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**Datasheet for the decision
of 12 January 2021**

Case Number: T 1394/17 - 3.5.02

Application Number: 11169135.8

Publication Number: 2532888

IPC: F03D9/00, H02J3/38

Language of the proceedings: EN

Title of invention:

Arrangement for generating a control signal for controlling a power output of a power generation system

Patent Proprietor:

Siemens Gamesa Renewable Energy A/S

Opponent:

Vestas Wind Systems A/S

Relevant legal provisions:

EPC Art. 123(2), 83, 56

Keyword:

Amendments - extension beyond the content of the application as filed (no)
Sufficiency of disclosure - (yes)
Inventive step - (yes)

Decisions cited:

T 0063/06, T 0491/08



Beschwerdekammern

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Case Number: T 1394/17 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 12 January 2021

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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
5 April 2017 concerning maintenance of the
European Patent No. 2532888 in amended form.**

Composition of the Board:

Chairman R. Lord
Members: C.D. Vassoille
A. Bacchin

Summary of Facts and Submissions

- I. The opponent filed an appeal against the interlocutory decision of the opposition division concerning European patent no. 2 532 888.
- II. In the decision under appeal, the opposition division concluded that the patent in amended form according to the main request filed on 20 December 2016 satisfied the requirements of Articles 123(2), 83 and 56 EPC.
- III. The following documents are relevant for the present decision:
- D1: US 2007/0085343 A1
 - D2: DE 103 41 504 A1
 - D3: DE 10 2009 014 012 A1
 - D4: WO 2011/008637 A2
 - D5: US 4,193,005
 - D6: DE 30 28 416 A1
 - D7: DE 10 2005 029 000 A1
 - D8: EP 2 075 890 A1
- IV. The parties were summoned to oral proceedings. In a communication under Article 15(1) RPBA 2020 annexed to the summons, the board set out their preliminary observations on the appeal, concluding that the patent proprietor's main request appeared to meet the requirements of the EPC.
- V. Oral proceedings were held on 12 January 2021 by videoconference.

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

The patent proprietor (respondent) requested that the appeal be dismissed and the patent be maintained in accordance with the decision of the opposition division (main request) or, if this was not possible, that the decision under appeal be set aside and that the patent be maintained in the form of one of auxiliary requests 1 to 4, all filed with letter of 20 December 2016.

VI. Claim 1 of the main request reads as follows (feature numbering added in square brackets):

Arrangement (100) for generating a control signal for controlling a power output of a power generation system **[feature 1]**,
in particular a wind turbine **[feature 2]**,
wherein
the power output is supplied to a utility grid **[feature 3]**, the arrangement comprising:
a first input terminal (105, 203) for receiving a first input signal indicative of an actual grid frequency of the utility grid **[feature 4]**;
a control circuit (101, 200) for generating the control signal **[feature 5]**; and
an output terminal (103) to which the control signal is supplied **[feature 6]**;
wherein the control circuit (101, 200) comprises a bang-bang controller (104) for generating a first power signal being indicative of a predefined amount of power to be added to the power output of the power generation system, wherein the predefined amount of power to be added is extracted from energy stored in a rotational

system of the power generation system **[feature 7]**,
wherein
the bang-bang controller (104) is adapted to be
activated, when the first input signal falls below a
first predefined threshold **[feature 8]**,
wherein
the arrangement further comprises a second input
terminal (202) for receiving a second input signal
being indicative of an average acceleration of a
generator of the power generation system **[feature 9]**,
wherein
the control circuit (101, 200) comprises a recovery
unit (201) for generating a second power signal
[feature 10], wherein
the recovery unit (201) is configured for performing a
controlled acceleration of the rotational system of the
power generation system before the power generation
system is released for a normal operation **[feature 11]**,
wherein
the second power signal is based on the first and the
second input signal **[feature 12]**, and wherein
the control signal depends on the first power signal
and the second power signal **[feature 13]**.

Claims 2 to 11 are dependent on claim 1.

VII. The arguments of the appellant as far as they are
relevant for the present decision are as follows:

Added subject-matter

The integration of features 7 and 11 in the originally
filed claim 1 constituted an inadmissible amendment.
Both features were only disclosed in the original
application documents in connection with a wind turbine
but not in connection with rotational systems of other

types of power generation systems. Claim 1 however was not restricted to a wind turbine, but instead generally referred to any kind of power generation system, such as flywheel arrangements, gas turbines or steam turbines. The skilled person would clearly understand the passages of the original application documents referred to by the opposition division in the decision under appeal and by the respondent to relate to wind turbines and not to other types of power generation systems.

