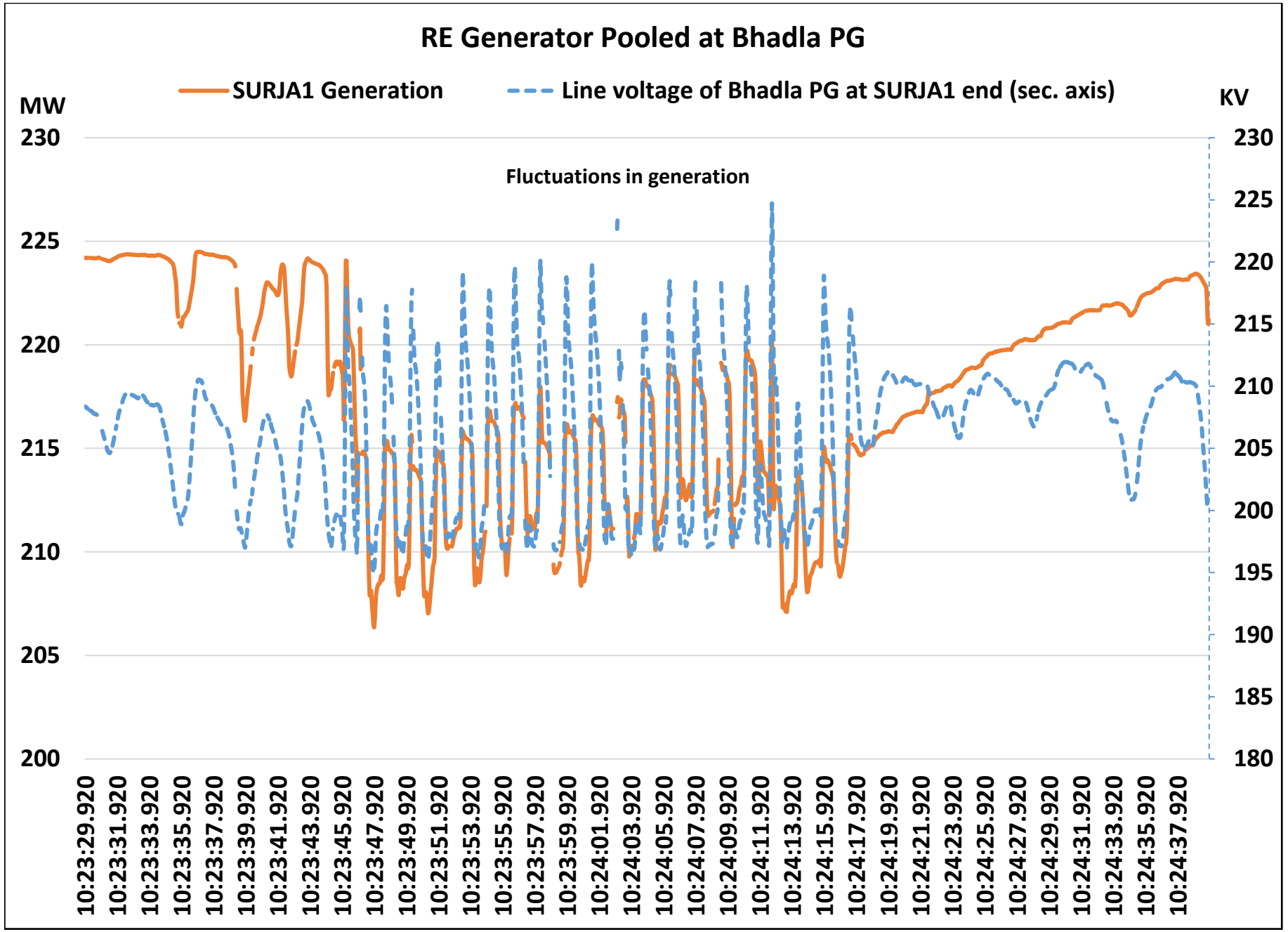

RE Generator Pooled at Bhadla PG
Reactive Power at RAWRA end
Line voltage of Bhadla PG at RAWRA end (sec. axis)
MVAR
KV
60
40
20
0
-20
-40
-60
-80
230
225
220
215
210
205
200
195
190
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

