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**Datasheet for the decision
of 31 May 2021**

Case Number: T 2463/16 - 3.5.02

Application Number: 11153557.1

Publication Number: 2485358

IPC: H02J3/26

Language of the proceedings: EN

Title of invention:

System and method for mitigating an electric unbalance of a three-phase current at a Point of Common Coupling between a wind farm and a power grid

Patent Proprietor:

Siemens Gamesa Renewable Energy A/S

Opponent:

Vestas Wind Systems A/S

Relevant legal provisions:

EPC Art. 56

RPBA 2020 Art. 13(2)

Keyword:

Inventive step - main request (no) - auxiliary request (yes)
Amendment after summons - objection based on different documents - exceptional circumstances (no)



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Case Number: T 2463/16 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 31 May 2021

Appellant: Vestas Wind Systems A/S
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 26 August 2016
rejecting the opposition filed against European
patent No. 2485358 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman R. Lord
Members: G. Flyng
W. Ungler

Summary of Facts and Submissions

- I. The appeal is against the decision of the opposition division rejecting the opposition against the European patent EP 2 485 358 B1. In the contested decision the opposition division concluded that the document combinations cited by the opponent, i.e. document **D1** with any of documents **D10/D3/D4**, "did not challenge the inventiveness" of the subject-matter of the independent claims 1 and 8 of the patent, Article 56 EPC.
- II. The document references used are as follows:
- D1:** US 2010/264666 A1;
 - D3:** "Voltage Disturbances Introduction to Unbalance" in "Power quality Application guide", Dr Johan Driesen & Dr Thierry van Craenenbroeck, Copper Development Association, May 2002;
 - D4:** GB 1 198 460 A;
 - D5:** "Design of D-STATCOM for Voltage Regulation in Microgrids", Tzung-Lin Lee et al, Energy Conversion Congress and Exposition, 12 September 2010, pages 3456-3463;
 - D6:** "Power Quality And Transient Stability Improvement of Wind Farm with Fixed-Speed Induction Generators Using a STATCOM", Guizhen Tian et al, 2010 International Conference On Power System Technology, 24 October 2010, pages 1-6;
 - D7:** US 2010/332040 A1;
 - D10:** "Merkmale der Spannung in öffentlichen Elektrizitätsversorgungsnetzen; Deutsche Fassung EN 50160:2007", DIN Deutsches Institut für Normung e.V., Beuth Verlag GmbH, April 2008.

- III. In the statement setting out the grounds of appeal the appellant (opponent) maintained that the subject-matter of claims 1 and 8 of the patent as granted lacked an inventive step in view of a combination of document **D1** with **D10**, **D3** or **D4**.

In respect of the dependent claims the appellant referred to section 4 of their notice of opposition dated 23 December 2014 and maintained the lack of inventive step arguments outlined therein. There it was argued inter alia in section 4.2 that the subject-matter of dependent claim 3 lacked an inventive step in view of document **D1** or in view of document **D1** in combination with **D7**.

- IV. With the reply to the appeal the respondent (patent proprietor) filed sets of amended claims according to **auxiliary requests 1, 2 and 3**.

The respondent argued that the subject-matter of independent claims 1 and 8 of the patent as granted (main request) involved an inventive step, countering the appellant's objections based on a combination of document **D1** with **D10**, **D3** or **D4**.

The respondent submitted that auxiliary request 1 had already been presented in the proceedings before the opposition division and made reference to item 7.1 of their first-instance submission dated 19 May 2015 for their supporting arguments.