Furthermore, the original description on page 7, lines 6 to 24 disclosed a controlled acceleration of the rotor and the generator by means of the recovery unit according to feature 11 only in the context of further features, in particular an output of the recovery unit for sending a signal comprising information that the rotor and/or generator can accelerate according to a defined acceleration scheme to the rotor and/or generator for providing an acceleration signal. Moreover, the feature of a soft recovery unit reducing delta P according to a specified droop, as disclosed in the original description on page 7, lines 6 to 24, was also missing in claim 1. There was no disclosure in the original application documents of a controlled acceleration resulting in a second power signal, which was based on the actual grid frequency (i.e. the first input signal). The actual grid frequency was exclusively used in the context of an embodiment where delta P was reduced according to a specified droop. Omission of the respective feature in claim 1 amounted to an inadmissible extension of subject-matter.

Sufficiency of disclosure

It was clear from figures 2, 3 and 8 to 12 as well as the corresponding description of the patent that the recovery unit 201/300 did not have an input for receiving a first input signal indicative of an actual grid frequency of the utility grid. In particular, the activation signal received via the terminal 204 was not based on a first input signal indicative of an actual grid frequency of the utility grid. Rather, as was clear from figure 6 and paragraph [0049] of the patent, the inertial response was characterised by fixed periods of time so that the total duration of the inertial response and thus the start time of the controlled acceleration did not depend on the actual grid frequency. Consequently, contrary to what was defined in claim 1, the recovery unit 201/300 according to the description of the patent under appeal did not generate a second power signal which was based on the first and the second input signals in the sense of features 4 and 9 of claim 1. It was further clear from the patent that the actual grid frequency (first input signal) was exclusively used in the context of droop control, which was however not defined in claim 1. The recovery unit 201/300 illustrated in figures 1 and 3 was unsuitable for droop control, since the actual grid frequency was not taken into consideration. Claim 1 thus covered embodiments not including droop control, while a corresponding embodiment was not described in the patent. The skilled person must be able to put into practice all embodiments covered by a claim, and thus also a recovery unit that was configured to output a second power signal on the basis of an actual grid frequency without using droop control. The skilled person could not infer any information from the patent

how to implement a corresponding recovery unit for generating a second power signal which was based on the actual grid frequency of the utility grid without using droop control. It was not clear in this case how and why the grid frequency of the utility grid was used to output the second power signal.

For similar reasons, the invention according to claim 6 had to be considered as not being sufficiently disclosed, since a PI controller, which generates a second power signal on the basis of the actual grid frequency of the utility grid was not described in the patent under appeal and the skilled person would not know how to implement a corresponding PI controller.

Furthermore, the present patent did not disclose that the invention worked for any power generation system other than wind turbines, such as, for example, a gas turbine or a steam turbine. Gas turbines and steam turbines in connection with synchronous generators were not suitable for extracting a predefined amount of power to be added to the power output of the power generation system from energy stored in its rotational system, or for performing a controlled acceleration of the rotational system before the power generation system was released for a normal operation, since gas turbines and steam turbines had a smaller moment of inertia than wind turbines, so that the possibilities for storing energy in such turbines were extremely limited, and they usually did not allow control of the speed of rotation of the turbine and a generator connected to it independently of the supply of gas or steam. It was therefore not possible for the skilled person to put the invention into practice over the whole range claimed, i.e. for other types of power generation systems than wind turbines. Thus since the

patent provided merely a weak presumption of reduction into practice for other types of power generation systems, the submission made by the appellant were sufficient to discharge its burden of proof (in line with decisions T 0063/06 and T 0491/08).

Inventive step

Document D1 as the starting point in the assessment of inventive step disclosed all features of claim 1 except feature 9 referring to a second input signal indicative of an average acceleration of a generator of the power generation system. In particular, document D1 also disclosed feature 4 according to which the arrangement comprised a first input terminal for receiving a first input signal indicative of an actual grid frequency (see paragraph [0020]: "a suitable operating parameter is used [...] preferably this will be the frequency change or rate of change", see also paragraph [0029]). Document D1 further disclosed feature 8 of claim 1 according to which the bang-bang controller is adapted to be activated, when the first input signal falls below a first predefined threshold (see the above-cited passage of paragraph [0020], claim 23 and paragraph [0029]: "it is possible to specify, e.g., a threshold ... "). Furthermore, a signal for adjusting the blades of a wind turbine was a "power signal" in the sense of feature 10 and the control circuit of D1 thus comprised a recovery unit for generating a second power signal (see paragraphs [0077] to [0079]). It was also clear from the description of the patent under appeal that the "second power signal" in the sense of claim 1 could be interpreted as a signal for adjusting the blades of the wind turbines (see paragraph [0020] of the patent under appeal: "sending a signal to the rotor"). Additionally, the recovery unit of D1