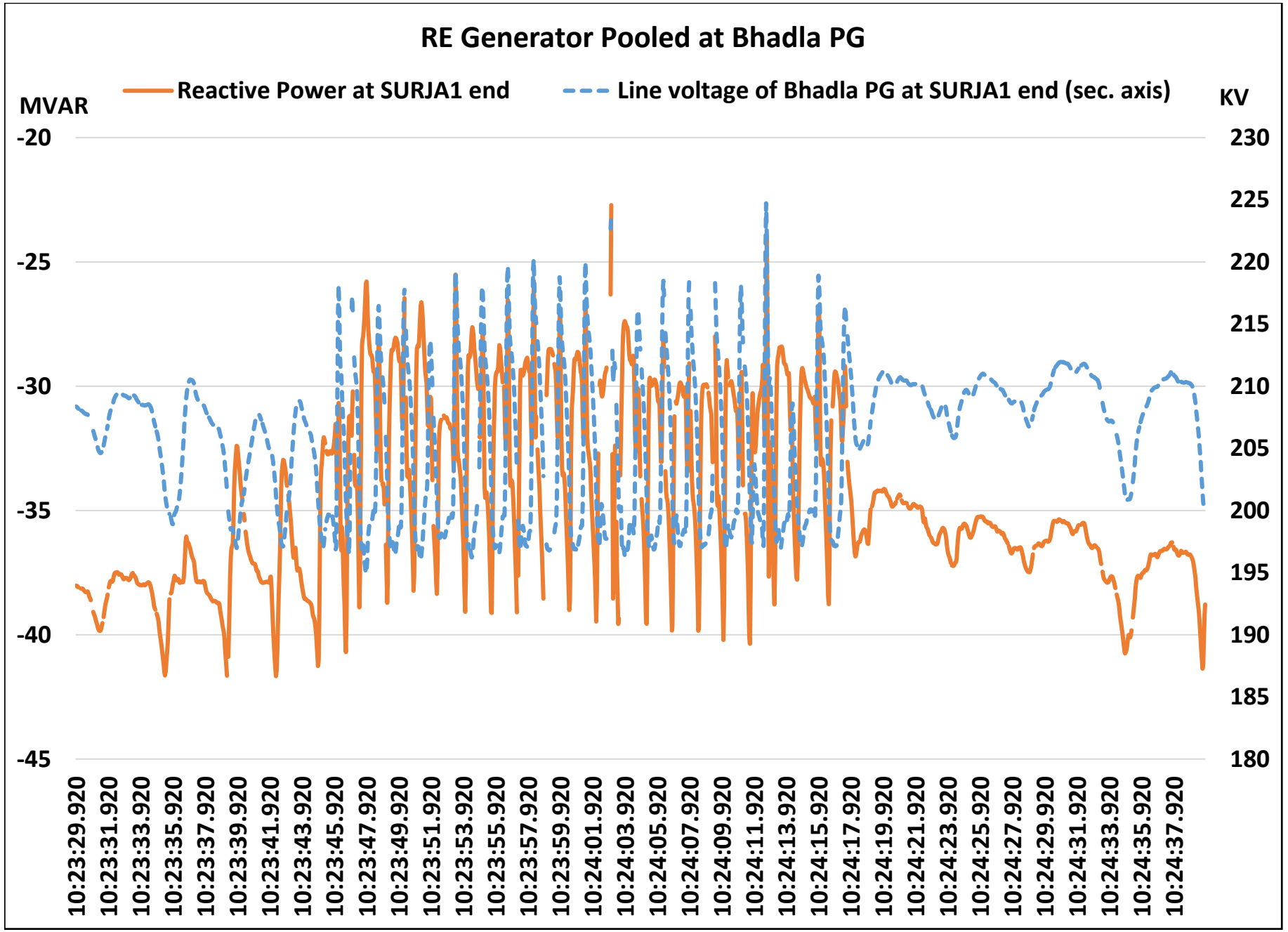

RE Generator Pooled at Bhadla PG
ACME Generation
Line voltage of Bhadla PG at ACME end (sec. axis)
MW
KV
Minor Fluctuations in generation
229
228.5
228
227.5
227
226.5
226
225.5
225
224.5
224
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

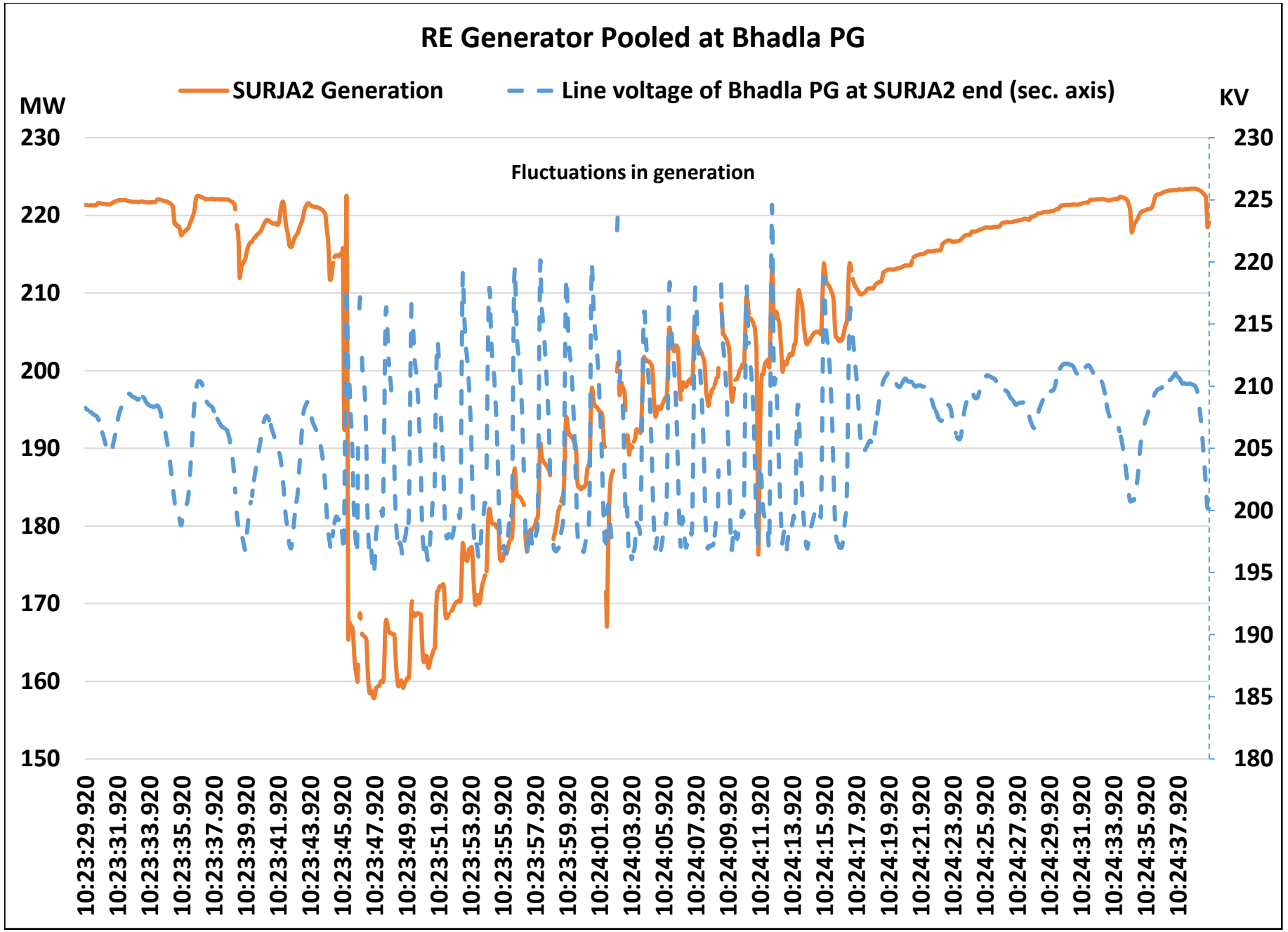

RE Generator Pooled at Bhadla PG
Reactive Power at ACME end
Line voltage of Bhadla PG at ACME end (sec. axis)
MVAR
KV
-20
-25
-30
-35
-40
-45
-50
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