- V. The Board summoned the parties to oral proceedings, setting out their preliminary observations in a communication pursuant to Article 15(1) RPBA 2020. The Board noted it to be uncontested that it was known from **D10**, **D3** and **D4** for the voltage unbalance factor

(hereinafter: **VUF**) to be used "*a posteriori*" to evaluate voltage unbalance to decide whether a voltage signal fulfilled predefined engineering standards or norms. The critical question remained, whether it would be obvious to use this known evaluation criterion to in some way improve the effectiveness, reliability and flexibility of the unbalance mitigation control system of **D1**. The Board was not convinced by the appellant's submissions that it would be. In particular, it seemed that the thresholds defined in **D10**, **D3** and **D4** defined the boundaries of the ranges of VUF at which it became intolerable. These boundaries did not seem to be suitable for making judgements about when or how to mitigate an unbalance.

VI. With a letter dated 27 April 2021 the appellant submitted observations in response to the communication pursuant to Article 15(1) RPBA 2020 and the respondent's reply to the appeal.

VII. Oral proceedings were held on 31 May 2021. The respondent presented amended description pages 2 to 7.

The **appellant (opponent) requested** that the decision under appeal be set aside and the patent be revoked.

The **respondent (patent proprietor) requested** that the appeal be dismissed (**main request**), auxiliarily that the decision under appeal be set aside and the patent be maintained in amended form in the following version:

- Claims no. 1 to 8 of **auxiliary request 1** filed with letter of 5 May 2017;
- Description pages 2 to 7 as filed during the oral proceedings of 31 May 2021;
- Figures no. 1 and 2 of the patent specification.

VIII. Independent **claim 1 of the patent as granted** reads as follows (feature references added by the Board):

- 1.0** "1. A system for mitigating an electric unbalance of a three-phase current at a Point of Common Coupling (120, 220) being located between a wind farm (100, 200) comprising a plurality of wind turbines (110) and a power grid, the system comprising
 - 1.1a** a measurement device (122, 222) for measuring the electric unbalance at the Point of Common Coupling (120, 220) and for providing a measurement signal (122a, 222a) being indicative for the measured electric unbalance,
 - 1.1b** wherein the measurement signal (122a, 222a) is a Voltage Unbalance Factor which is given by the ratio between the amplitude of a negative sequence and the amplitude of a positive sequence of the voltage signal of the three-phase current at the Point of Common Coupling (120, 220), and
 - 1.2** a central wind farm controller (130, 230) for controlling the operation of the plurality of wind turbines (110), wherein the central wind farm controller (130, 230) is coupled to the measurement device (122, 222),
 - 1.3** wherein in response to the measurement signal (122a, 222a) the central wind farm controller (130, 230) is configured for providing a control signal (130a, 230a) for mitigating the electric unbalance at the Point of Common Coupling (120, 220), and wherein
 - 1.4** the central wind farm controller (130, 230) is configured for determining a difference value between the measured Voltage Unbalance Factor and a predefined reference Voltage Unbalance Factor, and wherein

- 1.5** the central wind farm controller (130,230) comprises a control unit, which is configured
- (a)** for processing the determined difference value and
 - (b)** for outputting a negative sequence voltage compensation signal which is used for mitigating the electric unbalance at the Point of Common Coupling (120, 220)."

Independent **claim 8 of the patent as granted** sets out a method which corresponds to the system as set out in claim 1 of the patent as granted. As this has not been disputed, the wording of claim 8 of the patent as granted does not need to be cited.

Claims 2 to 7 and 9 of the patent as granted are dependent on claims 1 and 8 respectively.

Independent **claim 1 of auxiliary request 1** differs from claim 1 of the patent as granted by the deletion of the words "and wherein" at the end of feature **1.4** and by the addition of the following feature at the end of the claim (reference added):

- 1.6** ", and the control signal being provided by the central wind farm controller (130) is a compensation signal (130a) for power converters of at least some of the plurality of wind turbines (110)".

Independent **claim 7 of auxiliary request 1** differs from claim 8 of the patent as granted by the addition of a feature which corresponds to that added to claim 1.

Claims 2 to 6 and 8 of auxiliary request 1 are dependent on claims 1 and 7 respectively.