according to feature 11 was configured to perform a controlled acceleration of the rotational system of the power generation system before the power generation system is released for a normal operation (see D1 in paragraph [0073]: "After the end of the additional energy feed-in has been reached, the wind turbine returns to its old operating point"). Document D1 further disclosed that the second power signal was based on the first input signal as defined in feature 12 (see paragraph [0101]: "If the system frequency rises again to the value of the nominal frequency in the meantime, the reserve energy feed-in is (prematurely) ended. After the additional energy feed-in has ended, the wind turbine returns to its old operating point"). The entirety of signals provided by the control device of document D1 formed a control signal that depended on the first power signal and the second power signal, so that document D1 also disclosed feature 13.

The technical problem solved by the distinguishing feature of a second input terminal for receiving a second input signal being indicative of an average acceleration of a generator of the power generation system (feature 9) had to be considered to be that of how to return to a normal operation of the power generation system.

The skilled person starting from D1 as the closest prior art document and implementing the controlled acceleration of the rotational system of the power generation system would have been prompted by paragraphs [0050] and [0079] of document D1 to consider known methods that were used in situations wherein the optimum operating point still had to be reached, which was the case, in particular, in the case of the start-

up of a turbine. Furthermore, even without being prompted by paragraph [0050] of document D1, the skilled person would have considered prior art relating to the start-up of a turbine, since similar issues arose in this context.

Document D5 disclosed feature 9 relating to a second input terminal for receiving a second input signal being indicative of an average acceleration of a generator of the power generation system in combination with a generation of a second power signal and a controlled acceleration of the rotational system of a power generation system (see D5, column 4, lines 62 to 68, figure 5 and column 7, line 64 to column 8, line 16). In order to increase the power input of the wind turbine by adjusting the blades towards the optimum operating point in such a manner that the turbine speed will not drop further and to approach the original operating point as disclosed in paragraph [0079] on page 5 of document D1, the skilled person would implement feature 9 as disclosed in document D5.

Similarly, document D6 disclosed a second input terminal for receiving a second input signal being indicative of an average acceleration of a generator of a power generation system according to feature 9 (the output of the derivative circuit 12 is indicative of an average acceleration of a generator of a power generation system). When solving the objective technical problem of how to return to the normal operation of the power generation system, the person skilled in the art would consider document D6. The teaching relating to the control of turbines other than wind turbines could be applied in the technical field of wind turbines.

The subject-matter of claim 1 also did not involve an inventive step in view of a combination of any of documents D2, D3 and D4 with document D5 and/or document D6. The skilled person when starting from any of these documents D2, D3 or D4 would perform a recovery after having temporarily provided additional energy to the utility grid. Using the common general knowledge, the skilled person would recognise that a "double dip" situation was related to the return of the wind turbine to the optimal operating point after the provision of additional energy to the network.

Document D2 did not disclose features 9 to 13 of claim 1. The objective technical problem solved by the distinguishing features could be considered to be that of how to drive the wind turbine to its optimum operating point again after the supply of the additional power to the grid. When solving this problem, the person skilled in the art would consider document D5 and/or document D6 disclosing techniques for reaching an optimum speed of rotation of a turbine (see D2 in paragraph [0037] referring to methods for increasing the energy output of a wind power plant by influencing the speed of rotation so that the optimal operating point of the rotor blades is reached as soon as possible) and the skilled person would thereby arrive at the claimed invention.

Similar arguments applied when considering documents D3 or D4 as a starting point in the assessment of inventive step, which also differed from the subject-matter of claim 1 in features 9 to 13. Furthermore, the person skilled in the art starting from any of documents D1, D2, D3 and D4 would in any case be prompted to combine the teaching of the respective document with the teaching of D5 and/or D6 by the

teaching of document D7. Similarly to documents D1 to D4, document D7 related to wind power plants that can be operated at a variable speed of rotation (see paragraph 3 on page 2) so that the teaching of document D7 was particularly close to the teaching of any of documents D1 to D4.

Furthermore, the skilled person would be prompted by the teaching of document D8, relating to the same field as D1 to D4 (use of wind turbines for frequency regulation in utility grids) to consider documents relating to stall or pitch regulated wind turbines, in particular documents relating to variable pitch horizontal axis wind energy conversion systems as described in document D5.