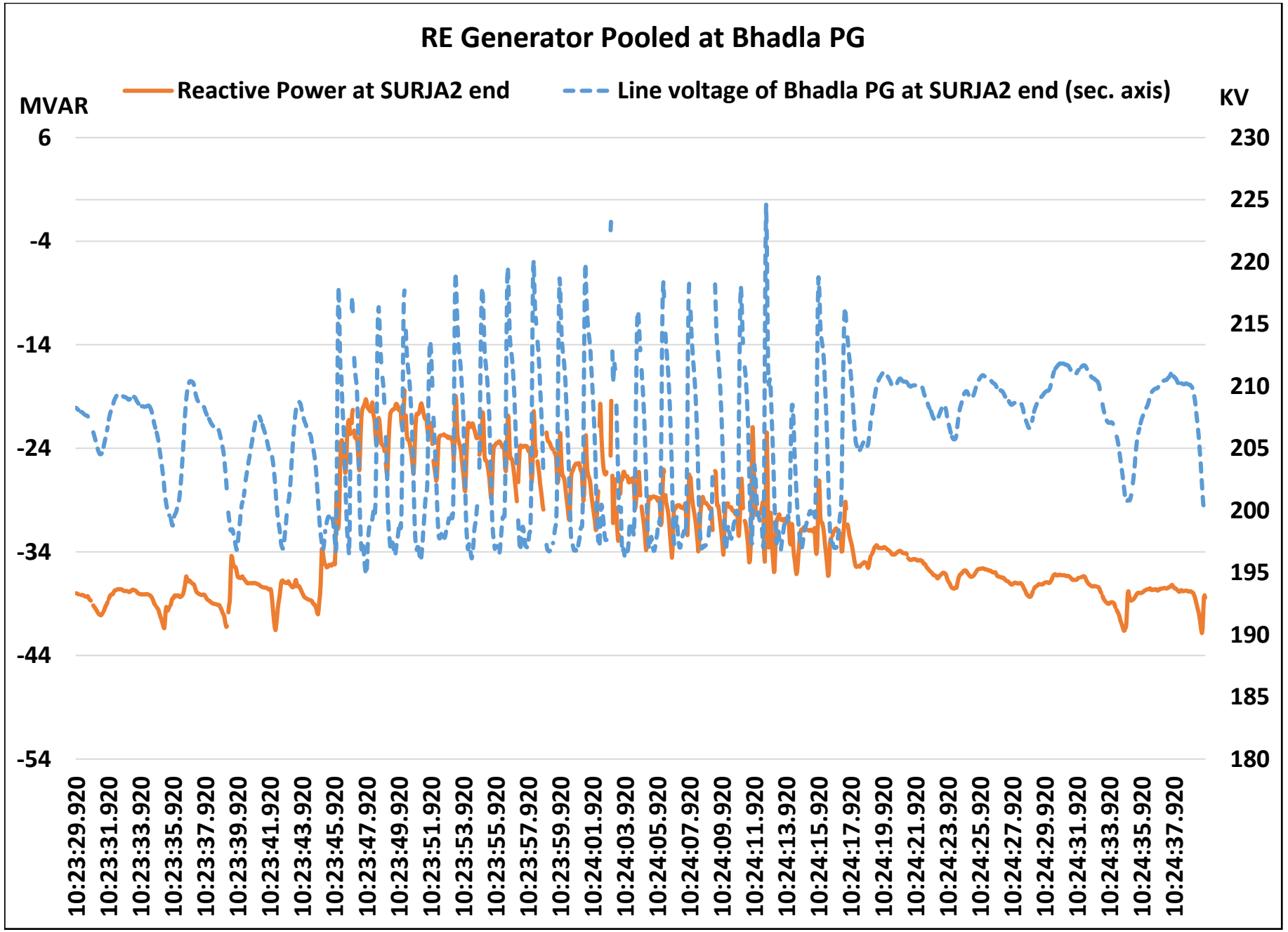

RE Generator Pooled at Bhadla PG
TPREL Generation
Line voltage of Bhadla PG at TPREL end (sec. axis)
MW
KV
No Fluctuations in generation
252
251
250
249
248
247
246
245
244
243
242
240
230
220
210
200
190
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

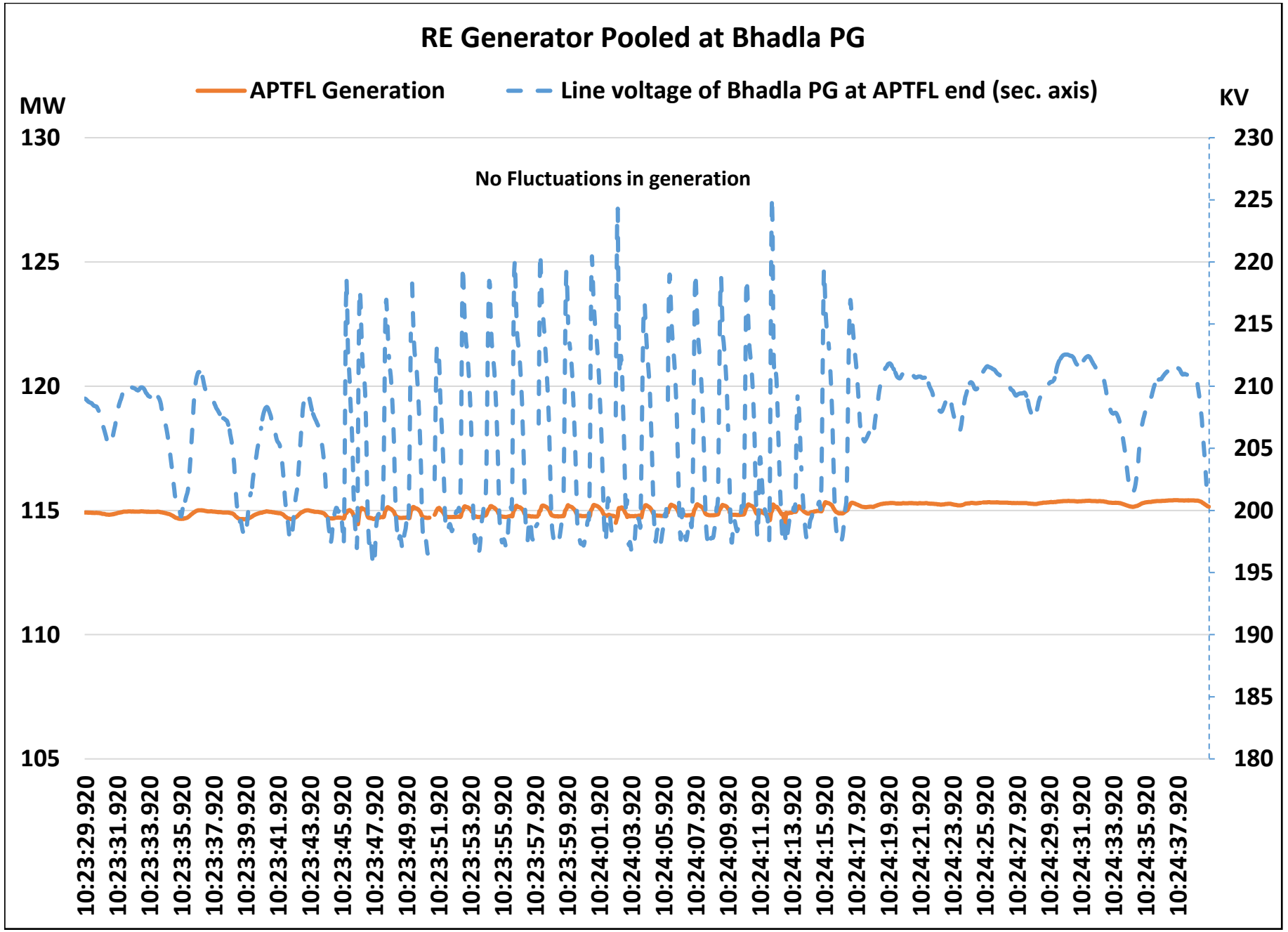

RE Generator Pooled at Bhadla PG
Reactive Power at TPREL end
Line voltage of Bhadla PG at TPREL end (sec. axis)
MVAR
KV
20
15
10
5
0
-5
-10
-15
-20
-25
-30
235
230
225
220
215
210
205
200
195
190
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