IX. The opposition division's findings in the contested decision may be summarised as follows:

The opposition division held it to be uncontested that the subject-matter of independent claim 1 of the patent as granted differed from the closest prior art document **D1** by the features **1.1b**, **1.4** and **1.5**.

According to the opposition division the technical effect of these features was the possibility to output a compensation signal which was directly representative of the negative sequence voltage of the system, since it was based on the comparison between the measured unbalance factor VUF and a predefined threshold VUF.

The opposition division held that document **D1** disclosed a scalar compensation method based on a simple comparison of the phase voltage amplitudes with their nominal values, and considered that whilst it might be obvious, from **D1** itself or in the light of **D10**, **D3** or **D4**, to use the VUF, derived from the positive and negative sequence components, as a measure by which to assess the effectiveness of the scalar compensation in mitigating the unbalance, it would not be obvious to use these as "primary regulation quantities" or "leading parameters" in the regulation process.

X. The appellant's submissions may be summarised as follows:

Main request

The appellant set out in the grounds of appeal that the subject-matter of claims 1 and 8 of the patent as granted lacked an inventive step in view of a combination of document **D1** with **D10**, **D3** or **D4**.

The appellant conceded that independent claim 1 of the patent as granted differed from document **D1** in that the measurement signal being a voltage unbalance factor in accordance with feature **1.1b** was not shown, and in that the central wind farm controller known from document **D1** was not configured for determining a difference value between the measured voltage unbalance factor and a predefined reference voltage unbalance factor in accordance with feature **1.4**, and processing it by a control unit comprised of the central wind farm controller and outputting a negative sequence voltage compensation signal for mitigating electric unbalance at the PCC in accordance with feature **1.5** was not shown (grounds for appeal, paragraph spanning pages 13 and 14).

The appellant submitted that the opposition division's assessment that the output negative sequence voltage compensation signal was "directly representative of the negative sequence voltage of the system" was incorrect, and that as a result of this erroneous assessment the opposition division made a mistake in defining the problem solved. The opposition division's characterisation of positive and negative sequence components as "primary regulation quantities" in the patent was also incorrect. The appellant argued that it was agreed on page 7 of the decision that claim 1 was silent about the nature of the negative sequence voltage compensation signal. The appellant saw this as an acknowledgement in the decision that it was the use of the VUF as the measurement parameter that was critical for inventive step, not the choice of the negative sequence voltage compensation signal output by the control unit of the central wind farm controller.

The appellant submitted that **D1** disclosed in paragraph [0056] to detect voltage imbalance by determining if the voltages at the Point of Common Coupling (PCC) form a negative voltage sequence or a [zero] voltage sequence, and to do so would require also a determination of the positive voltage sequence. The patent additionally provided for taking the ratio between the negative and positive voltage sequences (i.e. VUF) as the measurement parameter and that this ratio enabled a convenient threshold criterion to be formulated for determining when it was required to mitigate an unbalance. Based on this technical difference the appellant formulated the objective problem in the second paragraph on page 10 of the grounds for appeal as "selecting a suitable parameter for conveniently handling voltage unbalance mitigation in the central controller".

According to the appellant, the feature **1.4** could be interpreted as having the effect of indicating when to start unbalance mitigation control on the basis of a predetermined threshold (reference VUF) determining a tolerance level until which unbalances were considered as tolerable. There was a gap in the teaching of **D1** as to when to perform unbalance compensation. It would be part of the common general knowledge of the person skilled in the art from section 4.1 of the technical standard **D10** that VUF was the ratio of negative and positive voltage sequence components and that under normal conditions the negative voltage sequence component must be smaller than a threshold of 2% of the positive voltage sequence component. This filled the gap in **D1** as to when unbalance mitigation was to take place in order to comply with the norm.

Document **D3** referred on page 3 to the requirement in the international standards limiting the VUF to smaller than 2% and thus also provided a clear motivation as to when and how to perform mitigation in the set-up of **D1**.