VIII. The arguments of the respondent as far as they are relevant for the present decision are as follows:

Added subject-matter

Claim 1 of the main request was based on original claims 1 and 5 (the latter corresponding to current features 9, 10, 12 and 13). Furthermore, feature 7 was based on page 8, lines 5 to 7 of the originally filed application and feature 11 of claim 1 was based on page 7, lines 17 to 19. It was clear from the original application documents that the claimed arrangement was disclosed in a general context of power generation systems, and wind turbines were only mentioned as an example (see for example page 8, lines 5 to 7, page 4, lines 28 and 29). The original drawings also did not contain a specific reference to wind turbines. The skilled person would directly and unambiguously infer from the original description that the arrangement was described as being also applicable to other types of

power generation systems comprising a rotational mass, such as gas turbines.

A controlled acceleration of the rotational system was disclosed in several passages of the original description without any reference to droop control (see page 6, line 34 to page 7, line 4, page 8, lines 20 and 21, page 22, lines 1 to 10, page 22, lines 12 to 20). Thus, the controlled acceleration function of the recovery unit, which was already implied by the term "recovery unit", did not require any droop control. Furthermore, the person skilled in the art would understand that the second power signal generated by the recovery unit was necessarily based on the actual grid frequency because its activation depended on the deactivation of the bang-bang controller, which in turn was deactivated depending on the actual grid frequency of the utility grid (see figure 6 of the original application). Reference was also made to original claim 6 stating that the recovery unit is adapted to be activated, when the bang-bang controller is deactivated, which was the case when the actual grid frequency exceeded a specific threshold.

Sufficiency of disclosure

It was clear, in particular from figure 6 and the corresponding description of the patent that the activation of the recovery unit was dependent on the activation of the bang-bang controller, which in turn was dependent on the actual grid frequency of the utility grid. Accordingly, the signal input 204 of the recovery unit illustrated in figure 2 may be considered as a first input signal depending on the grid frequency in accordance with feature 12. Claim 1 was unrelated to droop control, which was merely an optional feature in

the context of the present invention. As regards claim 6 of the patent, it was clear that the recovery unit receives a first input signal being indicative of an actual grid frequency and based on that derives the second power signal (see in particular figure 2: input terminal 204, figures 5 and 6 illustrating the frequency dependent time point T1).

Furthermore, the invention can be applied to other power generation systems than wind turbines. Gas turbines come in many different sizes and the rotational mass may be adapted to serve the purpose of inertial response. The skilled person would thus know how to implement the invention in other types of power generation systems. In particular, converters may be used in connection with other types of power generation systems in order to implement the invention.

Inventive step

Document D1 did not disclose feature 4. Paragraphs [0016], [0020], [0070] and [0082] referred to a frequency change or rate of change of frequency and not to an actual grid frequency in the sense of feature 4. Consequently, also feature 8 specifying that the bang-bang controller is adapted to be activated, when the first input signal falls below a first predefined threshold, was not disclosed by D1.

Feature 10 was not disclosed in paragraphs [0077] to [0079] of D1. These paragraphs disclosed a blade adjustment towards the optimal operating point in such a manner that the turbine speed will not drop further and the original operating point is approached again. It did not, however, disclose that the recovery unit is adapted to generate a second power signal according to

feature 10, since a signal for adjusting the blade did not correspond to a second power signal in the sense of feature 10. Furthermore, a recovery unit that enables a controlled acceleration in the sense of feature 11 was not directly and unambiguously derivable from D1.

Feature 9 was not directly and unambiguously derivable from document D5. Moreover, even when combining documents D1 and D5, at least features 10 and 12 would be missing from the combination. The same applied to document D6.

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments (Article 123(2) EPC)*
 - 2.1 Claim 1 of the main request meets the requirement of Article 123(2) EPC.
 - 2.2 The additional wording of claim 1 incorporated in feature 7, stating that the predefined amount of power to be added is extracted from energy stored in a rotational system of the power generation system, is directly and unambiguously derivable from the original application as a whole in the general context of power generation systems and independent from specific wind turbine-related features.

The respondent has convincingly shown that the person skilled in the art would understand from the original application documents that the claimed arrangement, and in particular an additional extraction of energy, was

not restricted to a rotational system of wind turbines, but referred to power generation systems in general. The original claim 1 specifically referred to an arrangement for generating a control signal for controlling a power output of a power generation system, in particular a wind turbine (corresponding to feature 2). The board neither in the dependent claims nor in the description recognises any specific wind turbine-related feature, which the person skilled in the art would understand to be inextricably linked with a predefined amount of power to be added by the bang-bang controller, which is extracted from energy stored in a rotational system of a power generation system.

To the contrary, the original description on page 8, lines 5 to 7, which was presented by the respondent as forming the basis of the above cited wording of feature 7, is unrelated to a wind turbine. In particular, this passage explicitly discloses the extraction of additional active power from the "rotational system" without any explicit reference to a wind turbine or any specific features related to it.