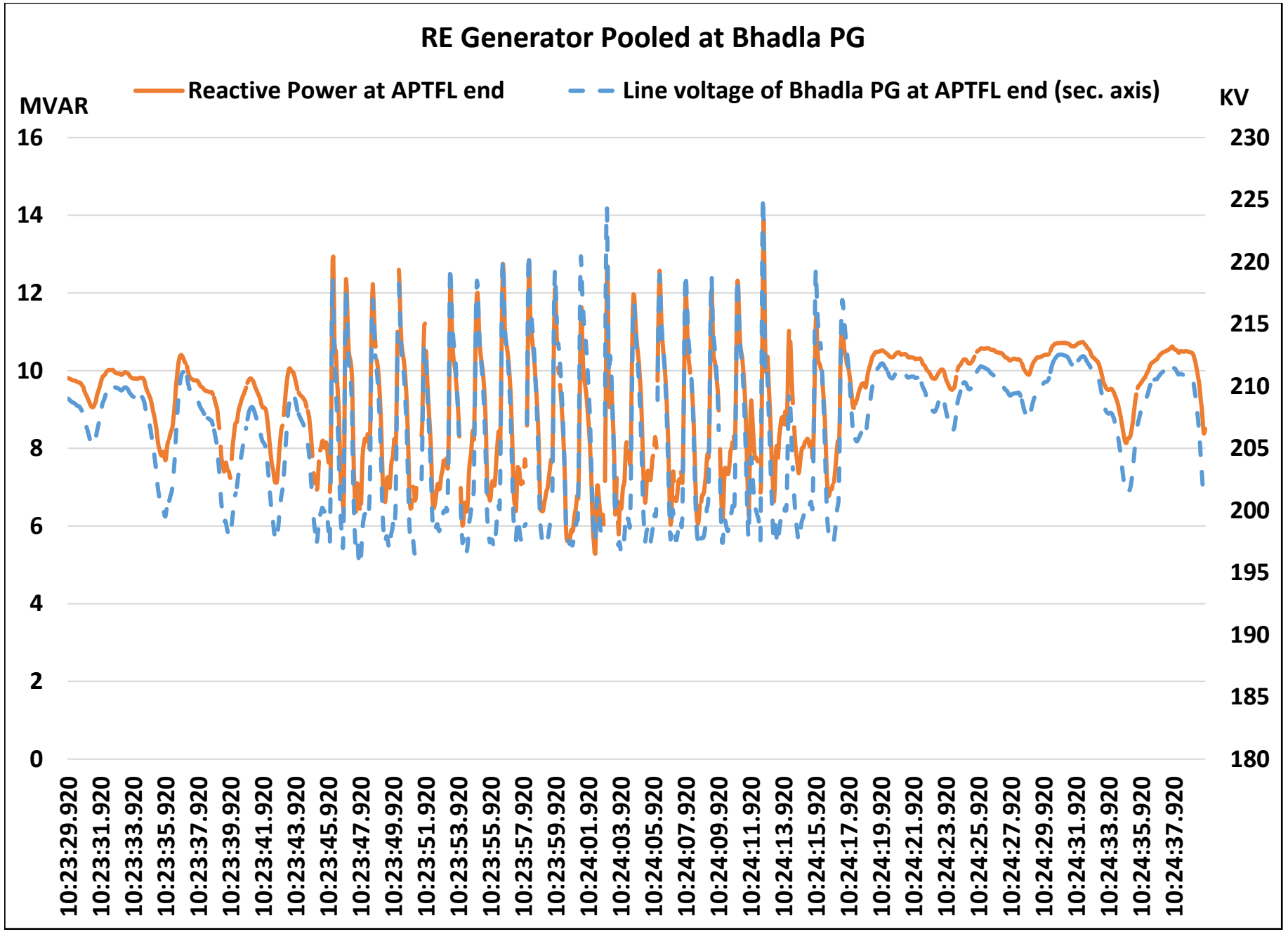

RE Generator Pooled at Bhadla PG
SURJA1 Generation
Line voltage of Bhadla PG at SURJA1 end (sec. axis)
MW
KV
Fluctuations in generation
230
225
220
215
210
205
200
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

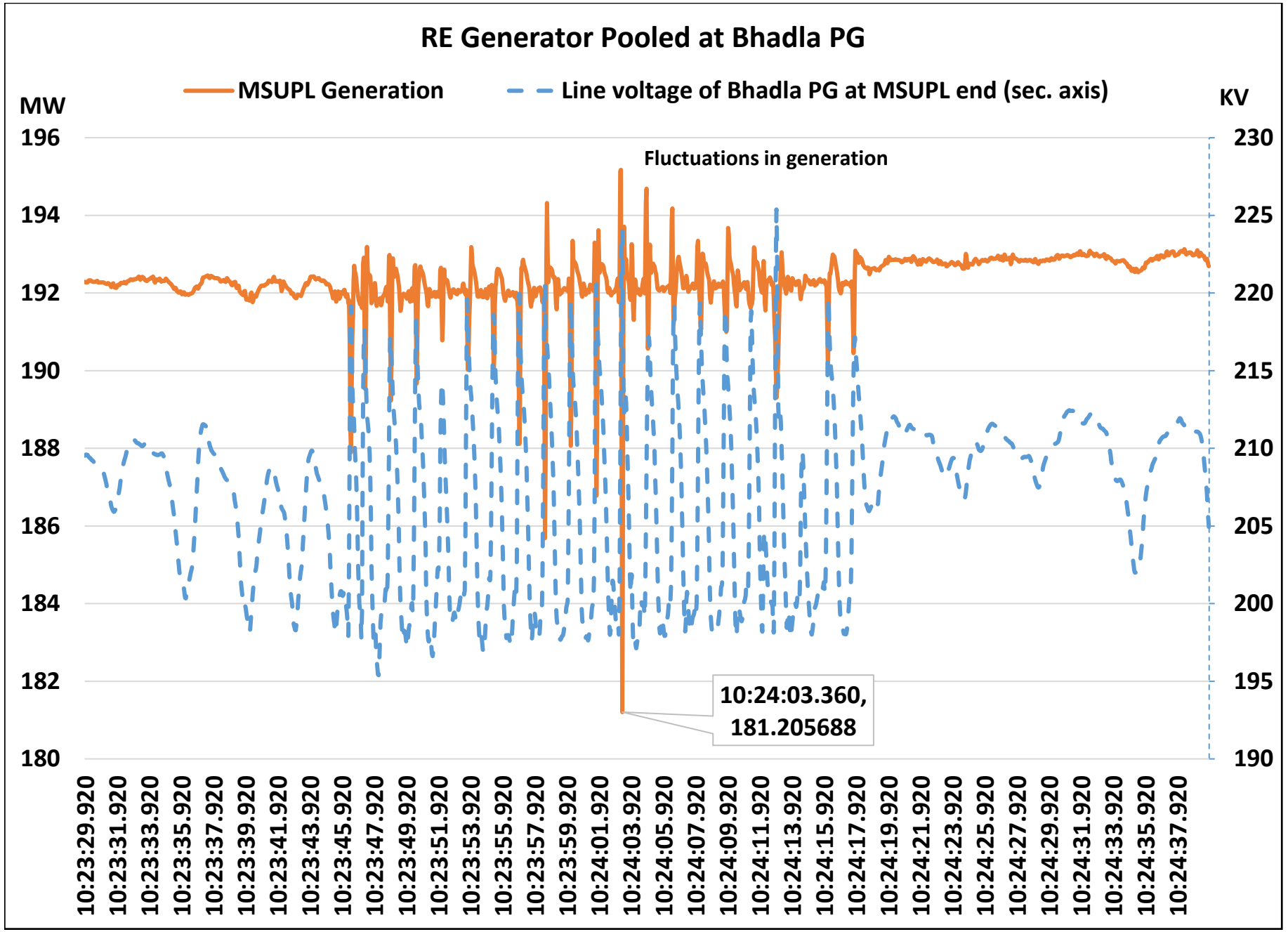

RE Generator Pooled at Bhadla PG
Reactive Power at SURJA1 end
Line voltage of Bhadla PG at SURJA1 end (sec. axis)
MVAR
KV
-20
-25
-30
-35
-40
-45
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