Document **D4**, in the sentence spanning pages 2 and 3, also gave a motivation to confine an unbalance factor to smaller than 0.3.

In the communication dated 27 April 2021 the appellant emphasised that feature **1.5** of claim 1 left open whether there was any relationship between the two functions **(a)** and **(b)** for which the control unit was configured and argued that it could not be concluded that the negative sequence voltage compensation signal was based on the determined difference between measured VUF and reference VUF. The appellant noted that the patent did not specify any direct relationship between the VUF and the negative sequence voltage compensation signal and paragraph [0057] of the patent taught otherwise.

In the oral proceedings the appellant maintained that feature **1.5** did not specify any connection between the processing of the determined VUF difference value and the outputting of the negative sequence voltage compensation signal used for mitigating the electric unbalance at the Point of Common Coupling. According to the appellant these could be entirely separate processes. Hence, it could be that the VUF difference value was only used for deciding when to initiate negative sequence voltage compensation, and that the compensation was then controlled not on the basis of the VUF, but on the basis of the magnitude of the negative sequence voltage, as in **D1**. This was consistent with the disclosure in paragraphs [0052] and

[0057] of the patent, according to which the control signal either was the amplitude of the negative sequence of the unbalanced three-phase voltage signal at the PCC 120, or was proportional to it. According to the appellant, the only difference between claim 1 and the disclosure of **D1** was the use of the VUF. This solved the problem of selecting a suitable parameter for deciding when to initiate negative sequence voltage compensation. In the light of **D10** it was obvious to choose VUF for this, as the VUF allowed a decision to be taken whether or not the voltage unbalance was within an acceptable range.

Auxiliary request 1

Claim 1 of auxiliary request 1 is a combination of granted claims 1 and 3. In the grounds of appeal the appellant submitted that the granted dependent claims lacked an inventive step, making reference to the arguments in section 4 on pages 17 to 20 of the grounds of opposition dated 23 December 2014. There it was argued that **D7** disclosed that the active and reactive currents may be generated by components in the wind turbine by a power or frequency converter (c.f. [0019]) and it was submitted that the subject matter of claim 3 lacked an inventive step in view of document **D1** or in view of document **D1** in combination with document **D7**. This objection was confirmed in respect of auxiliary request 1 in the appellant's letter of 21 April 2021.

In the oral proceedings before the Board the appellant maintained the objections based on **D1** and **D7**, arguing that converters were a typical feature of a wind turbine, that if there was a negative sequence voltage at the PCC there must also be reactive power present, and that it would be a straightforward matter for the

skilled person to control the converter using PWM phase control to mitigate the imbalance.

The appellant also sought in the oral proceedings to introduce new objections based on documents **D5** and **D6**, arguing that it was legitimate to refer to these documents as they had been referred to in the Extended European Search Report (with other references), had been mentioned in the grounds of opposition and had been discussed in the respondent's reply to the appeal. Furthermore, **D6** had been referred to in respect of auxiliary request 2 in their submission of 21 April 2021. An exceptional circumstance was that the respondent was presenting arguments in the oral proceedings regarding the viability of controlling the power converter of the wind turbine using phase locked loop (PLL) control.

XI. The respondent's submissions may be summarised as follows:

The respondent in essence concurred with the opposition division's findings, submitting that features **1.1b**, **1.4** and **1.5** were not disclosed in **D1** and that the objective technical problem as formulated in the decision was correct.

The respondent maintained that the "negative sequence voltage compensation signal" output by the control unit, and used for mitigating the unbalance at the PCC, was directly representative of the negative sequence voltage in the system, because a change in the negative sequence amplitude would directly result in a change of the negative sequence voltage compensation signal.

The respondent accepted that it was known from **D10**, **D3** and **D4** for VUF to be used "*a posteriori*" to evaluate voltage unbalance to decide whether a voltage signal fulfills predefined engineering standards or norms, but emphasised that the invention by contrast used the VUF "*a priori*" as a closed-loop regulation quantity for unbalance compensation. This was not known or obvious from the prior art.