The board is thus convinced that the skilled person would understand from the original application as a whole that the invention may also be applied to other types of power generation systems than wind turbines, which holds true also for the extraction of additional active power from the rotational system of any suitable type of power generation system (see in particular the above-cited page 8, lines 5 to 7 of the original description). The mere fact that in the case at hand wind turbines serve as an embodiment to describe the invention does not lead to a restricted disclosure of the invention in the sense that features described in the context of this embodiment can only be extracted in

combination with the specific embodiment, as the invention is originally explicitly described as referring to power generation systems in general. The skilled person would thus not understand the feature in question to have any characteristic related to an application in the specific context of wind turbines. Rather, the person skilled in the art would clearly understand that additional energy can be extracted from a rotational system of other suitable types of power generation systems as well, even if such other types of power generation systems are not explicitly mentioned in the original application. The same applies to feature 11 relating to a controlled acceleration of the rotational system of the power generation system.

- 2.3 Reducing the active power, ΔP , according to a specified droop cannot be considered to be inextricably linked in a functional manner to the recovery unit and in particular to a controlled acceleration of the rotational system of the power generation system according to feature 11 of claim 1. The omission of any reference to droop control in claim 1 of the main request therefore does not constitute an inadmissible amendment of the subject-matter of claim 1.

In accordance with what was argued by the respondent, the board interprets claim 1 to mean that the second power signal generated by the recovery unit is *inter alia* based on the first input signal and thus, on the actual grid frequency of the utility grid, in the sense that the activation (and deactivation) of the recovery unit, and thereby the second power signal, clearly depends on the actual grid frequency. As illustrated in figure 2, a corresponding activation signal is received by the recovery unit 201 via terminal 204 (see page 21, lines 30 to 32 of the original description).

The skilled person therefore would understand from the application as a whole that the activation of the recovery unit depends on the deactivation of the bang-bang controller (see also original claim 6), while the deactivation of the bang-bang controller in turn depends on the actual grid frequency of the utility grid (see feature 8 of claim 1). Contrary to what was argued by the appellant, this is not contradicted by a possible time lag between the deactivation of the bang-bang controller and the subsequent activation of the recovery unit (see figure 6, time t_{end}). Consequently, a reasonable reading of claim 1, comprising in particular the features of original claims 1 and 5 as well as the original description on page 7, lines 17 to 19, leads to an understanding of the person skilled in the art which is such that the first input signal indicative of an actual grid frequency of the utility grid (feature 4) and the second power signal generated by the recovery unit, which is *inter alia* based on said first input signal (feature 12), does not imply a reference to droop control (see page 7, lines 10 to 15 of the original description).

The board also has not been able to identify any passage in the original application, which inextricably links a reduction of the active power by a specified droop to a controlled acceleration of the rotor and generator performed by the recovery unit. A corresponding link is particularly not derivable from the original description on page 7, lines 6 to 24, as argued by the appellant. Rather, a droop control in the context of a soft recovery function as well as a controlled acceleration of the recovery unit are formulated as optional features, and no indispensable

functional interrelation between these features is apparent.

Similarly, it is not apparent to the board that the controlled acceleration function of the recovery unit was extracted from a specific combination of inextricably linked features disclosed on page 7, lines 6 to 24 of the original description, in particular from a combination with a feature relating to an output of the recovery unit for sending a signal comprising information that the rotor and/or generator can accelerate according to a defined acceleration scheme. Rather, further features disclosed in the above-mentioned passage of the original description are clearly formulated as optional features of the recovery unit and the skilled person thus would not understand these features to form an essential part of the recovery unit and its controlled acceleration function.

2.4 The board has therefore come to the conclusion that claim 1 of the main request meets the requirement of Article 123(2) EPC.

3. *Sufficiency of disclosure (Article 83 EPC)*

3.1 The patent discloses the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

3.2 As outlined under point 2.3 above, the only reasonable interpretation of claim 1 is such that the second power signal is based on the first input signal in the sense that the generation of the second power signal by the recovery unit depends on the activation or deactivation of the bang-bang controller, which in turn depends on the value of the actual grid frequency of the utility

grid. The second power output is therefore based on the actual grid frequency of the utility grid.

The appellant has argued that the patent did not contain any information as to how to implement an embodiment of the invention comprising a recovery unit which generates the second power signal based on the first input signal and on the second input signal, without using droop control.

The appellant's argument focuses on the one hand on an interpretation which assumes that claim 1 implies the presence of droop control using the actual grid frequency, and on the other hand assumes that other embodiments not using droop control are not sufficiently disclosed in the patent under appeal.