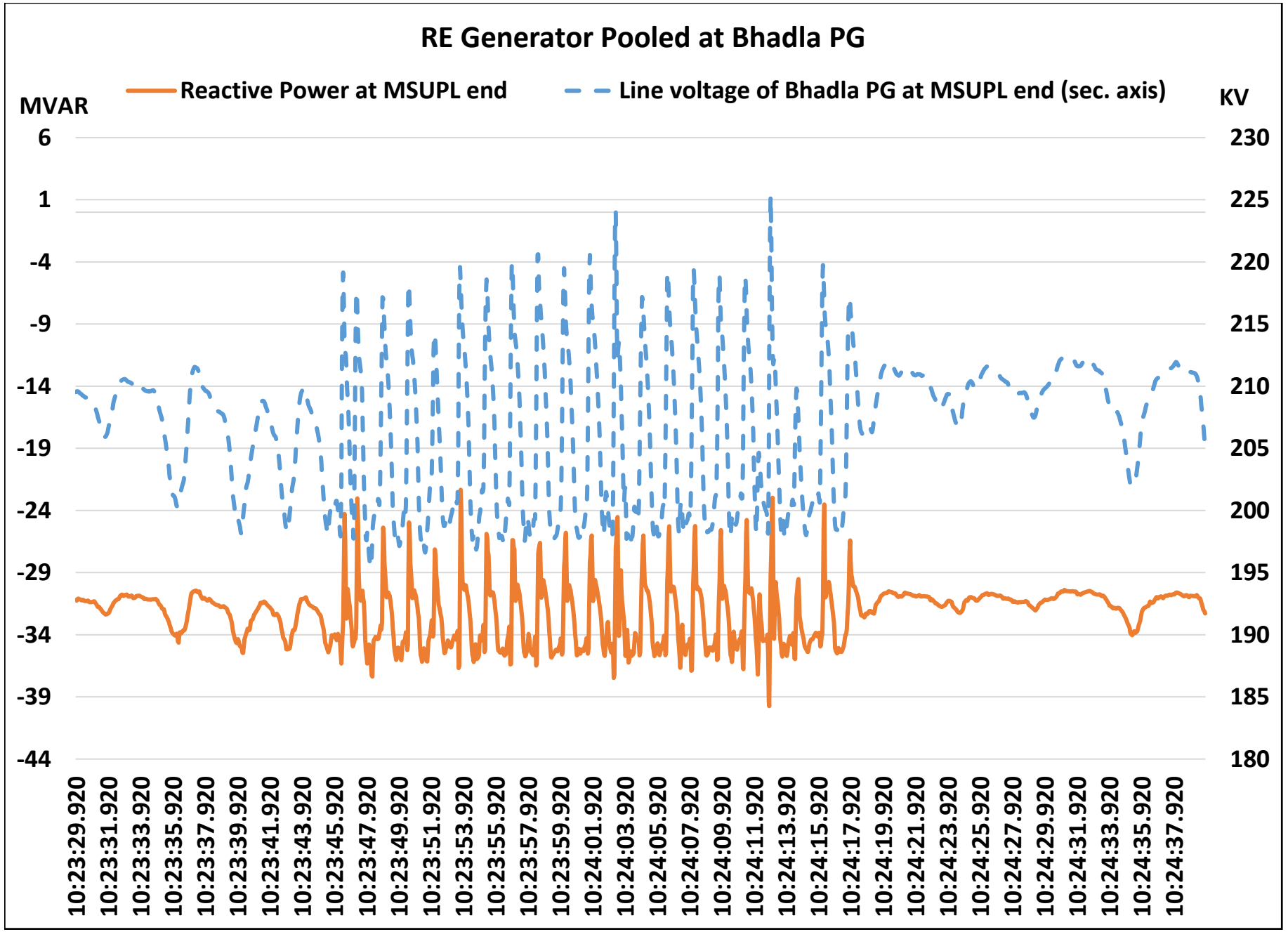

RE Generator Pooled at Bhadla PG
SURJA2 Generation
Line voltage of Bhadla PG at SURJA2 end (sec. axis)
MW
KV
Fluctuations in generation
230
220
210
200
190
180
170
160
150
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