In the oral proceedings the respondent maintained the above, arguing furthermore that when feature 1.5 was read with a mind willing to understand it, it was clear that the features (a) and (b) were related to one another, i.e. that the output negative sequence voltage compensation signal was related to the difference determined between measured and predetermined VUF. Hence, there was closed-loop control of unbalance mitigation using the VUF. Paragraphs [0052] and [0057] of the patent described arrangements which did not fall within the scope of the claims as granted, but it had been omitted to amend them for conformity with the claims.

Auxiliary request 1

The respondent argued that it was not obvious in view of **D7** to mitigate an unbalance using a converter of the wind turbine. Whilst converters as such were well known, **D7** only taught their use to control active and reactive power. This was a single-phase consideration determined by the phase difference between voltage and current. It had nothing to do with an unbalance in the voltages of the three phases.

In respect of the admittance into the proceedings of the arguments based on documents **D5** and **D6**, the

respondent submitted that the appellant had not at any stage relied on these documents when arguing against the features added with the independent claims of auxiliary request 1. There were no exceptional circumstances which justified their being admitted in the oral proceedings under Article 13(2) RPBA 2020.

Reasons for the Decision

1. **Main request - claim interpretation**

- 1.1 Considering the dispute over the interpretation of feature **1.5** of claim 1, the Board's findings are as follows.
- 1.2 According to feature **1.5** of claim 1 the control unit of the central wind farm controller is configured for performing two functions, namely (references added):
- (a) for processing the determined VUF difference value and
 - (b) for outputting a negative sequence voltage compensation signal which is used for mitigating the electric unbalance at the Point of Common Coupling.
- 1.3 In the wording of feature **1.5** there is nothing to indicate that the function (b) is in any way related to, or dependent on, the function (a). As far as the wording of feature **1.5** is concerned, the processing of the determined VUF difference value may be for some purpose completely unrelated to the outputting of the negative sequence voltage compensation signal used for mitigating the electric unbalance.
- 1.4 The question remains whether it would be implicit to the skilled person, on the basis of the content of the patent as a whole, that feature **1.5** of claim 1 has to be understood in the sense that the negative sequence voltage compensation signal is in some way related to, or dependent on, the processing of the determined VUF

difference value. The Board finds that not to be the case for the following reasons.

- 1.4.1 Paragraph [0024] of the patent corresponds to the wording of feature **1.5**, but also gives no hint to a link between the functions **(a)** and **(b)**.
- 1.4.2 Paragraph [0025] of the patent states that "The measured VUF is compared to this reference value (i.e. set to 0.02 or 0.03) and fed through the control unit with *[sic]* provides at its output the negative sequence voltage compensation signal". Whilst this wording ("through") might suggest that the output could be related to the input, that is not unambiguous.
- 1.4.3 Furthermore, paragraphs [0052], [0053] and [0057] of the patent make clear that the control signal (i.e. negative sequence voltage compensation signal) is not necessarily related to the VUF difference value. These paragraphs form part of the detailed description of "examples of embodiment" of the invention (cf. paragraph [0043] of the patent). Paragraphs [0052], and [0053] state (emphasis added):

"[0052] Based on the VUF 122a the central wind farm controller 130 determines a control signal 130a, which is forwarded by the data connection line 132 to the various individual control units of the wind turbines 110. According to the embodiment described here the control signal 130a is the amplitude of the negative sequence of the unbalanced three-phase voltage signal at the PCC 120. In Figure 1 this amplitude is denominated with $|V^-|$."

"[0053] Based on the amplitude $|V^-|$ of the negative sequence the individual control units of the wind

turbines 110 are operated in such a manner, that an electric unbalance at the PCC 120 is reduced at least approximately".

The disclosure in paragraph [0057] is similar except it is stated that "the control signal 230a is proportional to the amplitude of the negative sequence of the (unbalanced) voltage signal at the PCC 220".