In the light of the board's interpretation of claim 1, the invention is described in sufficient detail in the patent under appeal for it to be carried out by a person skilled in the art. The skilled person when reading claim 1 in a reasonable manner would understand that the second power signal is not based on the first input signal in the sense that a calculation of the second power signal involves the value of the actual grid frequency, but rather in a broader sense such that the generation of the second power signal by the recovery unit depends on whether the actual grid frequency results in an activation or a deactivation of the bang-bang controller.

Having arrived at this interpretation of claim 1, the board is not able to identify any insufficiency in the disclosure of the invention in the patent under appeal. The respondent particularly referred to figure 2 and the corresponding description in paragraph [0055],

disclosing an activation signal sent via terminal 204 in order to activate a recovery unit and start the controlled acceleration. The boards considers this understanding to be correct.

3.3 Accordingly, in view of the board's interpretation of claim 1, the skilled person would also understand claim 6 such that the second power signal generated by the PI controller depends on the actual grid frequency of the utility grid in the sense that an activation of the recovery unit, which the PI controller forms part of, depends on the actual grid frequency of the utility grid.

3.4 Furthermore, the fact that the invention in the patent under appeal is only described with reference to a wind turbine, in the present case does not hinder the skilled person from implementing the invention over the whole range claimed without undue burden.

The appellant made reference to the decision in appeal case T 0063/06, as well as to decision T 0491/08, in particular point 12 of the reasons, which held that when the patent does not give any information of how a feature of the invention can be put into practice, only a weak presumption exists that the invention is sufficiently disclosed. In such a case, the opponent can discharge his burden of proof by plausibly arguing that common general knowledge would not enable the skilled person to put this feature into practice. In that case a feature of a specific embodiment covered by the claim under consideration was not described in the patent specification. In the case at hand, however, for the reasons stated above it is undisputed that the patent discloses a way to put the invention into practice and therefore, to argue in accordance with the

decisions cited by the appellant, the patent provides a "strong presumption" of sufficient disclosure. It is therefore questionable, if the findings in the above cited appeal decisions can be transferred to the present case at all. However, this question can be left aside, because even if one were to assume that there was only a "weak presumption" in the sense of appeal decision T 0063/06, as was submitted by the appellant, the board does not consider the appellant to have presented plausible arguments which might rebut even such an alleged weak assumption. As a consequence the appellant has not discharged its burden of proof.

The appellant's arguments are essentially limited to the assertion that the invention is not applicable to other power generation systems than wind turbines, as particularly gas turbines and steam turbines had a smaller amount of inertia than wind turbines, so that the possibilities for storing energy in such turbines were extremely limited and these types of turbines further did not allow the speed of rotation of the turbine and the generator connected to it to be controlled independently of the supply of gas or steam.

As a preliminary remark, the board observes that it is not apparent how the selected types of power generation systems, namely gas turbines and steam turbines in combination with synchronous generators, are particularly relevant to the question of sufficiency of disclosure of the invention in the present case. In particular, no reason is apparent why other types of power generator systems from the totality of power generation systems comprising rotational systems have not been addressed by the appellant. In this context, it is noted that these types of power generation system

referred to by the appellant are also not mentioned in the patent under appeal.

Notwithstanding the previous remark, the appellant's arguments do not convince the board. The board finds the respondent's argument plausible that gas turbines (and similarly steam turbines) come in different sizes and therefore can provide different rotational masses. The general contention that gas turbines do not provide for a sufficient rotational mass to allow for an additional predefined amount of power extracted from energy stored in the rotational system in the sense of feature 7, without any further support in this respect, therefore does not convince the board.

The board further observes that the subject-matter of claim 1 does not contain any feature specific to wind turbines which would thus exclude the applicability of the invention to other power generation systems *per se*. In accordance with the respondent's arguments, corresponding indications do not arise from the description either. On the contrary, it is clear that the invention is generally applicable to suitably dimensioned and equipped power generation systems comprising a corresponding rotational system.

Against this background, it is unreasonable to believe that all power generation systems that are suitable to be used in connection with the invention can be set out in the patent under appeal. The person skilled in the art will undoubtedly recognise which power generation systems are suitable for the application of the invention and how they would need to be dimensioned, in particular the rotational system in order to provide for a sufficient inertial mass and thus additional power to the utility grid (feature 7). The same applies

to a controlled acceleration of the rotational system (feature 11), which the skilled person is undoubtedly able to implement in a suitable manner depending on the power generation system used in connection with the invention and the manner in which it is connected to the grid.

Consequently, the skilled person would not consider power generation systems to fall within the scope of claim 1, if they clearly do not have the required properties and therefore cannot be used in practice in connection with the invention. Nor is it apparent that the skilled person would be confronted with an undue burden when implementing the invention with regard to suitable power generation systems other than wind turbines, and the appellant did not provide detailed arguments in this respect.