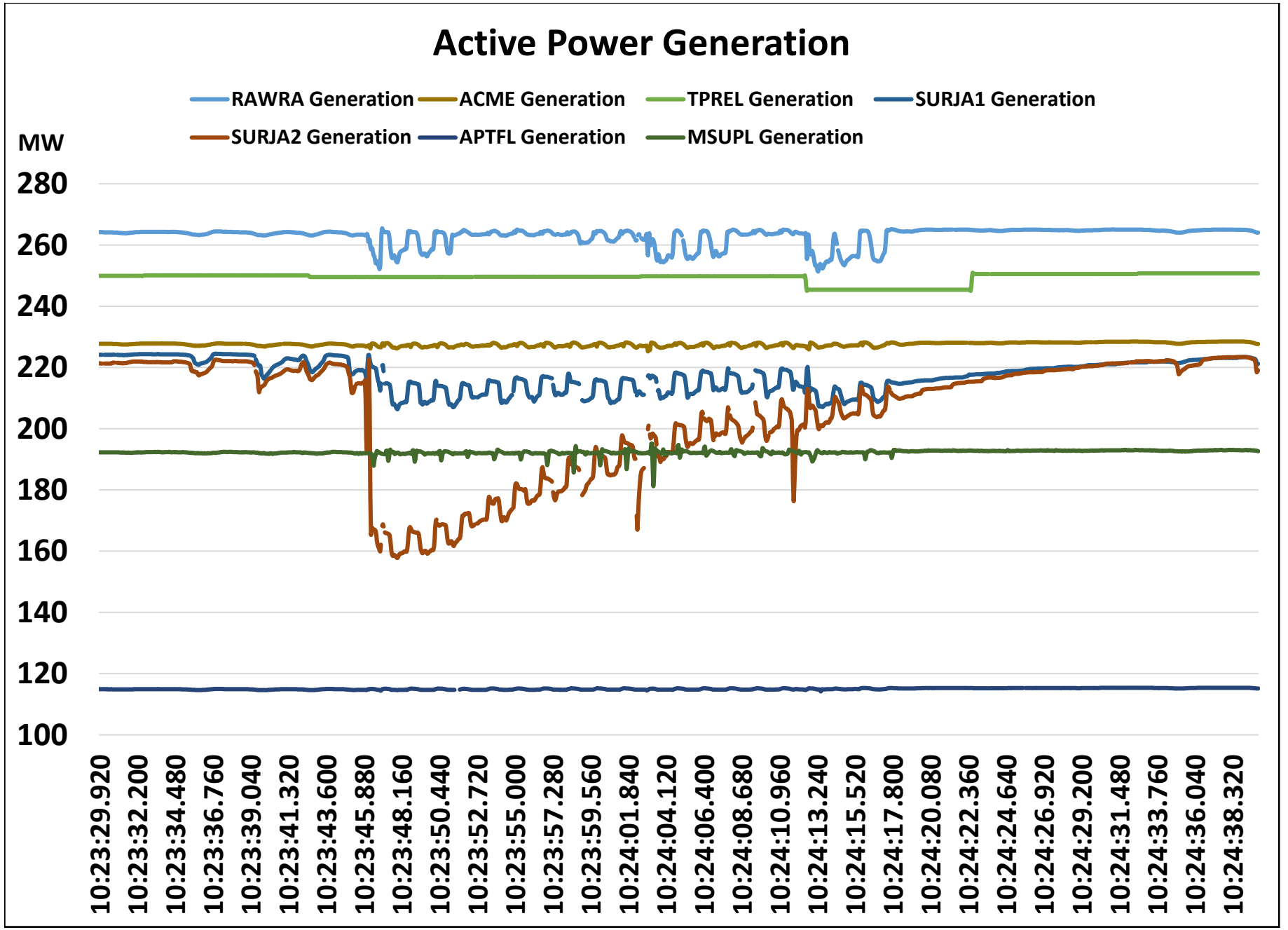

RE Generator Pooled at Bhadla PG
Reactive Power at SURJA2 end
Line voltage of Bhadla PG at SURJA2 end (sec. axis)
MVAR
KV
6
-4
-14
-24
-34
-44
-54
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920


RE Generator Pooled at Bhadla PG
APTFL Generation
Line voltage of Bhadla PG at APTFL end (sec. axis)
MW
KV
No Fluctuations in generation
130
125
120
115
110
105
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

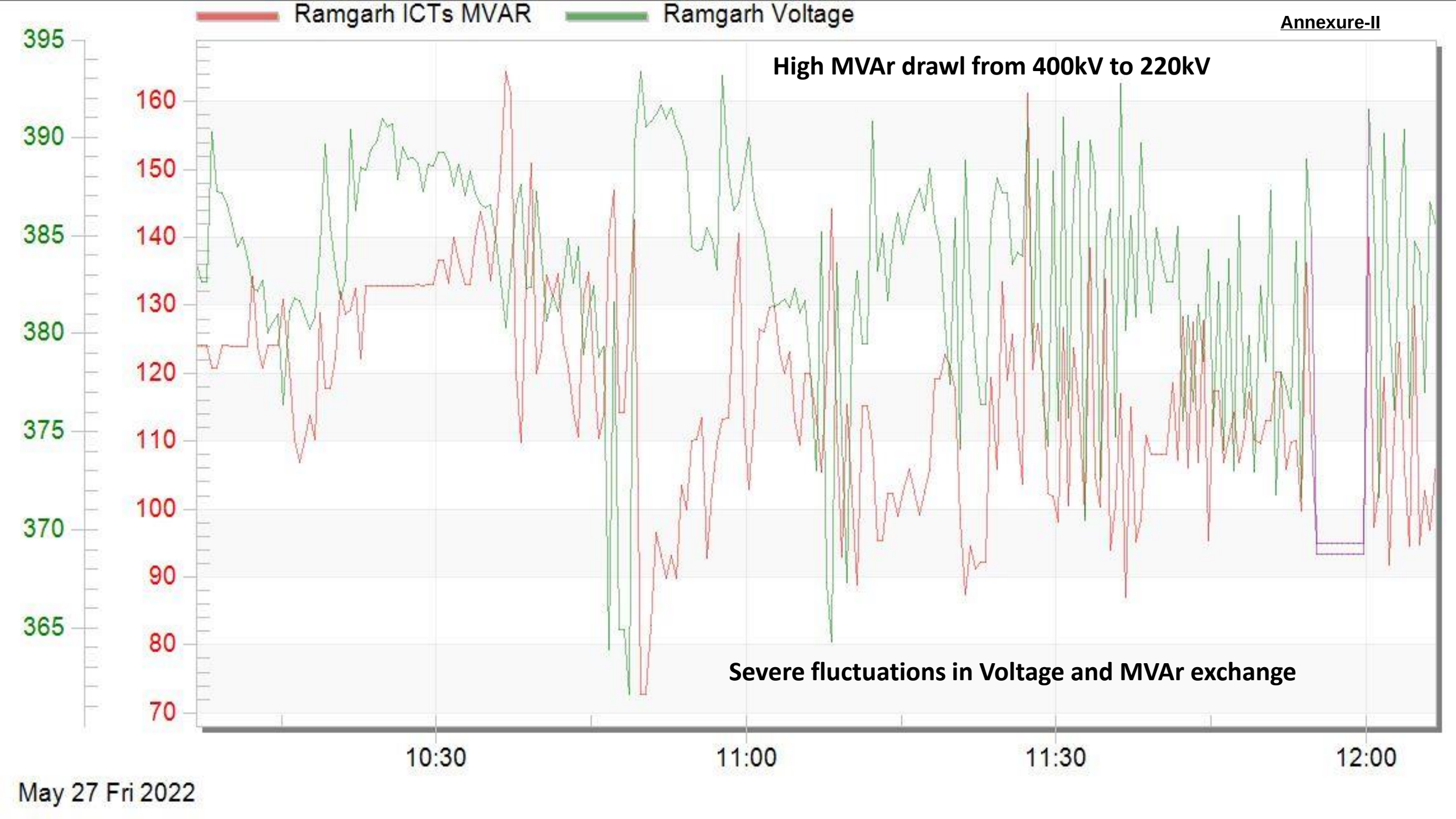

RE Generator Pooled at Bhadla PG
Reactive Power at APTFL end
Line voltage of Bhadla PG at APTFL end (sec. axis)
MVAR
KV
16
14
12
10
8
6
4
2
0
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