These disclosures make it clear that there are embodiments of the invention in which the control signal (i.e. negative sequence voltage compensation signal) output by the control unit and used to mitigate the unbalance is not related to the processing of the VUF difference value (function **(a)** of feature **1.5**).

- 1.4.4 Contrary to the respondent's argument, there is nothing in the patent that would make it unambiguous to the skilled reader that paragraphs [0052], [0053] and [0057] describe arrangements that do not fall within the scope of the claims.
- 1.5 For these reasons the Board came to the conclusion that feature **1.5** can be interpreted in such a way that the functions **(a)** and **(b)** are not related to one another.
- 1.6 In view of this interpretation of feature **1.5**, the Board cannot support the finding in the contested decision that the features **1.1b**, **1.4** and **1.5** have the technical effect of outputting a compensation signal which is based on the comparison between the measured unbalance factor VUF and a predefined threshold VUF.

2. **Main request - Inventive Step, Article 56 EPC**

2.1 Document **D1** can be taken as closest prior art for the the assessment of inventive step; that is not in dispute.

2.2 It is also not in dispute that document D1 discloses features **1.0**, **1.1a**, **1.2** and **1.3** of claim 1.

2.3 Considering feature **1.5** of claim 1 in combination with its function **(b)**, the tap control unit 230 of document D1 (see figure 2d) outputs a signal on the control line 206 to the tap-controlled main transformer 204 to compensate for voltage imbalances using the method set out in paragraphs [0074] to [0076]. Thus, feature **1.5** of claim 1 in combination with function **(b)** is known from document **D1**.

2.4 Document **D1** does not disclose:

- a measurement signal which is the Voltage Unbalance Factor (VUF) given by the ratio between the amplitude of a negative sequence and the amplitude of a positive sequence of the voltage signal of the three-phase current at the Point of Common Coupling (feature **1.1b**),
- that the central wind farm controller is configured for determining a difference value between the measured VUF and a predefined reference VUF (feature **1.4**), and
- that a control unit of the central wind farm controller (130,230) is configured for processing the determined difference value (feature **1.5** in combination with its function **(a)**).

2.5 As claim 1 does not set out the purpose for which the control unit processes the determined VUF difference

value (function **(a)**), the Board shares the appellant's view that the distinguishing features as set out in section 2.4 above can be considered as having the technical effect of indicating when to initiate unbalance mitigation control. Comparing the measured VUF with a predetermined reference VUF allows a threshold to be set, beyond which an unbalance is not considered as tolerable and mitigation has to be initiated. Hence, the problem to be solved when starting from **D1** can be formulated as how to decide when to initiate negative sequence voltage compensation.

2.6 Document **D10** is a technical standard that would be part of the common general knowledge of the person skilled in the art. Section 3.23 of **D10** demonstrates that it is known to use the ratio of the negative sequence voltage to the positive sequence voltage (i.e. VUF) to express the extent of a voltage unbalance. Furthermore, section 4.10 of **D10** sets the requirement that under normal operating conditions, in any weekly period, 95% of the ten-minute average values of the effective negative sequence voltage must be within a range of 0% and 2% of the corresponding positive sequence voltage. This corresponds to a VUF of between 0% and 2%.

2.7 These requirements in the standard **D10** make it clear to the skilled person that VUF would be a suitable parameter for determining when to initiate negative sequence voltage compensation in **D1**. Thus, it would be obvious for the skilled person starting from **D1** to use VUF as a measurement signal for determining when to initiate compensation (cf. feature **1.1b**). Furthermore, it would be clear from the range specified that compensation need not be initiated when VUF is low (i.e. close to 0%), but needs to be initiated if the

VUF risks exceeding the 2% limit set in the standard. A simple comparison of the measured VUF with a predetermined threshold (somewhere between 0% and 2%) would be an obvious choice for the skilled person to achieve this (cf. feature **1.4**). Processing the result of the comparison is a routine matter (feature **1.5** in combination with its function **(a)**).