Under these circumstances, the appellant's statements cannot be regarded as substantiated arguments capable of raising serious doubts and rebutting an alleged weak presumption that the invention is disclosed in a manner sufficiently clear and complete for it to be carried out by the person skilled in the art over the whole range claimed.

3.5 The board has therefore arrived at the conclusion that the opposition division was right in its finding that the patent in the form of the main request meets the requirements of Article 83 EPC.

4. *Inventive step (Article 56 EPC)*

4.1 *Closest prior art*

4.1.1 In the appeal procedure the appellant has presented a number of combinations of documents in the assessment of an inventive step of the subject-matter of claim 1. In particular, the appellant has provided inventive step attacks based on D1, D2, D3 and D4 in combination with documents D5 and/or D6. In support of these combinations, documents D7 and D8 were additionally relied upon.

4.1.2 The board's assessment of inventive step in the following is based on document D1 as the closest prior art document, since none of documents D2, D3 and D4 goes beyond the disclosure of document D1. To the contrary, none of documents D2, D3 or D4 refer to a recovery of the rotational system to a normal operation in the sense of feature 11 of claim 1, whereas D1 at least discloses a return of the wind turbine to its old operating point after the end of the additional energy feed-in has been reached (see D1 in paragraphs [0073] and [0098]). This was not disputed by the appellant.

4.1.3 The following assessment of inventive step, starting from D1 as the closest prior art document, therefore also applies to documents D2, D3 and D4 as possible starting points in an assessment of inventive step of the subject-matter of claim 1.

4.2 *Distinguishing features*

4.2.1 It is undisputed that document D1 discloses an arrangement for generating a control signal for controlling a power output of a power generation system

(feature 1, see D1 in paragraph [0014]: "generator feeding into an energy distribution system and a control device which controls the power feed-in in accordance with the operating conditions"), in particular a wind turbine (feature 2, see D1 in paragraph [0014]: "at least one wind turbine"), wherein the power output is supplied to a utility grid (feature 3, see D1 in paragraph [0014]: "wind turbine having [...] a generator feeding into an energy distribution system"). Document D1 further discloses a "control device which controls the power feed-in in accordance with the operating conditions" (see D1 in paragraphs [0014] and [0023]) and therefore implicitly discloses a control circuit for generating the control signal (feature 5) and an output terminal to which the control signal is supplied (feature 6).

Document D1 further discloses a bang-bang controller for generating a first power signal being indicative of a predefined amount of power to be added to the power output of the power generation system, wherein the predefined amount of power to be added is extracted from energy stored in a rotational system of the power generation system (see D1 in paragraph [0014]: "the control device significantly increases the power delivery into the power system for a period of time in dependence on the changes of a parameter of the power system, in that a part of the kinetic energy of the rotating parts (of the drive train) is additionally utilized to the feed-in").

- 4.2.2 While it was further undisputed that document D1 did not disclose feature 9 of claim 1, the respondent has additionally contested that document D1 disclosed features 4 and 8 according to which a first input terminal for receiving a first input signal indicative

of an actual grid frequency of the utility grid is provided (feature 4) and wherein the bang-bang controller is adapted to be activated, when the first input signal falls below a first predetermined threshold (feature 8). It was further disputed that document D1 disclosed features 10, 11 and 12 of claim 1 relating to a recovery unit for generating a second power signal, which is configured for performing a controlled acceleration of the rotational system of the power generation system before the power generation system is released to a normal operation, and wherein the second power signal is based on the first and the second input signals.

- 4.2.3 The board agrees with the respondent that features 4, 8, 10, 11 and 12 are not directly and unambiguously derivable from document D1.
- 4.2.4 As regards features 4 and 8, paragraphs [0020], [0070] and [0082] of D1 all refer to a frequency change or rate of change of the grid frequency and not to an actual grid frequency of the utility grid, which is taken into consideration to activate the bang-bang controller. Paragraph [0029] might disclose a frequency threshold. It is however not directly and unambiguously derivable from this passage that a threshold of the actual grid frequency is used to activate a bang-bang controller in the sense of claim 1, as was submitted by the respondent. Nor is it implicitly disclosed by taking into account the following or the preceding paragraphs, in particular paragraphs [0026] to [0028], as was argued by the appellant. The board does not recognise any specific link between these paragraphs and paragraph [0029] that would clearly imply that a frequency threshold of the actual grid frequency is used to activate a bang-bang controller, which

thereafter according to feature 7 generates a first power signal being indicative of a predetermined amount of power to be added to the power output of the power generation system.