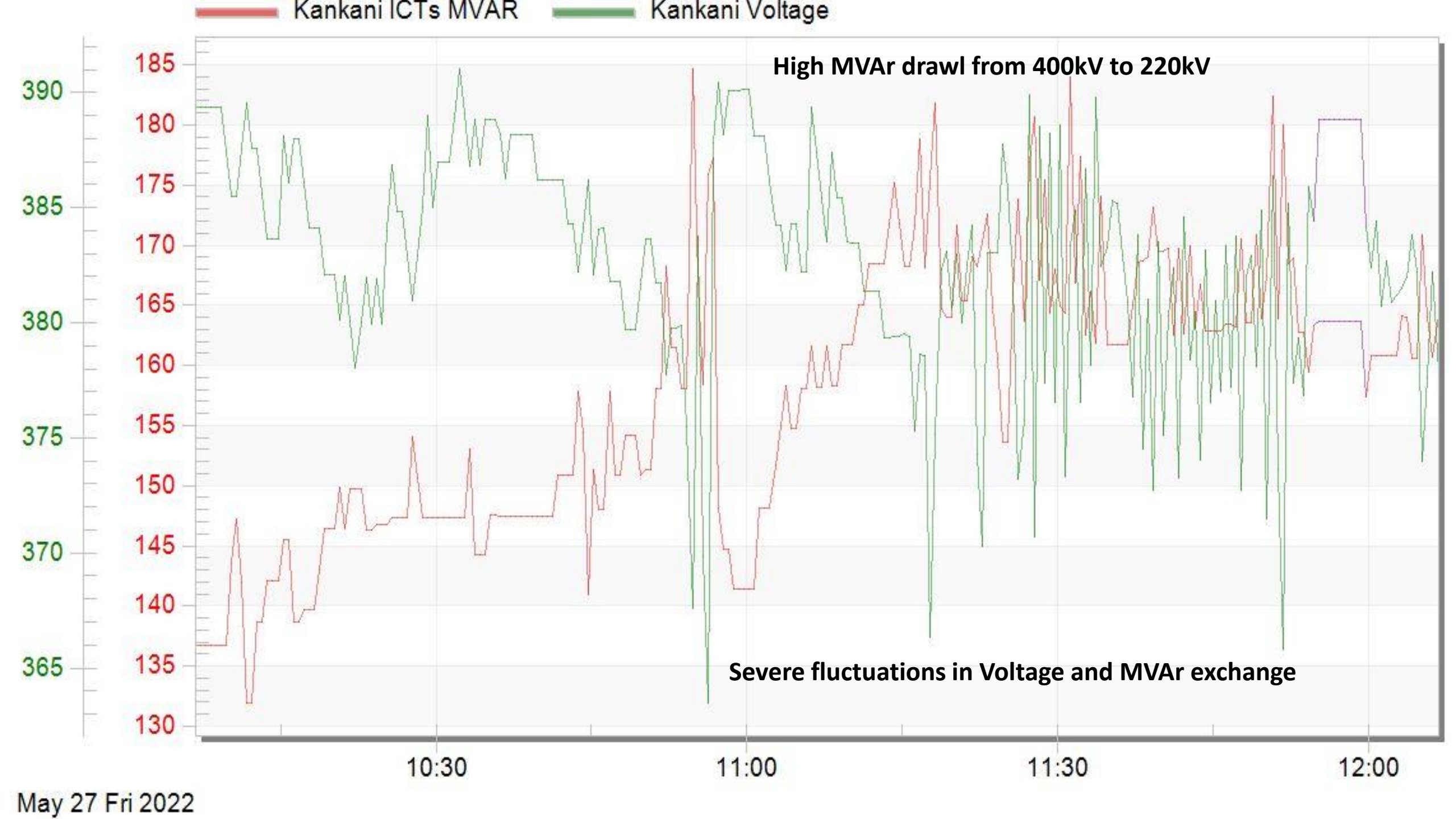

RE Generator Pooled at Bhadla PG
MSUPL Generation
Line voltage of Bhadla PG at MSUPL end (sec. axis)
MW
KV
196
194
192
190
188
186
184
182
180
230
225
220
215
210
205
200
195
190
Fluctuations in generation
10:24:03.360,
181.205688
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920

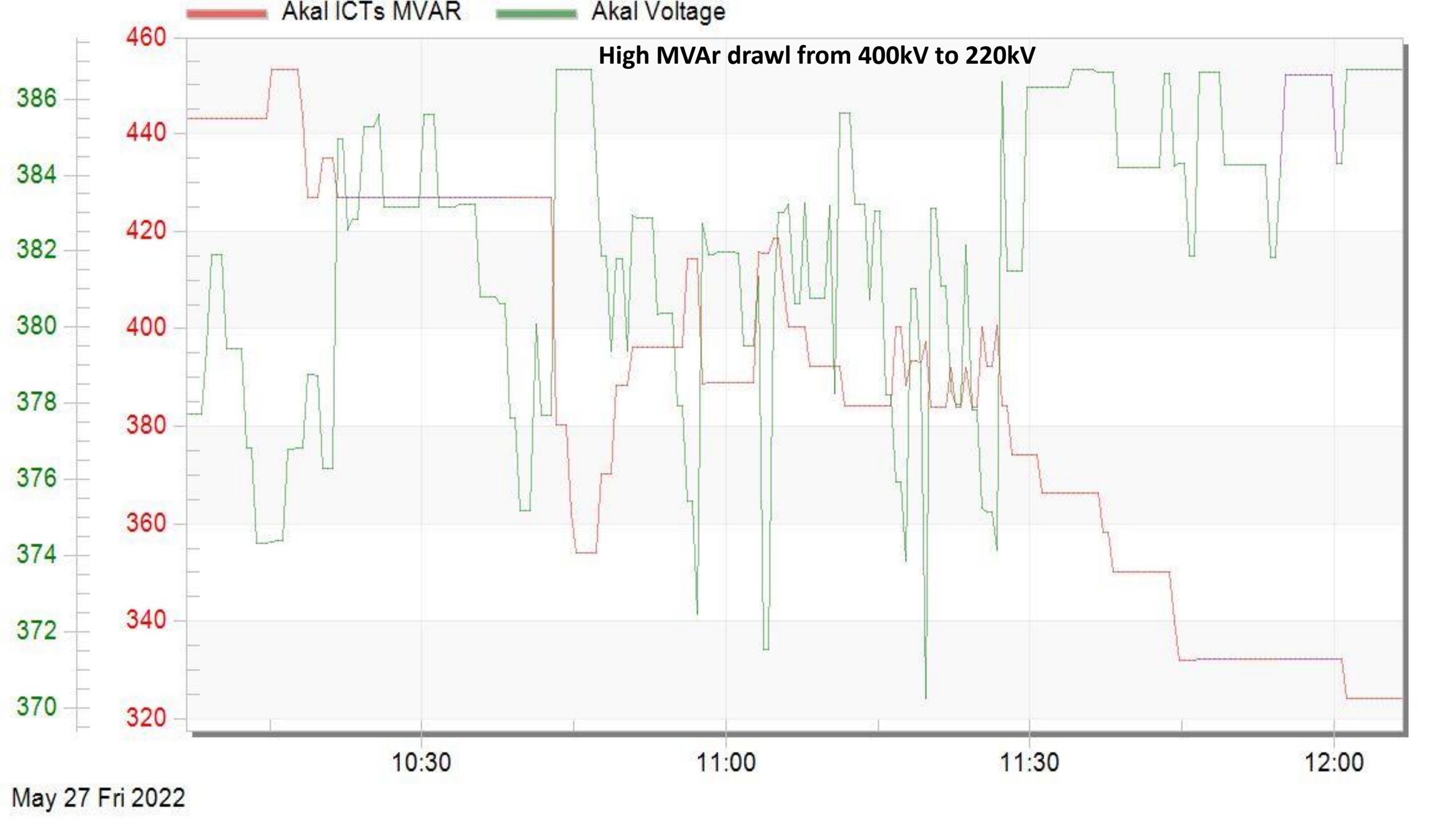

RE Generator Pooled at Bhadla PG
Reactive Power at MSUPL end
Line voltage of Bhadla PG at MSUPL end (sec. axis)
MVAR
KV
6
1
-4
-9
-14
-19
-24
-29
-34
-39
-44
230
225
220
215
210
205
200
195
190
185
180
10:23:29.920
10:23:31.920
10:23:33.920
10:23:35.920
10:23:37.920
10:23:39.920
10:23:41.920
10:23:43.920
10:23:45.920
10:23:47.920
10:23:49.920
10:23:51.920
10:23:53.920
10:23:55.920
10:23:57.920
10:23:59.920
10:24:01.920
10:24:03.920
10:24:05.920
10:24:07.920
10:24:09.920
10:24:11.920
10:24:13.920
10:24:15.920
10:24:17.920
10:24:19.920
10:24:21.920
10:24:23.920
10:24:25.920
10:24:27.920
10:24:29.920
10:24:31.920
10:24:33.920
10:24:35.920
10:24:37.920