2.8 For these reasons the Board came to the conclusion that the subject-matter of claim 1 of patent as granted is obvious in view of documents **D1** and **D10**. Hence, the ground for opposition under Article 100(a) EPC in conjunction with Article 56 EPC prejudices the maintenance of the patent as granted and the respondent's main request cannot be allowed.

3. ***Auxiliary request 1 - Objections referring to documents D5 and D6, admittance under Article 13(2) RPBA 2020***

3.1 According to Article 13(2) RPBA 2020 any amendment to a party's appeal case made after ... notification of a summons to oral proceedings shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.

3.2 At no stage in the proceedings prior to the oral proceedings before the Board did the appellant raise inventive step objections against the subject-matter now set out in the independent claims of auxiliary request 1 with reference to documents **D5** and **D6**. Any prior references to these documents in the proceedings were made in respect of altogether different subject-matter. This is a change to the appellant's appeal case at the latest possible stage of the proceedings.

3.3 The respondents arguments in the oral proceedings as to how the converter of a wind turbine would be controlled, using PLL control, to mitigate an imbalance cannot be seen as an exceptional circumstance in the sense of Article 13(2) RPBA 2020. These arguments cannot be seen as surprising. Furthermore, the appellant did not establish any causal link between these arguments and the need to refer to **D5** and **D6**.

3.4 For these reasons the Board took the discretionary decision under Article 13(2) RPBA 2020 not to admit into the proceedings the objections to auxiliary request 1 referring to documents **D5** and **D6**.

4. ***Auxiliary request - Inventive Step, Article 56 EPC***

4.1 According to auxiliary request 1, the control signal for mitigating the electric unbalance at the Point of Common Coupling provided by the central wind farm controller is a compensation signal for power converters of at least some of the plurality of wind turbines (features **1.3** and **1.6**). It is not in dispute that document **D1** does not disclose this combination of features. In **D1** the corresponding control signal is provided not to a power converter but to a tap changer of a transformer to mitigate the unbalance.

4.2 The Board concurs with the respondent that document **D7** would not lead the skilled person to amend the arrangement of document **D1** in this manner. There is no suggestion in document **D7** that the converter control strategies disclosed therein can be used to mitigate an electrical unbalance. **D7** only teaches their use to control active and reactive power. This is a consideration determined by the phase difference between voltage and current of a given phase, which is

completely unrelated to an unbalance in the voltages of the three phases. A voltage unbalance may exist even when the power drawn is purely active, with no reactive component (i.e. when there is zero phase shift between voltage and current). Conversely, a completely balanced voltage may exist at the PCC regardless of the relative amounts of active and reactive power drawn (i.e. regardless of the phase shift between voltage and current). Hence, starting from document **D1** and seeking to mitigate an unbalance at the PCC the skilled person would have no reason to take the teachings of document **D7** into account. Even if they did, **D7** would give no indication to the skilled person that a converter of the wind turbine could or should be used to mitigate an unbalance.

- 4.3 For these reasons the subject-matter of claim 1 is not obvious in view of a combination of **D1** and **D7**. The same applies for the independent method claim 7, which corresponds to the independent system claim 1.
- 4.4 In the absence of any further objections the Board concluded that the subject-matter of the independent claims 1 and 7 of auxiliary request 1 involved an inventive step.
- 4.5 Following adaptation of the description the Board decided that the respondent's auxiliary request 1 was allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent in amended form in the following version:
 - Claims no. 1 to 8 of auxiliary request 1 filed with letter of 5 May 2017;
 - Description pages 2 to 7 as filed during the oral proceedings of 31 May 2021;
 - Figures no. 1 and 2 of the patent specification.

The Registrar:

The Chairman:



A. Chavinier Tomsic

R. Lord

Decision electronically authenticated