- 4.2.5 The board is also not convinced that document D1 discloses feature 10 according to which the control circuit comprises a recovery unit for generating a second power signal. Paragraphs [0077] to [0079], and in particular the last mentioned paragraph, disclose an adjustment of the wind turbine blades towards the optimum operation point in such a manner that the original operating point of the wind turbine is approached again. The board does not consider a blade angle adjustment signal for adjusting the wind turbine blades in D1 to correspond to a second power signal generated by a recovery unit in the sense of feature 10 of claim 1.

The appellant in this context referred to paragraph [0020] of the patent under appeal and stated that also in the patent under appeal a power signal *inter alia* was understood to mean a signal output from the recovery unit to the rotor, which could only be a blade angle adjustment signal. The board notes, however, that the term "power signal" used in claim 1 is clear in its meaning, namely that it is a signal expressly (not indirectly) indicating a certain power, and therefore does not require interpretation in the light of the description. For the sake of completeness, however, the board observes that the description in paragraph [0020] of the patent under appeal does not disclose a "power signal" sent to the rotor but a "signal" and the referenced passage in the description of the patent under appeal is therefore not suitable for attributing

to the term "power signal" a meaning other than the usual one.

A signal to adjust a blade angle of a wind turbine clearly does not indicate any power, but rather a specific angle of the turbine blade. A blade angle adjustment signal as may be implicitly used in document D1 therefore cannot be understood to be a power signal in the sense of feature 10 of claim 1.

4.2.6 Furthermore, the board agrees with the respondent that the fact that paragraphs [0073] and [0098] might disclose a return of the wind turbine to a previous operation point, does not necessarily imply a controlled acceleration of the rotational system of the power generation system before the power generation system is released for normal operation (feature 11). The argument that a turbine was always under control, is in any case not sufficient to show that a controlled acceleration of the rotational system is directly and unambiguously derivable from D1. Furthermore, the fact that the blade angles may be controlled also does not imply that an *acceleration* of the rotational system is controlled.

4.2.7 The board has therefore come to the conclusion that document D1 at least does not directly and unambiguously disclose features 4, 8, 9, 10, 11 and 12 of claim 1 of the main request.

Objective technical problem

4.2.8 The board agrees with the appellant that the objective technical problem has to be considered to be that of how to return to a normal operation of the power generation system.

The narrower problem as was formulated by the respondent, namely that of how to provide a reliable return of the wind turbine to normal operation while avoiding double dips and overshoots, is not justified. The board does not consider claim 1 to contain any specific solution to the problem of how to avoid double dips and overshoots. Even if a corresponding objective is mentioned in the description of the patent under appeal, the board does not consider the distinguishing features to lead to any other technical effect than that of reliably returning to a normal operation of the power generation system. The broader objective technical problem formulated by the appellant is therefore justified.

4.3 *Solution*

- 4.3.1 The solution to the objective technical problem according to the distinguishing features 4 and 8 to 12 is not obvious to the person skilled in the art.

Even if documents D5 and/or D6 were considered to disclose an average acceleration in the sense of feature 9, a combination of document D1 with D5 and/or D6 would still not result in the claimed subject-matter. The question of whether documents D5 and D6 disclose an average acceleration as defined in feature 9 of claim 1 can therefore remain unanswered.

In any case, none of documents D5 and D6 disclose a first input signal indicative of an actual grid frequency of the utility grid and a bang-bang controller which is adapted to be activated when the first input signal falls below a first predefined threshold according to features 4 and 8 of claim 1. It

is also not apparent how documents D5 or D6 would prompt the skilled person to modify document D1 such as to provide a recovery unit for generating a second power signal and a controlled acceleration performed by said recovery unit (features 10 and 11).

It follows from the above, that also the question can be left aside of whether the skilled person would have considered documents D5 and D6 at all, both referring to a start-up of a power generation system and not to a return of the power generation system to a normal operation condition, when being confronted with the objective technical problem.

4.3.2 Furthermore, apart from the provision of a predefined amount of power to be added to the power output of the power generation system in the sense of feature 7, it is not apparent how documents D7 and D8, starting from D1, could possibly contribute to arriving at the claimed subject-matter, and the appellant has not put forward any convincing arguments in this respect. The board's above findings therefore also apply when documents D7 and D8 are taken into account.

4.3.3 The board has therefore arrived at the conclusion that the subject-matter 1 of claim 1 of the main request involves an inventive step in the sense of Article 56 EPC.

5. *Final remarks*

Given that the main request fulfils the requirements of Articles 123(2), 83 and 56 EPC, and since the appellant did not raise any further objections to this request, the board had to accede to the respondent's main request.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



U. Bultmann

R. Lord

Decision electronically authenticated