Active Power Generation
RAWRA Generation
ACME Generation
TPREL Generation
SURJA1 Generation
SURJA2 Generation
APTFL Generation
MSUPL Generation
MW
280
260
240
220
200
180
160
140
120
100
10:23:29.920
10:23:32.200
10:23:34.480
10:23:36.760
10:23:39.040
10:23:41.320
10:23:43.600
10:23:45.880
10:23:48.160
10:23:50.440
10:23:52.720
10:23:55.000
10:23:57.280
10:23:59.560
10:24:01.840
10:24:04.120
10:24:06.400
10:24:08.680
10:24:10.960
10:24:13.240
10:24:15.520
10:24:17.800
10:24:20.080
10:24:22.360
10:24:24.640
10:24:26.920
10:24:29.200
10:24:31.480
10:24:33.760
10:24:36.040
10:24:38.320

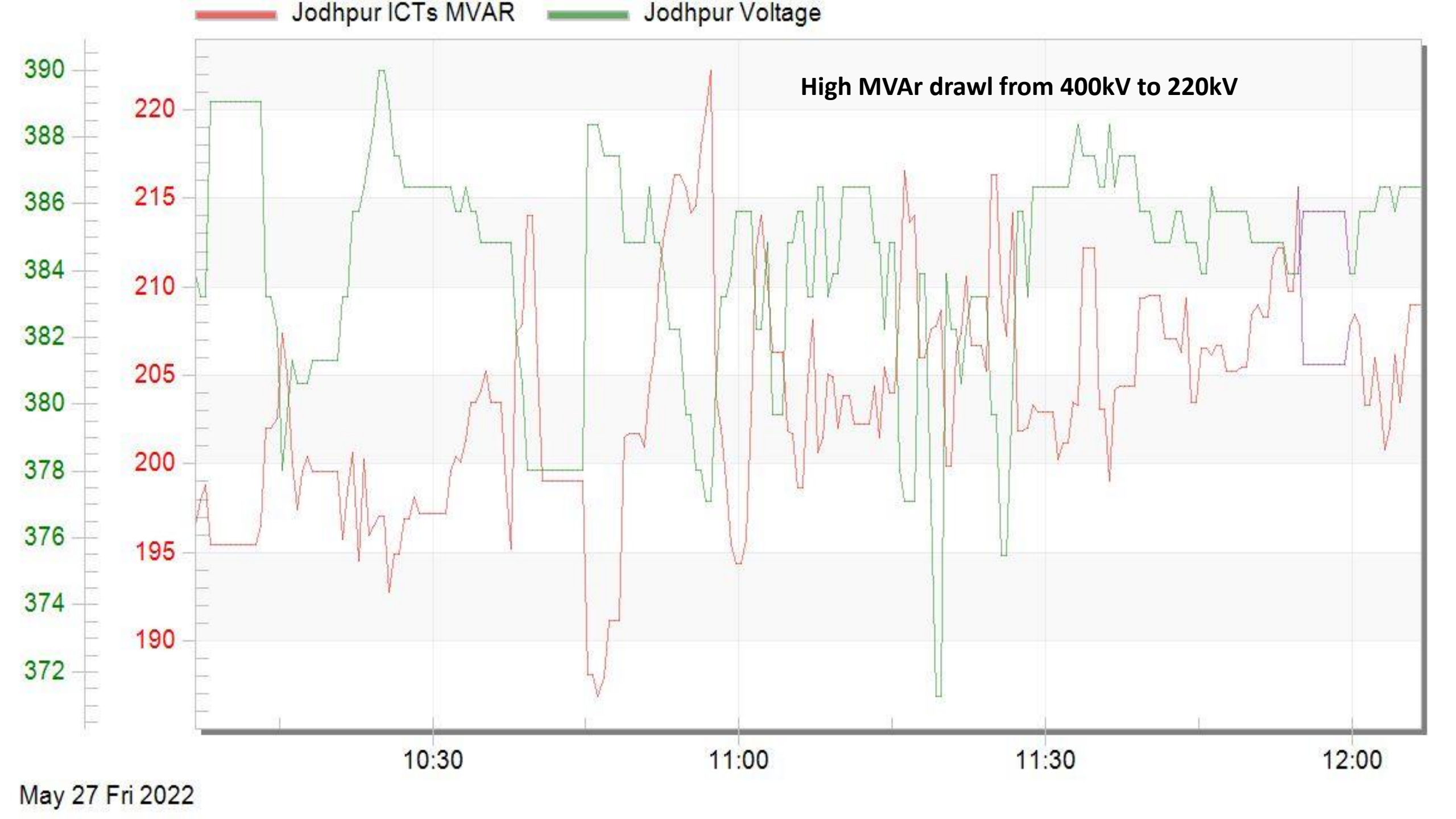
Annexure-II


Ramgarh ICTs MVAR
Ramgarh Voltage
High MVAr drawl from 400kV to 220kV
Severe fluctuations in Voltage and MVAr exchange
395
390
385
380
375
370
365
160
150
140
130
120
110
100
90
80
70
10:30
11:00
11:30
12:00
May 27 Fri 2022


Kankani ICTs MVAR
Kankani Voltage
High MVAr drawl from 400kV to 220kV
Severe fluctuations in Voltage and MVAr exchange
390
385
380
375
370
365
185
180
175
170
165
160
155
150
145
140
135
130
10:30
11:00
11:30
12:00
May 27 Fri 2022


Akal ICTs MVAR
Akal Voltage
High MVAr drawl from 400kV to 220kV
460
440
420
400
380
360
340
320
386
384
382
380
378
376
374
372
370
10:30
11:00
11:30
12:00
May 27 Fri 2022


Barmer ICTs MVAR
Barmer Voltage
High MVAr drawl from 400kV to 220kV
190
188
186
184
182
180
178
176
174
384
382
380
378
376
374
372
10:30
11:00
11:30
12:00
May 27 Fri 2022


Jodhpur ICTs MVAR
Jodhpur Voltage
High MVAr drawl from 400kV to 220kV
390
388
386
384
382
380
378
376
374
372
220
215
210
205
200
195
190
10:30
11:00
11:30
12:00
May 27 Fri 2022